CDDRL
WORKING PAPERS

Number 100
September 2009

Distribution of Highways Public Private Partnerships in India: Key Legal and Economic Determinants

TCA Anant
Delhi School of Economics,
University of Delhi

Ram Singh
Delhi School of Economics,
University of Delhi

Center on Democracy, Development, and The Rule of Law
Freeman Spogli Institute for International Studies

Additional working papers appear on CDDRL's website: http://cddrl.stanford.edu.

Paper prepared for the Law and Economy in India Project at the Center on Democracy, Development, and The Rule of Law.

Updated January 29, 2010.

Center on Democracy, Development,
and The Rule of Law
Freeman Spogli Institute for International Studies
Stanford University
Encina Hall
Stanford, CA 94305
Phone: 650-724-7197
Fax: 650-724-2996
http://cddrl.stanford.edu/

About the Center on Democracy, Development and the Rule of Law (CDDRL)

CDDRL was founded by a generous grant from the Bill and Flora Hewlett Foundation in October in 2002 as part of the Stanford Institute for International Studies at Stanford University. The Center supports analytic studies, policy relevant research, training and outreach activities to assist developing countries in the design and implementation of policies to foster growth, democracy, and the rule of law.

Distribution of Highways Public Private Partnerships in India:
Key Legal and Economic Determinants

TCA Anant
anant@econdse.org
http://www.econdse.org/faculty/anant/anant.htm

and

Ram Singh
ramsingh@econdse.org
http://www.econdse.org/faculty/ram/ram.htm

Department of Economics
Delhi School of Economics
University of Delhi
Delhi 110007 INDIA

ABSTRACT

In this paper, we have studied the performance of the Public Private Partnerships (PPPs) programme of Government of India, for development of highways and expressways. The focus of the study is on the following questions: Why have some projects attracted private investment while others have not? Why only a few states have attracted PPPs, while some others have completely failed to do so? We have also discussed some other issues related to the PPP policy and its limited success. We have provided a set of legal and economic variables that explain the skewed distribution of PPPs across projects as well as across the states. We have shown that the richer states have attracted more PPPs than the poorer ones. Besides, the probability of PPP is higher for projects located on national highways connecting richer states, and those located closer to mega cities. Moreover, *ceteris paribus,* the quality of governance, in terms of the level of property rights protection, in a state is also a significant explanatory variable. Empirical evidence in support of these claims is conclusive and robust. In the light of our findings, we have answered the following additional questions: Is PPP a viable and desirable public policy for development of infrastructure in poor states? What are the lessons emerging from the Indian experience with PPPs so far? Our dataset includes all of the highway and expressway projects that have been or are being developed as a part of the National Highways Development Project (NHDP).

Key Words: Public Private Partnerships, PPPs, BOT, Contracts, Efficiency, Roads, National Highways, India, NHDP

AKNOWLEDGEMENT: This paper has benefitted from helpful suggestions made by Lee Benham, Bibek Debroy, Ashima Goyal, Tom Heller, Neha Jain, Erik Jensen, Dilip Mukherjee, Megha Pradhan, and Jaivir Singh. We would also like to thank the participants of the *Stanford Conference of Law and Development in India* held at the *Center for Policy Research*, New Delhi, the Seminar participants at the *Center for the Study of Law and Governance*, JNU, the *IGIDR*, Mumbai, and at the ISI, Delhi for comments and helpful suggestions. We are grateful to the National Highways Authority of India for helping us with the required data. Mr. Pravin Tyagi and Mr. Sanjay Aggarwal of NHAI readily helped us whenever needed. Discussions with Mr. K.S. Money and Mr. M.P. Sharma helped us in better understanding of several aspects of PPP policy and other relevant issues. Atika Gupta provided an excellent research support and helpful suggestions. Sneha Bakshi, Kaushik Sarkar and Rajendra Kumar helped us with an extensive data collection. Finally, the research support provided by the *Center on Democracy, Development, and the Rule of Law* (CDDRL), *Stanford University*, is gratefully acknowledged.

1. Introduction

Private funding of infrastructure has become a mainstay of the Government of India's policy toward infrastructural development. The success of the ongoing eleventh five-year plan for infrastructure critically depends on private investment. This is especially true of the road sector. The private sector is expected to finance more than eighty percent of the ambitious National Highways Development Project (NHDP), undertaken to develop highways and expressways across the country.[1] In this paper, we examine the performance of the Public Private Partnerships (PPPs) programme of the Government of India, for development of national highways and expressways. We study various issues related to the PPP policy and its limited success. However, the focus of the study is on investigating the causes behind a highly skewed distribution of PPPs across projects and across the states/provinces. Specifically, we address the following questions: Why have some highway projects attracted private investment while many others have failed to do so? Why some of the states have attracted more PPPs, while some other states have totally failed to draw the investors? In view of our findings, we have answered the following questions as well: Is PPP a viable and desirable public policy for development of infrastructure in poor states? What are the lessons emerging from the Indian experience with the road sector PPPs so far?

Beside the above issues, the PPP programme triggers several other queries too. To put the issue in perspective, in a typical public private partnership scheme, the government contracts out the concessions/rights to build, operate and maintain parts of highways, flyovers, underpasses, etc., to private sector. The private partners are required to fund the project upfront. The ownership of the road assets generated or developed through PPP is returned back to the government, at the end of the contract period. In India, the PPPs on national highways are sponsored by the National Highways Authority of India (NHAI) on behalf of the Ministry of Roads Transport and Highways, Government of India. Mainly two forms of contracts are used to form PPPs in roads; namely BOT (build, operate and transfer) Toll and BOT Annuity.[2]

One set of issues concern the efficiency properties of these contracts and the governing laws. We have undertaken economic analysis of the PPP contracts and the relevant laws to determine their efficiency properties. We have argued that while the governing laws have several desirable and efficiency enhancing features, the enforcement of these laws has been far from satisfactory.

The government has taken several measures to attract private investment in roads, apart from streamlining the contractual framework for the PPPs. The next section provides a detailed discussion on the measures that have been undertaken over the last ten years. The question is whether the policy incentives have had the intended effect on investors or not. Our analysis shows that legal changes and the other policy initiatives, especially

[1] Rs 2,200,000 million crore programme aims to upgrade 50,000 kms of national highways by 2015. See Appendix A.

[2] PPPs can be of several types, like BOOT, DBOT, BOO etc. These forms differ in the control rights that are delegated to the private investors. For more on types of PPPs, see Yescombe (2007), and Grimsey and Lewis (2004).

those undertaken during 2005 and 2006, have had a favorable impact on private sector participation. Since 2005, the number of PPPs has gone up significantly. However, we show that several other factors like what we have termed as the 'learning effect' and the economic boom have also contributed to the attractiveness of highway projects for the investors.

Coming back the central issues, there is something very striking about the distribution of PPPs on national highways; it is extremely skewed. It is important to clarify the context behind this observed outcome. Since 1999, national highways are being upgraded under the National Highways Development Project. As mentioned above, the NHDP is an ambitious programme and is being implemented in seven phases. The most of the works for Phase I have already been completed. Contracts for Phase II have also been awarded and are being implemented. The process of awarding of contracts for Phases III and V is in the full swing, and work is on for the awarded contracts. The national highways covered under each of Phase I, II, III and V span across most states in the Union of India. Therefore, the contracts for upgradation of national highways have been offered to the investors in almost every state. Wherever possible the NHAI has tried to attract private investment by offering PPP contracts. As per the policy, initially a project is offered to investors for upgradation on PPP basis. Public funding is provided, only if the project fails to attract private investment. A look at the geographical distribution of PPPs shows that while the investors have shown preference for some states, they have almost totally neglected some other states. That is, most of the projects located in some select few states have been taken up on PPP basis. In contrast, in some other states very few projects have attracted private investment. On its face, this outcome may appear somewhat intriguing. Since, the NHDP is sponsored by a single agency, that is, NHAI. Moreover, this programme is governed by the laws and policies that are uniform across the country.

While exploring the answers to the above questions, it is important to remember that PPP projects are long-term projects and face several risks such as – political, construction, maintenance, commercial, and financial risks, among others. The profitability or otherwise of investment in PPP projects depends on several factors such as traffic density at the project highway, the toll rate, availability of supporting infrastructure, etc. These variables differ from state to state and project to project within a state. The question is whether such economic variables can explain the above discussed skewed distribution of PPPs. We will introduce several possible economic variables and analyze the extent to which these variables can help explain the observed distribution of PPPs across projects and the states.

Besides, we examine whether the law, the regulatory framework for PPPs and other legal factors also have some explaining to do. Legal and regulatory risks are important considerations for the investors.[3] Therefore, depending on whether the governing contract laws and regulatory rules are 'good' or 'bad', they can encourage or discourage the investors. In fact, there are other *local* legal factors that have bearing of the risk-return profile of PPP projects. For instance, the state governments have a crucial role to play in the implementation of the PPP contracts. Starting from land acquisition to shifting of utilities to providing police protection at the project site, the support of the state

[3] See Thomas, Kalidindi, Ananthanarayanan (2003) and Quiggin, (2005).

government is very crucial for successful implementation of the PPP projects. The situation of law and order in a state also has significant bearing on the profitability of a BOT contract. If law enforcement and protection of property rights are poor, a concessionaire may fail to realize all the benefits from the toll contract, since in that case users of the facility may not pay the toll fee. Alternatively, the concessionaire may be forced to employ private security agents. The latter option is a costly affair. Therefore, private participants may be reluctant to enter into BOT contract in a state where law enforcement is perceived to be poor. Moreover, whenever they enter into a contract in such states, they are likely to opt for annuity rather than a toll contract. That is the issue is whether the protection of property rights in a state an important consideration for private participants. We investigate and answer this question in affirmative.

To sum up, in this paper we have analyzed the performance of PPP policy in roads in India. We have provided project-specific and state-specific legal and economic factors/variables that can explain why some road projects have attracted private investment and not others. These variables are: the level of local infrastructure, project cost, time-lapse since the introduction of the policy, distance of the project from the nearest mega-city, number of transport vehicles in the state in which project is located, per-capita GDP of the state, per-capita GDP of the neighbouring states, level of property rights protection, and the legal and policy change dummy. We have examined the empirical significance of these variables. In order to do so, we have considered all of the NHDP projects undertaken by the NHAI for the upgradation of national highways. We have collected data on all the projects completed or awarded/approved from 1997 to July 2009. This set includes 405 projects including PPP as well as non-PPP projects. Our dataset is by far the largest and richest for any study on the subject.

In Section 2, we introduce the PPP policy for highway projects and discuss various related issues. Also, account of the need and the evolution of PPP policy in India are provided. In addition, an efficiency analysis of the governing laws is undertaken. Readers familiar with the policy or not interested in the issues covered can safely skip this section. In Section 3, we present an overview of the performance of the policy. In Section 4, we pose the research questions in the backdrop of the observed performance of PPPs. In addition, we propose a model and its explanatory variables along with the relevant hypotheses. Section 5 provides details of regression results. Finally, in Section 6, we draw policy conclusions that follow from our empirical analysis.

2. Public Private Partnerships in Roads: *The Law and the Economics*

2.1 *The Raison d'être*

Roads are the dominant form of surface transport in India and national highways account for forty percent of the traffic.[4] However, Only 14 percent of national highways are four or six-laned. During the last several decades vehicle population in India has grown at a

[4] The national roads carry about 65 percent of freight and 80 percent of passenger traffic. Highways/Expressways constitute about 2 percent of all roads but carry as much as 40 percent of the road traffic.

very high rate.[5] In contrast, the road network has expanded at a rather slow rate. As a result, the road infrastructure has been stretched to its extreme limits. Compared to China, its major economic rival, Indian road network is rather poor.[6] China invests as much as 10 times more on roads than India does. There is a wide and growing gap between the demand and the supply of road infrastructure. An extensive expansion of road network is needed to fill this gap. Moreover, the developmental needs of the economy also require a better road infrastructure (See Kumar *et al*, 2007). During the last half a decade, Indian economy has registered an unprecedented growth rate. In order to sustain this growth, there is a pressing need for an extensive and efficient infrastructure. However, given the fiscal constraints, the government lacks resources as well as expertise to provide the required infrastructure.[7] In such a scenario, the central government has decided to encourage public private partnership. According to the eleventh five-year plan, the private sector's share is expected to be as much as one third of the planned investment of $ 500 billion for infrastructure.[8]

Under a PPP the public as well as the private sectors can contribute towards the provisions of public goods or services, such as roads, railways, ports, airports, etc. The government can provide land for the project site, regulatory clearances, and a concession right to the contractor/concessionaire. The private sector, on the other hand, is expected to invest funds during the construction and maintenance phases of infrastructure projects. Therefore, PSP can supplement public investment in road infrastructure.

