Privatizing roads: An "old" new approach to infrastructure provision

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During most of the twentieth century, highways, tunnels and bridges were viewed as public goods that had to be provided by the government. By the end of the century, however, chronic budgetary problems had led governments to allow participation of private firms in financing, building, and operating infrastructure projects. For example, worldwide private investment in transport infrastructure went from almost nothing before 1990 to $10 billion in 1990–91 and almost $30 billion in 1997–98. Massive infrastructure projects like the Second Severn Bridge in the UK, the Guangzhou-Shenzen highway in China, or the 1,000 miles of upgraded Panamerican Highway in Chile have been financed and are being operated by private firms. Even in the United States, cash-strapped Orange County of the early 90's was unable to provide for needed expansion of the Riverside Freeway and resorted to private funding and operation. Thus, it has become increasingly accepted that private firms should finance, build, and operate roads, and that the revenues needed to pay for them should come from user fees rather than general funds.

In view of these trends it is remarkable that only two private toll-roads were built in the United States during the twentieth century: the Dulles Greenway in Virginia and the 91 Express Lanes in Orange County, CA.

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This contrasts with the early acceptance of this idea in the United States. Beginning in the 1790's and all through the nineteenth century, more than 2,000 companies financed, built, and operated toll-roads with a combined extension of more than 10,000 miles in 1821.

Are there any advantages to privatizing roads? Before comparing private and public provision of transport infrastructure, it is useful to clarify what is meant by these terms. Under public provision, the government designs, finances, and operates the infrastructure project. Private firms may participate in the building stage and may even be selected in competitive auctions. But once the facility is built, the government operates and maintains it. Construction costs are paid by taxpayers and even when users pay tolls, these are usually not directly related to construction costs. By contrast, when roads are privatized, a concessionaire finances, builds, and maintains the facility. The owner of the franchise collects tolls until the concession term ends, and the facility is transferred to the government, usually 20 to 30 years later. Such contracts, known as BOT contracts (Build-Operate-and-Transfer), can be awarded either through direct negotiations between the transit authority and an interested firm or through a competitive auction for the right to franchise a well-defined project.

Road privatization offers many potential benefits. First, new taxes are not needed to finance BOT projects. Second, having the same firm in charge of construction and maintenance provides better incentives to invest in quality. Third, private firms are usually better at managing and more efficient than state-owned companies. Fourth, cost-based tolls are easier to justify to the public when infrastructure providers are private. Fifth, those who benefit from the infrastructure pay for it. And sixth, in stark contrast to public provision, the BOT scheme uses the market mechanism instead of central planning to screen projects, which reduces the probability of white elephants; no private firm wants to invest in a road that will lose money.

Unfortunately, the advantages of private highways are not automatic. For example, in the early 1970s, France awarded four concessions, three of which went bankrupt after the oil shock and were bailed out by the government. Similarly, several of the twelve highway franchises in 70s Spain had

higher costs than anticipated, while traffic was much lower than expected. Three highways became bankrupt and the remanining contracts required renegotiation. More recently, the "private" Mexican highway concession program cost Mexican taxpayers more than US$8 Billion after renegotiation of the initial contracts. The examples illustrate a common experience: most concession contracts are renegotiated. J. Luis Guasch examined more than 1,000 concession contracts awarded during the 1990's in Latin America and found that within three years terms had been changed substantially in over 60% of the contracts.

The frequency of renegotiation is troubling because the contractual changes are often not desirable. In some cases, renegotiations allow governments to expropriate concessionaires after they have sunk their investments. In other cases concessionaires renegotiate contracts in order to shift losses to taxpayers. Why bother have private franchises if profits accrue to the firm while losses are paid by taxpayers, incentives for the franchisee are nonexistent to be efficient and cautious in assessing project profitability, and contract renegotiations favor firms with political connections? We believe that many of the problems with traditional highway concessions can be explained by the combination of a front-loaded investments and substantial uncertainty about demand for the road. We propose a new type of auction that allows more flexibility to changing conditions reducing the necessity of renegotiation.

