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Public–private partnerships in roads and government support: trends in transition and developing economies

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Private participation in roads revived strongly in transition and developing countries between 2005 and 2008, growing during the period from US$6.2 billion to US$16.4 billion a year, a new historic peak. However, in view of the recent global financial crisis, there has been some retraction of private financing resulting in an investment of US$15.8 billion in 2009. Driving policy-makers' renewed interest in attracting private financing for roads is the need for greater investments to keep road networks in an acceptable condition and carry out social and economic expansion plans in a context of public budget constraints. An analysis is presented of recent trends in road projects with private participation in developing and transition economies, in view of the policies and models adopted by these countries. A procedure for estimating the minimum toll rates required to attract private investors is also presented.

Keywords: public–private partnerships; roads; tolls; transition economies; developing economies

Introduction

In recent years, there has been an increased contribution by the private sector to finance transport infrastructure. However, in view of the current global financial crisis, there has been a relative retraction of private financing for infrastructure since the 2008 peak, which may negatively affect the capacity of many countries to expand, and even keep up their road networks. While this is an observed short-term phenomenon, it is still not clear what will be the medium- to long-term effects of the current crisis. It may well be that governments may be willing to increase their financial support to roads projects so as to make them more attractive to potential private investors. In this way, we may be seeing increased use of government support for public–private partnership (PPP) projects, in the form of more grants to support project construction, as well as operational grants or minimum revenue guarantees during their operational phase. Indeed, a recent review shows that new private activity in infrastructure continues to take place in developing countries despite the financial and economic crisis (Izaguirre 2009).

Driving policy makers' renewed interest in attracting private financing for roads is the need for greater investments to keep road networks in an acceptable condition

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and carry out required expansions in a context of public budget constraints. Indeed, when arrangements for private participation or, more generally, PPP are well designed, they can lead to a number of positive outcomes, including:

(1) greater financial efficiency, by leveraging public money through the mobilization of private capital, reducing the impact of road investments on the fiscal budget, and creating fiscal space to expand public service delivery in other sectors;
(2) better distribution of risks by transferring design, construction, and performance risks to the private sector, which is better able to manage such risks: and
(3) better governance by increasing the accountability of the service provider through competitive bidding, disclosure policies, and public reporting.

Drawing on the Private Participation in Infrastructure (PPI) Project Database (World Bank 2010), this paper analyzes recent trends in road projects with private participation in developing and transition economies, as well as their policy implications. Transition and developing countries now have a vast experience with road concessions: 33 countries have implemented 606 road projects with private participation during the period 1990–2009. These projects, involving investment commitments of US$129 billion, covered highway, bridge, and tunnel facilities (World Bank 2010). In addition, the paper addresses the issue of the minimum toll rate required to attract private investors.

An overview of private participation in roads

In the early 1990s a growing number of transition and developing countries introduced arrangements for more private investments in roads, and by the mid-1990s this private activity had reached levels not seen before, with 50–60 projects a year reaching financial closure and annual investment commitments of $10 billion–$12 billion (Figure 1). However, private activity in roads, as in other infrastructure

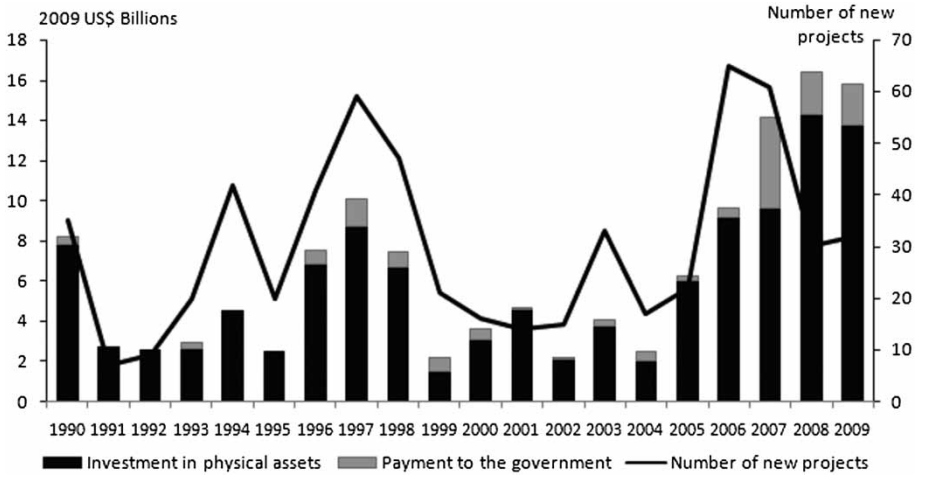

Figure 1. Investment commitments to road projects with private participation in developing countries, 1990–2009.

sectors, then declined sharply as a result of the 1997–1998 economic crises affecting many developing countries and the overall pessimism surrounding PPI in developing countries (Harris 2003).