Besides, as compared to the public sector, private sector firms have a better structure of incentives and sanctions. Therefore, PSP has potential to bring cost efficiency in the delivery of infrastructure. It is argued that private firms optimize resource allocation among the initial construction phase and the maintenance and operation phases later on. The argument goes that as a result, compared to traditional government funded infrastructure projects, instances as well as magnitudes of time and cost overruns are significantly lower for PPPs.[9] Moreover, private firms have greater flexibility in adjusting its resources (personnel, equipments and materials) to constantly changing circumstances. They also have stronger motivation to earn good returns on the investment. There are claims that private firms can manage the demand and supply curves in a more rigorous way than the public sector. Therefore, wherever there is scope for financing a project through direct user-fee, investors can use toll-fee more efficiently to recoup their money. In addition, it is argued that a developing country like India can benefit from participation of foreign firms in infrastructure. Foreign firms are expected to possess superior construction techniques, equipments and cheaper finance.[10] To sum up,

---

[5] Since 1980, while the population size of India has doubled, the number of vehicles has gone up 15 times (See Bose, 2006).

[6] During last decade China has made huge investment in roads at national, provincial as also at village levels. For details see Ojiro (2003).

[7] In fact, investment in infrastructure as a percentage of the GDP has been declining over the years. Between 1991-92 to 2002-03 capital formation in infrastructure came down from 6.34 to 3.5 percent of GDP. See Rakshit (2009).

[8] See Eleventh Plan document.

[9] (See Donahue, 1989; Panayatou 1997; Mott MacDonald, 2002; National Audit Office, 2003; PwC (2005); Infrastructure Partnerships Australia, 2007).

[10] Here is a quote from a report of the ADB: "The efficient use of resources, availability of modern technology, better project design and implementation, and improved operations combine to deliver

there is scope for the government to utilize efficiency and skills of private sector in providing public services.

Technically speaking, the above mentioned potential benefits of PSP follow from two sources: 1) the better incentive structure within private firms, and 2) unbundling and shifting of some risks from the public to the private sector. In some cases, this reallocation of risk has the potential to lower overall costs for the society (See Quiggin, (2005) and Sadka (2006).[11]

2.2 *Policy Initiatives*

The national highways are owned by the Government of India. The National Highways Act, 1956, bestows the rights regarding construction, maintenance, operation and tolling of highways only to the central government. The Act has been amended in 1995 with a view to attract private investment in road development, maintenance and operation. With this amendment, private investment in infrastructure via PPPs has become a possibility. This amendment has allowed government to provide concession to a private 'person' to invest in NH projects, levy, collect and retain fee from road users. Also a private person can be allowed to regulate traffic on such highways in terms of provisions of Motor Vehicle Act, 1988.

Therefore, the enabling legal framework has been in place for a decade and a half. However, the first policy framework for PPPs was introduced in 1997 as decision of the Cabinet of the Central Government.[12] It provided guidelines for toll based BOT projects. Later on, in order to attract private investment, the cabinet committee on economic affairs approved the first phase of the NHDP in December 2000. It was agreed by the committee that road projects under NHDP will be awarded on BOT Toll and BOT Annuity basis, to the extent possible.[13] The highway PPP policy essentially provided for two kinds of contracts – BOT toll contracts and BOT annuity contracts.

The BOT toll contracts are of various types, for example, BOT, DBOT, BOOT etc. The latter types are designed so as to provide greater flexibility to the investors. Under a BOT toll contract, the concessionaire recovers his investment by way of charging toll-fee from the road-users. Therefore, under these contracts the concessionaire bears not only the construction and the maintenance risks but also the entire commercial risk with respect to toll income. Under a BOT annuity contract, the concessionaire is assured a pre-agreed return on his investment. Therefore, under a BOT annuity contract, while the

---

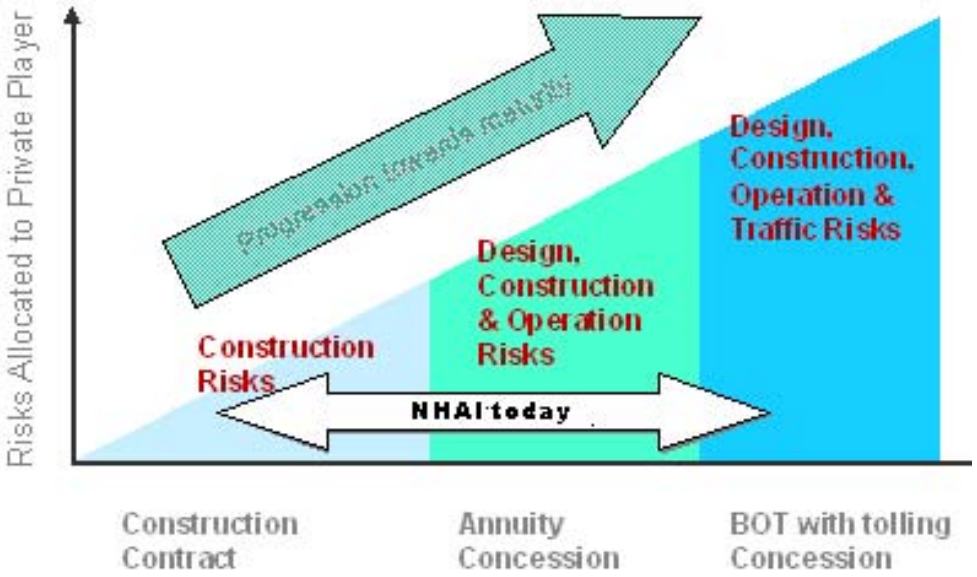
efficiency and effectiveness gains which are not readily produced in a public sector project." See ADB (2006, p. 22).

[11] It is pertinent to mention here that PPPs have several direct and indirect costs associated with them. For one, the cost of raising funds from market is higher for private firms than for the government; therefore the direct costs of financing projects are higher under PPPs. Two, the government is required to make annuity payments to investors or forgo the right to charge fee from the users. Moreover, since private investors are risk averse they demand higher returns on their investment.

[12] For an informative account of policy initiatives towards market based financing of road infrastructure see Haldea (2000), also see Haldea and Mohanty (2003). On PPP policy for road sector see Haldea (2008).

[13] See Report of the Core Group, Planning Commission (2006 a). For a critical review of the PPP policy see Rakshit (2009).

concessionaire bears the construction and the maintenance risks, the entire risk with respect to toll income is borne by the government.



The initial policy initiatives, however, did not yield the desired results. To illustrate, out of the total 7507.97 Kms of national highways marked under first phase, only 1349.72 were upgraded through PPP contracts. The failure of PPP initiatives was not surprising. Several constraints hampered the prospects of PPPs. These included:

- Lack of an integrated institutional policy framework for project identification, development and implementation.
- Lack of coordination between various Government agencies involved in development and implementation of infrastructure projects.
- Inadequate availability of long term finance – both debt and equity- due to under-developed financial markets.
- Inadequate capacity in the public sector to prepare and implement PPP contracts.
- Inadequate capacity in the domestic private sector to meet technical and financial requirements of PPPs.

In 2005, the government decided to give a big thrust to PPPs. In a meeting chaired by the Prime Minister, it was decided that as much as 2100 kms of NHDP phase II and all other future projects will be taken up on BOT basis.[14] At the same time, the government knew that without addressing the capacity and institutional constraints this objective was difficult to achieve. So, in order to overcome the above constraints the government has launched the following initiatives.

Standardization of Bidding and Concession Documents: In order to ensure transparency in the process, the government has introduced model documents. Request for

[14] See Planning Commission (2006 a).

Qualification (RfQ) and Request for Proposal (RfP) documents have been prepared for small as well as large projects. There is two-stage competitive bidding for award of concession contracts. At the RfQ stage, short listing of bidders is done on the basis of their technical and financial capabilities. That is, the bidders who have the necessary technical skills and financial resources to implement the project are short-listed. The admissibility or otherwise of a bid is decided on the basis of the previous experience and the financial capabilities of the bidder. Doubtful, frivolous and unsuitable bids are screened at this stage itself. Bidders so selected are issued RfP documents for financial bidding. The objective of this stage is to select the best among the qualified bidders. An attempt is made to select the bidder who offers the best value for money to the public sector.

In addition, the introduction of the Model Concession Agreement (MCA) documents has gone a long way in streamlining and clarifying the PPP policy. MCAs have been prepared for BOT Toll, BOT Annuity and BOT operation and maintenance (O&M) contracts. MCAs along with RfQ and RfP documents have provided an integrated institutional policy framework for project identification, development and implementation. Since January 1, 2007, all contracts are awarded on the basis of the MCA.

India Infrastructure Finance Company Limited (IIFCL): In the Indian financial market, debts are generally available for duration of 7 to 8 years whereas infrastructure projects require much longer payback period. So, inadequate availability of long term finance, both debt and equity, is a serious problem facing investors. This is partly due to the fact that local pension and long-term debt markets are underdeveloped. To mitigate this problem the government set up the IIFCL in January 2006. IIFCL is allowed to refinance infrastructure loans by banks and FIs as well as lend directly, subject to a limit of 20 percent of the project cost. PPPs have overriding priority under IIFCL funding schemes.

Provision of Viability Gap Funding (VGF): Since not all high projects are commercially viable, the government has made provisions for VGF to provide capital grants for BOT toll projects. The VGF can be up to 40 percent of the project costs. It enables leveraging of private investments in the highway sector. The institutional structure to govern the scheme has been in place since August 2005.[15]

India Infrastructure Project Development Fund (IIPDF): A major reason behind lackluster performance of PPPs has been the non-availability of credible and bankable projects. Detailed Project Reports (DPRs) and Project Feasibility Reports (PFRs) are of poor quality and cannot be relied upon. This is because the public sector in India has little capacity to prepare quality project reports. It also lacks abilities to implement PPP contracts. At the same time, the bidders cannot be expected to prepare their own reports as the cost of transaction advisors for PPP projects is huge. Therefore, the government has decided to develop capacity in the public sector as to line up credible and bankable

[15] The provision of VGF was made in 2005, vide Notification F.No. 2/10/2004-INF dated August 18, 2005 of Ministry of Finance. However, the detailed guidelines for the financial support under this scheme were published in 2006. The guidelines were notified by Ministry of Finance vide O.M. No 1/5/2005-PPP dated January 12, 2006, and later were published by Planning Commission. See Planning Commission (2006 b).

projects that can be offered through competitive bidding. IIPDF has been set up with an initial contribution of Rs 100 crore.[16] It is meant to help meet project development costs of public sponsoring agencies of infrastructure projects, both at central as well as state levels. It can assist to meet up to 75 percent of the project development costs. The costs are recovered from the successful bidder.

Public Private Partnership Appraisal Committee (PPPAC): This high powered committee has been set up with an objective to reduce transaction costs, enhance coordination among ministries involved and ensure fast track approval of PPP projects.[17] It appraises high cost Central government projects. For low cost projects, it has issued guidelines that are the main reference point for the NHAI.

In addition, over the years, the government has offered several fiscal and other incentives to attract investors to road projects. The following are the additional salient features of the new PPP policy:[18]

- Declaration of road sector as an industry, to facilitate borrowing on easy terms and to permit floating of bonds.
- Longer concession periods (up to 30 years).
- Easier external commercial borrowing norms.
- FDI including foreign equity participation up to 100 percent in the highways is allowed for BOT projects. Foreign investors generally allowed to repatriate 100 percent profits.
- Provision of encumbrance free site for work, i.e. government bears expenses for land and pre-construction activities.
- MRTP provisions have been relaxed to enable large firms to enter the highway sector.
- Duty free import of modern high capacity construction equipments has been allowed.
- Treating housing and other development activities which are integral part of highway project, as a part of infrastructure, for the purpose of tax concession.
- 100 percent tax holiday for any 10 consecutive years out of 20 years after commissioning of the project.
- Financial institutions providing long term finance for road projects have also been given an incentive by way of deduction of up to 40 percent of their taxable income derived from financing these investments.

2.3 *Essentials of Concession Contracts*

Parties: The direct PPP contract concession is between the NHAI on behalf of the Government of India, and the Concessionaire. However, there are three parties to a contract: NHAI, Concessionaire and the State Government(s) of the state(s) in which the road facility is to be developed. Clauses 5, 6, 13, 17, 37 and 43 of the MCA specify the

[16] The fund was set up following an announcement by the Finance Minister in the Budget Speech for 2007-08.

