

Transnational Projects and Public Goods

A Comparative Study

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Foreword

The Inter-American Development Bank has actively promoted infrastructure reform in Latin America. The Bank has also financed private projects aimed at fostering the implementation of reforms in the power, gas, water, and transport sectors. Now, the Bank is engaged in a program whose aim is the development of transnational infrastructure projects.

Two regional Initiatives were recently proposed to promote transnational infrastructure: the Initiative for the Regional Integration of South America (IIRSA in its Spanish acronym) and the Plan Puebla Panama (PPP) for Central America and Mexico. These initiatives face significant challenges, most of which have not been properly appreciated because transnational projects yield costs and benefits in several countries and the distribution of those costs and benefits is asymmetric. These features of transnational projects raise new issues that do not appear in projects in which benefits and costs mainly affect a single country. One relevant issue is that under the condition of asymmetric distribution of costs and benefits, individual decisions made by one country do not result in optimal levels of investments in transnational projects. Lower than optimal transnational investment results from poor identification of the benefits of transnational projects, country reluctance to pay for infrastructure assets located abroad, and the lack of socially acceptable mechanisms to distribute costs and benefits among countries. Therefore, it may take a great deal of time for two countries to enter into a dialogue about a project with cost and/or benefits in both nations if they lack rules for cooperation and/or incentives to communicate with each other about the project costs and benefits.

This article is part of a set of publications resulting from a program to analyze specific issues arising in transnational infrastructure projects in a well-defined conceptual framework. The paper discusses the special features that distinguish transnational projects from usual public goods. It reviews the most important tenets of the modern theory of public goods and shows the extent to which this theory is useful for dealing with transnational project issues. Particular emphasis is given to the institutional environment for transnational projects. The paper also addresses issues related to the political economy of transnational projects and briefly discusses property rights issues as they relate to transnational assets.

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Introduction

It is well recognized by now that proper infrastructures are key to economic development. Several empirical studies illustrate the impact of infrastructures on economic growth (see Calderón, Easterly and Serven, 2002; Calderón and Serven, 2002). A 1 percent increase in the stock of infrastructure can increase GDP by up to 0.2 percent. Despite the importance of infrastructure, some countries have faced significant shortages in access to crucial infrastructures. For instance, the stock and quality of infrastructures in the countries of Latin America and the Caribbean has lost significant ground relative to those of East Asia and the OECD countries. To illustrate that point, Calderón and Serven (2002) show that, from 1980 to 1997, the Latin America infrastructure gap relative to East Asia grew by 40 percent for roads, 70 percent for telecommunications and nearly 90 percent for power generation. They show that this widening infrastructure gap can account for nearly 25 percent of Latin America's GDP output gap relative to the East Asian economies over the 1980 to 2000 period.

In response to this, and given the scarcity of public funds in the developing countries,¹ most have turned to the foreign private sector for financing and

operating infrastructure services. However, a number of difficulties have emerged from this strategy. First, some countries have failed to attract those investments. Second, even those who succeeded have sometimes faced a high rate of contract renegotiation (Guasch, Laffont and Straub, 2002). Whether initiated by governments or concessionaires, renegotiations have often created public opposition to what is sometimes presented as a loss of sovereignty. This is particularly the case for water concessions.

Regardless of the strength of the motivations behind these public positions, countries should search for alternative ways of financing infrastructures. How to reconcile the need for more investment in public infrastructures and the aspirations of developing countries for a close control of their public services is a major political question today.

Cooperation between small developing countries, such as those of Central America, is clearly a potential solution. Sometimes the least-cost approach to improving the supply of infrastructure services requires the cross-country integration of networks. This is certainly the case for power grids and, to a lesser degree, may be the case for telecommunication networks. Such integration calls not only for coordination between countries at the investment stage, but also for cooperation later on in the use of the common networks. This paper develops a theoretical framework for exploring the allocative and distributive

¹ A World Bank report stated: *"When times are hard, capital spending on infrastructure is the first item to go... Despite the long-term economics costs of slashing infrastructure spending, governments find it less politically costly than reducing public employment or wages."* World Development Report, 1994, p. 19.

consequences of this kind of transnational coordination.