During the period 2005–2008, prior to the beginning of the global economic crisis, private participation in roads revived strongly. Investment commitments to projects with private participation (hereafter referred to as investment) grew from US$6.2 billion in 2005 to US$16.4 billion in 2008, when it reached a new historic peak (28% above the 2007 former peak). The main reason for the revival was the willingness of governments to provide the support needed to attract the private sector.

The average size of road projects with private participation has generally fluctuated between about $100 million and $500 million. However, it was large projects ($500 million or more) that drove the investment growth in 2007 and 2008.

The growth in private investment in roads in recent years was concentrated in a few countries (Figure 2). Brazil, Mexico, and India saw their share of the total investment rising from around 20% in 2005 to 50% in 2006, 69% in 2007, and more than 80% in 2008. Brazil had an investment of $7.6 billion in roads with private participation in 2008, or 46% of the total investments in roads that year. India had an investment of $4.8 billion, while Mexico participated with an investment of $0.9 billion. In 2009, the share of these three countries in total investments remained high, above 64%, with Brazil having an investment of $6.3 billion, India of $2.2 billion, and Mexico of $1.6 billion. Among other countries, Poland had the highest investment of $1.4 and $2.2 billion in 2008 and 2009, respectively.

In all three countries, new models and frameworks for private participation helped attract investment in road infrastructure (Izaguirre and Jett 2009). For example, in India, an amendment to the National Highways Act introduced three models for private participation in highways: build–operate–transfer (BOT) contracts on a toll basis, BOT contracts on an annuity basis, and special purpose vehicles. In 2003, Mexico also introduced three models: new highway concessions, private-sector utilization, and asset utilization.

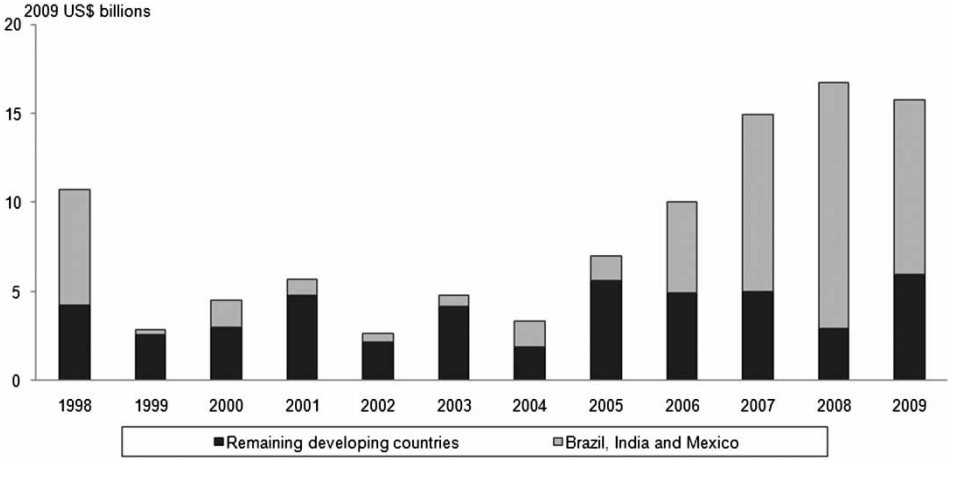

Figure 2. Investment commitments to road projects with private participation in main recipients and other developing countries, 1998–2009.

Impact of the global financial crisis on PPP in infrastructure

A recent review carried out by the Public–Private Infrastructure Advisory Facility (PPIAF; Izaguirre 2010) shows that the financial crisis significantly affected the rate of new PPP project closures in the second half of 2008. Since then, investments in new PPP projects have recovered, but several transport projects have been postponed or canceled due, inter alia, to difficulties in reaching financial closure. Nevertheless, investment in roads in 2009 decreased by less than 4% (to US$15.8 billion) from the 2008 peak, being the second highest level since the mid-1990s. The review indicated that three factors make projects more likely to reach closure:

(1) Strong economic and financial fundamentals,
(2) The backing of financially solid sponsors, and
(3) Government support.