[17] Secretary (Economic Affairs) is the chairman of the committee, and Secretary (Planning Commission), Secretary (Expenditure), Secretary (Legal Affairs), and Secretary of the sponsoring department, are the members.

[18] See GoI (2007).

entitlements as well as obligations of the parties. The main responsibilities of the state government are to acquire land for the project. The NHAI is required to help the concessionaire in getting regulatory clearances; such as forest and environmental clearances (Clause 6 of the MCA). The concessionaire has the obligation to meet all the project related deadlines, satisfy all of design and material related standards, and cooperate with the independent engineers who monitor the project (Clauses 5, 13 17 of the MCA).

Duration: Duration of the concession generally is 20 years including the construction period (assumed to be two years in most cases).

Risk Allocation: Contractual clauses provide for detailed risk allocation during all stages of the project. Clauses 2.1, 9.4, 13.2, 13.5, 15.4, 18.8, and 18.11 of the MCA deal with the details of risk allocation during the construction phase. Details of the allocation of financial and commercial risks are provided in Clauses 6 and 24.

*The Damage Measures***:** The contract provides for different damage measures for different violations of the contractual clauses. It employs what the law-and-economics literature describes as '*expectation damages'*, '*reliance damages'* and '*liquidation damages'*. For example, expectation damages are to be used if the central or the state government develops an additional toll way or a competing road that adversely affects the interests of the concessionaire. In that event the government is required to pay to the concessionaire, in compensation, a sum equal to the difference between the actually realized toll-fee and the projected/expected fee (Clauses 29 and 30 of the MCA). The compensation is to be made for the entire period of breach, that is, until the breach is cured. Reliance damages are used in case of material loss sustained by either concessionaire or the government. The party who is in the breach of contract pays all the direct costs borne by the other party. For certain other violations the contract explicitly provides for penalties which are very similar to the liquidation damages in nature.[19] For example, when the government doesn't provide the agreed land to the concessionaire within a pre-specified time, the concessionaire receives a pre-agreed fixed sum on a daily basis**.** (Clause 12).

Regulator: It is important to note that a PPP contracts are long-term and complex. This means that contractual disputes are possible. There can be unforeseen circumstances in which the concessionaire and the government may make conflicting claims regarding their entitlements and obligations. Therefore, there is a need for an independent regulator to verify the claims made by the parties. To this end, the MCA provides for an 'independent' engineer to monitor the progress of the project. Also, in case the government asks for a change in the scope of the contract, the financial implications of the required change have to be verified by the independent inspector (Clauses 12, 19 and 26). The appointment of the independent engineers is made by the NHAI for a period of three years.[20] The remuneration, cost and expenses of the independent engineer are

[19] These penalties are triggered in the event of deficiency in performance rather than in the even of contract termination. Perhaps that is why, the MCA does call these penalties as liquidated damages.
[20] The NHAI forms a panel of 10 firms or corporate bodies in accordance with selection criterion set forth in the schedule.

shared by both the parties. Moreover, all contractual disputes are governed by the Arbitration and Conciliation Act, 1996. The Act is based on the provisions of UNCITRAL Model Law for international commercial arbitration.[21]

2.4. *Efficiency of PPP Contracts*:

The structure of incentives and sanctions created by the contractual (MCA) clauses has several desirable and efficiency enhancing attributes.[22] The following features are notable:

- *Reduced Adverse Selection and Moral Hazard:* Provisions for suspension and termination of the contract induce the concessionaires to choose a project carefully as well as to avoid subsequent breach. The requirements of concession fee and performance security help in screening of fraudulent bidders. Besides, there are provisions of fines and penalties which can be invoked by the either party if the other party reneges on its commitment under the contract. These provisions avoid moral hazard during the implementation phase.
- *Avoiding Delays:* The time period of construction (generally assumed to be two years) is included in the concession period itself. An earlier completion of project enables the concessionaire to increase the total toll revenue from the project. In case of annuity contract, the concessionaire receives a bonus for an earlier completion. If there is any delay in the completion of the project, he is penalized in the form of reduced annuity payments. These along with the other above mentioned provisions penalties encourage the concessionaire to complete the project sooner and avoid time overrun.
- *Technology:* The above provisions also induce the concessionaire to use better technology in order to complete the project ahead of the agreed time. In addition, technological capabilities of the bidders are taken into account while selecting the concessionaire.
- *Flexibility:* The contract has provisions like cure period for delay in meeting deadlines. The contract also allows changes in the scope of the contract under certain circumstances. Besides, contract modification is also allowed in the events of any change in the relevant law or *force majeure*. These provisions help in increasing the flexibility of the contract.
- *Better Demand management*: Concessionaire has the sole and exclusive right to demand, collect and appropriate toll from users. Though toll rates are fixed by NHAI, annual revision of toll takes place. The concessionaire is fully compensated for inflation, which is measured by the WPI. The contract also allows the concessionaire at its discretion to levy, determine and collect a higher and discounted fee for the use of the facility during peak and off-peak hours, respectively.[23]
- *Efficient Risk Sharing*: Contract allocates risks to a party that is in a better position to bear it. For example, the government is in a better position to bear the risk associated with land acquisition and regulatory clearances. These risks are assigned to the

[21] The Model Law has the backing of the General Assembly of the United Nations.
[22] For studies on efficient management of Road PPPs see DeCorla-Souza, (2005) and Brown, Christine (2005).
[23] This option can be exercised from the 5th year on and after obtaining prior and written approval of the authority.

government. In contrast, the risks such as those related to construction and maintenance and financial risks are assigned to the concessionaire, who can bear these risks more efficiently.

In addition, the contract allows for regular monitoring by the government of the progress on the project. In order to enable the government to monitor the progress in terms of material standards and meeting of deadlines, the contract provides for the following:

- Submission of monthly progress report by an independent engineer.
- The concessionaire has to submit a concession fee which is on the basis of an ascending revenue–share.
- Concessionaire is also required to pay performance security which is seized by the Authority in case of default.

3. Performance of PPP policy

3.1 Overview:

As mentioned in the Introduction and Section 2, under NHDP, national highways are being upgraded. The programme has to be implemented in seven phases; Phases I-VII. While Phases I, II, III, V, VI and VII are to be executed by the NHAI, the Phase IV will be executed by the parent Ministry of Shipping, Roads Transport and Highways. Details of these phases are provided in Table B1 in Appendix B. So far, work has started only on Phases I, II, III and V. As on July *31, 2009* a total of 405 road projects have been undertaken for upgradation. Some of these projects have been undertaken on PPP basis; for the rest funding has been provided by NHAI, WB, ADB and JBIC. Table 1 provides year-wise break up of the number of PPPs that have come up on national highways. The first PPP on national highways was construction of a railway over bridge (ROB) at Kishangarh located in the Ajmer district of Rajasthan. This segment was formed in March 1998 on NH 8 and was developed on BOT basis. Since then the number of PPPs has been increasing gradually over the years. However, the rate of growth was rather dismal up to 2005 (See Graph 1). It has significantly picked up since then. Seemingly, the policy interventions made in 2005 and 2006 to woo private investment in road projects have had a desirable impact on the investors. Alternatively, the spurt in PPPs since 2006 might have been triggered by the exuberance generated by an unprecedented growth of Indian economy in the recent years. In the next section, we will investigate plausibility of these and other possible explanations for the growth and the distribution of PPPs across Indian states.

3.2 Profile of Concessionaires in PPPs

Table 2 shows nationality-wise break-up of PPPs on national highways. For example, out of a total of 109 PPPs, 43 have been formed by Indian firms. The table also provides nationality-wise break-up of the distance covered by PPPs on national highways.

TABLE 1: Growth of PPPs **(BOT Toll + BOT annuity + SPV[24])** on highways over the years

TIME	NO. OF PPP's	Cumulative no. of PPP's
1996	0	0
1997	0	0
1998	1	1
1999	2	3
2000	1	4
2001	4	8
2002	14	22
2003	2	24
2004	3	27
2005	2	29
2006	35	64
2007	21	85
2008	19	104
2009	5	109

Source: www.nhai.org and www.pppinindia.com as on 31, 2009.

As is clear from the table, many investors in PPPs are Indian firms. About forty percent of all PPPs have been formed by Indian firms; together accounting for about one third of the distance covered by all PPP projects. As far as foreign participation is concerned, it is dominated by Malaysian and American firms. In most cases of foreign participation, the foreign firm and an Indian firm form a consortium to bid for projects. The bidding rules have encouraged Indian firms to opt for joint venture with foreign firm(s). The rules for the Request for Qualification as well as for the final Request for Proposal stages provide weights to prior experience and financial soundness of the bidders. Foreign firms generally have longer experience and easier access to capital in international market. Therefore, a consortium of foreign and Indian firms stand better chances of qualifying the short-listing criteria as well as winning the bid. The following Table B1 in Appendix B shows the profile of major Indian players in PPPs.

[24] Under every PPP contract, two or more developers get together to form a project specific SPV, i.e., Special Purpose Vehicles. The contract is signed with the SPV. However, SPVs here refer to those contracts in which the (state) government is one of the partners. As far as the allocation of the risk is concerned, these contracts are similar to BOT toll contracts.

GRAPH 1: Growth of PPPs in Roads over the years

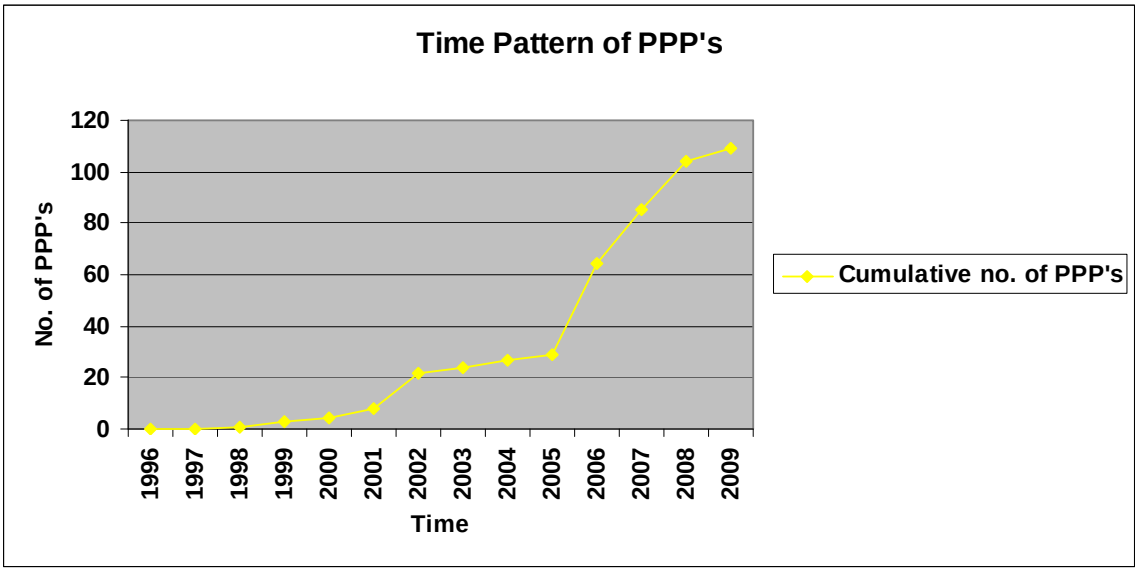


TABLE 2: Nationality-wise break-up of concessionaires in PPPs.

Nationality	No.of PPPs	Proportion of distance covered
India	45	0.32
Malaysia	15	0.15
USA	14	0.13
French	6	0.06
Italy	3	0.04
Korean	1	0.01
Spain	2	0.06
Singapore	1	0.04
UK	4	0.04
Dubai	1	0.03
Denmark	1	0.01
Canadian	1	0.01
China	1	0.00
Switzerland	1	0.00
Miscellaneous*	10	0.09
Others**	3	0.02
Total	**109**	**1.00**

** 1. Miscellaneous includes Indonesia, Germany and Philippines, among others.*
*** 2. Others include the projects for which the information on contractor is not available.*

3.3 Distribution of PPPs across States

National highways covered under Phases I, II, III and V span across most states in the union of India. Therefore, the upgradation work on NHs has been (is being) undertaken in most states. As was stated earlier, regardless of the state, wherever possible the NHAI has tried to award upgradation works on PPP basis. However, some states have attracted more PPPs than others. That is, investors have shown preference for some states over others. Table 4 shows the ranking of Indian states in terms of the number of PPPs attracted by them. As the table shows, Tamil Nadu, Andhra Pradesh and Maharashtra are the favorite states; together these states account for as much as 45 percent of all PPPs in the country. States like Assam, Jharkhand, Bihar, Orissa and Kerala, on the other hand, have failed to attract private investment in the form of PPPs.

