

Literature Survey

4.1 Infrastructure as a key to economic growth:

Infrastructure plays a key role in economic growth but it also has a great effect on distribution of income. It has been established through a study by Calderon *et al* (2004)⁶² about the impact of infrastructure development – as measured by larger stocks of infrastructure assets and improved quality of their services – on economic growth and the distribution of income using data for a sample of 121 countries over the period 1960 – 2000. Their main findings were:

- (i) The volume of infrastructure stocks has a significant positive effect on long-run economic growth.
- (ii) Infrastructure quantity and quality have a robust negative impact on income inequality. Regardless of the econometric technique and the inequality measure employed (Gini coefficients or income shares), they also found that inequality declines not only with large infrastructure stocks but also with an improved quality of infrastructure services.
- (iii) A variety of illustrative experiments show that their empirical findings are significant not only statistically but also economically. For example, were all Latin American countries to catch up with the region's leader in terms of infrastructure quantity and quality, their long-term per capita growth gains would range between 1.1 and 4.8 percent per annum, and their Gini coefficient would decline

⁶²Calderon, Ceaser and Serven, Luts (2004), "The Effects of Infrastructure Development on Growth and Income Distribution", *World Bank Policy Research Paper No. 3400*, Washington D.C.: World Bank.

between 0.02 and 0.10. Catch up with the East Asian median country would involve even large gains – ranging from 3.2 to 6.3 per cent extra growth and 0.05 to 0.13 lower Gini.

A one percent increase in a country's level of just one type of infrastructure such as telephone lines per worker can increase gross domestic product (GDP) growth by 0.20 percentage points.

- (iv) Infrastructure raises growth and lowers income inequality. It implies that infrastructure development may be a key win-win ingredient for poverty reduction. In addition to raising society's overall level of income, it would help raise the income of the poor more than proportionately.

The World Bank estimates that the private sector financed about 20 percent of infrastructure investments—amounting to about US\$850 billion—in developing countries during the 1990s.⁶³ Several industrial countries (e.g., Australia, Canada, Ireland, and the Netherlands) have recently adopted PPP arrangements to provide education, health, water and waste management, and other social services.

The contribution of infrastructure to economic growth is well recognized both in academic and policy debates. For example, two influential studies - Sachs and others (2004)⁶⁴ and the United Nations Economic Commission for Africa (2005)⁶⁵ - identify significant infrastructure expenditure needs in sub-Saharan Africa. Their estimate of annual needs range from 9 to 13 percent of

⁶³ World Bank (2002), "Building Institutions for Markets", *World Development Report 2002*, Washington: World Bank, Chapter 8 on Regulation of Infrastructure, pp. 151-67.

⁶⁴ Sachs, Jeffrey D., John W. McArthur, Guido Schmidt-Traub, Margaret Kruk, Chandrika Bahadur, Michael Faye, and Gordon McCord (2004), "Ending Africa's Poverty Trap", *Brookings Papers on Economic Activity*, pp. 117-240.

⁶⁵ Economic Commission for Africa (2005), "Assessing Regional Integration in Africa", *ECA Policy Research Paper*, New York: United Nations.

GDP for at least the next 10 years. However, given the stringent budget constraints that many developing countries have faced in recent decades, very few can afford to allocate the necessary resources to infrastructure.

Infrastructure built in the 1960s in most developing countries, albeit insufficient to meet residential demand, did support economic growth for a while. Hence, the lack of infrastructure was not a major economic policy concern. But after the oil shocks of the 1970s, growth prospects and macroeconomic conditions deteriorated in many developing countries, especially in low-income countries. These countries, with the help of such international institutions as the World Bank and the IMF, reacted to this challenge by formulating policies or other economic agreements aimed at increasing regional market size and promoting regional trade. These policies, combined with demographic pressures and increasing urbanization, led to a mismatch between limited supply and increasing demand for infrastructure in many regions of the developing world.⁶⁶

This mismatch was worsened by recurrent fiscal crises resulting partly from poor economic performance in many developing countries. Policy responses to these fiscal crises led to cuts in public expenditure, under-maintenance of infrastructure, and under-investment in new infrastructure in many sectors, including social sectors. Since long-term economic growth requires investments in infrastructure, governments face a growing need to find alternative ways to finance infrastructure.

At the same time, private firms cannot be relied upon to build and deliver these public infrastructures independently. For these reasons, mutually

⁶⁶ Mona Hammami, Jean-Francois Ruhashyankiko, and Etienne B. Yehoue (2006), "Institute Determinants of Public-Private Partnerships in Infrastructure", *IMF Working Paper*.

beneficial partnerships between public and private sectors can be important. The provision of public goods or services through partnerships is based on two different motives. Private firms care about making money by building public goods and delivering services, while governments are concerned with saving money through private participation. Impressionistic evidence suggests that successful and effective partnerships are those in which the partners share the same goal of quality, efficiency, and accountability in building public goods and delivering public services.⁶⁷

4.2 Public Private Partnership in International Perspective

A public-private partnership is defined as a contract between the public and private sectors for the delivery of a project in which the private partner has the responsibility for acquiring the majority of the necessary financing.

The Federal Highway Administration, American Association of State Highway and Transportation Officials, and National Cooperative Highway Research Program sponsored a scanning study to collect information about PPP programs for highway infrastructure in Australia, Portugal, Spain, and the United Kingdom, where PPP experience is more extensive.⁶⁸

4.2.1 General Findings

- **Highway PPP arrangements, particularly in the most mature markets, are not exclusively financial transactions; rather, they are the selected project delivery strategy based on a value-for-money or feasibility analysis.** In the majority of the countries visited,

⁶⁷ Mona Hammami, Jean-Francois Ruhashyankiko, and Etienne B. Yehoue (2006), "Institute Determinants of Public-Private Partnerships in Infrastructure", *IMF Working Paper*.