Infrastructures often entail fixed costs that are so large that no single country can afford to build the infrastructure on its own. Those fixed costs must be shared by several countries. Infrastructures can thus be viewed as public goods for which financing mechanisms must be agreed upon by the project partners. This raises the ugly head of the *free rider problem* when Coasian bargaining among countries is not feasible, particularly in contexts plagued by informational asymmetries among countries.

This paper discusses the special features that distinguish transnational projects from usual public goods. It reviews the most important tenets of the modern theory of public goods and provides a summary of the key points made in Laffont and Martimort (2003), which proposes a theoretical framework for understanding transnational public goods. Particular emphasis is given to the institutional environment for transnational projects and how that environment affects inefficiencies in the provision of public goods. The paper also addresses issues related to the political economy of transnational projects and briefly discusses property rights issues as they relate to transnational assets.

A Reminder: The Received Theory of Public Goods

Let us consider a society that wants to implement a public good. This public good may be an irrigation, a transportation or a telecommunication network or an energy plant. Building the infrastructure entails a fixed cost to be financed by those who benefit from it since using the infrastructure entails a cost per unit of consumption. For the time being, we do not distinguish between transnational projects, which are physically located in (at least) two countries, and traditional public goods located in a single country.

The Coase Theorem provides a useful benchmark to understand how this public good should be provided. Under complete information, in the absence of transaction cost and with transferable utilities, an efficient bargain among all those who benefit from the project is feasible. The efficient size of the infrastructure is chosen through multilateral bargaining. The investment is made if and only if the sum of the benefits of building the infrastructure for all agents is greater than its cost: the so-called Samuelson rule for public goods (Samuelson, 1954). There exist, then, compensatory transfers among the various groups of individuals to guarantee that all the groups are willing to agree on the decision to build the project. For instance, groups whose preference is for less of the public good being constructed are compensated by those who would like more of it.

Of course this idealistic environment is far from what is found in practice. The Coasian framework has to be amended to understand the provision of public goods in environments where informational asymmetries and transaction costs matter. To do so, we first focus on a national project.

ASYMMETRIC INFORMATION

Decisionmakers are unlikely to have perfect information on the residents' preferences for the public good or on their marginal utility of income. To acquire the missing information, decisionmakers have to design an *incentive compatible mechanism* (Groves, 1973; Green and Laffont, 1976 and 1977; d'Aspremont and Gerard-Varet, 1978). This mechanism specifies whether the infrastructure should be built or not and how the cost of doing so should be shared among the different countries. It has to simultaneously satisfy a set of incentive compatibility constraints that guarantee that residents reveal their true preferences, that balance the budget so that the project is financially sustainable, and that ensure that agents' utility increases more by accepting the mechanism than by refusing it.

Clearly, the three objectives cannot always be achieved simultaneously without giving up efficiency (Laffont and Maskin, 1979; Mailath and Postlewaite, 1990; Ledyard and Palfrey, 1999; Rob, 1989). Asymmetric infor-

mation on the preferences of individuals creates a trade-off between inducing revelation of their preferences by those who like a lot the public goods, most likely the rich, and inducing the participation of the poor. To satisfy the latter's participation constraint, their contribution to the financing of the public good should be reduced. Doing so reduces the incentive of rich agents who may be tempted to underestimate their valuation for the good, pay less and take a free ride. Reducing the size of the public good or the probability of building it are second-best solutions which come out of this trade-off.

MEDIATED BARGAINING

Under asymmetric information, multilateral bargaining among residents, even if it was feasible, could be the source of significant inefficiencies. The outcome of bargaining under asymmetric information not always lies on the economy's Pareto frontier. This implies that decentralized bargaining forms should be given up.