Projects are currently raising funds at higher cost and with more stringent conditions (e.g. lower debt/equity ratios, shorter tenors, and more conservative structures). Governments in developing countries are actively trying to facilitate the implementation of new projects by restructuring them so that they are financially viable under the post-crisis market conditions. For example, in Mexico, the Farac II proposal and the proposed Ruta del Sol in Colombia have been divided into two and three projects, respectively, to reduce required investments. New road concessions in Eastern Europe are based largely (or entirely) on availability payments to improve project bankability. The National Highways Authority of India is downsizing investments in at least 48 projects whose calls for bids were unsuccessful between September 2008 and February 2009 (Izaguirre 2009).

Projects involving the rehabilitation of existing roads ('brownfield' projects) entail lower capital costs per kilometer and allow more accurate traffic forecasting than projects to build new roads ('greenfield' projects). Moreover, private investors are usually allowed to start charging tolls after few initial rehabilitation works are completed, which improves the financial viability of projects. Such projects may become favored in view of the post-crisis market environment. Governments may also look to multilateral and bilateral agencies to take a bigger role in the funding of private infrastructure projects.

More government support

In the 1990s, most road projects with private participation in developing countries had toll collection as the only source of revenues. By contrast, in 2001–2008 at least a third of such projects had some form of government support – either to complement or entirely replace revenues from user fees. Government support is justified when an economically feasible project does not offer, without such support, the financial benefits required to attract private concessionaires. The mixing of public and private funding to get projects completed is a way to leverage scarce public resources, not just replace them.

At least 13 developing countries provided government payments to private operators of transport projects between 2005 and 2008. In most cases, the amount of government support was determined through competitive tenders under which the

concessionaires were selected. In other cases, the amount of government support was defined by the government prior to the tender. With the exception of four projects, government payments have been used only in road projects. The exceptions are the South African Gautrain light rail concession, which was granted a US$3 billion government subsidy, the Ecuadorian Manta port concession, which obtained a US$55 million subsidy, the Indian GMR Hyderabad International Airport BOT, which received a US$25 million capital grant, and the Peruvian Regional Airport Network Group I concession, which was granted government payments required to cover the actual gap between project revenues and cost (World Bank 2008).

How a government contributes financial support to a concession project, and how much it contributes, are often limited to what is required to attract private financing and promote the success of the project (Queiroz and Izaguirre 2008). Among the mechanisms governments use to support private financing include:

(1) *Shadow tolls*, paid to the concessionaire by the government on the basis of the volume and composition of traffic and not charged to motorists. This concept was created for design–build–finance–operate (DBFO) roads in the UK. The UK Highways Agency's objectives for each DBFO project include (1) to ensure that the project road is designed, maintained, operated safely, and satisfactorily so as to minimize any adverse impact on the environment and maximize benefit to road users; (2) to transfer the appropriate level of risk to the private sector; and (3) to promote innovation, not only in technical and operational matters but also in financial and commercial arrangements. Mexico has used shadow tolls in several recent contracts (Mexico 2006, 2008). Shadow tolls are also used in such countries as Finland, Portugal, and Spain. However, depending on the number of projects under this regime, this concept, over the long term, may increase government budgetary commitments beyond their financial capability, as was the case with Portugal. As a result, the government of Portugal decided to make an effort to convert existing shadow toll projects into real tolls.
(2) *Availability fee* (also called availability payment or annuity), paid to the concessionaire by a government on the basis of the availability of required capacity (e.g. number of lanes in acceptable condition), regardless of traffic volumes. An inherent risk of such an approach is the potential overdesign of projects because payments to the private sector are not linked to road use. India has used availability payments (or annuities) in some of its recently awarded road projects. Some countries have used availability payment in combination with actual toll revenues. In Poland, for example, revenues for road concessionaires come from both tolls and availability payments. In Peru, the Interoceanic Highway contracts awarded in 2006 include periodic payments from the government to complement toll revenues. Latvia was expected to award its first PPP highways contract in 2010, to be based on availability payments.
(3) *Capital grants*, or subsidies, to cover part of the construction cost. Where toll revenues would not be sufficient to recover the full construction cost of a project, reducing the privately financed construction cost may make the project financially attractive to the private sector. Colombia, India, and Mexico, for example, have offered capital grants since 2002. The grants were

usually determined through the competitive bidding process used to select the concessionaires. Despite the fact that a capital grant was considered for the St Petersburg Western High-Speed Diameter motorway in the Russian Federation, the project was unable to attract sufficient competition and is being restructured.