⁶⁸ Federal Highway Administration, U.S. Department of Transportation American Association of State Highway and Transportation Officials (2009), *Public-Private Partnerships for Highway Infrastructure: Capitalizing on International Experience*.

this perspective was either firmly held or gaining traction. In nearly all cases, the government determines that a PPP arrangement is the preferred method of delivery based on a systematic analysis and selection methodology.

- **PPPs are a critically important and growing percentage of the national highway network.** A moderate percentage of the overall highway and roadway networks are under PPP arrangements, but the PPP segments are typically critical components of the national or regional system for vehicular mobility.
- **Highway PPP arrangements do not automatically require user fees.** The various sources of funds are used throughout the world—from exclusively real tolls to a combination of real tolls and shadow tolls to exclusively shadow tolls or direct-payment mechanisms (often principally availability based).
- **The necessary public sector mindset and skills base for successful PPP programs and projects differ substantially from those needed for conventional practices.** All of the public agencies visited emphasized the significance of these two points and indicated the importance of building public sector capacity in PPP program management.
- **A reasonable balance among technical, commercial, and legal conditions and terms in a PPP contract is integral to its success.** While all highway projects are engineering efforts, PPP projects are also long-term enterprises. A fundamental difference exists between prescribing a highway that an agency wants constructed versus

granting a private entity the right to operate an enterprise within the bounds of a contract. The latter demands establishing equilibrium between business and engineering aspects of a highway project.

- **Public agencies recognize that a PPP arrangement is in fact a long-term partnership with the private sector founded on a contract.** As such, the public sector's contract management team will be the one responsible for sustaining this relationship. Doing so may require understanding the spirit as well as the letter of a contract.

4.2.2 Project Life Cycle Findings

- **All public agencies emphasized the importance of adequate front-end or preliminary planning for a project to fully comprehend its business case and potential life-cycle value.** This is necessary to understand what service a potential asset should provide and where value is derived. Such comprehension will undoubtedly influence the remaining decisions on project delivery, including whether the project is a PPP candidate.
- **When defining or scoping a PPP project, the primary focus should be on identifying and conveying the outputs desired without inappropriately compromising existing technical standards.** Project outputs are what customers focus on: reliable travel times, safe travel environment, comfortable ride, etc. Thinking first about what customers desire rather than developing a prescriptive definition of the asset is a major transition in practice.
- **Risk analysis and allocation are paramount to PPP project success.** Certainly, risk allocation is not a new concept, but the public

agencies with significant PPP experience have evolved from stressing maximum risk transfer to optimal risk allocation in PPP arrangements.

- **Most countries use an independent verifier or reviewer to monitor the design and construction phases of a PPP project.** The independent verifier serves as an objective third party to administer (certify pay requests, etc.) and review (check compliance with requirements, make onsite visits, etc.) the project during design and construction.
- **All countries use key performance indicators (KPIs) or performance measures in their PPP contracts to assess service along with incentives and disincentives to motivate contractor performance.** KPIs are the means for assessing whether the PPP contractor is providing the outputs desired from the asset. Contractors are usually rewarded monetarily for exceeding performance targets or showing positive trends, and they are debited monetarily for missing performance targets or showing negative trends.
- **Effective PPP contract management is vital to maintaining the public sector's risk posture and to sustaining a good working relationship with the PPP contractor.** The public agency's contract manager must understand the line between risk liability and risk transfer when interacting with the PPP contractor on issues. Further, the contract manager must recognize that the PPP contractor is likely his or her counterpart for the better part of 30 years or more, so keeping the bigger picture in perspective is more important than a petty disagreement or discrepancy.

4.2.3 Additional Findings worldwide to PPPs are far from standard

- **Public agencies in the host countries have faced or continue to face challenges similar to those in the United States when it comes to providing serviceable highways and roadways.** Not a single public agency indicated that it had a surplus of funds available for expansion, restoration, and preservation of its highway assets.
- **Significant institutional learning, in both the public and private sectors, has occurred in the countries visited over roughly the last decade.** Most PPP programs in the countries visited began in response to fiscal crises, and the early PPP arrangements in these countries, while well intentioned, did not necessarily provide the best value for the public. Since that time, the planning, procurement, and management of PPP projects have improved substantially. project that
- **The maximum contract period (or concession period) for road or highway contracts observed was 50 years, and most periods ranged from 30 to 40 years.** This is a contrast to several recent lease agreements of existing assets with periods ranging from 75 to 99 years coupled with large upfront payments in the United States. None of the countries visited have implemented a model of this sort recently. during
- **All public agencies indicated that PPP arrangements can allow the delivery of projects sooner than would be possible through their other delivery methods.** This is a common refrain among agencies with significant PPP experience. make project delivery the the results
- **One man's BOOT (build-own-operate-transfer) is another's DBFO (design-build-finance-operate).** The definitions, acronyms, and

nomenclature used worldwide for PPPs are far from standard.

- **Innovation by the private and public sectors in PPP arrangements is evident.** In the case of the private sector, innovation is typically stimulated by competition for the award of an integrated, commercial enterprise. In the case of the public sector, innovation is typically driven by stewardship of public interests.
- **In general, the representatives of the PPP contractors the scan team met with exhibited a focus on their customers, an emphasis on life-cycle management and value, and a pride in ownership and stewardship of their assets.** The comments and answers of the private participants visited demonstrated to the team members that their business model depends on these attributes.
- **The two most commonly cited attributes of a project that potentially make it a PPP candidate were scale and complexity.** The scale attribute is necessary to offset the transaction costs of PPPs, while complexity is generally seen as the ingredient that enables or perhaps compels the private sector to find novel or unique project solutions.
- **All public agencies emphasized the need for transparency during the procurement process for PPP projects.** The typical scale and complexity of PPP highway projects generate an unusually high level of public, political, and media attention. Nearly all of the agencies visited go to substantial lengths to make project documents and records accessible. In addition, some agencies use a public auditor to monitor proceedings.