However, to assess the relative success of states merely in terms of the number of PPPs is not plausible. Since, the number of PPPs in a state does not necessarily reflect the financial stakes involved in PPP projects in that state.

TABLE 4: Ranking of States in terms of number of PPPs

STATE	NO. OF PPP's	RANK
Tamil Nadu	20+0=20	1
Andhra Pradesh	17+0=17	2
Maharashtra	12+1=13	3
Uttar Pradesh	7+2=9	4
Gujarat	6+2=8	5
Karnataka	8+0=8	5
Rajasthan	5+3=8	5
Haryana	2+6=8	5
Madhya Pradesh	6+1=7	6
Punjab	3+3=6	7
West Bengal	4+0=4	8
Chattisgarh	3+0=3	9
Kerala	3+0=3	9
Delhi	0+2=2	10
Orissa	1+0=1	11
Bihar	1+0=1	11
Goa	1+0=1	11
Himachal Pradesh	1+0=1	11
Jharkhand	0+0=0	12
Assam	0+0=0	12
Jammu&Kashmir	0+0=0	12
Total		**109**

*. The first term on left side is the number of PPPs within the state and the second is the number of PPPs shared with neighbouring state(s).

Therefore, one may be tempted to consider the cost of PPP projects in the states rather than the number as a better indicator of the relative performance. After all, the investment made in PPP projects in a state captures the stakes for private parties better than the

number of PPPs per-se. However, there is a problem with this measure of performance as well. It is important to remember that Indian states are quite diverse in terms of their size and the length of national highways passing through them. More importantly, there can be scope for forming a PPP only on projects that are parts of the highways upgradation programme undertaken by the NHAI. Therefore, it is quite possible that states like Uttar Pradesh and M.P. have attracted a fair amount of financial resources in PPP projects simply because NHAI has taken up many projects in these states. Similarly, Delhi and Punjab may be lagging behind not because projects located in these states are un-remunerative for toll based road facilities, but because NHAI has not taken up too many projects where PPPs could be formed. If there is not much upgradation work undertaken in a state, there is little scope for PPPs to add to the pot. Ceteris-paribus, the larger is network of highways (in terms of the length covered or the total costs of all projects) undertaken for upgradation the greater will be private investment, and vice-versa. We therefore propose to analyze the ratio of the road distance covered under PPP contracts to the total distance being covered under all contracts in a state. This ratio appears to be a better indicator of relative performance.

Before proceeding further, we must clarify that Phases III and V of the NHDP are far from being complete. NHAI is still trying to award contracts for majority of projects under these phases on PPP basis. So, in principle, the total number as well as ranking of states in terms of PPPs can change as more contracts get awarded in future. While some changes in the relative ranks cannot be ruled out, it is unlikely to change significantly. Since, many projects in low performing states have been on the offer for quite some time, yet there are no takers for them. To substantiate the argument we have studied the distribution of PPPs on the Golden Quadrilateral (GQ), North-South and East-West (NSEW) Corridors. Contracts for most projects on these corridors (except in Jammu and Kashmir and North-East) have been awarded. Table B1 in Appendix B gives the details regarding the number of PPPs on GQ and the NSEW Corridors. Table B2 in Appendix B provides the ranking of states in terms of the ratio of distance covered by PPP projects to total distance covered by all the projects in the state. Again, the distribution of the length of expressways covered by PPP projects is highly skewed. The top five states account for more than three fourth of the total length covered by PPPs (See Table B1). In fact, the top three high income states alone make up for as much as 60 percent of the total distance.

To sum up, the richer states with relatively high per capita SGDP seem to have attracted more PPPs than the poorer states. This is especially true for BOT and SPV projects. In the following section, we pose research questions related to this skewed distribution in and will answer them in Section 5.

4. Research Questions, Hypotheses and the Model

4.1 Research Questions:

For policy purpose it will be useful to know why investors have shown preference for some states over others. That is, we want to answer the following question: Why some states have performed better in attracting PPPs while others have not succeeded in doing so?

Alternatively and perhaps more meaningfully, the focus of analysis can be individual projects rather than the states. As is shown in Section 3, only a fraction of road projects undertaken under NHDP have attracted private investment in the form of PPPs. Therefore, one can try to explain why some road projects have attracted private investment and why others have failed to do so. That is, the question can be: Why only some road projects have been taken up on PPP basis and not the others? But, the skewed distribution of PPPs across states shown in Table 4 indicates that the above two questions may be closely related. Mindful of these interconnections, in this section we will answer both of these questions. We will show that answers to these questions have striking similarities. In addition, we will answer the following related questions: What matters for PPPs? Which legal and economic factors are likely to influence the decision making of the private investors?

4.2 The Model and Explanatory Variables:

Under PPPs most of the construction and maintenance related risks are passed on to the private investors. Under BOT Toll contracts, even traffic and financial return related risks are borne by investors. Therefore, as one would conjecture, several factors are likely to influence the decision making of the private investors in PPPs. For example, road projects with high projected traffic are more likely to attract PPPs. Similarly, *ceteris paribus*, provision of viability gap funding is likely to make investment in road projects more attractive. Below, we list the relevant legal and economic variables and the associated hypotheses.

4.2.1 ECONOMIC VARIABLES: Other things held constant, the higher is the demand and willingness to pay for a better road service, more likely it is that the project will attract private investment. Similarly, the greater is the profitability or the lower is the risk profile of a project, higher will be chances of formation of PPP. We have attempted to capture these attributes with help of several variables. The following project specific attributes/variables are likely to affect the chances of a project being taken up on PPP basis.

i. *Local Infrastructure: INFRASTRUCTURE:* The quality of infrastructure available locally affects the level of economic and transport activities in the close proximity of the project. The level of economic activities, in turn, affects the demand as well as ability to pay for better road facility. Moreover, enabling infrastructure can facilitate a project during construction as well as the O&M phases. Therefore, the likelihood of private investment increases with the quality of the local infrastructure. We have considered infrastructural index of the district in which the road project is located as an explanatory variable. We have used the infrastructure index prepared by the Center for Monitoring of Indian Economy. The main components of the index are power, communication and transport.

ii. *Project Cost: PCOST*: Project cost captures the financial stakes involved in the project. However, the project cost per-se is not an indicator of financial viability of a project. Several factors such as length of road project and availability of an alternative road facility affect returns from a project. As a result, it is apriori difficult to say whether the cost will increase or decrease the attractiveness of a project for PPP.

iii. *Time Factor: TIMELAPSE:* When PPP policy was introduced in 1995, the policy makers as well as investors were inexperienced. In other words, the risks associated with PPP projects were unknown. With the passage of time, both sides to the PPPs contracts - the investors as well as the policy makers - have become better informed about the strengths and weaknesses of PPPs in India. So, presumably some learning has taken place overtime. Further the policy regime itself has evolved over time. Therefore, we expect that due to the learning and policy initiatives, the road projects have becomes less risky and hence the probability of formation of PPPs has increased significantly.

iv. *Distance from mega city: DISTANCECITY:* Big cities are hubs of commercial activity. These cities act as growth pole for many of industrial and commercial activities. A lot of freight and passenger traffic on National Highways move to and from these cities. Road segments closer to mega cities experience denser traffic as opposed to projects tucked away from cities. As a result, ceteris paribus, the closer a project is to a mega city, the higher are the chances of formation of PPP.

Since national highways attract traffic from districts of the state other than in which the project is located as well as from the neighboring states, we think the following state specific variables are likely to affect the probability of formation of PPPs.

v. *Vehicular Population of the State: TRANSPORTVEHICLE:* The benefits in terms of reduced travel time and lower risk of accidents are proportional to the level of congestion on the alternative routes. The road segments developed by BOT and other PPP projects generally save travel time and have better driving conditions. Therefore, such road facilities are likely to be in greater demand in states with high traffic density. For this purpose, we have used data on total vehicular population of the state in which the project is located.[25] The number of registered vehicle is taken for the same year in which road project is taken up for upgradation.

We should however note that private buses, trucks and heavy vehicles are the main sources of toll revenue. However, the data available is an aggregate of small and large vehicles. Further, there is lot of interstate traffic plying on National Highways. So this variable may or may not turn out to be very significant.

vi. *Per capita State Gross Domestic Product: PSGDP:* A higher per capita SGDP is indicative of income as well as of the demand for transport services in the state. States with higher per capita SGDP are also the states with larger number of economic activities that involve intensive use of surface transport, and *vice-versa*. Moreover, when average per capita income is high, average road user will be more willing and able to pay for the services of BOT toll roads. Therefore, states with relatively high per capita income are likely to attract more PPP projects as compared to the states with relatively low per-capita GDP. In other words, we conjecture that per-capita income can provide a demand based explanation for the skewed

[25] Ideally we would like to consider the number of vehicles plying on the road segment under consideration. Unfortunately, such a data does not exist.

distribution of PPP projects among Indian states. Therefore, we have used per-capita SPGDP as an explanatory variable. A ranking of Indian states in terms of per-capita SPGDP is provided in Table B3 in Appendix B.

vii. *Per capita State Gross Domestic Product of Neighbouring States: AVGEPSGDP:* As argued above, a significant proportion of traffic plying on National Highways is interstate. This is especially true of commercial and goods/freight vehicles. Therefore, in addition to the local demand, income level and intensity of economic activity in the neighbouring states also affects traffic density and hence the profitability of BOT toll projects. We have captured this effect by considering an average of per-capita SGDPs of neighbouring states as an explanatory variable.

To sum up we should expect the following pattern of results. Other things remaining the same,

i) the higher the value of INFRASTRUCTURE, i.e., the better local infrastructure, better are chances of forming PPP.
ii) the smaller is the project cost, PCOST, the better are chances of forming PPP.
iii) the longer is the time lapse, TIMELAPSE, the better are chances of forming PPP.
iv) the closer a project is to a mega city, the higher are chances of formation of PPP.
v) the higher the value of TRANSPORTVEHICLE, i.e., the larger is the number of vehicles in the state, better are chances of forming PPP.
vi) the higher the PSGDP, i.e., richer is the state in term of per capita GDP, the better are chances of forming PPP.
vii) the higher the AVGEPSGDP, i.e., richer are the neighbouring states, the better are chances of forming PPP.

4.2.2 *Governance and Legal Indicators*:

In addition to the above mentioned economic factors, the governing law for PPP contracts has several consequences for investors. Similarly, the situation of law and order and protection of property rights in the state in which a road project is located has bearing on the prospects of PPPs. We consider the following law and governance related variables to be relevant.

i. *Governance and Property Rights*: *PROPRIGHTS:* All PPPs contracts are primarily contracts between the NHAI on behalf of the central government and the contractor/concessionaire. Moreover, the nature of contracts and the governing laws are the same for PPPs across states.[26] To that extent, all PPPs are governed by the same property and contract laws. Therefore, one may think that the states have little role to play in the entire exercise. However, state governments have two crucial roles in the matter. The all-important tasks of land acquisition and shifting of utilities are undertaken and performed by the state government concerned. Therefore, during the construction phase, a state government can make the concessionaire's life easy or

[26] For details of contractual clauses and the governing laws see MCA for PPPs in roads.

very difficult. Presumably, better governed states are likely to facilitate the execution of project related activities. These states have better coordination among various ministries and departments. Therefore, the official machinery in a better governed state is likely to be efficient and fast in land acquisition. It may also be able to resolve disputes over land acquisition expeditiously. Besides, a better governed state is likely to be efficient in shifting of utilities, a major cause of the delay in project implementation. The state machinery in poorly governed states, in contrast, is likely to be less efficient and slow in performing these activities. Therefore, projects in different states have different risk profiles. Secondly, the law and order, and the protection of property rights are state subjects. The situation of law and order and the level of property rights protection in a state can have significant bearing on the risk and hence on profitability of a BOT contract. Specifically, the protection provided to the private property rights is crucial for the concessionaire to be able to appropriate benefits from the investment made in the project. If property rights are not protected or poorly protected, a concessionaire may fail to realize all of the appropriable benefits from toll contracts. Since, users of a road facility may not pay the toll fee. Alternatively, the concessionaire may be forced to employ private security agents. The latter option is a costly affair. Moreover, a weaker property right protection is generally associated with encroachments on project sites and prolonged litigations. Therefore, other things remaining the same, investors may be reluctant to enter into BOT Toll contract in a state where law enforcement is perceived to be poor. Whenever they enter into a contract in such states, they are likely to opt for BOT annuity rather than a BOT Toll contract. In sum, we expect the level of property rights protection of the relevant state to play an important role in determining whether a project is taken up as PPP or not. We have used the index prepared by Debroy and Bhandari (2007)[27] to approximate the governance climate across states.

ii. *Changes in the Governing Legal Regime*: *POLICYDUMMY:* As argued above, the PPP policy of the government has evolved overtime. Many policy changes have been introduced overtime. However, significant changes like provision for VGF were introduced in the Union Budget of 2003-04. Moreover, since 2005 when NHDP Phase III was undertaken, NHAI has pushed for PPPs in a big way. Projects under this and the later phases can be taken up on non-PPP basis, that is public funding is provided, only if a project has no chances of attracting private investment. We expect these policy changes to have impacted the probability of a project being taken up on PPP basis favorably and significantly. We have used policy dummy for projects that started in April 2005 or later. We expect the policy dummy to be a significant explanatory variable.

