

The Economic Impact of Public-Private Partnerships in the Infrastructure Sector: Literature Review

Version 2.0

March, 2016

This draft was prepared by a team led by Fernanda Ruiz-Núñez and composed by Clio Dinthilac, and Zichao Wei. The authors welcome feedback to enrich and consolidate this draft version. Please, send comments to fruiznunez@worldbank.org.

We are grateful to the following peer reviewers for providing comments and useful inputs: Luis Alberto Andres, Dan Biller, Chris Blades, David Richard Bloomgarden, David Bright, Maria Cabrera Escalante, Javier Calvo, Gianfilippo Carboni, Brian A. Casabianca, Omar Chaudry, Dilyan Donchev, Marianne Fay, Thomas Farole, Mary C. Hallward-Driemeier, Roland Mitchelitsch, Jordan Schwartz, Thomas Richard Ward and Chiaki Yamamoto.

Contents

1. The Economic Impact of Public-Private Partnerships (PPPs)	3
1.1 What is the impact of PPPs on service effectiveness and efficiency?	4
1.2 What is the impact of PPPs on Jobs?	7
1.3 What is the impact of PPPs on Poverty and Income distribution?.....	9
2. Conclusions and Next Steps.....	11

This summarizes the most recent academic literature on the empirical impact of Public-Private Partnerships (PPPs) in Infrastructure sectors on economic growth, jobs, income distribution and poverty in developing countries. It draws on authoritative pieces of work that are robust and analytically sound, with a clear methodology to establish attribution through a well-defined counterfactual. It does not consider local or project-level impact studies, except for the cases where there is significant empirical evidence that allows for extrapolation.

The authors welcome feedback and references to relevant empirical studies that are missing from this version. Please, send comments to Fernanda Ruiz-Nuñez (fruiznunez@worldbank.org).

Introduction

The debate over the effectiveness of Public-Private Partnerships (PPPs) as a procuring method to achieve development goals has been revived by the discussion about the post-2015 development agenda. One of the targets of the sustainable development goals is to “*Encourage and promote effective public, public-private, and civil society partnerships, building on the experience and resourcing strategies of partnerships.*” If PPPs are to play an important role in the development agenda, the scale of PPP investments has to increase significantly.

This document attempts to shed light on what is known, and not known, about the nature and strength of the economic impact of PPPs in the infrastructure sector. The post-2015 development agenda focuses on economic growth, jobs, income distribution and poverty reduction therefore this paper attempts to assess the economic impact of infrastructure PPPs on those variables.

The concept of *infrastructure* has a wide range of definitions in the literature. In this document, infrastructure is defined as all the long lasting and irreversible investments used to deliver public services in the following sectors: energy, transport, water and sanitation, and telecommunications. ‘Public services’ include any service that the relevant government considers its responsibility to provide or ensure is provided.

There is not a consensus on the definition of PPPs but for the purpose of this paper they are defined as “*any contractual arrangement between a public entity, or authority, and a private entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility.*”

This literature review draws on authoritative pieces of work that are robust and analytically sound, with a clear methodology to establish attribution through a well-defined counterfactual. It does not consider local or project-level impact studies, except for the cases where there is significant empirical evidence that allows for extrapolation. It includes only studies for developing countries.

Following the introduction, section 1 summarizes the results of empirical papers on the linkage between PPPs and economic outcomes and it offers a discussion of those contributions including (i) service efficiency; (ii) jobs and (iii) income distribution and poverty reduction.

1. The Economic Impact of Public-Private Partnerships (PPPs)

The benefits of PPPs have been well recognized among practitioners. There are many arguments in favor of procuring infrastructure projects but only a few are valid arguments.

Under the right circumstances, PPPs can mobilize additional financing sources for infrastructure and defer payments into the future. Unless there are efficiency gains, PPPs do not increase the fiscal space available for infrastructure, it only affects the intertemporal government budget but there are not gains in discount terms. Importantly, the private sector does not fund public infrastructure projects, it only finances them.

The main argument in favor of PPPs is that they can lead to efficiency gains in service delivery. There are many drivers of those efficiency gains in PPPs (See World Bank 2014) and they include the following:

By subjecting assumptions to the market test of attracting private finance, PPPs can go some way to improving project selection. As long as the private sector faces significant risks, projects that are not profitable will fail to reach financial closure reducing optimism biases in project selection.

By bundling construction, operation and maintenance, life cycle costs are optimized with better infrastructure quality and adequate maintenance leading to efficiency gains. Full integration incentivizes the single party to complete each project function in a way that minimize total cost. The latter will usually be realized when quality of service can be well defined, measured and enforced.

By allocating the risk to the party which is in a better position to manage it, it can reduce the project overall cost. Infrastructure projects usually carry substantial risks and therefore the benefits of managing them effectively are significant.

By specifying outputs in a contract rather than prescribing inputs, it incentivizes the use of innovative solutions that could lead to efficiency gains.

By linking payment and penalties to performance requirements of the asset and services to be provided (quantity, quality and timeframe), it can create important means to minimize costs.

Most economists and practitioners agree that the main benefits of PPPs are maximizing efficiency gains. The impacts of PPPs on jobs and poverty reduction have been central in the post-2015 development agenda however, the findings in the literature are less clear on those outcomes as they seem to be linked to the provision of infrastructure services itself rather than the procurement method used (traditional procurement vs. PPPs).

The academic empirical literature of the economic impact of PPPs is very limited. Most of the evidence is based on anecdotal evidence and case studies with the majority of them comparing outcomes before and after without a well-defined counterfactual. Unfortunately, the overall economic impact of PPPs has not been systematically analyzed using robust and sound analysis. The attribution problem remains one of the main constraints. The central question is to what extent changes in the outcomes of interest can be attributed to a particular intervention, and this would imply being able to compare the results of the PPP to a counterfactual of public provision. Sound empirical analysis has been carried out in the literature of private sector participation (PPI) in Infrastructure mainly privatizations (Galal et al. 1994; Newbery and Pollitt, 1997; Jones, Jammal & Gokgur, 1998; Pollitt and Domah, 2000) where the authors built counterfactuals to assign ownership changes on those performance shifts post-privatization that are clearly caused by the ownership change per se. (cf. Birdsall and Nellis). In those studies where PPPs are included, they are only one option and they do not distinguish between the different forms of private participation but instead captures the fact that the private party can make decisions that affect the performance of the utility. This implies that most of the findings cannot be generalized or extrapolated to other contexts.