- **The commitment of the government to see PPP project procurements through to closure is essential to stability within this market.** Given the enormous transaction costs involved in PPP projects, private participants must have confidence that the public sector is committed to closing deals expeditiously with rare exceptions.
- **In many of the countries visited, the PPP project development time was remarkably efficient.** In some countries, the entire procurement process, from circulation of an environmental document to attainment of financial close, averaged 12 months.
- **Multiple public agencies claimed that PPP projects provide better price and time certainty on design and construction when compared to the conventional approach.** Several of the countries visited indicated that the scale and complexity of a competition for PPP contracts generally lead to design and construction efficiencies, which result in better pricing and scheduling by the private sector.
- **Practices for managing changes and uncertainty throughout the contract period vary and range from rebalancing actions to limited material adverse effect impacts.** Rebalancing is a significant modification process, but one that is intended to be applied symmetrically. The conditions can be modified in either the public or private sector's favor. Similarly, material adverse effect changes can be quite arduous, but in the countries where this approach is taken, the public agencies have evolved to substantially limit the triggers of such provisions.
- **Handback provisions appear to necessitate good asset**

management practices by the private sector, but the handback process is generally untested in the countries visited. Typically, the handback provisions specify residual service lives for the different elements of the facility, such as pavements, at the end of the contract's term.

4.3 Various studies

4.3.1 Harris (2003)⁶⁹ traces the historical evolution of Public utilities, which were privatized in the 1980s and 1990s, for example in the UK and parts of Latin America. These were private at the start of the post Second World War period. After the post-Second World War period, most governments entrusted delivery of these services to state-owned monopolies. But in many developing countries, the results were disappointing. Public sector monopolies were plagued by inefficiency. Many were strapped for resources because government succumbed to populist pressures to hold prices below costs. By and large publicly owned utilities failed to expand services to meet rapidly growing demand and did not do a good job of providing service to poor and rural households. Fiscal pressures and the success of the pioneers of the privatization of infrastructure services, provided governments with a new paradigm, many governments sought to involve the private sector in the provision and financing of infrastructure services.

The shift to the private provision that occurred during the 1990s was much more rapid and widespread than had been anticipated at the start of the decade. By 2001, developing countries had seen over \$755 billion of

⁶⁹ Harris Clive, (2003), "Private Participation in Infrastructure in Developing Countries: Trends, Impacts and Policy Lessons", *World Bank Working Paper No. 5*, Washington DC: The World Bank.

investment flows in nearly 2500 infrastructure projects. However, these flows peaked in 1997s, and have fallen more or less steadily ever since. These declines have been accompanied by high profile cancellations or renegotiations of some projects, a reduction in investor appetite for these activities and, in some parts of the world, a shift in public opinion against the private provision of infrastructure services. Services where real competition for consumers has been introduced, such as telecommunications, may well have escaped from the cycle.

Whatever policies countries choose, governments cannot avoid the inescapable realities that infrastructure services have to be paid for, whether provision is public or private. Most of the concerns about the sustainability of private infrastructure really reflect the difficulties governments have in sustaining cost-recovering tariffs and commercial principles in these sectors. This is likely to be a bigger problem when provision is public rather than private; hence we are likely to see less resources flowing to the infrastructure sectors under public provision, everything else being equal. The real issue is not public infrastructure versus private infrastructure. Put this way, it is simpler: *the argument is about less infrastructure versus more.*

4.3.2 Gwilliam and Shalizi (1999)⁷⁰ based on their study of road funds argue that a dedicated road fund funded substantially by user charges to maintain and upgrade highways in developing countries may be essential for growth. Surcharge or high taxes on diesel is not as good a proxy for road damage by trucks, which account for the bulk of road damage. The impact of a heavy truck is 10,000 times as great as that of a Medium auto. It also varies

⁷⁰ Gwilliam K. and Shalizi. (1999), "Road funds, user charges, and taxes", *The world Bank Research Observer*, (14.2), Washington DC: World Bank, pp.159-186.

nonlinearly with axle weight. Too high a surcharge would adversely affect the other sectors of economy like is power generation or agriculture. The reliance should therefore be placed on user charges based on potential damage to highway.

The quality of good roads is so essential for the economy can be seen from the fact that for every dollar that road agencies withhold by under funding maintenance, road users must spend about three dollars in additional vehicle operating costs. Therefore, the economy as a whole benefits from timely road maintenance.

4.3.3 Alexander et al (1999)⁷¹ highlighted the importance of role of transport regulators. In the context of Concession contract, it is important that the right level of return / cost of capital be assessed by the regulators. Return is to be influenced by risk level which is also to be assessed by the regulator. Regulators in the developing countries face a more difficult scenario where a regulated company is unquoted or takes a wide range of activities and even across sectors.

4.3.4 Trujillo et al. (2000)⁷² argue that bidders of concessions have an incentive to overestimate demand and, thus to promise low tolls if they count on renegotiations once the contract has been awarded to them, Contracting authorities may be willing to accept too optimistic demand projections, rather than abandoning projects for which there is not enough demand, as this allows them to avoid cancelling expensive and highly visible projects.