Highway Franchising and Demsetz Auctions

Many highway projects, among them the two cases in the United States, have been awarded through negotiations between a firm and the transit authority. There is an alternative, proposed by Demsetz, which is particularly suited for highway concessions. In a Demsetz auction, firms compete for the franchise in a process that seeks to emulate competition. In the words of Chadwick, who originally proposed the idea in 1859, competition for the field substitutes for competition in the field. For example, in Chile, a BOT highway project is awarded to the firm that makes a bid that

charges the lowest toll to use the road. If tolls equal average costs, no excess (monopoly) profits will be earned. Thus if competition among bidders is sufficiently strong, the toll set by the lowest bid will equal average cost and eliminate any monopoly profits. Consequently, these projects will be run as efficiently as if highways were competitive even though they are local monopolies.

An alternative Demsetz franchise-award system is used in Mexico. The transit authority sets the tolls and interested firms compete by bidding for the shortest acceptable franchise term.

But while a competitive auction is necessary to produce good outcomes, neither Demsetz format is sufficient because of demand uncertainty and large initial capital costs. Consider the Dulles Greenway Highway. Investors underestimated how much users disliked paying tolls, and initial revenues were much lower than forecasted. Two independent consulting companies had predicted that in 1996, with an average toll of $1.75, there would be a daily flow of 35,000 vehicles. But by March 1996, the average number of vehicles per day was only 8,500, one fourth of the initial estimates. Investors did not count on the State of Virginia widening the congested Route 7, which serves as a free alternate. After tolls were lowered to $1.00, ridership increased to 23,000, still far below predictions. Bonds that were issued to finance the project were renegotiated and investors wrote off their equity.

More recently the highway's prospects have improved because free alternative public roads have become congested. In 1999 and 2000, Moody's and Fitch gave senior bonds for the private franchise a stable rating.

Consider the opposite situation, which occurred with California's Orange County's 91 express lanes. This is a ten-mile privately owned toll road running from Anaheim to Riverside, which lies in the middle of the congested Riverside Freeway. Motorists can use the private lanes to get relief from congestion by paying up to $8 for a round trip. The concessionaire can increase tolls freely in order to relieve congestion, and they have been hiked seven times in five years. With 33,000 daily trips, the express lanes are close to congestion at peak time and the franchise is a financial

success. Yet users of the Freeway experience enormous congestion. The expansion of the Freeway was delayed for years because cash-strapped Orange County accepted a clause in the toll-road franchise contract that prevented any expansion in Freeway capacity until 2035.

Both examples demonstrate that demand side risk (upside and downside) is a characteristic of highways. The standard concession contract exacerbates the risk because it lasts a fixed number of years. A few bad years at the beginning of the franchise may not leave enough time with normal traffic flows to recover the initial investment. If the length of the franchise were lengthened whenever demand is sluggish at first (and shortened if demand is higher than expected), the risk to the franchise holder would be smaller without affecting expected revenues. We have designed an alternative contract, which we have called a Present-Value-of-Revenues (PVR) franchise, that solves the time uncertainty of the revenue stream and has some additional attractive features.

The PVR Auction

In a PVR auction:

- The regulator sets a maximum toll;
- The franchise is won by the firm bidding the least present value of toll revenue (thus the acronym of PVR);
- The franchise ends when the present value of toll revenue equals the franchise holder's bid;
- Toll revenue is discounted at a predetermined rate specified in the contract. The rate should be a good estimate of the loan rate faced by franchise holders.

A PVR auction is similar to a standard Demsetz auction except that bidders compete on the present value of revenue they would like to obtain from the project.