1.1 What is the impact of PPPs on efficiency gains in the provision of infrastructure assets and services?

As previously argued, the main valid motivation for PPPs is achieving efficiency gain in the provision of infrastructure assets and services. Efficiency gains are normally measured by the ratio output to inputs and it can be improve by producing the same output at a lower cost (inputs) or producing more and better outputs at the same cost (inputs).

There has been a significant number of case studies on PPPs that have documented improvement on efficiency gain in infrastructure assets and services. While these studies only compare the situation before and after a PPP project, they illustrate successful stories on how they have contributed to build efficient infrastructure.

Case studies have shown that efficiency gains from PPI are common but vary with the type and size of the projects and with the context in terms of regulatory environment and governance. The effects also depend on the sector with strong efficiency improvements in telecoms, typically positive impact in transport, and mixed results in electric and water and sanitation. See Annex 1 for a description of case studies in developing countries. For example, in the transport sector, this includes container terminals that have increased significantly the volume of traffic (Suape Container Terminal in Brazil), and reduced the time needed for container handling and dispatching (Port of Toamasina in Madagascar; highways that have managed to have patronage growth (Yitzhak Rabin Trans-Israel Highway 6 in Israel, and SANRAL Concessions in South Africa) and reduce travel time (Hyderabad MirpurKhas Dual Carriage Way Project in Pakistan); and airports with an increase on the number of flights and destinations (Queen Alia Airport in Jordan) and Airlines with more demand and improved services to customers with reduced airfare (Virgin Samoa Airlines in Samoa).

In the energy sector, examples include the increase in power generation capacity and connections as well as improved services and reduction in technical losses (Ashta Hydropower Project in

Albania; Société Nationale d'Electricité in Cameroon, Kenya Power and Lighting Company, Liberia Electricity Corporation, Hidrodrini Radoniqi water service in Kosovo).

In the water sector, the case studies have shown an increase in the number of people connected to improved water services (Busembatia small scale infrastructure provider water program in Uganda; Lim Town; Bucharest Water and Sanitation project in Romania and Minh Duc Town Water projects in Vietnam); an increase in water supply quality and reliability (King Abdulaziz International Airport Desalination in Saudi Arabia and Bucharest Water and Sanitation in Romania) and better payment collection system (Hidrodrini Radoniqi water service In Kosovo), as well as, increased access to improved irrigation systems (Guerdane Irrigation in Morocco).

In telecoms sector, these includes increase in penetration rate and international coverage (Cellis and Libancell GSM service in Lebanon).

In terms of prices some projects have presented a reduction in unitary cost (Ashta Hydropower Project in Albania; West African Gas Pipeline Project in Ghana; and King Abdulaziz International Airport Desalination in South Arabia); an increase in operating profits with no increase in tariff (Hidrodrini Radoniqi water service in Kosovo); or lower service fees to consumers (Shanghai wastewater treatment project in China; Clark Water in Philippines; and Cellis and Libancell GSM service in Lebanon).

The empirical literature on the impact of PPPs on efficiency gains in service provision is very limited when confining to those papers that provide robust and sound empirical analysis.

Estache and Saussier (2014) argue that the available empirical evidence confirms that PPIs can lead to improvements in efficiency, but do not necessarily do so. The econometric evaluation of various types of PPI experiences indeed shows that the careful choice of control variables, the proper framing of the institutional and sectoral context and the careful avoidance of selection biases in sample choices matter to the conclusions reached by empirical tests.

Based on an empirical analysis using time series data (1995-2006) in 32 countries of LAC, Andres et al. (2013) conclude that there is positive and significant impact of private sector participation in the coverage, quality of service and labor productivity of the analyzed utilities, especially when regulation is strong. The report does not distinguish among management and lease contracts, concessions, greenfield projects, and divestitures. The terms “private participation in infrastructure” and “privatization” are used interchangeably to cover all four types of private sector participation (PSP). In this report, the author used information on 181 firms in electricity distribution, telecommunication and water distribution that went through privatization in the 1990s as well as the LAC electricity benchmarking database (World Bank, 2008) which contains annual information of 250 private and state-owned utilities.

Gassner et al. (2007, 2009) studies the impact of PSP in electricity distribution, and water and sanitation services. The study compares the firms with PSP to a counterfactual of “sufficiently” similar SOEs. The private party (from divestitures to performance based contracts) has to have the power to make decisions that affect the performance of the firm. These authors find that this type of PSP is associated with output increases in electricity connections (29% increase in residential connections per worker), in water and sanitation connections (12% in water and 19% in sanitation), in bill collection ratios (up to 85% higher than in SOEs in electricity and 50 higher in water) and in the quality of service in both sectors, the latter expressed as a reduction in distributional losses in electricity (25% more efficient in electricity and an increase in hours of daily service in water

(41% increase). The authors note that these efficiency gains do not always translate into a decrease in prices, they might also either (i) compensate a previously non-profitable service, or (ii) be kept by the private operator. Also, there is a possibility that these improvements might be short-term, as the authors point out a 'worrying lack of investment in utilities by the public or private sector'. The study uses a dataset of more than 1,200 utilities (301 with PSP and 926 SOEs) in 71 developing and transition economies over more than a decade of operation.