They cite the example of most of South East Asia's BOT projects for toll

⁷¹ Alexander, Ian, Antonio Estache & Adele Oliveri, (July, 1999), *A Few Things Transport Regulators Should Know About Risk and the Cost of Capital*, Washington DC: The World Bank.

⁷² Trujillo L., Quilinet E. and Estache A. (2000). "Forecasting the demand for privatized transport – What economic regulators should know and why". *World Bank Policy Research Working Paper No. 2446*, Washington DC: World Bank.

roads which were based on very optimistic growth assumptions pre-dating the fallout at the end of the 1990s. Excess capacity is indeed resulting in a renegotiation of many road contracts in Latin America and East Asia. Whatever the regulatory regime selected, many of the players have a strong incentive to play strategically. Politicians will want to look good during their tenure and support policies that maximize short run fiscal payoffs and /or minimize tariffs. They can do so quite consciously and knowing perfectly well that requiring high payments and expenses from the operators while imposing low tariffs are generally not consistent and sustainable. Willingness or ability to pay and hence the real potential value of a business are seldom analyzed very analytically in this context. The political gain for them to announce a new infrastructure is much higher than the political loss of having to increase taxes; furthermore these concerns and the eventual renegotiation of the deal is left to their successors since they generally imply political costs. But it is clear that private operators happily play in this game. For many of the best deals, their main concern is to get the contract signed by the government, knowing quite well that there is generally significant room for renegotiation. Patience in this field is often rewarded once the contract is won.

In case of rare over pessimistic forecast, the main outcome is a lack of transport capacity and hence congestion. This can be quite dramatic in the short run when it is impossible to revise investment plans to adjust quickly to the larger than expected demand. This is a common problem in urban transport modes metro rides are often underestimated at peak time, urban access roads in many of the largest urban centers witness permanent traffic jams at rush hours and in some case throughout the day as in Bangkok.

They highlight the critical role of regulators to control strategic behaviour of bidder as well as granting authority. Privatization induces new needs for demand forecasting; it leads to pay more attention to risk than it is the case when investment is publicly financed. The regulator has to be able to judge the traffic study made by the operators, and to find out the strategic behaviour which influences these studies.

4.3.5 Guasch's (2004)⁷³ study of about 1000 concession contracts signed during the 1990s in Latin America suggests that problems in PPP have been in the making for a while now. Guasch found that in transport concessions renegotiation⁷⁴ are almost a norm rather than an exception. Fifty five per cent of all transport concessions implemented between 1985 and 2000 in the Latin American and the Caribbean region were renegotiated. It is interesting to note that, in the transport sector, in 57 per cent of the cases the renegotiation was requested by the operator (vs. 61 per cent for all infrastructure contractors) and that the Government was the sole initiator in 27 per cent of the cases, the highest rate across sectors.

Guasch highlights the opportunistic behaviour of government and private enterprises in infrastructure concessions. In this type of concession the private party has to make large investment in the beginning. These high sunk costs may tempt governments to behave opportunistically, taking regulatory actions that expropriate rents once costs are sunk, such as compulsory or unilateral renegotiations of agreed –upon contract terms. A typical scenario is a government seeking to secure popular support during a re-election

⁷³ Guasch J.L. (2004), *Granting and renegotiating infrastructure concessions: Doing it right*, Washington DC: The World Bank.

⁷⁴ Guasch defined renegotiation as an event in which a concession contract undergoes a significant amendment in any of the following areas: tariffs, investment plans and levels, exclusivity rights, guarantees, lump-sum payments or annual fees, coverage targets, services standards and concession periods.

campaign and deciding to cut tariffs or not honour tariff increases. Another common scenario is a new administration deciding not to honour tariff increases agreed to in a concession contract granted by a previous administration or pursuing different priorities than the previous administration and so requesting a different action plan. Investors, aware of such pitfalls, might avoid investing in the first place unless such issues are properly addressed, or they may require an additional premium (higher tariffs, smaller transfer fees) to account for the risk. Depending on the country and sector, such regulatory risks can add two to six percentage points to the cost of capital. Higher tariffs or lower transfer fees or sale prices are then needed to cover these higher costs.

Governments are not the only parties who may behave opportunistically. Once a private enterprise has been granted a concession in an infrastructure sector, it may be able to "hold up" the government –for example, by insisting on renegotiating the contract, seeking more favourable terms, or using regulatory capture. An enterprise's extensive information advantages over government (and, in most cases, over other potential operators) and perceived leverage in negotiations can give it strong incentives to renegotiate a contract and secure a better deal than the original bid. The resulting regulatory arrangements may be less effective in protecting customers from monopoly abuses.

Moreover, neutral events not induced by governments or service providers – for example, internal or external macroeconomic shocks such as the sharp devaluations in Mexico in 1994, Brazil in 1999 and Argentina in 2001- can significantly undermine the financial equilibrium of firms, because

of currency risks.

The main problems identified by Guasch (2004) include the incompleteness of the contracts, the lack of competitive bidding processes with clear and transparent award processes and the absence of an independent and technically capable regulator.

4.3.6 Estache and Srebrisky (2004)⁷⁵ trace the evolution of public –private partnerships (PPPs) in developed and developing countries since the early 1990s. In developed countries, asset sales (most obvious in Australia and continental Northern Europe) and concessions / franchises (in the U.K., Southern Europe and Canada) have been the main instruments of private participation in transport infrastructure, but not the only one. Additional complementary initiatives abound. The best known may be the Private Finance Initiative (PFI) launched by the UK in 1997 to deliver new and modernize infrastructure to public service. The initiative is interesting because it has been adapted in other developed and developing countries for their transport sector.