However, we expect the effects of the policy dummy to be intertwined with the time factor variable. Both of these variables capture the effects of several concurrent phenomena; learning with time, intermittent policy changes, general economic outlook and, of course, the significant policy changes of 2004-05. Hence, while we expect the coefficients of both the variables to be significant if considered individually, taken together one of them may confound the effect of the other.

[27] The index captures the relative efficiency of the executive and the judiciary across states in recovering the stolen property, dispute settlement and the law and order. For details, see Debroy and Bhandari (2007).

Thus, to sum up, other things remaining the same,

i) the higher is the PROPRIGHTS index, i.e., stronger is the protection provided to property rights in the state, the better are chances of forming PPP.
ii) if POLICYDUMMY=1, i.e., if the project is offered after April 2005, better are chances of forming PPP.

4.3. The Data

We have collected data for all of the 405 projects started under various phases of NHDP. These include projects that have been completed, are being implemented, as well as those for which contracts have been awarded as on June 30, 2009. We have collected data on all of the below mentioned explanatory variables. Data on project specific attributes such as project cost, start date, the district(s) in which a project is located, distance of project from the closest mega city etc. were most difficult to get. Even on one aspect, say project cost, there is no single source of data. The data have been collected sources. Such as more than 120 MIS[28] reports of NHAI, 20 odd quarterly reports of MOSPI, publications of WB, ADB and the information available from web sources.[29] Still we have managed to collect data on 381 projects. Fortunately, we were able to collect the relevant data on all of the PPP projects. For the remaining 24 projects data on one or the other relevant aspect was unavailable. Most of these projects were implemented before 1999, that is, before any meaningful implementation of the PPP policy. Therefore, absence of these projects is unlikely to affect the validity of our findings.

TABLE 5: Number of Projects (as on till 31, 2009).

Item	Total	PPP projects	non-PPP projects
Projects initiated/complete under various phases of NHDP	405	109+2*	294
Number of projects for which data available	381	109	272

* ***These are the projects for which contract has been terminated and therefore excluded***.

We have mapped all the projects with the district(s) in which they are located. While the information regarding the state in which project is located was available, we had to find out the district(s). Similarly, we had to calculate the distance of a project from the nearest mega city. We carried out this exercise for all of the 381 projects. Table 6 below provides detailed description of data and sources

[28] These documents are internal to the ministry concerned and are meant for intra-ministry communication. We were provided access to these reports on special request.
[29] www.pppinindia.com is a useful source for PPP projects.

TABLE 6: Explanatory Variables and Data Sources

S. No.	VARIABLES	DESCRIPTION	DATA SOURCE
1	PGSDP	Per-capita Gross State Domestic Product of the state in which project is located. PSGDP is taken for the year in which the project was started or approved. All figures at 1999-2000 constant prices. Figures for years 2007-08 and 2008-09 have been extrapolated using the average growth rate for the previous four years.	Ministry of Statistics and Programme Implementation (MOSPI), Central Statistical Organization (CSO)
2	PCOST	Total Cost of the project. We have deflated all project costs. All costs are at constant prices of 1990-2000.	Data on project cost is collected from various reports of NHAI and MOSPI. Source of WPI is the office of the Economic Adviser, Ministry of Commerce and Industry
3	PROPRIGHTS	Index representing the property rights ranging from 0 to 100.	Bhadari and Debroy (2007)
4	DISTANCECITY	Distance of the project from mega-city.	OUR CALCULATIONS: We have calculated the distance of each project from the nearest city of population 10 lakhs or more.
5	TRANSPORTVEHICLE	Total number of registered Motor Vehicles in the state in which the project is located in the year. Figures for the years 2007-08 and 2008-09 have been extrapolated using average growth rate of the last four years.	Ministry of Shipping, Road Transport and Highways, Govt. of India, various publications.
6	INFRASTRUCTURE	Infrastructure index of the district in which the project is located. The index is based on four major infrastructure facilities (energy, transport, irrigation and finance) and two social infrastructure facilities (education and health).	CMIE Published Data, Oct 2000, and OUR CALCULATIONS. We have mapped each project with the district(s) in which it is located.
7	TIMELAPSE	Time elapsed since August 1995, when the first project under NHDP was started, to the start date of the project. Time elapsed is measured in months.	OUR CALCULATIONS: We have calculated time TIMELAPSE for each project.
8	POLICYDUMMY	Policy dummy is used for projects that stated during or after April, 2005.	OUR CALCULATIONS
9	AVGPGSDP	This is the average of PGSDP of the states that are in immediate neighbors of the state in which project is located. The figures are for the year of start/approval of the project, and are at 1999-2000 constant prices.	MOSPI and CSO and OUR CALCULATIONS: For each project, we have determined the neighboring states and their average PGSDP. Immediate neighboring states differ depending on which NH the project at hand is located.

4.4. Model: To analyze and answer the above raised questions, we have constructed a dependent binary variable *pppnonppp* that takes two values; 'yes' or 'no', depending on whether the project is PPP or not. We want to explain the observed values of this variable across projects. Therefore, we have decided to use binary choice probability models. We have estimated the models using *logit*. The details of the different models estimated are provided in Appendix C.

5. Regressions and Results:

***Preliminary Observations*:**

From the definitions of TIMELAPSE and POLICYDUMMY, these variables are expected to be correlated. Indeed, they are highly correlated with correlation coefficient equal to 0.88 (See Table C1 in Appendix C). Therefore, we cannot use TIMELAPSE and POLICYDUMMY variables simultaneously. TIMELAPSE variable, however, is expected to have better explanatory power. It captures several effects, for example, the above discussed learning effect, general economic outlook, intermittent and gradual policy changes as well as significant policy changes. The POLICYDUMMY, in contrast, captures only the last effect.

***RESULTS*:**

Results of regressions using TIMELAPSE (instead of POLICYDUMMY) along with the other explanatory variables are presented in Tables 7 and 8 below. If we use POLICYDUMMY and drop the TIMELAPSE variable instead, the results are very similar and are reported in Tables 2C and 3C in Appendix C.

As we had expected the coefficient of *PSGDP* is positive and highly significant (p=0.011). Moreover, marginal effect of this variables is positive and very significant (p=0.013). In keeping with our conjecture, the proximity of a project to a mega city affect the chances of PPP favorably. The coefficient of *DISTANCECITY* is negative and it is extremely significant (p=0.001). The coefficient of its square term is positive and significant, suggested a U-shape effect. That is, the effect of the distance from mega city is less pronounced for projects far away from big cities. Overall the effect makes economic sense. The marginal effect of *DISTANCECITY* on probability of PPP is identical. The total project cost has turned out to be extremely significant (p=0.000). The coefficient is positive implying that greater is the project cost, higher is the probability that it will attract private investment. However, the coefficient of its square term indicates that this effect tapers away at very high levels of project cost.

The coefficient of *AVGEPGSDP* is positive and weakly significant. The same is the case with its marginal effect. For obvious reasons, the *PSGDP* has a stronger marginal effect on the probability of PPP than the *AVGEPGSDP*. The coefficient of TRANSPORTVEHICLE is positive but is insignificant; (p=0.364). Note that the private buses, trucks and heavy vehicles are the main source of toll revenue. However, the data available is an aggregate of the state level small and large vehicles. Moreover, lot of

traffic on highways is from other states. So, it is not surprising at all that this variable has turned out to be insignificant.

TABLE 7: Effects of economic and legal indicators

Model 1: Dependant variable y = Pr(pppnonppp).

Logistic regression — Number of obs = 381
Wald chi2(11) = 89.89
Prob > chi2 = 0
Log pseudolikelihood = -142.50514 — Pseudo R2 = 0.3726

ppp_non_ppp	Coef.	Robust Std. Err.	z	P>|z|	95% Confidence Interval	
DISTANCECITY	-0.0067463	0.00201	-3.36	0.001	-0.0106859	-0.0028068
DISTANCECITYSQ	5.56E-06	2.12E-06	2.62	0.009	1.40E-06	9.73E-06
TIMELAPSE	-0.0561953	0.0401162	-1.4	0.161	-0.1348216	0.0224309
TIMELAPSESQ	0.0003689	0.0001903	1.94	0.052	-3.98E-06	0.0007419
PCOST	0.0118658	0.0021177	5.6	0	0.0077152	0.0160164
PCOSTSQ	-7.15E-06	1.79E-06	-3.99	0	-0.0000107	-3.64E-06
INFRASTRUCTURE	-0.008044	0.0030799	-2.61	0.009	-0.0140804	-0.0020076
PGSDP	0.0000588	0.0000231	2.55	0.011	0.0000136	0.0001039
TRANSPORTVEHICLE	0.0000554	0.0000611	0.91	0.364	-0.0000643	0.0001752
PROPRIGHTS	1.437407	1.110228	1.29	0.195	-0.7385988	3.613413
AVGPGSDP	0.0000337	0.0000265	1.27	0.203	-0.0000182	0.0000855
_cons	-2.827596	2.126176	-1.33	0.184	-6.994825	1.339633

TABLE 8: Marginal effects of economic and legal indicators

Marginal effects after logit

y = Pr(pppnonppp) (predict) = .2238985

Variable	dy/dx	Std. Err.	z	P>|z|	95% Confidence Interval		X
DISTANCECITY	-0.001109	0.00033	-3.35	0.001	-0.001757	-0.000461	231.057
DISTANCECITYSQ	9.15E-07	0	2.63	0.009	2.30E-07	1.60E-06	93217.9
TIMELAPSE	-0.0092379	0.0069	-1.34	0.181	-0.022759	0.004283	104.378
TIMELAPSESQ	0.0000607	0.00003	1.83	0.067	-4.20E-06	0.000126	12085.8
PCOST	0.0019506	0.00035	5.61	0	0.001269	0.002632	208.907
PCOSTSQ	-1.18E-06	0	-4.04	0	-1.70E-06	-6.10E-07	72553.7
INFRASTRUCTUREE	-0.0013224	0.00053	-2.5	0.013	-0.002361	-0.000284	110.521
PGSDP	9.66E-06	0	2.48	0.013	2.00E-06	0.000017	21040.2
TRANSPORTVEHICLE	9.11E-06	0.00001	0.91	0.364	-0.000011	0.000029	4793.79
PROPRIGHTS	0.2362945	0.18594	1.27	0.204	-0.128149	0.600738	0.404622
AVGPGSDP	5.54E-06	0	1.27	0.204	-3.00E-06	0.000014	23140

We have got very similar results by replacing TIMELAPSE with the POLICYDUMMY – the coefficient of the latter is positive and very significant (p=0.036). Again, the marginal effect is positive and significant (p=0.026) (See Tables C2 and C3 in Appendix B). That is, the policy interventions made in 2005-06 have made a desirable and significant impact. Moreover, with this substitution the variable AVGPGSDP becomes significant (p=0.018) with a positive sign. However, a comparison of the two sets of results shows that the combined effect of learning, intermittent and significant policy interventions along with the generally optimistic economic environment during last three-four years seems to offer a better and stronger explanation. It is the combined effect of these variables that has caused a spurt in the number of PPPs during the last three years.

The results are indeed intriguing as far as the variables *PROPRIGTS* and *INFRASTRUCTURE* are concerned. Though the coefficient of *PROPRIGTS* is positive, it is not very significant; p=0.195. The outcome is indeed counterintuitive as regards to the local INFRASTRUCTRE. As argued above, a large proportion of traffic plying on National Highways is inter-district and inter-state. So, local demand captured by district infrastructure index was not expected to play a significant role in the overall demand for National Highways. However, the coefficient of INFRASTRUCTRE has turned out to be negative and very significant (p=0.009)!