Marin et al. (2009) analyze performance data for more than 65 large water PPP projects (concessions, lease-affermage or management contracts) that have been in place for at least five years (three years in the case of management contracts). The authors focus on four dimensions of performance: access (coverage, expansion), quality of service, operational efficiency and tariff levels; they do not use a counterfactual, but use average measures for SOE to illustrate differences when those measures are available. The sample represents a combined population of about 100 million people served (close to half of the urban population that has been served by private water operators between 1990 and 2007). The study concludes that the main effects of PPPs have been significant improvements in operational efficiency. In terms of access, Marin et al (2009) finds that water PPP projects have provided access to piped water for more than 24 million people in developing countries since 1990. The authors assess the performance of concessions to be mixed as many of those concessions failed to invest the amount of private funding they had originally committed and did not always meet their original contractual target for coverage. The good performers in the pool of 30 concessions studies are the ones where private financing was complemented by public funding (Colombia, Guayaquil in Ecuador and Cordoba in Argentina). On the other hand, the authors mention lease-affermage cases that were successful in expanding access (for instance in Senegal and Cote d' Ivoire). In these cases the investment was carried out by a public asset-holding company with very limited or no Government money. In terms of quality of service, the key challenge for most PPPs was to eliminate water rationing, a measure which also enables a higher quality of water by minimizing risks of pipe infiltration. The authors mention several examples (Colombia, and countries in West Africa) where private operators succeeded in improving service continuity, often starting from highly deteriorated systems.

In terms of operational efficiency, Marin et al. (2009) measures operational efficiency in three ways: water losses, bill collection and labor productivity. The outcomes concerning water losses are ambiguous: whilst some utilities succeeded in reducing water losses to best-performing utilities level (about 15% of non-revenue water for some operators in Western Africa, Brazil, Colombia, Morocco and Eastern Manila), other projects did not achieve significant reductions¹. On the other hand, private management significantly improved bill collection rates in most cases. In terms of tariffs, the impact depends on the initial tariff level, in most cases below cost recovery. Marin et al. (2009) argues that in most cases tariffs increased, but that in some cases the private operator was able to decrease them due to efficiency gains. However, it is difficult to assess whether these tariff increases were justified or not (for instance if they were accompanied by increase in access and quality). The authors also use the fact that out of the 65 developing countries that embarked on water PPPs during the past two decades, at least 41 still had private water operators and 84 percent of all awarded contracts were still active by the end of 2007 to suggest that overall

¹ In some countries, it is also difficult to track accurately water losses. For example, in Argentina, where a large proportion of residential customers are billed on estimates rather than actual consumption.

performance of PPPs was good. On the other hand 24 countries had reverted to public management and several contracts had been terminated early following conflicts between parties.

Under public management, public services such as utilities came at a lower average cost for the customer. Estache (2006) argues that in particular “effective tariff levels” were comparatively lower because of the unpaid bills. He also argues that power and water shortages were the norm in many countries such as Chile, Argentina or Senegal. This situation implied that the taxpayers were effectively bridging the gap between the average cost and the effective tariff since a significant amount of subsidies was necessary to keep the system going. According to the author, the subsidies were also relatively regressive²: “In other words, it was unlikely that the middle class would have been too enthusiastic for reform if quality had been reasonable”.

Estache and Rossi (2004) analyze in more detail the impact of private sector participation on the productivity of electricity distribution firms. Using a stochastic production frontier model³, they estimate the impact of private sector participation. They use a sample of 110 firms from 14 countries in Latin America during 1994-2000. These firms had different levels of private sector participation in the ownership structure as well as different types of regulation applied to them for electricity distribution (price cap or rate of return base). The authors find that private firms perform on average better (approximately 30% better) than public firms for the operation of services. There is no clear pattern of differences in electricity prices according to the regulatory regime. The paper also finds that after involvement of the private sector, prices fell but that the drop did not match the productivity gains. This implies that a share of this was kept by operators and by the state in the form of rents and higher tax revenue respectively.

As described above the evidence is mixed but overall positive. Most of the results depend on the sector, the type and size of projects, the private sector increasing capital investment as contractually agreed, and the country context in terms of regulatory environment and governance.

1.2 What is the impact of PPPs on Jobs?

The main argument for PPPs is that they can lead to efficiency gains and one channel for this is by improving labor productivity i.e. an increase in the amount of good and services produced by one hour of labor (operational efficiency). While it can be argued that PPPs could lead to more productive jobs, the links between PPPs and number jobs are less clear. The relevant literature analyzes the impact of infrastructure on the generation of direct jobs (depending on capital intensity) an indirect jobs (infrastructure as a enabler for economic growth leading to the creation of indirect jobs in the economy) but it does not distinguish between PPPs and other forms of contracting.

There are a significant number of case studies that show that PPPs have led to an increased number of new direct and indirect jobs; however they fail to compare with the counterfactual of public provision. The following case studies (described in Annex 1) show a positive impact: the Suape Container Terminal in Brazil (172 new direct jobs created); the Dosso Dry Port in Niger (30 new

² One of the first well documented cases is Colombia. Velez (1995) shows that in 1992 80% of the 1.4% of GNP spent on subsidies for utility services benefited mostly middle income households. For Latin America, studies have shown that as much as 60–80 percent of the historical cross-subsidies have gone to households well above the poverty threshold, while as many as 80 percent of poor households failed to benefit (Estache – 2006).

³ And cross testing with two other methodologies, including between firms variation and model in differences.

direct jobs during the first year); the Hyderabad MirpurKhas Dual Carriage Way project in Pakistan (5,000 direct jobs with 15,000 indirect jobs); the Virgin Samoa Airlines in Samoa (671 indirect jobs created); the Hanoi bus transportation service in Vietnam (1,300 indirect jobs created); and the Lim Town and Minh Duc Town Water projects in Vietnam (14 direct jobs created).

However when we look at more robust empirical literature that uses counterfactuals, most of those studies show that PPP have led to less but more productive jobs.

Gassner et al. (2009) find that PSP lead to labor productivity gains but those gains are linked to a reduction in staff numbers in both water and electricity (no separate results are available for sanitation) with the strongest effect for divestitures. Following the introduction of PSP, average employment falls by 24% in electricity and by 22% in water. There is also evidence of an increase of capital expenditure per worker, but only in the case of divestitures. The study was conducted on a panel of 302 utilities with PSP and 928 utilities without PSP in 71 developing countries.