Instead, the design of a mechanism for the provision of public good requires an institutional environment with enough credibility to enforce the mechanism without falling into the difficulties posed by continuous communication and bilateral negotiation with the various parties. In the standard case of a

public good, the government is the key actor with at least some measure of credibility. This means that it can credibly commit to building the infrastructure if a predetermined proportion of the population benefits from it.

In an institutional framework of this type, communications regarding preferences have to be somewhat centralized. Informational flows on preferences (by means of polls, public hearings or the like) should be controlled directly, as much as possible, by the political decisionmaker in charge of the mechanism. Control of information flows is important because it avoids any risk of political capture between interest groups willing to manipulate the size of the public good and lower level decision-makers who may be following their own agendas.

To summarize, asymmetric information and mediated bargaining are two key elements to the understanding of inefficiencies in the provision of any public good. When it comes to transnational public goods both dimensions of the problem come back with a vengeance. Difficulties in implementing an efficient decision rule on whether to build or not to build the project are increased by the institutional environment surrounding transnational projects. The remainder of this paper addresses this issue.

A Framework to Understand the Design of Transnational Projects

To the best of our knowledge, Laffont and Martimort (2003) is the first study that presents a specific framework for analyzing transnational projects. These projects differ from standard public goods by the mere fact that these are infrastructures located in neighboring countries (for the sake of the discussion, we can limit it to two countries, but it could be more). Another characteristic of transnational projects is that neither country can finance the infrastructure alone because it entails large fixed costs and the individual countries lack the resources to take on the project alone.

The key point of the analysis made in Laffont and Martimort (2003) is that these types of public goods are not financed out of the pockets of individuals as in the received theory, but out of national budgets. The mechanisms' main actors are no longer individuals but countries, which aggregate the preferences of heterogeneous agents in one way or the other. For the moment, we will keep unspecified the political process by which the heterogeneous preferences are aggregated. We will come back to this issue later.

The fact that the transnational project does not lie completely in either country raises several issues. Who should be the mediator in charge of designing the mechanism for building this kind of public good? Can international agencies play this role efficiently? What are the

consequences of having governments play the role of intermediaries between their residents and that mediator? Given that the usage of the infrastructure takes place at the local level, how and who will structure prices? What sort of external constraints are imposed on local governments by the fact that the mechanism is designed by an external actor?

To tackle these issues, Laffont and Martimort (2003) propose extending the traditional model for the provision of public goods along several directions.

THE INTERNATIONAL AGENCY AS A MEDIATOR

First, note again that decentralized bargaining between two countries over how their respective contributions should be structured and what should be the size of the infrastructure carries the same caveats as any decentralized bargaining among residents of the same country (as in the case of a pure public good seen above). The bargaining outcome is unlikely to reach efficiency, even if one relaxes the efficiency concept to take into account that countries retain private information on their costs and benefits from the project and moves toward “informationally constrained efficiency.”

Given the difficulty of giving the power to propose the mechanism for building

the project to any single government, the natural actors in charge with doing become the international agencies (such as development banks), which can also provide technical expertise and financial assistance. Thus, Laffont and Martimort (2003) assume that the international agency is concerned with the well-being of both countries and acts as a benevolent mediator in the bilateral bargaining between countries, reducing transaction costs and bridging informational gaps more easily.

The international agency is also concerned with the economic sustainability of the project and should adopt it only when its benefits exceed the costs. Moreover, project costs (including the fixed cost of building the infrastructure and the variable costs of using it) should be financed by the countries. Part of the design problem faced by the agency comes from finding the optimal share of the costs that each country should bear.

The assumption that the agency is benevolent seems a reasonable first approximation. Of course, a positive perspective should also account for the exact incentives faced by the agencies and, in particular, the career concerns of the people heading them. Some agencies may also be pursuing agendas, such as “fostering industrialization” or “promoting growth,” that in the short run are different from efficiency.