TABLE 9: Effects of economic and legal indicators when Tamil Nadu projects are dropped

Logistic regression

Number of obs = 332
Wald chi2(11) = 77.15
Prob > chi2 = 0
Log pseudolikelihood = -121.87338
Pseudo R2 = 0.3652

Pppnonppp	Coef.	Robust Std. Err.	z	P>|z|	95% Confidence Interval	
DISTANCECITY	-0.006649	0.0021202	-3.14	0.002	-0.0108046	-0.0024935
DISTANCECITYSQ	5.18E-06	2.17E-06	2.39	0.017	9.36E-07	9.43E-06
TIMELAPSE	-0.0448193	0.0279968	-1.6	0.109	-0.0996921	0.0100535
TIMELAPSESQ	0.0004134	0.000184	2.25	0.025	0.0000528	0.000774
PCOST	0.0117115	0.0022891	5.12	0	0.0072251	0.016198
PCOSTSQ	-7.01E-06	1.91E-06	-3.67	0	-0.0000108	-3.27E-06
INFRASTRUCTURE	-0.0085414	0.0076407	-1.12	0.264	-0.0235169	0.006434
PGSDP	0.0000657	0.0000241	2.72	0.006	0.0000184	0.000113
TRANSPORT VEHICLE	0.000062	0.000069	0.9	0.369	-0.0000732	0.0001973
PROPRIGHTS	3.329376	1.553264	2.14	0.032	0.2850346	6.373718
AVGPGSDP	0.0000303	0.0000296	1.02	0.306	-0.0000277	0.0000884
_cons	-4.329839	1.492633	-2.9	0.004	-7.255346	-1.404331

This perverse outcome is caused by what we term as 'the Tamil Nadu effect.' As Table 4 shows, Tamil Nadu has attracted a disproportionately large number of PPPs.[30] This has potential of introducing distortions. To check whether this is the case, we have run regressions by dropping all the projects located the state of Tamil Nadu. The results are presented in the following Tables 9 and 10.

TABLE 10: Marginal Effects of economic and legal indicators when Tamil Nadu projects are dropped

Variable	dy/dx	Std. Err.	z	P>|z|	95% Confidence Interval		X
DISTANCECITY	-0.0010206	0.00033	-3.13	0.002	-0.00166	-0.000381	240.335
DISTANCECITYSQ	7.96E-07	0	2.41	0.016	1.50E-07	1.40E-06	100972
TIMELAPSE	-0.0068796	0.00447	-1.54	0.124	-0.015637	0.001878	75.6777
TIMELAPSESQ	0.0000635	0.00003	2.14	0.032	5.30E-06	0.000122	6898.98
PCOST	0.0017977	0.00035	5.11	0	0.001109	0.002487	207.06
PCOSTSQ	-1.08E-06	0	-3.66	0	-1.70E-06	-5.00E-07	71375.9
INFRASTRUCTURE	-0.0013111	0.00118	-1.11	0.268	-0.003632	0.00101	101.625
PGSDP	0.0000101	0	2.62	0.009	2.50E-06	0.000018	20083.1
TRANSPORT VEHICLE	9.52E-06	0.00001	0.91	0.365	-0.000011	0.00003	4186.8
PROPRIGHTS	0.5110466	0.24576	2.08	0.038	0.029365	0.992729	0.35291
AVGPGSDP	4.66E-06	0	1.03	0.304	-4.20E-06	0.000014	22383.9

[30] Coincidently, the minister in the Highways Ministry is from Tamil Nadu.

As is clear from the above tables, it does matter whether Tamil Nadu is or is not included in the dataset. While the signs, magnitudes as well as the significance levels of other variables have remained the same, there are significant difference with respect to variables PROPRIGHTS and INFRASTRUCTRE. Now, PROPRIGHTS has positive and significant sign implying that, *ceteris paribus,* the probability of PPP is higher for projects located in the states with relatively better protection of property rights. Moreover, as predicted local infrastructure does not have significant explanatory power to explain the distribution of PPPs.

Lastly, to check robustness of our results, we have also run regressions by considering the distribution of only the BOT Toll projects. That is by treating BOT Annuity projects and non-PPPs. The results are presented in Tables 4C and 5C in Appendix C. Again, the results are very similar to that for all of PPPs in terms of the magnitude of coefficients as well as their level of significance.

6. Concluding Remarks

We can now answer the questions posed in Section 4: Why some states have performed better in attracting PPPs while others have not succeeded in doing so? And, why some road projects have been taken up on PPP basis while others have not succeeded in doing so? The results of regressions presented in the last section provide clear answers to these questions. States with higher per capita income have attracted more PPPs than the poorer states. Road projects located in richer states have shown higher probability of attracting private investment than those located in the poorer ones. Other things remaining the same, projects located on national highways connecting richer states and those located closer to mega cities have exhibited higher probability of becoming PPPs. Similarly, *ceteris paribus,* states with better governance index and projects located in them have higher probability of attracting private investment. Empirical evidence in support of these claims is conclusive and robust.

Our analysis enables us to make several public policy recommendations.

PPPs as a public policy tool for financing infrastructure

Our study provides strong empirical evidence that per-capita SGDP of the state concerned is a significant factor behind the attractiveness of highway projects for private investment. The likelihood of private investment increases in direct proportion to the per-capita SGDP. This means that road projects located in rich states can be expected to attract PPPs, in the form of BOT toll as well as BOT annuity contracts. Therefore, only the richer states can hope to realize the efficiency gains from private sector participation. That is, the private sector participation is likely to help provide more and better infrastructure in rich states like Haryana, Gujarat, Punjab, Tamil Nadu, etc. There is a large state level demand for better infrastructure facilities in these states, enabling the investors to recoup their investment with good returns by charging toll or user fee. In contrast, projects located in poor states, like Orissa, Jharkhand, UP, Bihar, cannot draw on private investment. In such states, private sector is likely to invest only in projects if they are located very close to some big city. Since average per capita SGDP of neighboring states is a significant explanatory variable, wherever possible, the poor states

can capitalize on their geographical proximity to rich states. Therefore, in a poor state, the private investment can also come in if this state has rich neighboring states and the projects are located on highways that connect the neighbors. For example, states like Rajasthan can hope to attract PPPs on major national highways passing through the state that connect Delhi and Haryana in the North with Gujarat and Maharashtra in the South. In addition, poor states with better law and order situation like Madhya Pradesh and Rajasthan can also hope to attract PPPs.

Therefore, policy recommendation for road projects to be undertaken under NHDP and other centrally sponsored projects is clear. PPP is likely to work as a public policy for financing infrastructure for projects located in richer and better governed states. Conversely in states with low income and thus with low demand, PPPs are not going to be as attractive. Similarly, *ceteris paribus*, the states providing poor protection to property rights are less likely to attract private investment.

Options available to poor states

It does not require any persuasion that poor states have poor infrastructure and lack financial resources to finance the required infrastructure. Therefore, the poor states are in greater need of resources as well as expertise of private sector. Unfortunately, projects located in these states are perceived to be risky and unprofitable. So, poor states cannot count on private investment, especially on BOT toll contracts to finance infrastructure. Therefore, centrally sponsored projects in such states should be implemented either through BOT annuity contracts, wherever possible, or by providing public funding. A look at Table B4 in Appendix B shows that many of the PPPs formed in relatively poor states like Bihar, UP and MP, and Andhra Pradesh, are BOT annuity contracts; relatively better off states like Haryana, Gujarat, Tamil Nadu and Karnataka have relatively smaller share of annuity contracts. Most of BOT Toll PPPs, on the other hand, are located in the top five rich states.

Therefore, it appears that poor states have two options available to them if they want to improve infrastructure. Either they can go for public funding of infrastructure projects, or they can hope to attract private investment only by providing extra 'sweeteners' to investors. The sweeteners can be provided in various ways. For example, project risk can be reduced by the sharing of revenue risk with the private participants. In extreme case, the state can assume the entire revenue risk, while construction and maintenance risks can be allocated to the private sector. Annuity contracts are examples of this latter option. In addition, private investment can be attracted by increasing the viability gap funding and/or by lowering of applicable taxes, etc. In addition, investors can be allowed to develop land on or adjacent to the project site for other commercial purposes. That is, investors in road projects can be granted developmental rights over the adjacent land. Some states have experimented with this last option. The contract for the Ganga Expressway in UP is an illustrative case in point. The government of UP and the developers, a JP group led consortium, have signed an annuity contract. As a part of the contract, the consortium has been allocated land that it can use for commercial activities. Similarly, real estate considerations have played major role in the Hyderabad Metro Rail project.

However, for several reasons, the use of real estate to finance infrastructure is very problematic. First of all, note that under a pure annuity contract, the costs and benefits to investors and the society are clear. The investors get annuity payments as returns on their investment, and the society receives a public service for a predetermined price (annuity payments). In contrast, if developmental rights over land or property are used to attract investors, the cost society pays and the benefits it receives from doing so become very unclear. More importantly, such transfers are inherently susceptible to rent-seeking and corruption. Besides, since property market is inherently risky, clubbing of real-estate with an infrastructure project increases the project-risk. Any downturn in property market adversely affects the progress of the project, if not its viability itself. It is not surprising that due to the recent economic slowdown, each one of the above mentioned project has got delayed.

PPP policy needs improvements

As was discussed in Section 2, during 2005 and 2006, the Government of India launched several policy initiatives to attract private investment in infrastructure, especially in roads. As a result, the extent rules and laws that govern PPP contracts have several desirable features. Our regression results show that these policy and legal interventions have made a significant impact. Most of PPPs in roads have been formed after these policies were implemented. The coefficient of the POLICYDUMMY is positive and very significant (p=0.014) with strong and significant marginal effect (p=0.008). Therefore, PPP policy has surely helped in tapping financial resources of the private sector for upgradation of the road infrastructure. However, the effect of time lapse is even stronger. The coefficient of TIMELAPSE is larger and more significant (p=0.000). Its marginal effect is also larger and more significant (p=0.000). That is, the combined effect of learning, intermittent and significant policy interventions along with the generally optimistic economic environment during last three-four years seem to offer a better and stronger explanation. Perhaps, it is due to the combined effect of these variables that in recent times even relatively backward states like UP, and Orissa have been able to attract PPPs. It is worth to dwell more on this conjecture.

At the same time, there is a widespread feeling that the PPP policy has not delivered what was expected of it. For instance, out of 60 projects offered for PPPs during the last fiscal, 34 received no response from investors, and six received only one bid each.[31] To a significant extent, the ever changing PPP policy is responsible for this poor performance. It is important to note that even commercial viable projects will attract private funding only if a clear and consistent policy is in place. Unfortunately, PPP policy has been subjected to many mid-course changes. In some cases, such midway changes have triggered litigation and delays. The insertion of clause 3.5.2 in model request for qualifications (RFQ) for road sector and its subsequent deletion is a case in point. Last year, at least 60 projects worth about Rs 60,000 crore became casualty of this policy change. The clause invited protests from some Indian companies and led to litigation.[32]

[31] See The Economic Times, dated January 22, 2009.

[32] According to Indian companies this clause favored large multinational companies with vast experience across sectors. It was inherently anti-competitive and discriminatory against Indian companies who have enough experience in road sector but otherwise are relatively small.

In response, the ministry of roads and surface transport imposed another odd condition. The new clause 2.1.18 restricted, among other things, the number of projects a company could bid for to eight projects. While the government was still going back and forth on the bidding rule, the economy got hit by the downturn. As a result, many projects have got delayed.

In addition, there are some other serious problems with the way PPP contracts are awarded and implemented. For instance, BOT contracts provide for contract modification on the grounds of over/under estimation of the traffic. In several instances, the realized traffic has been much less than the projected traffic leading to disputes over contract renegotiations. Though over estimation of the revenue streams has been observed in other countries as well, [33] in India renegotiations are neither transparent nor conclusive.[34] In addition, some state governments have been found wanting in providing the necessary support to the concessionaire. There have been long delays in land acquisition in the states of West Bengal, Jharkhand and Karnataka. As a result, several projects have been held up in these states. Indeed, many projects are being held up because of delays in land acquisition, environmental clearances, shifting of utilities, and contract renegotiations due to flaws in the initial specifications of projects. These problems can be and need to be addressed without delay.

Several other measures need to be taken to encourage private sector participation and improve the delivery system. The project feasibility reports should be prepared seriously so as to avoid later changes in design and alignments. Contracts should clearly spell out the obligations of the parties involved. Moreover, there should be an independent agency to arbitrate or adjudicate the disputes between government agencies and concessionaires/contractors.