Andres et al. (2013) analyze data for telecoms and water and electricity distribution in LAC and conclude that there is positive and significant impact of private sector participation in labor productivity but a negative impact in employment. Despite this, it should be noted that according to Andres et al (2008), "these negative short term employment effects may be offset in the longer term" by increased employment among subcontractors to the utility (as services are contracted out), or because of faster sectoral growth triggered by the reforms (particularly in sectors such as telecommunications, in which liberalization often triggers rapid market expansion). Short-term reductions of direct employment may be counterbalanced in the medium term by indirect job creation due to an increase in efficiency but those effects have not been assessed empirically.

The only paper that attempt to look at long term impacts is Benitez et al (2003). In this paper, the authors show that in the case of Argentina, at the macro level, credit market restrictions resulting from failed banking reforms might be a more convincing explanation of the increase in unemployment in the late 90s than any impact of PPI. The authors use a general equilibrium approach to isolate the effect of utility reform on macroeconomic performance and compare it to the impact of the interest shocks of the 1990s. The relative impact of PPI compared to financial markets reforms, tested by the authors, actually indicates that PPI might have been associated with increases in the number of jobs after the initial adjustments.

For the specific case of the port sector, Estache et al. (2002) show a positive impact on employment when analyzing the Mexican port reform. Using stochastic production frontier methodology during the 1996-1999 period, they find that the port had made some significant labor productivity improvement within three years of the reform. They also showed that the most successful terminals had higher employment levels than before the reform, reversing the often drastic initial cut.

Estache and Garsous (2012) argue that the impact of private participation in infrastructure depends on the type of sector. They argue that in telecommunication, the involvement of the private sector may be accompanied by ICT change that might create more qualified jobs in the medium term. On the other hand, according to the authors, and consistent with Gassner et al. (2009)'s findings, large scale PPI in the water sector have resulted in non-reversible job losses. Finally, energy and transport PPI seem to have mixed results.

The empirical evidence on the impact of PPPs on jobs remains limited. There is a scarce number of robust empirical studies, and those find a negative impact on direct employment in the short-term but positive impact in labor productivity and long-term indirect employment. We should

caveat that the impact of PPPs on jobs might be one of the most politically sensitive issues for a government. The empirical evidence of the impact of PPPs on job creation is sensitive to the baseline/ex- ante situation of the management of the asset, timeline of evaluation and the scope of the analysis (i.e., whether indirect employment is also considered). Moreover, some studies do not control for labor productivity at the baseline stage, and other studies overestimate the effects; for instance, by comparing the job creation of a PPP (construction and operation) to a counterfactual of “no project.”

1.3 What is the impact of PPPs on Poverty and Income distribution?

Determining whether the PPP efficiency gains have been shared with users, particularly the poor, requires a detailed assessment of the different channels through which private sector involvement affects the poor. Estache et al. (2001) distinguish two channels: Microeconomic linkages and Macroeconomic linkages.

The Microeconomic linkages are related to increase access to services and changes in tariffs and in prices of substitutes and complements. The macroeconomic linkages are related to the impact that the improved infrastructure have in economic growth, employment and reallocation of public expenditure due to efficiency gains. Most of the empirical evidence focuses on access and tariffs while the rest of the channels remain empirically unexplored.

In terms of access to services, at a baseline of operation of utilities by the public sector, the poorest segments of the population were usually largely excluded from the delivery of public services. They would rely instead on services of small and medium private providers, often at higher cost. Estache (2004) shows that “for a large sample of African countries, the bottom two deciles of the population are essentially not connected and rely on alternative sources of energy and water. In general the baseline of public service management is indeed relatively regressive with middle class that pushed for reforms in utilities management, but for quality purposes.

McKenzie and Mookherjee (2003) find that the distributional impact of private sector participation (primarily electricity, telecommunications, water, and gas), in the case of Bolivia, Nicaragua Argentina and Mexico was overall positive because of service extension to previously unconnected customers, quality improvements that resulted in welfare gains for the poorest households, and positive fiscal impact for the state. The negative impact relates mostly to employment contraction. The study uses a before and after technique without a counterfactual.⁴

Estache, Gomez-Lobo and Leipziger (2001) states that the private sector participation in the electricity and telecom sector in Chile is a case where it allegedly benefited the poor. In 10 years, between 1988 and 1998, the percentage of people connected to a phone line or electricity increased sharply among all income categories. Of course without an adequate counterfactual, this change cannot be thoroughly attributed to PSP. However, the authors use two arguments to justify the identification: First, before the telecommunications industry was privatized, there was a notorious rationing of lines, as the companies could not finance the required investment in switching capacity. Secondly, a large fraction of new connections can be attributed to factors other than

⁴ The study assesses the distributional impact by (i) estimating the change in price and access on the welfare of households (it also estimates consumer surplus changes on the basis of estimated budget shares and price elasticity from household surveys), (ii) computing the effect of privatization on wages and employment from employment surveys, and (iii) considering the fiscal impact of privatization

growth of household income. The latter is based on Contreras and Gómez-Lobo (2000), which use probit regressions and separate the effects of disposable income growth on connection rates from other influences.

In terms of tariffs, Andres et al. (2008) argue that the effects vary by sector: “In situations in which tariffs have been kept artificially low for political reasons, reforms will typically necessitate tariff increases to restore the financial sustainability of the utility. The situation is most typical in the water sector. In situations in which tariff have historically covered costs but enterprises have been inefficiently run, reform probably will lead to tariff reductions as consumers benefit from improved efficiency and more competition. This situation is most typical in sectors such as electricity and telephony.”

Estache and Rossi (2004) compare the relative performance of public and privatized Latin American electricity distribution utilities for the years 1994 to 2001 and they shows that final prices to consumers fell but they did not fall to reflect the significant productivity gains implying that the operators and the state share some of the gains in the form of rents and higher tax revenue, respectively.