The UK was probably the first country to use a contract similar to PVR. Both the Queen Elizabeth II bridge on the Thames River (£180MM, operational 1991) and the Second Severn bridges on the Severn estuary (£331MM, operational 1996) were franchised for a variable term. These franchises will last until toll collections pay off the debt issued to finance the bridges and are predicted to do so several years before the maximum franchise period. Chile was the first country to use a PVR auction. In February of 1998, a franchise to improve the highway joining the capital, Santiago, and the seaport of Valpara'iso ($400 MM) was assigned in a PVR auction.

The Advantages of a PVR Auction

PVR franchise contracts are superior to traditional private franchise agreements because they reduce risk by incorporating flexible adaptation to shocks into the basic contractual framework. The major disadvantage of PVR contracts is that their risk-reduction features can make the franchise holder indifferent toward customer service and other demand enhancement activities. Thus PVR auctions should be used only for certain types of public infrastructure.

Risk Reduction

A PVR contract reduces risk: when demand is less than expected, the franchise period is longer, while the period is shorter if demand is unexpectedly high. Assuming that the project is profitable in the long run, so that repayment eventually can occur, all demand-side risks have been eliminated. Even if the project never collects enough revenues to equal the present value bid by the franchise holder, the revenue will still be larger than would have been collected by a franchise holder under a traditional fixed-term contract. PVR also reduces risk by placing the decision of whether to invest in a project in private hands. Private bidders are very likely to say no to projects with no possibility of paying for themselves than are traditional transportation agencies. PVR franchises should attract investors at lower interest rates than traditional Demsetz franchises. Toll revenues are the

same under both, but the franchise term is variable under PVR. If demand is low, the franchise holder may default under a fixed term. In contrast, under a PVR scheme, the concession is extended until toll revenue equals the bid, which rules out default. Of course, under PVR, the bond holders do not know when they will be repaid, but this is less costly than not being paid at all.

Adaptation and Flexibility

PVR franchises allow adaptation to changing circumstances not easily possible in standard Demsetz auctions. Consider again California's 91 Express Lanes. As traffic increased on the freeway, the congestion tolls in the private express lanes were increased. Caltrans (California Department of Transportation) would have liked to widen the Freeway in order to accommodate the increased traffic, but was hampered by the contract it signed with the owner of the 91 Express Lanes, which prevented Orange County from raising the capacity of the Riverside Freeway without the franchise holder's consent. Given the experience of the Dulles Greenway Highway (low demand and bankruptcy), this provision seemed reasonable at the time the contract was signed. But under current conditions it allowed the franchisee to price congestion as a monopolist.

Within the PVR framework, a solution to the buyout problem is to include an option to buy out the franchise at the difference between the initial present-value bid and the present value of the revenue already received. This solves the problem of widening a highway in response to increased congestion because after buying back the franchise, the Transit Authority can set up another PVR auction for operation of the tollway that takes into account the new wider freeway as competition. As a numerical example, assume that the owners of 91 Express Lanes had asked for $160MM in present value terms on the $130MM investment. Suppose they had already collected $65MM. Then, according to the PVR scheme, the Orange County Transportation A could have bought them out for $95MM, which is exactly what the owners would have obtained if the franchise had run

to term. But because the existing franchise is not PVR and did not have a buyout provision, the owners turned down an offer of $274MM and negotiations dragged on for years (In the end agreement was reached last April and Caltrans will pay $207 MM to rebuy the express lanes.).

The PVR auction also allows flexibility in setting tolls relative to a standard Demsetz auction, in which bidders compete on the lowest fixed toll they can set. The problem is that unless traffic forecasters are unusually fortunate in their estimates as to the sensitivity of traffic to prices, the resulting tolls are likely to be incorrect: either so low that they create congestion, or so high that the highway is underutilized. One possibility is to allow fees to respond directly to congestion so they are never too low. But the result can be monopoly pricing as in the case of the Orange County 91 Express Lanes.

A better possibility is to include toll flexibility in the PVR auction contract. The guiding principle of the PVR franchise is to allow the winning bidder always to collect their required present value. In order to induce the franchise holder to accept toll flexibility, however, the contract has to recognize that lower tolls not only increase the time required to earn the desired revenue, they also increase traffic and therefore increase maintenance costs.

