DISCUSSION OF RÉMY PRUD'HOMME'S "INFRASTRUCTURE AND DEVELOPMENT"[1]

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Rémy Prud'homme provides an authoritative and entertaining survey on the relation between infrastructure and economic development. This is a welcome contribution on an important topic and I strongly recommend reading it.

Among the many things I liked, let me mention three. First, the paper tracks the concept of infrastructure through (economic) history, arguing convincingly that for a long time it was ignored by most leading development economists. Second, it provides a good review of the literature that quantifies the relation between infrastructure and growth. Given the author's important contributions to this literature, this sceptical survey should be taken seriously.

Third, the paper provides a refreshing discussion of the large (demand and cost) forecasting errors observed for infrastructure projects. Demand is usually overestimated while costs are underestimated, in both cases reflecting strategic behavior by public and private agents involved. Yet once we correct for this systematic source of errors, the residual component, even though unbiased, has a very large variance, reflecting the inherent uncertainty that is part of most infrastructure projects.

There are some things I missed in this paper. I would have liked a stronger stance on some of the policy choices considered. Too often the author concludes that "the devil is in the details", which of course is true but not very useful for policymakers. I would have also liked more examples from developing countries. Finally, some important topics are barely mentioned. Admittedly, my complaints are mainly due to differences in preferences and style, and should therefore not be taken too seriously.[3]

As mentioned by the author, he only considers marginally the issues of privatization and regulation of infrastructure, a topic of major concern for policymakers in developing countries, given

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[3] With, possibly, one exception. I believe the exercise comparing alternatives for providing infrastructure services is conducted in a framework that is too simple to warrant many of the conclusions the author obtains. Needless to say, this does not mean that I disagree with the conclusions.

widespread disillusion with the recent wave of privatization. Indeed, as shown in Table 1, support for privatization in Latin America fell substantially between 1998 and 2003, from an average, across 16 countries, of more than 46% to less than 22%. By 2003, more than two-thirds of the population in every single country in the region disagreed with the statement that "the privatization of public utilities had been beneficial".[4]

Table 1: SUPPORT FOR PRIVATIZATION IN LATIN AMERICA (%)

	Argentina	Bolivia	Brazil	Colombia	Costa Rica	Chile
1998	39	52	49	40	59	50
2001	17	24.	49	13	31	43
2002	14	23	38	23	n.a.	22
2003	12	19	33	24	n.a.	28
	Ecuador	El Salvador	Guatemala	Honduras	Mexico	Nicaragua
1998	52	53	61	46	50	46
2001	33	25	22	21	28	31
2002	40	35	29	34	28	30
2003	20	15	16	25	31	20
	Panama	Paraguay	Peru	Uruguay	Venezuela	*Average*
1998	20	46	43	43	51	*46.3*
2001	37	34	22	23	49	*29.4*
2002	31	19	32	16	38	*28.2*
2003	10	23	22	16	32	*21.6*

Source: LatinoBarometro. The question those surveyed were asked was: *Do you (a) strongly agree, (b) agree, (c) disagree, (d) strongly disagree with the statement "the privatization of public utilities has been beneficial for the country"*. Possible answers: the four options above and (e) do not know, (f) does not respond. Reported: percentage of individuals that chose options (a) or (b). Reported averages exclude Costa Rica, since no data for 2002 and 2003 is available for this country.

Thus an important question facing policymakers is what went wrong with infrastructure privatization and how can it be fixed. In the remainder of this comment, I sketch an answer to this

[4]Even though part of this decline may be explained by cyclical factors, most analysts believe there is a marked negative trend as well.

question for the particular case of highways.[5] A more ambitious project, considering additional infrastructure sectors, such as telecommunications, electricity and water, would make a good topic for a future ABCDE paper.[6]

Highway Privatization: Recent Experience and Policy Lessons

The "lost decade" of the '80's led to low investment and inadequate maintenance of infrastructure, and created a major highway deficit across Latin America. This was the origin of the wave of infrastructure privatization that began in the '90's, as this deficit, combined with chronic budgetary problems, led governments to embrace a scheme where the private sector financed urgently needed infrastructure investments, thereby freeing up public resources for other priority areas.