GOVERNMENTS AS DELEGATES IN THE BARGAINING PROCESS

For transnational projects, the power to bargain on behalf of the residents of any country is delegated to a political

decisionmaker. This important delegation problem raises the issue of the types of objectives that the bargainers are asked to pursue. The Coase theorem and its limitations come into play at this point. Under complete information regarding the preferences of individuals living in the country, and assuming that utilities are transferable, this delegation would maximize the sum of resident’s utilities. The aggregation of preferences at the local level is not an issue and, a “representative” agent can be found.

Once that perfect delegate has chosen how much the country is ready to pay for the infrastructure, the only issue remaining is to determine how the prices paid by the different groups for using the infrastructure are structured. That stage of the process does not present any difficulty given that the preferences of these groups are perfectly known and first degree price discrimination can be used.

However, Coasian bargaining at the local level is just an illusion. Asymmetric information on the preferences of residents plays a crucial role in shaping the preferences of the political decisionmaker. To make that point, Laffont and Martimort (2003) assume that the decisionmaker is *a priori* benevolent and maximizes the sum of the residents’ utilities. Obviously this looks like an extreme assumption, but it is less severe than it looks and of the case where the preferences of residents are not completely known and the national budget must be balanced.

Under asymmetric information at the local level, first degree price discrimination is no longer feasible and the

pricing of usage has to be designed in an incentive compatible way. Second degree price discrimination prevails. The richer residents who are also the most willing to benefit from the infrastructure may again underestimate their own valuation of the good. By doing so, they reduce the price they pay for usage and the country's contribution to its financing. There exists a conflict at the local level between those incentives and the fact that payments should cover the overall contribution of the country to the project. This conflict can only be solved by reducing the incentives of rich agent to pay less for usage. This is done by offering a less efficient consumption level to poor residents as required by the theory of second degree price discrimination. Given that the country faces a harder budget constraint, the conflict is exacerbated and distortions increase.

In fact, similar distortions would be obtained if one of the government's initial objectives at the time of designing the pricing scheme were redistribution from the rich to the poor. In such a case, the government would reduce the price paid by the poor, exacerbating the incentive problem. Making the benefit of the infrastructure more evenly distributed within the country leads to stronger allocative distortions.

The key point here is that, because of asymmetric information at the local level, the preferences of the political decisionmaker regarding which groups should be primary targets of the project has a strong allocative impact. Insofar as local politics determine those preferences, it has a significant impact on the contribution of the country to the over-

all financing of the infrastructure. For instance, when preferences are excessively biased toward the poor, one cannot expect the country to bear a significant share of the financing. This local redistribution problem increases the scope for the free-rider problem among countries and leads to an inefficiently low probability of building the infrastructure.

GOVERNMENTS AS PRIVATELY INFORMED INTERMEDIARIES

By introducing an extra layer between residents in each country and the international agency in charge of designing the mechanism for provision of the transnational project, one opens the door to additional inefficiencies because that new layer may also have some private information. There are now two sources of incentives problem and agency costs, rather than only one as in the case of standard public goods.

Private information for the government may come from better knowledge of preferences at the local level or from better knowledge of the exact weight that it places on the poor in the social objective function. In Laffont and Martimort (2003), we justify that new degree of asymmetric information by means of more basic principles. We assume that even though governments are benevolent, they have private information about the nature of the country's hard budget constraint. We show that, because of asymmetric information about the preferences of the country's residents and the trade-off between equity and efficiency discussed above, private information about the budget constraint can also be treated as

asymmetric information about the preferences of the political decisionmaker. Countries with important financial difficulties or with inefficient taxation systems are also those where political decisionmakers have the most pronounced preferences for redistribution, or equivalently those where the political principals give a greater weight to the poor in their objective functions. Uncertainty regarding that weight is formally equivalent to uncertainty regarding the budget.

The international agency must design the public good mechanism with an eye on this new degree of asymmetric information about the preferences of the governments. Again, the basic lessons discussed previously are still true and there generally exists a trade-off between inducing the truthful revelation of those preferences and the participation constraints of the countries involved in the mechanism. Relatively wealthy countries that place a lot of weight on the utility of the rich have strong incentives to pretend that they are poorer than they really are in order to limit their overall financial contribution to the project. That new layer of asymmetric information hardens the incentive compatibility problem.