Because maintenance costs are roughly proportional to road usage, the original PVR contract could be specified so that the revenue target is net of maintenance costs. With this adjustment, the only effect of a change in tolls is a change in the total operational costs over the length of the contract, costs that are highly predictable and represent a minor fraction of total costs. PVR franchises allow the Transport Authority to change tolls below the maximum allowed rate to the efficient level without harming the franchise holder.

Reduces Opportunism

The efficient flexibility provided by the PVR method reduces the likelihood of opportunistic behavior. Requests to alter traditional franchise contracts often reflect opportunistic behavior by one of the parties. For example,

the government could try to expropriate the franchise holder (a regulatory taking), or alternatively, the franchise holder may pressure the Transit Authority to change the conditions of the contract at the expense of the public.

Traditional contracts are renegotiated either by extending the length of the franchise, increasing tolls or providing a government transfer. Extending the franchise term with a PVR contract is not possible because, by definition, the term is variable. Increasing tolls is ineffective, because it shortens the franchise term without increasing overall income. Government transfers are not logically impossible under PVR but because the franchise holder cannot claim that it will receive less toll revenue than expected, a government transfer would be difficult to rationalize to the public.

Consider Mexico, where the franchise procedure awarded concessions to the firm that consented to build the road and operate it for the shortest time periods. The result was highway tolls as high as US$35. Because parallel (although congested) freeways were available, the tolled highways had little traffic. The government was pressured into bailing out the franchises (and the banks that lent to them), at a cost of at least $8 Billion.

Fixed term franchises often obtain government loan guarantees. Guarantees weaken the market test that privatization is supposed to provide and escape the usual the scrutiny that accompanies specific appropriations in the budget. PVR schemes reduce the need for guarantees because the risk to investors is much smaller. For example, when the Chilean government used PVR to auction the highway joining Santiago, Chile's capital city, with the port of Valpara'iso, it did not have to offer guarantees, in contrast to previous highway franchises using traditional fixed-term auctions.

An Important Caveat

While PVR schemes have a big advantage in terms of reduced risk, the downside is that the franchise holder has no incentive to increase demand for the infrastructure project because any action that increases demand will shorten the term of the franchise. Projects earn their return regardless of efforts of the franchise holder. This suggests that the method is applicable

only in cases in which demand does not respond to the actions of the franchise holder. Bridges, tunnels, water reservoirs, and roads are examples for which PVR seems appropriate because other than maintenance (for which standards can be set and checked fairly easily) the franchise holder can do little to increase demand for these projects. On the other hand, PVR would be inappropriate for projects for which service quality is essential and demand does respond to performance such as seaports, airports, and public utilities. In these cases a traditional Demsetz auction on minimum price seems more appropriate. In some cases an infrastructure project can be unbundled into separate parts, with different responses to demand enhancing activities. For example, an airport franchise can be divided into a franchise for the landing strip, auctioned with a PVR scheme, while all other services are provided via a standard fixed term franchise.

Conclusion

Private highway franchises can lead to large improvements in infrastructure provision. But the experience accumulated so far suggests improvements are necessary. We suggest a variation to the classic Demsetz auction, which awards the franchise to the bidder that asks for the lowest toll. Our proposal is that firms compete on the basis of the minimum toll revenue (in present value terms) requested by bidders: a PVR auction.

This modified Demsetz auction has a number of advantages: it reduces risk and thus lowers the return required by bidders. It also reduces the need for guarantees and the scope for opportunistic renegotiations. Moreover, the franchise is flexible, because it can incorporate a buyout option that leaves both parties satisfied, so that widening the road itself or other free competitors in response to increased traffic is not an issue. In addition, the tolls can be changed by the Transit Authority in response to changed conditions without harming the franchise holder. The PVR auction solves most of the common problems that occur with highway franchises. In particular, the serious problems encountered by both private highway franchises currently operating in the US would have been avoided with a PVR contract.

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