Shirley and Menard (2002) compare the impact of reforms of the water distribution state-owned company in Lima to a counterfactual where reforms would have been done with a concession. The state-owned company originally went through a program of restructuring to prepare for a concession in 1992. The restructuring took place but the concession was postponed. The author used a partial equilibrium cost benefit methodology (developed by Jones et al., 1990), where they compared the actual reform outcomes with a counterfactual project on the basis of the draft concession contract (CEPRI – SEDAPAL 1994) assuming the private operator complied with the minimum requirements of the concession. The total welfare calculation accounted for the consumer surplus, employee welfare, government revenue and investor’s revenue. Despite price increases, consumers would be better off by USD 251 million (i.e., USD 33 per connection per year). Employees are also considered to be better off in this model because they own 5% of the shares (~ USD 1,579 per employee per year). The Government is better off by USD 12.5 million. The authors found that (after the foreign and domestic owners) the consumer and the workers were the main beneficiaries from concessions partly because concessions would entail higher coverage and sewerage systems post reforms (following the contract). Shirley et al. (2002) study other water reform experiences (Buenos Aires, Mexico, Santiago, Abidjan, and Conakry) comparing before and after and they argue that access to service and coverage improved in most cases. In terms of distributional impact and consumer welfare, the studies show that the magnitude vary but largely positive results.

An interesting robust empirical study of the impact of PSP on health outcomes at a macro level is presented by Galliani et al (2005). These authors use a natural experiment in Argentina where a large privatization program (mainly through concessions) took place in the 1990s. Thirty percent of the country’s municipalities had their local water companies privatized/given in concession. Using variation in ownership of water provision across time and space generated by the privatization process, the authors show that child mortality fell by 8 percent in the areas which had privatized their water services and that the effect was largest (26 percent) in the poorest areas.

2. Conclusions and Next Steps

This document takes stock of the recent academic literature on the empirical impact of PPPs on efficiency gains in service provision, jobs, income distribution and poverty in developing countries. There is a plethora of anecdotal evidence and case studies where attribution remains dubious. Unfortunately, the empirical evidence on the impact of PPPs is for the most part limited to studies of private sector participation in infrastructure investments, where PPPs is one of many options that in most cases cannot be disentangled.

The evidence shows that there is a positive and significant impact of private sector participation in access, quality of services, labor productivity, and reduction in technical losses. The magnitude of the impact varies by sector and size of the project and with the context, especially as it relates to the institutional and regulatory environment.

Has this positive impact translated into lower prices, more jobs and less poverty? Here the availability of data becomes extremely poor and the evidence very thin. Efficiency gains do not always translate into reduction in tariffs due to initial prices below cost recovery (with subsidies not always well targeted to the poor), or with the private sector retaining part of the profit. Many scholars argue that gains in labor productivity have been linked to a reduction in staff. Most of the literature confirms that this has been the case for short-term direct employment; however, little is known about the medium- and long-term impact on direct and indirect employment that could have counterbalanced the initial negative impact. The empirical evidence also indicates that the distributional impact varied, but the effects were largely positive.

The good news is that the appetite for more robust analysis is increasing. While still very costly, quasi-experimental studies on the impact of PPPs can enrich the discussion on their effectiveness and help to design better interventions. While those studies are mainly carried out at the project-level, as the evidence accumulates, and if results are found to be consistent, they can help to address some of the numerous questions that remain to be answered.

ANNEX I: PPPs in the infrastructure sector case studies.
Contents

I.	Transport Sector:.....	13
1.1	Brazil: Suape Container Terminal.....	13
1.2	India: Indira Gandhi International Airport, Delhi.....	13
1.3	Israel: Yitzhak Rabin Trans-Israel Highway 6.....	13
1.4	Jordan: Queen Alia Airport.....	13
1.5	Madagascar: Port of Toamasina.....	14
1.6	Niger: Dosso Dry Port.....	14
1.7	Pakistan: Hyderabad MirpurKhas Dual Carriage Way (HMDC) Project.....	14
1.8	Samoa: Virgin Samoa Airlines.....	14
1.9	South Africa: SANRAL Concessions.....	15
1.10	South Africa: Chapman’s Peak Drive.....	15
1.11	Vietnam: Hanoi bus transportation service.....	16
II.	Energy Sector:.....	16
2.1	Albania: Ashta Hydropower Project.....	16
2.2	Cameroon: Société Nationale d’Electricité.....	16
2.3	Ghana: West African Gas Pipeline Project.....	16
2.4	Kenya: Kanya Power and Lighting Company.....	16
2.5	Liberia: Liberia Electricity Corporation.....	17
III.	Water Sector:.....	17
3.1	China: Shanghai wastewater treatment project.....	17
3.2	Kosovo: Hidrodrini Radoniqi water service.....	17
3.3	Morocco: Guerdane Irrigation.....	17
3.4	Philippines: Clark Water.....	18
3.5	Romania: Bucharest Water and Sanitation.....	18
3.6	Saudi Arabia: King Abdulaziz International Airport Desalination.....	18
3.7	Uganda: Busembatia small scale infrastructure provider water program.....	18
3.8	Vietnam: Lim Town and Minh Duc Town Water projects.....	18
IV.	ICT sector.....	19
4.1	Lebanon: Cellis and Libancell GSM service.....	19

Transport Sector:

1.1 Brazil: Suape Container Terminal⁵

On March 2001, a concession agreement was signed between International Container Terminal Services (ICTSI) of Philippines and Pernambuco state government in Brazil. ICTSI was supposed to build and operate the container terminal for 30 years and transfer the assets back to state government at the end of the contract. As of 2008, the port handled over 300,000 TEUs per year, up nearly 500 percent from before the terminal was commissioned. This port handles up to five percent of all container movements in Brazil. With regard to job creation, 417 full time staff have been employed, an increase from 172 employees in the first year of concession (2002).