In developing and transition economic, concessions are the most common form of private sector participation in transport. Concession contracts accounted for 56 per cent of all transport projects between 1990 and 2001. It also shows that while Latin America and East Asia are the most active in promoting concessions. Greenfield projects have been quite successful in East Asia over the last eleven year or so.

Estache and Serebrisky conclude that PPPs only work for a limited period of time, but often result in complex renegotiation after some time, either

⁷⁵ Antonio Estache and Tomas Serebrisky (July, 2004) "Where Do We Stand on Transport infrastructure - Deregulation And Public –Private Partnership?"; *World Bank Policy Research Working Paper* 3356.

due to macroeconomic shocks (such as in Argentina) or because individual projects run into problems. The authors also emphasise the need for strong political commitments to make the PPP reform path sustainable in regions such as Latin America and Central and Eastern Europe. In addition, a high technical competence is required on both sides (public and private) to make PPPs work.

In their view deregulation has generally had different effects in developed and developing economies. Project sizes are larger for developed countries and their relative contribution to the needs is larger as well. The fiscal payoffs have generally been good in the short run but less predictable in the long run, certainly in the case of developing countries, often as a result of contract renegotiations. As for the users, the payoff from reform is somewhat different for passenger and freight transport. The passenger have seen improvements in the quality of services, have more options to choose from and often face relatively low prices, but often because the government has kept a tight control with important fiscal consequences.

Their final and most vital conclusion is that the possibility of the private sector playing a strong role in the transport infrastructure of all countries of the world is rather low.

4.3.7 Queiroz (2005)⁷⁶ studied the PPP projects in Highways sector in Transition Economies of Hungary, Czech Republic, Poland, Slovenia, Croatia, Romania and Serbia over a period of 10-15 years. Most of these projects resulted in renegotiation. Main risks in PPP in highways are those affecting gross revenue. Both predictability of future traffic volumes and the willingness

⁷⁶ Queiroz Cesar (2005) "Launching Public Private Partnerships for Highways in Transition Economies", *The World Bank Transport Paper 33910*, Washington DC: The World Bank.

of road user to pay tolls, together with the possibility that expected land use may not materialise.

It cites the need to have Concession law and transparency in award of projects. The paper highlights the need to disclose the concession agreement once the same is signed. This greatly helps the taxpayer to believe that entire process is above board and creates favourable public opinion about PPPs.

Queiroz also analysed the positive role played by World Bank in PPP projects by providing guarantees to cover government performance risks that the market is not able to absorb or mitigate. The WB guarantees have helped reduce the risk for concessionaire thereby enabled them to mobilise new source of finance at reduced costs and extended maturities. These guarantees amounting to \$1.2 billion led to \$12 billion of investment in projects covered by guarantees.

4.3.8 Bain and Plantagie (2002)⁷⁷ studied traffic forecast in 68 toll roads across countries in 2002 and 2003 on behalf of Standards and Poor. The business case for many project financed toll road, bridges and tunnel transactions rely heavily on projections of traffic and therefore revenue. This places market risk at the forefront of credit analysis. Market risks is commonly greatest at the project opening, so the study focused on first year's operation. Based on toll facilities for which before and after data were available.

The study found that, there is great degree of optimism in traffic forecast in different countries. Countries with history of tolling have much less smaller error distribution compared to countries new to tolling. In the 68 toll roads the actual traffic to forecast traffic varied from 0.15 to 1.51 with mean of 0.74.

⁷⁷ Bain Robert and Jan Willem Plantagie, (2002), *Traffic Forecasting Risk: Study Update 2003*, Standard & Poor's infrastructure Finance.

Optimism bias is a consistent trend, the mean error was 25 per cent over prediction in year one.

Normal (0.74, 0.26), n=68

The error is much greater in countries without history of tolling, than the countries with toll experience.

Countries with history of tolling : Normal (0.81, 0.24)

Countries with no history of tolling : Normal (0.58, 0.26)

4.3.9 The study conducted by Mona Hammami et al (2006)⁷⁸ has derived the hypothesis under the various constraints channel as tabulated in Table 4.1.

Table 4.1
Channels, Hypotheses and Explanatory Variables, and Data Sources

Channels	Hypotheses	Explanatory Variables	Data Sources
Government Constraints	H1 : Governments running large deficits and high debt burden are more likely to engage in PPPs.	General government balances (as a percentage of GDP) Total debt (as a percentage of total exports of goods and services)	<i>World Economic Outlook (2005)</i>
	H2: Rentier countries with large sources of revenue have soft budget constraints and are therefore less motivated to engage in PPP projects.	Aid per capita (current US\$)	<i>World Development Indicators (2005)</i>
		Fuel exports (as percentage of total merchandise exports)	<i>World Development Indicators (2005)</i>
Political Environment	H3: PPP arrangements are likely to be positively correlated with ethnic fractionalization .	Ethnic fractionalization (index)	Dataset from "Fractionalization" by Alesina and others (2003)
	H4: Right wing governments are more likely to engage in PPPs.	Chief executive party's orientation (indexed as 1 = left; 2 = center; 3 = right)	Database of Political Institutions from "New Tools and New Tests in Comparative Political Economy:
	H5: PPPs are higher in politically stable	Opposition parties in the legislature	<i>The Database of Political Institution" by</i>

⁷⁸ Mona Hammami, Jean-Francois Ruhashyankiko, and Etienne B. Yehoue (2006), "Institute Determinants of Public-Private Partnerships in Infrastructure", *IMF Working Paper*.