(4) *Minimum traffic or revenue guarantees*, in which a government pays the concessionaire compensation if traffic or revenue falls below a specified minimum (for example, 90% of the expected traffic volume). In Spain, for example, the compensation is 50% of the shortfall in revenues. Conversely, if revenues are higher than forecast, the concessionaire shares the surplus with the government, also on a 50% basis. Countries such as Chile, Mexico, and Russia have offered minimum revenue guarantees in an effort to increase their capacity to attract private investors for road projects, while Brazil has not included such guarantees in its road concessions. Nevertheless, Brazil has been successful in attracting substantial private investments for roads. From first concessions granted in 1995, the Brazilian Government worked continuously on the enhancement of concession agreements recognizing that good governance is a key for attracting private capital to the road sector (Amorelli 2009).

Other forms of public support to private projects are also available, such as partial risk guarantees like those offered through the World Bank guarantee facility.

The distribution of risks between the public and private sectors varies with the form of public support. For both actual tolls and shadow tolls, for example, the private investors assume demand (traffic volume) risk, but this risk is smaller under shadow tolls because traffic volumes are not subject to the effect ('elasticity') of toll rates. For availability payments, demand risks remain with the public sector, while the main risks assumed by the private partner are construction risk and those associated with road performance during implementation of the contract.

For both shadow tolls and availability fee regimes, the concessionaire is paid by the government over the project's operational life. Even though it can be argued that the private sector finance of road projects is more expensive (i.e. higher cost of borrowing) than the public financing, it should be taken into the account that, in the case of PPP contracts, public sector budgetary expenditures are spread over the project's life instead of immediate expenditures (Yescombe 2007). Under strict budgetary situations, government options may become 'PPP project or no project.'

Estimating minimum toll rates

Balancing the affordability and sustainability of projects with attractiveness to the private sector usually requires estimating a minimum toll rate that, while affordable to prospective road users, will be capable of providing concessionaires with sufficient revenues to yield acceptable returns on their investments. All other things being equal, this rate depends largely on the construction cost and traffic volumes (Queiroz 2007). Estimating such toll rates for different PPP projects can be largely facilitated when an appropriate financial tool is available.

The 'Toolkit for PPP in Roads and Highways,' developed by the PPIAF and World Bank (2009), has the main objective of providing a tool to policy-makers from transition and developing economies with some guidance and resources to design

and implement PPP projects in the roads subsector. (The Toolkit is available at: http://www.ppiaf.org/documents/toolkits/highwaystoolkit/index.html.) The Toolkit includes a financial simulation tool (in two forms, graphical and numerical) that can assist policy-makers and technical specialists to review the financial feasibility of PPP projects in highways. (The financial model is available at: http://www.ppiaf.org/documents/toolkits/highwaystoolkit/6/financial_models/index.html.)

Several assumptions are made regarding hypothetical highway projects, as indicated in Table 1, to estimate the minimum toll rate to attract private investors. The Toolkit financial tool can assist in estimating various financial parameters, such as the financial internal rate of return (FIRR) of the project and the return on equity (ROE), for different toll rates. By changing the toll rates, it is possible to identify the minimum rate that satisfies the financial constraints included in Table 1. Setting the appropriate level of such constraints depends on the project and individual country parameters. For example, under conditions of higher risks, private investors and lenders may require a higher rate of return and loan coverage ratios.

The results of the analysis carried out using the Toolkit financial tool and the parameters shown in Table 1 are given in Figure 3. The horizontal axis represents construction costs and the vertical axis represents minimum required toll rates. This minimum required toll rate should be interpreted as the toll rate to be paid by an average vehicle, i.e. the weighted average toll rate per vehicle.

A review of toll rates adopted in several countries indicates that a toll rate structure based on the number of axles of trucks and buses is commonly used (IBTTA 2010). Several countries simply multiply the rate for a passenger car by the number of axles of a truck (or bus) to compute the toll rate for such vehicle. This is the case, for example, for all the federal highway concessions in Brazil, as detailed in the concession contracts published by the Brazilian Agency for Land Transport.

Table 1. Basic assumptions used to estimate minimum required toll rates for a PPP project to attract private investors.