1.2 India: Indira Gandhi International Airport, Delhi⁶

In September 2003, the Indian Cabinet approved the restructuring of Delhi and Mumbai airports through the joint venture mode. Airports Authority of India (AAI) incorporated a subsidiary company viz. M/S Delhi International Airport Pvt. Ltd (DIAL), and sold 74% of the shares of DIAL to the JV Consortium. AAI subsequently signed an Operational Management Development Agreement (OMDA) with DIAL. The AAI handed over Indira Gandhi International (IGI) airport, Delhi to DIAL on May 2006 on 'as is where is' basis and granted DIAL the exclusive right to undertake functions of operations, maintenance, development, design, construction, modernization, finance and management of the airport for 30 years. There have been significant improvements in services at IGI airport for the travelling public. The new terminal T3 was completed within time for the Commonwealth Games 2010. The Airports Council International has adjusted the airport as the second best in the world in Category of 25-40 million passengers per annum.

1.3 Israel: Yitzhak Rabin Trans-Israel Highway 6⁷

The Yitzhak Rabin Trans-Israel Highway 6 is a four-lane 53 mile fully-electronic toll road running parallel with the coast but through the center of Israel near Tel Aviv. The road was constructed from 1999 to 2004. The State of Israel awarded this design-build-finance-operate and transfer (DBFO) project to the winning syndication Derech Eretz. The toll road was progressively opened from August 2002, with the entire highway opened in January 2004. The performance of the toll road relative to traffic and revenue projections has been positive, with annual double-digit patronage growth. In 2004, average daily patronage was approximately 70,000 vehicles.

1.4 Jordan: Queen Alia Airport⁸

Jordanian government awarded a 25-year construction contract to private sector operator to construct a new airport terminal to replace the existing terminal, expand the new terminal's related facilities, and operate the entire airport. The number of international flights has increased from 120 flights per day from 55 international destinations in 2007 to more than 175 daily flights from over 60 international destinations in 2015.

⁵ IFC: Public-private partnership impact story: Brazil: Suape Container Terminal

⁶ Implementation of Public Private Partnership Indira Gandhi International Airport, Delhi. Union Government, Ministry of Civil Aviation India. Report No 5 of 2012-2013

⁷ Case studies of Transportation Public-Private Partnerships around the World, U.S Department of Transportation, 2007

⁸ World Bank Group PPP Brief

1.5 Madagascar: Port of Toamasina⁹

Philippines' International Container Terminal Service, Inc. had a 20-year concession with the Madagascar government to operate, manage, finance and rehabilitate the container terminal at Toamasina. Since 2005, the container movement of loading and unloading has increased from 10 or less to more than 30 per hour per vessel; the number of days needed to clear customs dropped from five days in 2007 to 2.6 days in 2010. In terms of port capacity, time needed for container yard handling and dispatching product has decreased from several days to a few hours.

1.6 Niger: Dosso Dry Port¹⁰

The private company, Bolloré Africa Logistics (B.A.L.), won the bid for a 20-year concession to build, develop, and operate the dry ports in Dosso and Niamey from the Government of Niger. In order to make the project more attractive and to compensate for the relatively low volume of traffic at Dosso, the Government committed to provide a onetime \$6 million subsidy to support the first phase of the project investment. As the start of the project, it provided at least 30 jobs. The project increases efficiency via the link with the regional railway corridor program linking Niger to Benin, and then Burkina Faso and the rest of West Africa.

1.7 Pakistan: Hyderabad MirpurKhas Dual Carriage Way (HMDC) Project¹¹

HMDC project is being constructed under design, finance, build, operate and transfer mode by M/s Deokjae Construction Company which was selected as the private partner through competitive bidding process. The concession agreement was signed between the Government of Sindh and Deokjae Connecting Roads (Special Purpose Vehicle) on November 2009 and the project was successfully implemented by August 2012. It was expected that the commute time would have reduced from 1 hour 40 minutes to 40 minutes between Hyderabad and Mirpurkhas, but in reality it went down to 30 minutes (commuters were over speeding by around 20%). The project created 5000 direct jobs with 15,000 indirect jobs.

1.8 Samoa: Virgin Samoa Airlines¹²

In September 2005, a joint venture between the government of Samoa and Australia's Virgin Blue established a new national airline, Virgin Samoa, and restructured the existing flagship carrier. The international aviation investor would manage and operate the new airline, providing the fleet capacity as well as commercial and managerial oversight. The government would provide traffic rights, operational support, flight operations personnel and other productive assets. Since 2005, indirect tax collection from additional tourist arrivals is estimated at \$1.86 million. From 2005-2009, 243,000 people received improved airline service, far exceeding the estimate of 80,000. During the same period, consumers have saved \$ 57.7 million in reduced airfare. Indirectly, it benefited of resulting expansion in tourist facilities created 671 jobs and increased national salaries and wages by \$1.4 million.

⁹ IFC: Public-private partnership impact story: Madagascar: Port of Toamasina

¹⁰ World Bank Group PPP Brief

¹¹ <http://www.pppunitsindh.gov.pk/site/index.php?pid=26> and information provided by Mujtaba Shahneel, former head of PPP Unit, Sindh, Pakistan

¹² World Bank Group PPP Brief

1.9 South Africa: SANRAL Concessions¹³

The South African National Roads Agency Limited (SANRAL) has concessioned 1,299 km of its 19,700 km wide road network under long-term PPP-type concessions for the design, build, finance and operation of the roads. The construction contract with Trans Africa Concessions (TRAC) for the construction and maintenance of the N4 Toll highway from the Pretoria to the Maputo harbor (Mozambique) was signed in 1998 for a period of 20 years, ending February 2008. The concession has serviced its debt service obligations successfully. On average, over the first five to ten years of operation, traffic demand has been in line with that forecast and revenue has been such that the Highway Usage Fee has already generated income for SANRAL.