A total neglect of operation and maintenance of highways is also a serious concern. All road projects that were developed using public funds are experiencing a complete neglect. As a result, quality of these segments is deteriorating fast. Maintenance of the developed highways is as important activity as building of new ones.

[33] Similar patterns have been observed the world over. See Guasch (2004).
[34] For a case study on contract renegotiation of Delhi-Noida Bridge over traffic shortfall, see Pargal (2007).

APPENDIX A

NHDP: Details of planned works and modes of funding, for 2005-15

NHDP Phase	Item	Construction Contracts	BOT (Toll)	BOT (Annuity)	Total
I (Balance work)	Length (Km) Cost (Rs Crore)	1711 8145	20 581	7 85	1738^ 8811
II (Balance work)	Length (Km) Cost (Rs Crore)	4569 29493	1237 8065	930** 6064	6736 43622
III	Length (Km) Cost (Rs Crore)	- -	10000 65197		10000 65197
IV	Length (Km) Cost (Rs Crore)	- -	5000 6950	15000** 20850	20000 27800
V	Length (Km) Cost (Rs Crore)	- -	6500 41210	- -	6500 41210
VI	Length (Km) Cost (Rs Crore)	- -	1000 16680	- -	1000 16680
VII	Length (Km) Cost (Rs Crore)	 2594	 9638	 4448	* 16680
Total	Length (Km) Cost (Rs Crore)	6280 40232	23757 148321	15937 31447	45974* 2,20,000

Source: Planning Commission (2006a)

* Length covered under NHDP Phase VII is yet to be finalized.

** To be determined based on budgetary resources and the tolling policy for two-lane highways

^ Total length of Phase I is 7,507 km. 7,300 km

^^ Total length of Phase II is 7,300 km.

Description and the status of NHDP as on (June, 2009.)

Phase I: The objective of this phase is to connect four major cities Delhi, Mumbai, Chennai, and Kolkata. This is popularly known as the Golden Quadrilateral (GQ).

Phase II: The objective is to construct North-South and East-West corridors connecting four extreme points of the country: Srinagar in the North to Kanyakumari in the South and Silchar in the East to Porbandar in the West.

Phase III: The objective is to improve the existing National Highways of 12,230 km. This phase mainly included connectivity to state capitals, major commercial hubs, and ports.

Phase IV: To widen the existing National Highways which were not a part of the earlier phases. This phase mainly included widening of single lane National Highways to two or more lanes. The length of the network in this phase is expected to be 20,000 km. Work on this phase has not started yet.

Phase V: To upgrade 5,000 km (3,125 mi)(6500km) of four lane highways to six lanes including some portions of GQ.

Phase VI: To construct 1,000 km (625 mi) of expressways to connect major hubs in the

country. Work on this phase has not started yet.

Phase VII: To provide faster connectivity to the highways by improving the urban road network. Construction of flyovers and bypass roads for seamless movement on the highways are also part of this phase. Work on this phase has not started yet.

Status Of Different Phases of NHDP (as on 30.6.2009)

Phase	**Total Length in km**	**Approved Cost (Expenditure till 30.6.2009) in Rs Crore**	**Length Completed in km**	**Length under Imp.**	**Likely date of Completion**
I GQ,EW-NS corridors, Port connectivity & others	7,498	30,300 (35,224)	7,825	267	Substantially completed
II 4/6-laning North South-East West Corridor, Others	6,647	34,339 (30,756)	3,192	2,703	Dec - 2010
III 4/6-laning links from network to capital etc.	12,109	80,626 (9098)	890	2069	Dec. 2013
IV 2 - laning with paved shoulders	20,000	27,800	-	-	Dec. 2015
V 6-laning of GQ and High density corridors	6,500	41,210 (1514)	130	900	Dec - 2013
VI Expressways	1000	16,680 (NIL)	NIL	NIL	Dec - 2015
VII Ring Roads, Bypasses and flyovers and other structures	700 km of ring roads/ bypass + flyovers etc.	16,680 (NIL)	NIL	NIL	Dec-2014

APPENDIX B:
Tables

TABLE B1: Profile of major Indian players in PPPs.

PPP Concessionaire	Market Capitalization** (Rs Crores)	Net Sales (Rs Crores)	Net Worth (Rs Crores)	No. of Contracts*
L & T	110340	17645	5768	5=5+0
Rel Energy	47414	5752	9339	3=0+3
GMR infra	32262	33.39	1639	5=4+1
IDFC	27348	1500	2882	4=0+4
Lanco	11985	541	1379	2=2+0
Nagarjuna	5815	2870	1039	1=0+1
IVRCL Infra	5726	974	1321	3=0+3
Gammon India	4810	1851	1150	3=0+3
Patel	4425	1110	703	2=0+2
HCC	4404	1850	904	2=2+0
Madhucon	2616	510	447	4=4+0
Gayatri	543	502	141	2=0+2
Soma	NL			4=0+4
Ashoka	NL			4=0+4
Navayuga	NL			3=2+1
Ircon Int.	NL			2=2+0
KNR	NL			2=0+2

Source: Websites of the company concerned and internet sources.

NL= not listed

*= first figure denotes single ownership and the second figure indicates number of joint ownership

** As on January 2008.

TABLE B2: PPPs on Golden Quadrilateral and NSEW corridors

Stretch	Number of BOT contracts	Number of Annuity contracts	Number of SPV contracts	Total number of PPPs	Proportion of length under PPP (%)
GQ:Delhi- Mumbai	2	-	2	4	2.04
GQ: Mumbai-Chennai	2	1	-	3	2.67
GQ:Kolkata-Chennai	1	4	-	5	3.16
GQ:Delhi-Kolkata	1	2	-	3	1.49
NS	13	12	-	25	14.16
EW	1	4	-	5	2.39

Source: *NHAI*

TABLE B3: Distance covered by PPP projects on GQ and NSEW corridors

STATE	Total Length Upgraded (Kms)	Length Funded by PPPs (Kms)	Length covered by PPPs (%age of Total)
Kerala	86.6	70	80.83
Andhra Pradesh	1785.462	741.922	41.55
Karnataka	655.28	170.88	26.08
Tamil Nadu	1008.385	360.715	35.77
Madhya Pradesh	643.525	227.825	35.40
West Bengal	521.017	135.457	26.00
Maharashtra	549.95	133	24.18
Gujarat	872.2	129.4	14.84
Rajasthan	1136.155	167.38	14.73
Uttar Pradesh	1602	194.4	12.13
Haryana	192.7	10	5.19
Bihar	756.235	10	1.32
Assam	648.3	0	0.00
Delhi	202.4	0	0.00
Jammu & Kashmir	134.53	0	0.00
Jharkhand	121.75	0	0.00
Orissa	388.095	0	0.00
Punjab	81.17	0	0.00
Total	**11385.75**	**2350.98**	**20.65**

Source: *Calculations based on NHAI data*

Table B4: Ranking of states in terms of Per Capita State GDP (Average of SGDP for years 2006-07, 2007-08 and 2008-09)

STATE	AVERAGE SGDP	RANK
Delhi	52101.33	1
Haryana	34893.67	3
Punjab	30163.00	4
Maharashtra	29776.33	5
Himachal Pradesh	28233.67	6
Gujarat	27665.00	7
Kerala	27358.33	8
Tamil Nadu	26006.00	9
West Bengal	22707.67	10
Andhra Pradesh	22614.00	11
Karnataka	22093.67	12
Chattisgarh	16778.00	13
Jharkhand	16235.67	14
Assam	16100.00	15
Rajasthan	15497.33	16
Jammu&Kashmir	15304.00	17
Orissa	14801.67	18
Madhya Pradesh	12779.33	19
Uttar Pradesh	11636.67	20
Bihar	7462.00	21

Source: www.rbi.org

Table B5: Distribution of Annuity PPPs across states

STATES	NO. OF ANNUITY PPP'S	RANK
Andhra Pradesh	9	1
Uttar Pradesh	4+1*=5	2
Madhya Pradesh	3+1*=4	3
Karnataka	2	4
West Bengal	2	4
Bihar	1	5
Gujarat	1*	5
Rajasthan	1*	5
Tamil nadu	1	5
Punjab	1	5
Assam	0	6
Chattisgarh	0	6
Haryana, Delhi Maharashtra, Goa	0	6
Himachal Pradesh	0	6
Jammu&kashmir	0	6
Orissa	0	6
Total No.of Annuity Projects		**25**

*** These are the projects which are shared with the other states**

APPENDIX C

The Models

In our dataset for each project the observed outcome, y, takes two values; $y = 1$ if the project is PPP, and $y = 0$ it is not. We are interested in the variables that affect the probability of a project becoming a PPP. Let,

$p = \Pr(y = 1)$, i.e., the probability of project being a PPP.

As discussed above, this response probability is a function of several variables discussed in the text, i.e.,

$$p = F\left(DISTANCECITY, TIMELAPSE, PCOST, INFRASTRUCTURE, PGSDP, TRANSPORTVEHICLE, PROPRIGHTS, AVGPGSDP, POLICYDUMMY\right)$$

For the purpose of estimation of the response probability, we have used the following *Logit Probability Function*:

$$p = F(Z) = \frac{e^Z}{1 + e^Z}$$

where variable Z is a linear function of the above mentioned explanatory variables, i.e.,

$$Z = \beta_0 + \beta_1 DISTANCECITY + \beta_2 TIMELAPSE + \beta_3 PCOST + \beta_4 INFRASTRUCTURE + \beta_5 PSGDP + \beta_6 TRANSPORTVEHICLE + \beta_7 PROPRIGHTS + \beta_8 AVEGPSGDP + \beta_9 POLICYDUMMY$$

The marginal effect of a variable, say *PSGDP* is given by

$$\frac{dp}{dPSGDP} = \frac{dp}{dZ}\frac{\partial Z}{\partial PSGDP} = f(Z)\beta_5,$$

where

$$f(Z) = \frac{dp}{dZ} = \frac{e^{-Z}}{(1 - e^{-Z})^2}.$$

Note that for all finite values of Z, we have

$$f(Z) = \frac{e^{-Z}}{(1 - e^{-Z})^2} > 0.$$

Therefore,

$$\beta_5 > 0 \Rightarrow \frac{dp}{dPSGDP} > 0, \text{ and}$$

$$\beta_5 < 0 \Rightarrow \frac{dp}{dPSGDP}.$$

Similarly, for the other variables.

We wanted to start with the following specification of *Z*

$$Z = \beta_0 + \beta_1 DISTANCECITY + \beta_2 DISTANCECITYSQ + \beta_3 TIMELAPSE + \beta_4 TIMELAPSESQ + \beta_5 PCOST + \beta_6 PCOSTSQ + \beta_7 INFRASTRUCTURE + \beta_8 PSGDP + \beta_9 TRANSPORTVEHICLE + \beta_{10} PROPRIGHTS + \beta_{11} AVEGPSGDP + \beta_{12} POLICYDUMMY$$

However, as we had expected, variables TIMELAPSE and POLICYDUMMY have turned out to be highly correlated with the coefficient of correlation equal to 0.89. As a result, these variables could not be used simultaneously. Therefore, we have used one of these variables at a time. More specifically, we have used the following two specifications of *Z:*

Model 1:

First, we have dropped the POLICYDUMMY, and the specification used is

$$Z = \beta_0 + \beta_1 DISTANCECITY + \beta_2 DISTANCECITYSQ + \beta_3 TIMELAPSE + \beta_4 TIMELAPSESQ + \beta_5 PCOST + \beta_6 PCOSTSQ + \beta_7 INFRASTRUCTURE + \beta_8 PSGDP + \beta_9 TRANSPORTVEHICLE + \beta_{10} PROPRIGHTS + \beta_{11} AVEGPSGDP$$

Model 2:

Next, we have dropped the TIMELAPSE variable and used the POLICYDUMMY instead. In this case the specification used is

$$Z = \beta_0 + \beta_1 DISTANCECITY + \beta_2 DISTANCECITYSQ + \beta_3 PCOST + \beta_4 PCOSTSQ + \beta_5 INFRASTRUCTURE + \beta_6 PSGDP + \beta_7 TRANSPORTVEHICLE + \beta_8 PROPRIGHTS + \beta_9 AVEGPSGDP + \beta_{10} POLICYDUMMY$$

Model 3:

Besides, we have estimated the following model as well:

$$y_i = \beta_0 + \beta_1 INFRASTRUCTURE + \beta_2 PSGDP + \beta_3 TRANSPORTVEHICLE + \beta_4 PROPRIGHTS + \beta_5 AVEGPSGDP + \beta_6 POLICYDUMMY$$

where $y_i =$ the ratio of the length covered by PPP projects in the ith state to the total length covered by all the projects in the state. We have calculated this ratio for all the states. For this model the results obtained as very much in line with the first two models. Moreover, it is less comprehensive than the first two models, so results are not reported here.