A. Project parameters
Concession term = 25 years
Construction cost = US$1 million per km to US$8 million per km
Operation costs = US$500,000 per km per year (no variable costs)
Equity = 30% of the construction cost
Government subsidies to the capital costs = 0
Initial traffic = 5,000 vehicles per day to 40,000 vehicles per day
Traffic growth = 3% per year
Inflation = 6% per year
Value added tax (VAT) = 18%; Corporate tax = 18%
B. Loan terms
Nominal interest rate = 10% per year
Grace period = 4 years; Repayment period = 14 years
C. Financial constraints
Financial internal rate of return of the project (FIRR) $\geq$12%
Return on equity (ROE) $\geq$16%
Loan life coverage ratio (LLCR) $\geq$1.2
Annual debt service coverage ratio (ADSCR) $\geq$1.2

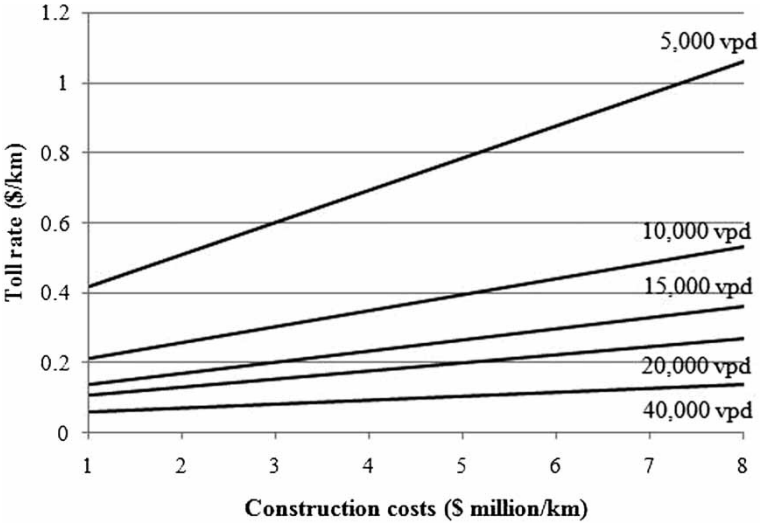

Figure 3. Minimum toll rate required to attract private sponsors as a function of construction costs and average annual daily traffic (AADT) in vehicles per day (vpd).

Assuming that the traffic on a given road, for tolling purposes, is comprised of cars, trucks, and buses, the weighted average toll rate (WATR) per vehicle can be expressed as:

$$\text{WATR} = (\%C * TRc + \%T * TRt + \%B * TRb)/100 \quad (1)$$

where $\%C$ is the percentage of cars; $\%T$ is the percentage of trucks; and $\%B$ is the percentage of buses in the traffic flow. *TRc*, *TRt*, and *TRb* are toll rates for cars, trucks, and buses, respectively.

Following the assumptions shown in Table 1, if the initial traffic volume (AADT) is, for example, expected to be 20,000 vehicles per day, and the construction cost US$2 million per kilometer, the minimum toll rate required to attract private sponsors would be US$0.13 per vehicle kilometer (from Figure 3). In this case, using the Toolkit financial model, the FIRR of the project is 15.3%, ROE is 23.5%, ADSCR is 1.28, and LLCR is 2.0.

Furthermore, assume that (1) the traffic composition is 70% cars, 28% trucks, and 2% buses; and (2) the relationships between toll rates are $TRt = 4^* TRc$ and $TRb = 2^* TRc$. Then, from Equation (1), the minimum toll rates required to attract private investors would be estimated as U$0.07 per car km, US$0.28 per truck km, and US$0.14 per bus km. Such toll rates are comparable with toll rates adopted in several countries. For example, the average toll rate for highways in USA for passenger cars is about US$0.06 per km (Holguin-Veras, Cetin, and Xia 2006); in Poland, the average toll rate on the A4 motorway in the first half of 2008 was €0.055 per car km, or about US$0.07 per car km (Carpintero 2010), and in Serbia the average toll rates are €0.067 or about US$0.085 per car km.

As can be seen in Figure 3, the minimum required toll rate, *ceteris paribus*, is highly sensitive to traffic volumes, which have to be forecast for any proposed toll road. Bain (2009) compiled a database of predicted and actual traffic usage for over 100 international, privately financed toll road projects. The findings suggest that toll

road traffic forecasts are characterized by large errors and considerable optimism bias. Consequently, Bain recommends that financial engineers need to ensure that transaction structuring remains flexible and retains liquidity such that material departures from traffic expectations can be accommodated.