	countries with accountable governments.	(number)	Beck and others (2000)
Market Conditions	H6: PPPs tend to be higher in large markets where demand and purchasing power are higher.	Population (log) Real GDP per capita (lagged 2000 US\$, purchasing power parity)	<i>World Development Indicators</i> (2005)
Macro-Economic Stability	H7: PPPs are higher in countries with credible, predictable, and stable macroeconomic conditions. In particular, countries with lower inflation and stable exchange rates are more attractive candidates for PPPs.	Inflation (annual percentage change of GDP deflator) Money supply (M2 in percent of GDP) International reserves (in months of imports of goods and services)	<i>World Development Indicators</i> (2005) <i>International Financial Statistics</i> (2005)
Institutional Quality	H8: Countries with weak institutions and low quality of bureaucracy are more likely to display high country risk and therefore less likely to attract PPPs.	Control of corruption (index) Composite country risk (index)	<i>ICRG</i> <i>ICRG</i>
Legal System	H9: PPPs will be higher in countries with strong and effective legal institutions. H10: PPPs will be higher in environments where the legal code (laws on books) allows for better investors' rights protection.	Rule of law (index) Common law origin (dummy)	Data from "Governance Matters III: Governance Indicators for 1996 – 2002" by Kaufmann, Kraay, and Mastruzzi (2003) Drawn from LaPorta and others (1998) and expanded by the authors based on the <i>CIA World Fact Book</i>
PPP Experience	H11: PPPs are higher when both, the public and the private sector, have had previous PPP experiences.	PPP experience (dummy for country – year with previous PPP project)	Created by the authors based on the WB PPI database: http://ppi.worldbank.org

The data also show that investment flows in PPPs increased over time to reach a peak in 1997 of more than US\$100 billion. Investment flows in

PPPs receded after 1997, to about US\$55 billion in 2003, about the same level as in 1995–96. Interestingly, this pattern is similar to that of total private capital investment flows, which also peaked at about US\$275 billion in 1997 and declined thereafter. This suggests that PPPs, like private capital investment flows, may react to global shocks such as the Asian, Russian, Turkish, and Argentinean crises, as well as the September 11 events in the United States.

The PPP projects are traditionally more important in energy (1,116 projects in the PPI database) and transportation (735 projects), followed by the telecommunications (600 projects) and water (261 projects). Perhaps more interesting is that the most common mode of entry into the energy and telecommunication sectors is through Greenfield investments, while the most common mode of entry in transportation and water sectors is through concessions.⁷⁹

The most common contract type for PPPs appears to be build-own-operate (38.9 percent of all projects), followed by build-own-transfer (17.9 percent) and build-rehabilitate-operate-transfer (13.2 percent). These three represent 70 percent of all projects.

4.4 PPP in Indian Perspective

4.4.1 Harris (2008)⁸⁰ studied the investment commitments to private sector infrastructure in various regions of the world. South Asia has been getting greater share of investment commitment going to all the developing countries.

⁷⁹ Mona Hammami, Jean-Francois Ruhashyankiko and Etienne B. Yehoue (2006), "Institute Determinants of Public-Private Partnerships in Infrastructure", *IMF Working Paper*.

⁸⁰ Harris Clive (Mar. 2008), "India leads developing nations in private sector investment : but the region needs more investment to meet demands", *Gridlines- Note No. 30*, Washington DC: PPIAF C/O The World Bank.

It has risen from five per cent in the period 1995 -2000 to 19 per cent in 2006. Among the sectors Telecom is the biggest recipient with 64 per cent commitments during the period 2001-06.

In 2006 India attracted more investment commitment to infrastructure projects with private participation than any other developing country, commitment to India were nearly twice those of Brazil and well ahead of even China.

4.4.2 Izaguirre et al (October 2009)⁸¹ studied the private activity in road projects in developing countries underwent resurgence in the past four year. Investment commitments to road projects with private participation grew from US\$7 billion in 2005 to US\$16.7 billion in 2008, reaching a new peak.

The growth in investment was concentrated in few countries. Brazil, Mexico, and India saw their share of the total investment rising from around 20 per cent in 2005 to 50 per cent in 2006, 66 per cent in 2007, and more than 80 per cent in 2008. In all three countries new models and frameworks for private participation helped attract investment in road infrastructure.

In India private activity in roads rose steadily from 2002 onwards, with annual investment reaching levels of US\$ 3.2 – 4.8 billion in 2006 – 08, far higher than in previous years. The Indian projects granted in 2008 differ in nature from those in 2006–07. The 75 projects (concessions and BOT contracts) implemented in 2006–07 averaged around US \$ 100 million in investment size, and around 80 per cent were tendered using the lowest government contribution (lowest government payment or subsidies) as the main bidding criterion. In contrast, the eight projects implemented in 2008

⁸¹ Izaguirre, Ada Karina and Alexander N. Jett, (October, 2009), "Investment in road projects with private participation more than double between 2005 and 2008, but was concentrated in a few countries", *Private Participation in Infrastructure Database*, The World Bank Group.

averaged US \$570 million in size, and six used highest transfers to the government (highest price paid to or highest percentage of revenue transfer to government) as the main bidding criterion. These data suggest that most Indian projects awarded in 2008 were expected to generate enough resources to be financially viable, requiring little or no government support.

4.4.3 Izaguirre et al (December 2009)⁸² highlight the stellar achievement of India in attracting private investment in infrastructure. In South Asia, India attracted 84 per cent of regional investment and implemented 28 of the 36 new projects. Investment in the country rose by 21 per cent from 2007, reaching a record US\$27.9 billion.

In transport the region had 13 new projects, all in India and Pakistan, involving investment of US\$5.8 billion. India implemented 11 projects. Eight of these are road projects, involving more than 1,500 kilometers and US\$4.6 billion in investment.