Regression Results:

TABLE C1: Partial Correlation Matrix

	distan~y	pgsdp	pcost	timela~e	policy~y	transp~e	propri~s	infras~e	avgpgsdp
Distancecity	1								
Pgsdp	-0.0337	1							
Pcost	0.0285	0.252	1						
Timelapse	0.1356	0.3554	0.3269	1					
policydummy	0.1135	0.2554	0.1761	0.8891	1				
transportv~e	-0.02	0.4675	0.2496	0.351	0.263	1			
Proprights	0.0631	0.2914	0.0544	0.0501	0.0437	0.5142	1		
infrastruc~e	-0.1183	0.2232	0.0086	0.0091	0.0357	0.2114	0.3621	1	
Avgpgsdp	0.0028	0.4116	0.1971	0.4527	0.3794	0.3088	0.3943	0.145	1

TABLE 2C: Effects of economic and legal indicators when TIMELAPSE is replaced with POLICYDUMMY: **Model 2:**

Logistic regression

Number of obs = 381
Wald chi2(10) = 72.94
Prob > chi2 = 0
Log pseudolikelihood = -147.99393 Pseudo R2 = 0.3485

ppp_non_ppp	Coef.	Robust Std. Err.	z	P>|z|	95% Confidence Interval	
DISTANCECITY	-0.0062107	0.001896	-3.28	0.001	-0.0099269	-0.0024946
DISTANCECITYSQ	5.23E-06	2.09E-06	2.5	0.012	1.14E-06	9.33E-06
PCOST	0.0119027	0.0021157	5.63	0	0.0077561	0.0160493
PCOSTSQ	-6.74E-06	1.77E-06	-3.81	0	-0.0000102	-3.27E-06
INFRASTRUCTURE	-0.00765	0.0035173	-2.17	0.03	-0.0145438	-0.0007561
PGSDP	0.000067	0.0000216	3.1	0.002	0.0000246	0.0001093
TRANSPORT VEHICLE	0.0000591	0.0000548	1.08	0.281	-0.0000484	0.0001665
PROPRIGHTS	1.052709	1.05603	1	0.319	-1.017071	3.122489
AVGPGSDP	0.0000574	0.0000242	2.37	0.018	0.00001	0.0001048
POLICYDUMMY	0.7095839	0.3388253	2.09	0.036	0.0454985	1.373669
_cons	-5.378365	0.8599216	-6.25	0	-7.06378	-3.692949

TABLE 3C: Marginal effects of economic and legal indicators when TIMELAPSE is replaced with POLICYDUMMY

Variable	dy/dx	Std. Err.	z	P>|z|	95% Confidence Interval		X
DISTANCECITY	-0.0010208	0.00031	-3.25	0.001	-0.001637	-0.000405	231.057
DISTANCECITYSQ	8.60E-07	0	2.51	0.012	1.90E-07	1.50E-06	93217.9
PCOST	0.0019564	0.00033	5.91	0	0.001308	0.002605	208.907
PCOSTSQ	-1.11E-06	0	-4	0	-1.60E-06	-5.60E-07	72553.7
INFRASTRUCTURE	-0.0012574	0.00059	-2.13	0.033	-0.002416	-0.000098	110.521
PGSDP	0.000011	0	3.05	0.002	3.90E-06	0.000018	21040.2
TRANSPORT VEHICLE	9.71E-06	0.00001	1.08	0.279	-7.90E-06	0.000027	4793.79
PROPRIGHTS	0.1730276	0.17765	0.97	0.33	-0.175151	0.521207	0.404622
AVGPGSDP	9.44E-06	0	2.41	0.016	1.80E-06	0.000017	23140
POLICYDUMMY*	0.1145987	0.05144	2.23	0.026	0.013782	0.215416	0.543307

TABLE 4C: Effects of economic and legal indicators when Annuity projects are treated as Non-PPPs.

Number of obs = 381

Wald chi2(11) = 91.71
Prob > chi2 = 0
Log pseudolikelihood = -120.60336 Pseudo R2 = 0.3999

pppnonppp	Coef.	Robust Std. Err.	z	P>|z|	95% Confidence Interval	
DISTANCECITY	-0.0087885	0.0023207	-3.79	0	-0.013337	-0.00424
DISTANCECITYSQ	6.96E-06	2.38E-06	2.93	0.003	2.31E-06	0.0000116
TIMELAPSE	-0.056695	0.0357449	-1.59	0.113	-0.1267537	0.0133636
TIMELAPSESQ	0.0003368	0.0001627	2.07	0.038	0.0000179	0.0006558
PCOST	0.0092909	0.0021838	4.25	0	0.0050107	0.0135711
PCOSTSQ	-4.85E-06	1.86E-06	-2.6	0.009	-8.49E-06	-1.20E-06
INFRASTRUCTURE	-0.0069528	0.0031107	-2.24	0.025	-0.0130496	-0.000856
PGSDP	0.0000771	0.0000241	3.2	0.001	0.0000298	0.0001243
TRANSPORT VEHICLE	0.0000965	0.0000648	1.49	0.136	-0.0000304	0.0002235
PROPRIGHTS	1.014236	1.19776	0.85	0.397	-1.333331	3.361803
AVGPGSDP	0.0000448	0.0000298	1.5	0.133	-0.0000136	0.0001031
_cons	-3.060287	1.92148	-1.59	0.111	-6.826318	0.7057451

TABLE 5C: Marginal Effects of economic and legal indicators when Annuity projects are treated as Non-PPPs.

variable	dy/dx	Std. Err.	z	P>|z|	95% Confidence Interval		X
DISTANCECITY	-0.0009672	0.00025	-3.9	0	-0.001453	-0.000482	231.057
DISTANCECITYSQ	7.66E-07	0	3.04	0.002	2.70E-07	1.30E-06	93217.9
TIMELAPSE	-0.0062392	0.00419	-1.49	0.136	-0.014449	0.00197	104.378
TIMELAPSESQ	0.0000371	0.00002	1.91	0.056	-9.40E-07	0.000075	12085.8
PCOST	0.0010225	0.00023	4.53	0	0.00058	0.001465	208.907
PCOSTSQ	-5.33E-07	0	-2.72	0.006	-9.20E-07	-1.50E-07	72553.7
INFRASTRUCTURE	-0.0007651	0.00037	-2.07	0.038	-0.001489	-0.000041	110.521
PGSDP	8.48E-06	0	3.04	0.002	3.00E-06	0.000014	21040.2
TRANSPORT VEHICLE	0.0000106	0.00001	1.51	0.132	-3.20E-06	0.000024	4793.79
PROPRIGHTS	0.1116155	0.13526	0.83	0.409	-0.153493	0.376724	0.404622
AVGPGSDP	4.93E-06	0	1.49	0.135	-1.50E-06	0.000011	23140

REFRENCES

ADB (2006), "Facilitating Public–Private Partnership for Accelerated Infrastructure Development in India", *Asian Development Bank*, New Delhi.

Bose, Ranjan Kumar (2006), "Growing On-Road Transportation in India: *Analysis of Policy Co-Benefits of Climate Change and Pollution*" available at http://www.cleanairnet.org/baq2006/1757/docs/SW32_3.ppt

Brown, Christine (2005) '"Financing Transport Infrastructure: For Whom the Road Tolls", the *Australian Economic Review*, vol. 38, no. 4, pp. 431–8.

Calderon, Cesar and Luis Serven (2004), 'The Effects of Infrstructure Development on Growth and Income Distribution,' *World Bank Policy Research Working Paper,* no 3400, World Bank, Washington, DC.

Debroy, Bibek and Laveesh Bhandari (2007), "Legal Structure and Economic Freedom of States in India," in *Judicial Reforms in India* (Eds: Arnab Kumar Hazra and Bibek Debroy, Academic Foundation.

DeCorla-Souza, Patrick (2005), "A New Public-Private Partnership Model for Road Pricing Implementation", *Paper Presented at the 2005 Annual Meeting of the Transportation Research Forum* .

Donahue, John, 1989, *The Privatization Decision*. Basic Books: New York.

GoI (Government of India) (2007), "Public Private Partnerships: Creating an enabling environment for state projects," Government of India, Ministry of Finance, Department of Economic Affairs.

Gray (2001). "Private Participation in Infrastructure: A Review of the Evidence," Private Provision of Services Group, October.

Grimsey, Darrin and Lewis, Mervyn, (2004), "Public Private Partnerships: The Worldwide Revolution in Infrastructure Provision and Project Finance," Edward Elgar.

Guasch, J.L. (2004), "Granting and renegotiating Infrastructure concessions: Doing it right," World Bank Institute, Washington D.C.

Haldia Gajendra (2000), *Indian Highways: A Framework for Commercialization*, National Council of Applied Economic Research, New Delhi.

Haldia Gajendra (2008), "Infrastructure in India: Challenges and Opportunities" available at www.ncaer.org/downloads/Lectures/JIPPS2008/gajendra-p.ppt

Haldea, Prithvi and Praveen Mohanty (2003), 'Market-based financing for highways in India', India Development Foundation Working Paper No 0307.

Infrastructure Partnerships Australia, IPA (2007), "Performance of PPPs and Traditional Procurement in Australia" prepared by *The Allen Consultancy Group* and *University of Melbourne*, Infrastructure Partnerships Australia.

Kumar, Rajiv, Palit, Amitendu and Singh, Karan (2007), "Sustainability of Economic Growth in India", CIGI Working Paper No. 25. Available at SSRN: http://ssrn.com/abstract=990082

Majumder, Rajarshi (2008), *Infrastructure and Development in India: Interlinkages and Policy Issues*, Rawat Publications, New Delhi.

Miller, James and Christopher Tsoukis (2001), 'On the Optimality of Public Capital for Long-term Economic Growth: Evidence from Panel Data,' *Applied Economics*, 33(9), .

Mott MacDonald (2002), "Review of Large Public Procurement in the UK", *Report to HM Treasury*.

Mott MacDonald (2002), "Review of Large Public Procurement in the UK", *Report to HM Treasury*.

National Audit Office (2003), "PFI: Construction Performance", The Stationery Office, London. HC87.

Ojiro, Makoto (2003), "Private Sector Participation in the Road Sector in China", *Transport and Communications Bulletin for Asia and the Pacific*, 73, pp. 1-25.

Panayotou, T. 1997. "The Role of the Private Sector in Sustainable Infrastructure Development." Available on line at www.yale.edu/environment/publications/ bulletin/101pdfs/ 101panayotou.pdf.

Pargal, Sheoli (2007), "Concession for the Delhi Noida Bridge", Planning Commission.

Planning Commission (2006a), "Financing of the National Highway Development Programmed", Report of the Core Group, Planning Commission.

Planning Commission (2006 b), "Guidelines on Financing Support to Public Private Partnerships in Infrastructure, Planning Commission.

PwC (2005), "Delivering the PPP promise: A review of PPP issues and activity".

Quiggin, John (2005), " Public–Private Partnerships: Options for Improved Risk Allocation" *The Australian Economic Review*, vol. 38, no. 4, pp. 445–50.

Rakshit, Mihir (2009), 'Issues in Infrastructure Investment: *National Highways Development Programme'* in *Macroeconomics of Post-reform India*, Vol I, Oxford University Press, New Delhi.

Sadka, Efraim (2006), "Public-Private Partnerships: A Public Economics Perspective," *IMF Working Paper*, WP/06/77

Thomas, A. V; Satyanarayana N. Kalidindi; K. Ananthanarayanan (2003), Construction Management and Economics, 21, pp. 393 – 407.

UNISON (2005), "The Private Finance Initiative: A Policy Built of Sand," UNISON.

Yescombe, E.R. (2007), "Public-Private Partnerships - Principles of Policy and Finance," Elsevier Finance.

DATA SOURCES:

CMIE (Centre for Monitoring of Indian Economy)
MOSPI, *Project Implementation Repots* (*various issues*)
NHAI, *MIS reports* (*various issues*)
CSO, Central Statistical Organization, *various publications*.
Arbitration and Conciliation Act (1996)
India Infrastructure (2008).

WEB SOURCES:

www.pppinindia.com
www.nhai.org
www.rbi.org
Websites of individual companies.