Private financing of new highways throughout Latin America freed up fewer government resources than expected (Engel, Fischer and Galetovic 2003). In several cases, public funds were diverted to bail out franchise holders in financial trouble.[7] Government guarantees for private highway franchises also added to the fiscal burden. Making things worse, such guarantees were paid out mainly during economic downturns, when government budgets were under pressure.[8]

Before proceeding, it is useful to clarify what is meant in this paper by public and private provision of roads. Under public provision (the *traditional approach* in what follows), the government designs, finances, and operates the road. Private firms may participate in the construction stage and may be selected in competitive auctions. But once the highway is built, the government operates and maintains it. Taxpayers finance the road and, even when users pay tolls, they are usually unrelated to construction costs. By contrast, when roads are privatized, a concessionaire finances, builds, operates and maintains the facility. The franchise owner collects tolls for a long time –usually between 15 and 30 years– and when the franchise ends, the road reverts to the government. Such Build-Operate-and-Transfer (BOT) contracts can be awarded either through direct negotiations between the transit authority and an interested firm, or through a competitive auction for the franchise of a well-defined project.[9]

Highway privatization not only promised to free up government resources, but also to deliver some of the standard advantages expected from privatization.[10] First, a firm that is responsible for

[5]The evidence I discuss is from Latin America, even though the policy implications are likely to apply in other regions as well.

[6]Alternatively, see Gómez-Ibáñez (2003) and Laffont (2004).

[7]For example, Mexican taxpayers spent more than US$8 billion to bail out the franchise owners and the banks that lent to them.

[8]See for example, "World Bank warns of new debt dangers" *Financial Times*, May 30th, 1997.

[9]Under most circumstances the latter option should be preferred to the former. See Demsetz (1968) for a forceful argument in favor and Williamson (1976) for a critique.

[10]For example, an official 1999 document from ALIDE (Latin American Association of Financial Institutions for

construction and maintenance has the right incentives to invest in road quality (Tirole 1997). Second, private firms are better managers than state-owned highway authorities. Third, BOT contracts may be desirable on distributional grounds, since roads are paid by those who benefit. In particular, cost-based tolls are easier to justify politically when infrastructure providers are private.[11] Finally, in contrast to public provision, under BOT only privately profitable roads will be built, thus using the market mechanism instead of central planning to screen projects. This reduces the likelihood of building white elephants, a common occurrence in Latin America (and other continents).[12]

The promised benefits of highway privatization failed to materialize (Engel, Fischer and Galetovic 2003). The main reason for the failure were the continuous processes of renegotiation of franchise contracts.[13] In most countries concessionaires renegotiated their contracts without public scrutiny. This facilitated shifting losses to taxpayers. Such renegotiations negate the public benefits of private highways by giving an advantage to firms with political connections, limiting the risk of losses and reducing the incentives to be efficient and cautious in assessing project profitability.

Highway franchises need to be regulated. Building deadlines and quality standard must be enforced during the construction phase. Tolls, quality of service and maintenance must be regulated when the concession is operating. Most important, a mechanism for solving contractual oversights fairly and promptly must be put in place.

Opportunistic renegotiations have been pervasive because of two design flaws which are present in all major franchising programs undertaken in Latin America (Engel, Fischer and Galetovic 2003). First, countries have followed a "privatize now, regulate later" approach. For example, the lack of a clear contractual structure often led to cost overruns and renegotiation of the conditions of the original contract. Moreover, the government agency interested in the success of the franchise program was usually the same as the agency that supervised the franchise contracts. Since the success of these agencies is often measured by the percentage of the program which they succeed in building, they tend to be lax in enforcing compliance with franchise contracts and are inclined to ease the conditions for franchise holders.

Development) states: *"The fiscal and financial crisis [...] of the eighties led to the end of the traditional model of infrastructure financing, that considered the state as the main investment agent, and opened space for important participation by the private sector [...] with the objective of not only bringing relief to the burden supported by public finances, but, more importantly, to improve the allocation of risk and improve the efficiency of management [...]"*

[11] This is important, if trucks are ever to pay tolls that approximate the road deterioration they cause.

[12] Where a white elephant is defined as a project whose net (of costs) social value is negative. For an extreme example of a white elephant consider the Túnel Las Raíces, crossing the border between Argentina and Chile, still the longest tunnel in Latin America, built in the 1940s and never put to its intended use.

[13] This is not limited to highway franchises. Contractual terms changed substantially, within three years, for more than half of the concessions awarded during the 1990s in Latin America (Guasch 2001).