4.4.4 Izaguirre et al (November 2009)⁸³ in their study found that private activity in transport declined in 2008, with the full onset of the financial crisis driving a slowdown in the second half of the year. Yet while investment commitments to transport projects with private participation were down from the peak levels of the previous two years, they remained strong – at the third highest level in 1990–2008.

Total investment in road projects amounted to bringing the total in 2008 to US\$16.8 billion, a level never before seen in roads. The projects, however, declined by 58 per cent in 2008 compared with 2007. Activity was

⁸² Izaguirre, Ada Karina, and Rossa FitzGerald, (December, 2009), "Investment commitments reach a new peak in South Asia while the number of new projects declines" *Private Participation in Infrastructure Database*, PPIAF, The World Bank Group

⁸³ Izaguirre, Ada Karina and Alexander N. Jett, (November 2009), "Private activity in transport down for second consecutive year, but still around peak level", *Private Participation in Infrastructure Database*, PPIAF, The World Bank Group.

concentrated in large projects in a few countries, of the eight countries signing road contracts, three (Brazil, Mexico, and India) accounted for 76 per cent of projects and 83 per cent of investment.

4.4.5 Gurmeet Kaur (2009)⁸⁴ highlights the limitation of Viability Gap Funding scheme. It is used for the projects where the traffic is low. It bridge gap between financing costs and actual return from the projects. While VGF would reduce overall projects costs and end user tolls, it will not overcome the underlying low demand. The private party would assess the likely demand and if this is insufficient, the project is unlikely to receive financial closure. The cross city Tunnel project in Australia is one such example where demand was incorrectly assessed. The project went into bankruptcy and had to be bailed out.

4.4.6 Tsukada (2005)⁸⁵ highlights some of the 3 advantage of the BOT based on his study of NHAI project as ADB expert in India. He cites a major advantage of the BOT scheme that the combined provision of construction and later O&M enables BOT operators to design the facilities in such a manner as to minimize the life cycle costs of the construction and operation of the infrastructure, and thus enhance the operational efficiency of the project. Other benefits would include the efficiency of intervention of the financiers once a problem happens. Usually the private sector financiers have a "step in" clause which enables them to intervene quickly in the management of a company managing a failed project so as to prevent a default. This may prevent disruption of BOT service provision in a more effective manner than intervention by the public sector, which is often slow in decision making and

⁸⁴ Kaur Gurmeet (December 10th, 2009), "PPP; Bridging Infrastructure gap", *Economic Times*.

⁸⁵ Tsukada Shunso (2005), *Global Experience of Public Private Partnership for Highway Development*, ADB

less capable in dealing with managerial issues in the project companies.

4.4.7 Rakshit (2006)⁸⁶ argues that a basic problem with NHAI schemes is that there is no bench mark against which estimated project costs of the bidders are judged. In the UK for example projects under Private Finance Initiative (PFI) are compared ex ante with a bench mark called Public Sector Comparator (PSC) and this acts as a check on rampant collusion and guarantees some minimum fair value for money, In NHAI there is no such ex ante evaluation of BOT projects, there is no ex post assessment either of costs and benefits of projects implemented. Choice of optimum form of PPP in Indian context is hindered by the absence of such ex ante and ex post evaluation.

He further argues that in BOT toll some of the risks transferred are the ones concessionaire is least equipped to bear like demand and macroeconomic changes over the concession period, this makes the risk premia in BOT (toll) exceptionally high.

He criticises BOT (annuity) model on the grounds that annuity payments are calculated on the basis of a 15 per cent Internal Rate of Return (IRR) and the length of concession (excluding the construction period of 2 ½ years) is 15 years, both these figures are ad hoc, not derived through an exercise for ensuring the best value for money.

He argues that for tolled roads government should get the job done through competitive bidding and also hand over maintenance contract with fixed tolls for five years. He argues that this option would be much cheaper in view of lower cost of funding for the government.

⁸⁶ Rakshit, Mihir (Jan-Jun, 2006), "Issue in infrastructural Investment-National Highway Development Programme", *Money & Finance*.

4.4.8 Singh and Kalidindi (2006)⁸⁷ criticised the BOT (Annuity) model on the grounds that it lacks incentives to projects for maximizing or improving traffic in the projects. NHAI does not have the option to take advantage of the projects promoter's techno – managerial efficiency in case NHAI decides to collect tolls from the user.

The private investors perceive the annuity based PPP road projects to be risky in spite of assumption of traffic risk by the granting authority, Annuity quotes received by NHAI in pilot project Panagarh – Palsit were far in excess of estimates prepared by NHAI.

Realisation of greater than estimated traffic during the operational phase could damage the pavement and increase the concessionaire scope of works regarding repair and maintenance of the highway.

The cost of annuity based projects is higher. The cost of capital for private investors is higher compared to NHAI. There is need to use PSC used in countries like UK and Australia. The authors argue that in spite of all the shortcomings the annuity based BOT model is important in view of the unreliable traffic estimates and low level of private sector participation in pure BOT concession road projects in India.

4.5 Evaluation of Completed NHDP Phase-I & Phase-II⁸⁸

4.5.1 Some authors argue that Indian manufacturing has been constrained by inadequate infrastructure and that industries that are dependent upon infrastructure have not been able to reap the maximum benefits of the

⁸⁷ Singh L. Boeing & Kalidindi S.N. (2006), "Traffic revenue risk management through Annuity Model of PPP road projects in India", *International Journal of Project Management* 24, pp 605-613.

⁸⁸ Ejaz Ghani, Arti Grover Goswami and William R. Kerr (2012) *Highway to Success: The Impact of the Golden Quadrilateral Project for the Location and Performance of Indian Manufacturing*

liberalization's reforms (e.g. Gupta et al. 2008, Gupta and Kumar 2010, Mitra et al. 1998).