1.10 South Africa: Chapman's Peak Drive¹⁴

The Western Cape Provincial Government entered into a 25 year concession for the design, building, financing and operation of the Chapman's Peak Dive Toll Road in Cape Town in 2003. A capital grant by the government of approximately 50% of the total project cost was approved as part of the concession. The road was successfully completed on time in December 2003 and to a high quality in very difficult mountain-side conditions. The road was performed exceptionally well in terms of the quality of both construction and maintenance by the concessionaire. The traffic demand was however a less satisfactory outcome and revenue proved to be extremely seasonal with winter months achieving around 60% of forecast revenue while summer months have peaks of close to 140% of revenue. Including all road closures, revenues between 2003 and 2010 were, on aggregate, 63% of forecast, but with closure months excluded, revenue was 85% of forecast. Although toll revenue was below the forecast, this was primarily due to the lengthy closure period. The table below summaries the position;

Table 1 Estimated % Actual vs Forecast Demand

	Description	% of Forecast
1	Actual total revenues collected vs total forecast for the period December 03 to December 08	63.0%
2	Actual total revenues for full months open during above period vs forecast for these months	85.4%
3	Actual total revenues for open months plus projected revenues for closed months based on actual levels achieved (seasonally adjusted) vs total revenue forecast for period.	83.3%
4	As for 3 above plus 50% of revenue from Day Passes vs total forecast revenue	84.9%
5	As for 3 above plus 100% of revenue from Day Passes vs total forecast revenue	88.7%

Source: DTPW Report (2010)¹⁵

¹³ Consideration of Risk Transfer and the Impact of External Events in Road Concessions in South Africa, Proceedings of the 2nd International Conference on Public-Private Partnerships, May 2015

¹⁴ Consideration of Risk Transfer and the Impact of External Events in Road Concessions in South Africa, Proceedings of the 2nd International Conference on Public-Private Partnerships, May 2015

¹⁵ Western Cape Department of Transport and Public Works: Report on Chapman's Peak Drive 2010 (unpublished)

1.11 Vietnam: Hanoi bus transportation service¹⁶

With new bus routes contracted out based on the lowest subsidy requirements, the Hanoi city government realized a cumulative reduction of approximately \$2.5 million in public subsidies. The new bus routes have generated an additional 1,300 private sector long-term jobs and \$11 million in private investments for 218 new buses. The increased level of competition between the public sector—Transerco buses still ply old routes—and private sector has led to improved service quality for consumers, as well as environmental benefits.

I. *Energy Sector:*

2.1 Albania: Ashta Hydropower Project¹⁷

Albania government signed a 35-year concession with Verbund (Austria's largest electricity company) to build and operate a new hydropower plant in 2008. The construction was finalized in less than three years with high construction quality and became fully operational in 2013. The electricity produced by the Ashta hydropower plant cost \$0.08 per kilowatt-hour, which is below the import prices at the time bids were solicited. The project increased Albania's power generation capacity by 53 megawatts, and delivered improved service for 170,000 people (five percent of population).

2.2 Cameroon: Société Nationale d'Electricité¹⁸

AES Corporation, a global power company, acquired 56 percent of Cameroon state owned power utility Société Nationale d'Electricité (SONEL)'s equity and entered into a 20-year concession to generate, transmit and distribute electricity in Cameroon. By 2011, the number of connections had increased by over 75 percent, up to 792,000. Total capacity grew to 1,033MW by 2011 through construction of new thermal power plants in Dibamba Limbe, and the renovation of existing hydropower plants.

2.3 Ghana: West African Gas Pipeline Project¹⁹

The West African Gas Pipeline (WAGP) project was one of the first regional Public-Private Partnership (PPP) initiatives for large infrastructure project in West Africa. WAGP project comprises about 678 kilometers of onshore and offshore pipelines to transport gas from Nigeria to power generation plants in Benin, Togo, and Ghana, and associated processing/receiving facilities. The WAGP connected power plants in Ghana, Togo, and Benin to large gas resources in Nigeria. All physical infrastructure related to WAGP was completed by mid-2011, a few years later than what was planned. With the availability of natural gas since late 2009, the wholesale generation cost has been decreasing in Ghana (14%), Benin (12%), and Togo (12%). The thermal generation cost using natural gas is about 40% compared to use the Light Crude Oil in the three countries.

2.4 Kenya: Kenya Power and Lighting Company²⁰

In May 2006, Kenya Power and Lighting Company (KPLC) management service contract was successfully completed with the preferred bidder for two-year contract period. The management

¹⁶ World Bank Group PPP Brief

¹⁷ IFC: Public-private partnership impact story: Albania: Ashta Hydropower

¹⁸ World Bank Group PPP Brief

¹⁹

²⁰ PPIAF impact story

contract led to gains on the distribution side in a number of areas. New customer connections increased from 67,000 to 120,000 in the first year, followed by a further 25% increase to 150,000 connections in the second year. System losses were reduced significantly from 19.6% to 17.6% by June 2007, and voltage fluctuations were reduced by 130.2%.

2.5 Liberia: Liberia Electricity Corporation²¹

Manitoba Hydro International (MHI) of Canada was awarded a five-year management contract for Liberia Electricity Corporation (LEC), the electricity utility in the capital city of Monrovia in 2010. The post-completion evaluation shows that 6,000 new electricity connections have been set up and 32,420 people have benefited from new or improved access to power. The improved operational efficiencies resulting from the contract have led to an increase in revenue collection by LEC of 160 percent, and a reduction in losses of 21 percent.

II. Water Sector:

3.1 China: Shanghai wastewater treatment project²²

The Shanghai Zhuyuan Youlian No. 1 wastewater treatment project is the first mega-ton wastewater treatment plant in Shanghai with advanced primary treatment capacity of 1.7 million m³/day. In 2002, the Youlian Consortium was awarded a 20-year concession with the Shanghai Water Authority through an open tender process to provide wastewater treatment services. The plant serves 23.5 million residents over an area of 107 sq km at a relatively low service fee of CNY0.22 per cubic meter of treated wastewater and a minimum treatment level of 1.4 million m³/day. The savings generated through the PPP arrangement are reflected in the service fee, which was about 40% below the government's own projected cost of CNY0.38 per cubic meter.