Tolling is economically efficient, as it prices an overused resource – crowded roads. Nevertheless, tolls are politically sensitive (like fuel taxes). Indeed, in some countries tolls may not be viable. In such cases, shadow tolls or availability payments could be considered as possible options to launch a PPP program for roads. However, these alternatives do not lead to any new source of revenue to the roads subsector. They are usually financed from the country's budget, becoming in fact a long-term budgetary liability. Considerable care should be exercised in launching non-toll road concessions, so as to avoid overburdening a country's budgetary system in future years. As an example, the shadow toll program in Portugal may have contributed to the country's recent financial difficulties.

Affordable toll rates through construction subsidies

The previous section described a means to estimate the minimum toll rates required to provide sufficient financial return to private investors. Depending on the local social, financial and economic conditions, such toll rates may not be affordable by road users. This section discusses how government's support, through subsidies to the construction costs, can lead to more affordable toll rates. While these subsidies will not change the financial internal rate of return of the project (which is independent of the financial structure of the project), increases in subsidies will increase the other financial parameters (e.g. ROE, ADSCR, and LLCR), making the project financially stronger for equity investors and potential lenders.

An analysis of the impact of subsidies on the minimum required toll rate has been carried out using the financial tool of the aforementioned 'Toolkit for PPP in Roads and Highways'. The results are shown in Figure 4. The horizontal axis represents the expected AADT for the given project (in the first year of operation) and the vertical axis represents minimum required toll rates. The parameters shown in Table 1 were also used for this analysis, except for (1) the construction cost which was assumed to be fixed at US$2 million per km, and (2) government subsidies to the capital costs which were assumed to be 0%, 25%, and 50% of the construction cost, respectively. As noted above, financial targets that were considered in this analysis were ROE, ADSCR, and LLCR.

As expected, government subsidies can reduce the minimum toll rate required to attract private investors for a road project. For example, if the initial AADT is estimated to be 20,000 vehicles per day and the construction cost US$2 million per km, the minimum weighted average toll rate (WATR) to attract private investors would be (1) US$0.13 per km if there are no subsidies, (2) US$0.11 per km with 25% subsidies, and (3) US$0.10 per km with 50% subsidies. In summary, it was found that, for the given example, WATR can decrease from 11% to 18% with government subsidies of 25%; and from 22% to 29% with government subsidies of 50% of the construction cost.

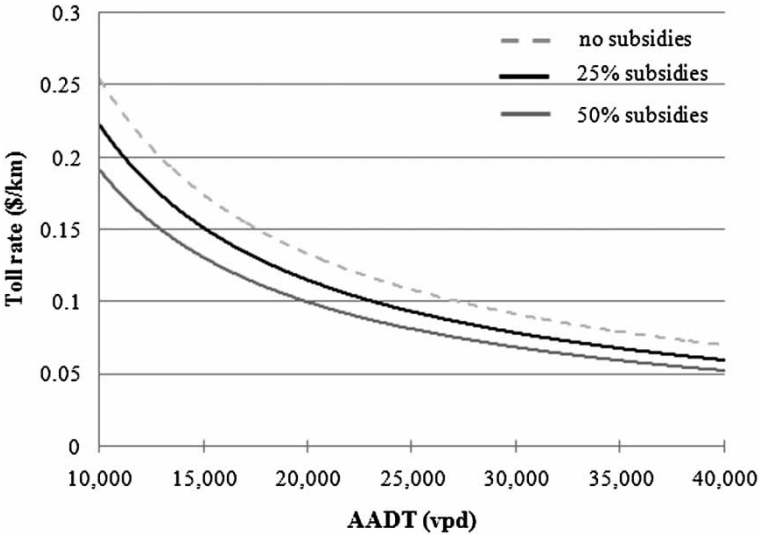

Figure 4. Minimum toll rate required to attract private sponsors as a function of subsidy to construction cost and average annual daily traffic (AADT).

The need for good governance

Because road concessions have monopolistic features, good governance in managing them is essential to ensure that the private sector's involvement yields the maximum benefit for the public. Good governance in this case requires (1) competitively selecting the strategic private investor, (2) properly disclosing relevant information to the public, and (3) having a regulatory entity oversee the contractual agreements over the life of the concession (Queiroz 2009).