The GQ project sought to improve the connection of four major cities in India: Delhi, Mumbai, Chennai, and Kolkata. The GQ system comprises 5,846 km of road connecting many of the major industrial, agricultural, and cultural centers of India. It is the fifth-longest highway in the world. The massive project began in 2001, was two-thirds complete by 2005, and mostly finished in 2007.

Through 2006 and inclusive of the GQ upgrades, India invested US\$71 billion for the National Highways Development Program to upgrade, rehabilitate, and widen India's major highways to international standards. A recent Committee on Estimates report for the Ministry of Roads, Transport and Highways suggests an ongoing investment need for Indian highways of about US\$15 billion annually for the next 15 to 20 years (The Economic Times, April 29, 2012)⁸⁹.

The comparisons of non-nodal districts 0-10 km from the GQ network to districts 10-50 km away (and in some specifications with additional concentric rings to 200 km away) have been made. The organized manufacturing sector is comprised of establishments with more than ten workers if the establishment uses electricity. If the establishment does not use electricity, the threshold is 20 workers or more. These establishments are required to register under the India Factories Act of 1948. The unorganized manufacturing sector is, by default, comprised of establishments which fall outside the scope of the Factories Act. The organized sector accounts for

⁸⁹ The Economic Times (April 29, 2012), "Highway Development Requires Rs 200 cr Investment Every Day", *Economic Times*.

over 80% of India's manufacturing output, while the unorganized sector accounts for a high share of plants and employment (Ghani et al. 2012)⁹⁰.

4.5.2 Highways and Spatial De-Concentration

The development and growth of Indian economy in the last two decades has been accompanied by widening spatial disparities. Cities like Gurgaon in Haryana and Bangalore in Karnataka have experienced high growth in economic activity and real estate developments, while many other places remain mired in poverty and stagnation. These differentials are common to many developing economies (e.g., World Development Report 2009)⁹¹, as well as advanced economies. For instance, China's growth is attributable mainly to coastal provinces. However, unlike China, growth in India's moderate-sized cities is relatively lower. Desmet et al. (2012)⁹² argue that manufacturing in India is slowly moving away from high-density districts to districts that are less congested, allowing industrial activity to spread more equally across space.

They group districts into three bins based on their population density: low-density districts are below the median density for India (up to 353 persons per square km); moderate-density districts are those in the middle two quartiles (353-693 persons per square km), and high-density districts are those in the top quartile (over 693 persons per square km).

The GQ upgrades have increased new entry the most in high- and medium-density districts that lie 0-10 km from the GQ network. For instance, moderate-density districts, like Surat in Gujarat or Srikakulam in Andhra

⁹⁰ Ghani E., A. Goswami, and W. Kerr. (2012), "Is India's Manufacturing Sector Moving Away from Cities?", *NBER Working Paper No. 17992*.

⁹¹ World Development Report (2009), *Reshaping Economic Geography*, The World Bank, Washington DC.

⁹² Desmet, K., E. Ghani, S. O'Connell, and E. Rossi-Hansberg (2012), "The Spatial Development of India", *World Bank Policy Research Paper 6060*.

Pradesh, which lie on the GQ highway registered more than 100% increase in new output and new establishment counts after GQ upgrades. On the other hand, the GQ upgrades are not linked to heightened entry or performance in low-density areas. One interpretation of these results is that the improved connectivity enables manufacturing establishments to efficiently locate in intermediate cities, but that localization economies prevalent for the sector continue to preclude entry in low-density places. The findings are similar to Baum-Snow et al. (2012)⁹³ who identify how infrastructure aided the decentralization of industrial production and population in Chinese cities from 1990-2010. Henderson et al. (2010)⁹⁴ similarly find that industrial decentralization in Korea is attributable to massive transport and communications infrastructure investments in the early 1980s. These and similar studies form the foundation for development recommendations with respect to infrastructure found in the World Bank's (2012) Urbanization Review Flagship Report and comparable policy reports.⁹⁵

4.5.3 Conclusions

G.Q. upgrade improved the connectivity and market accessibility of districts lying close to the highway compared to those more removed. Non-nodal districts located within 0-10 km from the GQ network experienced substantial increases in entry levels and higher productivity. Dynamic specifications and comparisons to the NS-EW highway system mostly confirm these conclusions, with the most substantial caveat being that the productivity gains may be upwardly biased by a pre-period dip.

⁹³ Baum-Snow N., L. Brandt, V. Henderson, M. Turner and Q. Zhang (2012), "Roads, Railroads and Decentralization of Chinese Cities", *Working Paper*.

⁹⁴ Henderson V. (2010), "Cities and Development", *Journal of Regional Science*, 50(1): 515-540.

⁹⁵ The World Bank (2012), "Planning, Connecting, and Financing Cities-Now", *Urbanization Review Flagship Report*, Washington DC: The World Bank.

The GQ upgrades also appear to have facilitated a more natural sorting of industries that are land and building intensive from the nodal districts into the periphery locations; the upgrades also appear to be encouraging decentralization by making intermediate cities more attractive for manufacturing entrants.

The GQ project improved the allocative efficiency of the manufacturing sector in India. Given the high levels of misallocation with which India is starting, improvements in allocation are most important. Ghani et al. (2012)⁹⁶ highlight the extent to which the organized and unorganized sectors are moving in different directions within India, with the unorganized sector becoming more urbanized, and we need to better understand the role that infrastructure connections across districts play in this process.

⁹⁶ Ghani E., A. Goswami, and W. Kerr. (2012), "Is India's Manufacturing Sector Moving Away from Cities?", *NBER Working Paper No. 17992*.