Some examples of lax regulation follow (Engel, Fischer and Galetovic 2003). A report published by Argentina's National Comptroller in 2003, concludes that the equipment needed to measure a highway's friction coefficient had been out-of-service since 1994, so that this index had not been measured for any franchised highway for almost a decade. The same report pointed out that highway quality immediately after construction often was considerably below specifications, and often deteriorated faster than stipulated in the contract. Building delays also were recurrent, while fines to which the government was entitled were rarely collected. In Colombia many concessionaires did not obtain financing and faced no penalty for this. And in Chile the regulator relied on traffic flows reported by the franchise-holders to payout minimum traffic guarantees.

The second pervasive design flaw is that most concessions have been awarded using a fixed-term contract, which make franchise holders bear most of the demand risk and create demand for subsidies and guarantees. This is troublesome, since demand risk for highways is particularly high (Engel, Fischer and Galetovic 2001). And since the franchise holder has little ability to influence demand, there is no point in having her bear this risk. Fixed-term franchises allocated in competitive auctions make it almost certain that firms will lose money in low-demand states, which generates pressure for renegotiations and guarantees.

Optimal risk sharing (between users, the government and the franchise holder) is achieved through a flexible term contract, which can be implemented with a present-value-of-revenue (PVR) auction (Engel, Fischer and Galetovic 2001).[14] In it, the regulator fixes user fees and announces a discount rate,[15] and the franchise is awarded to the firm that asks for the least present value of toll revenue. The franchise ends when the present value of toll revenue is equal to the winning bid.

PVR franchises have four advantages over their fixed term counterparts (Engel, Fischer and Galetovic 1997, 2003). First, by having the franchise length adjust to demand realization, a PVR contract substantially reduces demand risk faced by the franchise-holder and therefore the demand for guarantees. Second, PVR franchises avoid lengthy negotiations on what should be the fair compensation when the franchise must be terminated early, say, because additional lanes need to be built, since the difference between the winning bid and the present value of tolls collected at the time of termination is a good estimate of fair compensation. No such a measure exists for a fixed term franchise. Third, PVR franchises are more amenable to toll changes in response to changes

[14]The UK was the first country to use a PVR-like franchise contract, with a flexible franchise term, in the early '90's, even though the franchise was not awarded in a competitive auction. Colombia auctioned a highway to the bidder demanding the least toll revenue in the mid '90's, yet toll revenue was not discounted. The first PVR auction took place in Chile in 1998, when the US$400 million improvement and expansion of the Santiago-Valparaíso-viña del Mar was auctioned. This was the first highway franchise in Chile that required no (explicit) government guarantees.

[15]The discount rate should be a good estimate of the cost of funds faced by franchise holders and could be variable (such as LIBOR plus some fixed risk premium).

in demand than their fixed term counterparts, since tolls may vary substantially without affecting the franchise holder's present value of toll income.[16] For example, in the urban highway example, a PVR contract could stipulate that tolls will be reset by an independent agency/commission every year in response to demand conditions, so that users internalize congestion costs.[17] Finally, it can be argued informally that opportunistic behavior, both by the franchise holder and the government, is less likely under a PVR contract. The main downside of PVR contracts is that they provide less incentives for maintenance than their fixed term counterparts. As long as quality can be easily verified by independent parties —which is the case for highways— this is not a major concern.[18]

Summing up, the Latin American experience with highway privatization during the last decade was disappointing: both the reduction of the fiscal burden and efficiency gains were considerably below expectations.[19] Weak regulation and pervasive opportunistic renegotiations explain this outcome. Considerable improvement can be expected if concessions are regulated seriously and flexible term concession are used in the future.

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[3] ————————, "Least Present Value of Revenue Auctions and Highway Franchising," *Journal of Political Economy*, **109**(5), 993-1020, 2001.

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[16] Profits are affected, since the franchise term determines maintenance and operational costs. Yet the PVR contact can be modified to incorporate maintenance costs (Engel, Fischer and Galetovic 2003).

[17] Discretion in toll setting may be limited by fixing a lower and upper bound (in real terms) on possible tolls.

[18] This characteristic of PVR may render unattractive using it with other types of infrastructure (e.g., water sewage systems).

[19] Of course, this does not mean that the traditional approach would have led to better results.

[5] Gómez-Ibáñez, J.A., *Regulating infrastructure*, Cambridge, Mass.: Harvard University Press, 2003.

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