Competitive bidding

The competitive selection of concessionaires, which is considered essential for economy and efficiency of the selection process, involves public advertisement, invitation to bid, bid evaluation, and award of the concession contract to the candidate that provides the best offer (World Bank 2004). While competitive selection of the private investor or operator is usually the preferred approach, sometimes private companies approach governments with new project ideas, typically called 'unsolicited proposals.' Such proposals often become controversial if governments negotiate the project rights directly with the original proponent without sufficient transparency or competing proposals. To avoid those situations, some countries have developed effective systems to channel unsolicited proposals into processes that incorporate transparency and competition (Hodges and Dellacha 2007).

Governments should provide a clear explanation of goals, priorities, and specifications to bidders in order to avoid long and expensive explanation processes for tender documentation or for the negotiation phase once the preferred bidder has been selected (World Bank 2009). Providing transparency in the bid evaluation process helps ensure that all bidders are treated identically. During implementation

of the concession, renegotiations may raise opportunities for corruption. In order to avoid or reduce the need for renegotiation, the concession contract could provide flexibility in the risk sharing to allow adjustments in cases of external factors (e.g. a substantial reduction in traffic volumes because of economic downturn). The contract could also specify under which conditions renegotiation could be initiated, and how the process would be managed in case an agreement is not achieved.

Disclosure of information

Full disclosure of concession agreements, an indication of good governance, helps ensure that the users know what to expect from the facility under concession, thus increasing transparency in the role of the regulator. Nevertheless, not all concession contracts are open to public scrutiny. In one country in Eastern Europe, the main text of a concession agreement was published but key annexes including financial and technical obligations of the concessionaire were not open to the public. In a Latin American country, the full final draft of the concession agreements were published, but the signed version was kept confidential. As a result, potential last-minute negotiations conducted 'behind closed doors' between the successful bidder (i.e. the concessionaire) and the highway agency responsible for the project, if inserted in the contract, were not made available to the public or to the other contenders in the competitive bidding process. Full disclosure, in every case, increases accountability of both the concessionaire and the regulator.

Regulatory oversight

More than two centuries ago, Adam Smith (1776) wrote that 'a high road, though entirely neglected, does not become altogether impassable. The proprietors of the tolls upon a high road, therefore, might neglect altogether the repair of the road, and yet continue to levy very nearly the same tolls.' To avoid such situations, which might occur even today, many countries have established regulatory agencies that monitor the performance of roads under concession. For example, in 2001 Brazil established the National Agency for Land Transport, which, *inter alia*, monitors federal road concessions.

Road concession contracts typically include required standards for construction, operation, maintenance, and toll collection. For monitoring the quality of the road during the life of the concession, several indicators of condition are usual – such as roughness, skid resistance, luminescence of pavement markings, and the presence and condition of signs, lighting, and other safety features. Performance on these indicators that falls outside the boundaries of acceptability may lead to penalties for the concessionaire.

Performance standards to be met by the concessionaires, when clearly defined and fully disclosed to the public, will contribute to good governance. Road users, who also have a stake in monitoring road conditions, will help guard against corruption or irresponsible behavior by the concessionaire or the inspecting agent. For example, by avoiding situations where the concessionaire underperforms but the inspector 'signs off' anyway.

Conclusions

This paper has reviewed recent trends in financing road projects with private participation in developing and transition economies, as well as their policy implications. Transition and developing countries now have a vast experience with road concessions, having implemented 606 road projects with private participation during the period 1990–2009. These projects, involving investment commitments of US$129 billion, covered highway, bridge, and tunnel facilities. Despite the impact of the global economic crisis, there has been a continued interest in private investments in roads. A procedure to estimate the minimum toll rate required to make a project attractive to private investors, with or without government subsidies, was also demonstrated.

Driving the revival prior to the crisis was the rising demand for transport infrastructure, driven in turn by strong economic growth in many developing countries. In addition, the revival was greatly facilitated by the willingness of governments to provide support to attract the private sector, such as through capital grants, availability payments, and guarantees. The mixing of public and private funding to get projects completed is a way to leverage scarce public resources, not just replace them. Nevertheless, when providing guarantees, governments need to be aware of the potential costs of contingency liabilities.

Moreover, the monopolistic features of road concessions mean that good governance is essential to ensure that the private sector's involvement brings the maximum benefits to the public. Here, good governance requires competitive selection of the strategic private investor, regulatory oversight of the contractual agreements, and proper disclosure of relevant information to the public.

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