At this point, it is also worth stressing that inducing the participation of a country as a whole is a weaker requirement than inducing participation by all its residents. In the first case, the poor may be hurt as long as the rich sufficiently benefit from the project. In a sense, dealing with governments is somewhat easier than dealing with in-

dividuals and allocative distortions should be lower in the latter case.

To react to this extra layer of asymmetric information, the international agency must commit to a lower probability of building the infrastructure in case any of the countries pretend to be poorer than it really is. Even though, the first-best decision rule would recommend that the project should always be built, even when one of countries involved faces a strong financial difficulties and is relatively poor, the second-best rule restricts that probability. This leads to an excessive allocative efficiency and an increase in the contribution of the poor country as a means to reduce the incentives for lying of the rich one.

This external constraint has important consequences on the redistributive concerns within the countries itself. A poor country sees its budget constraint worsened by the process. Equivalently, the trade-off between equity and efficiency within the country becomes more acute. The poor country appears to be even more concerned with poverty under the pressure of this external constraint.

Alternatively, the international agency could include the concern for the issue of poverty among its own objectives. Laffont and Martimort (2003) show that this leads to an excessive decrease in the probability of constructing the project. Intuitively, that concern for poverty amounts to replacing the participation constraints of the countries as a whole by individual participation constraints that are harder to satisfy.

The Political Economy of Transnational Projects

As shown, in Laffont and Martimort (2003) we assume that political decisionmakers maximize a weighted sum of the utilities of both the rich and the poor but give a greater weight to the latter. In fact, one could well imagine the reverse assumption. This is particularly true for countries where power is in the hands of a small elite that identifies itself with the wealthier group.

The Laffont-Martimort framework is still relevant to understand what happens in that case, but it must be significantly amended. Because the rich are favored by the pricing of usage, asymmetric information about the preferences of residents implies that poor residents would like to pay the same price as the rich and may, as a result, report that they are wealthier than what they really are. To prevent those countervailing incentives to arise, consumption by the wealthy residents has to be

increased significantly above its first-best value.

Those perverse incentives at the local level bubble up to the country as a whole. Now, instead of pretending to be poorer than they really are, countries are willing to pretend that they are in fact wealthier. If the project is a zero-one project, those incentives will not affect the decision-rule chosen by the international agency. If, under complete information, the agency was willing to implement the project, the same remains true under asymmetric information. In a sense, from the agency's viewpoint, this is less of a problem. Nevertheless, if the size of the infrastructure has to be fine-tuned to exact preferences at the local level, and the decision is no longer zero-one, it could well be that more infrastructure than is actually needed will be provided.

Joint Ownership of Transnational Projects

The framework proposed by Laffont and Martimort (2003) is essentially static. It is particularly suited to understanding the basic inefficiencies that may arise at the time of building the infrastructure. It is less well targeted to analyzing dynamic issues related to the maintenance of these infrastructures. Indeed, the basic issue here is to determine who has the incentive to repair and maintain in the assets. The paradigm of the property rights literature is useful to understand this issue (Grossman and Hart, 1986; Hart and Moore, 1990; Hart, 1995).

Once the project is complete, it becomes jointly owned by the two countries, which form a sort of cooperative to manage the asset. Clearly, the decision to maintain that the part of the infrastructure that is situated in a given country is made by the country in question. However, in the case of networks, the investment made in any given coun-

try exerts a positive externality on the other. Thus, each country's incentives to undertake the necessary investments to maintain the infrastructure may be too low.

An appropriate governance structure should be designed to avoid this free-rider problem. Decisions regarding the types of maintenance investments that each country should make must be agreed upon by the partners in the venture just like in a cooperative. The received theory of cooperatives states that governance functions better when the countries in question are similar to each other (Hansman, 1996).

Of course the international agency might still play a role in organizing these additional stages of investment, but one may expect an increasingly significant political resistance to foreign intervention.

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