3.2 Kosovo: Hidrodrini Radoniqi water service²³

Hidrodrini Radoniqi (HSR), a regional water company in Kosovo, had partnered with the Kosovo Trust Agency (KTA), established by United Nations Interim Administration Mission in Kosovo (UNMIK) on a water service management contract in 2001. The HSR took full control of operations, maintenance, and billing and collections in the area. This was a performance based contract, with a fixed fee plus a performance bonus based on the achievement of selected performance targets. The collection ratio increased from 64 percent in 2001 to 81 percent by the end of the contract, with the average time taken to collect payments dropping from 13 months to just 4 months. The utility went from an operating loss of about €250,000 in 2001 to an operating profit of more than €100,000 in 2004, even with no increase in tariffs during the contract period. Much progress was also made in metering coverage, which increased from about 10 percent to 90 percent by the end of the contract.

3.3 Morocco: Guerdane Irrigation²⁴

As the world's first irrigation PPP project, Morocco government signed a concession with Omnium Nord-African, a Moroccan industrial conglomerate in July 2004. The transaction is structured as a 30-year concession to build, co-finance and manage an irrigation network to channel water from dam complex and distribute it to farmers in Guerdane. Project benefited over

²¹ IFC: Public-private partnership impact story: Liberia: Liberia Electricity Corporation

²² ADB (2010): Urban Innovations and best practices, sustainable urban development in the People's Republic of China

²³ PPIAF case study: <http://www.ppiaf.org/sites/ppiaf.org/files/publication/52-water-postconflict-situation.pdf>

²⁴ IFC: Public-private partnership impact story: Guerdane Irrigation

1,900 individual farmers with improved irrigation and overall access to services. It also benefited the local economy by improving incomes for 11,000 people.

3.4 Philippines: Clark Water²⁵

The Philippine government-owned Clark Development Corporation (CDC), who oversighted the water and wastewater service in the Clark Special Economic Zone, negotiated with the private sector service provider, Clark Water Corporation (CWC) to amend the concession agreement for 15-year extension in 2014. The CWC followed the new regulatory regime and applied the principles of regulation to provide the water and wastewater service to economic zone. This also resulted in a 1Php/m³ reduction in the current tariff.

3.5 Romania: Bucharest Water and Sanitation²⁶

The municipality of Bucharest, Romania had a 25-year concession contract with Vivendi of France, who won the bid to operate and maintain the water and sanitation system for 25 years. In 2000, 69 percent of samples complied with the standard of residual free chlorine; in 2009, 100 percent of water samples met or exceeded Romanian and E.U. quality standards. Water consumption decreased from total consumption from 516 liters per capita per day in 1999 to 129 liters per person per day in 2009, and is decreasing at a compound annual rate of eight percent due to reduced leakage.

3.6 Saudi Arabia: King Abdulaziz International Airport Desalination Desalination²⁷

Saudi Arabia's General Authority of Civil Aviation (GACA) and the investor signed a 20-year take-or-pay water purchase agreement under a BOT arrangement for King Abdulaziz International Airport desalination project. The investor financed, designed, constructed, operates, and maintains a new desalination plant with an initial capacity of 30,000 m³ per day of potable water, increasing to 35,000 m³ per day in year eight. The savings directly to GACA resulting from the lower unit cost of water is between \$8-10 million per annum. This project also increased reliability of water supply with no plant breakdowns or other unplanned outages to date. The increased water production capacity has enabled GACA to meet current water demand, with over 11,000 residents served by the new plant.

3.7 Uganda: Busembatia small scale infrastructure provider water program²⁸

The government of Uganda awarded a five-year performance-based management contract to a private operator Trandint Limited for the town of Busembatia in June 2010. As a result, residents of Busembatia had expanded access to water at the same tariffs for the next five years, and 24 hour service at 430 new water connections were installed in the first year of operation, ahead of projected schedule.

3.8 Vietnam: Lim Town and Minh Duc Town Water projects²⁹

A design, build, and lease contract was signed by the Vietnam government and the private sector to provide the water needs of the local community. Lim Town quickly saw the number of connected households grow from 1,792 to 2,336. Fourteen local full-time and six part-time jobs

²⁵ World Bank Group PPP Brief

²⁶ IFC: Public-private partnership impact story: Romania: Bucharest Water and Sanitation

²⁷ World Bank Group PPP Brief

²⁸ World Bank Group PPP Brief

²⁹ PPIAF impact story

have been created. Minh Duc Town is showing similar results, with the initial 1,350 connected households quickly growing to 2,000. Both operators report that women are driving the increased consumption of water for household uses, and that clinics, schools, and other public services have also visibly benefited from gaining access to running water.

III. *ICT sector*

4.1 Lebanon: Cellis and Libancell GSM service³⁰

The Lebanese Government granted two ten year Global System for Mobile (GSM) service concessions under a build operate and transfer contract to France Telecom Mobile Liban, commercially known as Cellis, and Libancell in 1994. The networks of the operators cover more than 80 percent of Lebanon and the GSM penetration rate is around 22 percent. The operators have also increased their international coverage. Roaming arrangements have reached 67 countries for Cellis and 55 countries for Libancell. The end-user price for a minute is US\$0.0779, which is one of the lowest in the world.

³⁰ Jamali (2004), Success and failure mechanisms of public private partnerships (PPPs) in developing countries: Insights from the Lebanese context

References

- Acemoglu, D. and J.A. Robinson (2012). “Why Nations Fail? The origins of power, prosperity and poverty”. Crown Publisher
- Ajwad and Wodon (2000). “Bolivia Poverty Assessment”, mimeo, The World Bank, LACPREM.
- Agénor, Pierre-Richard and Blanca Moreno-Dodson, 2006. ‘Public Infrastructure and Growth: New Channels and Policy Implications’, World Bank Policy Research Working Paper 4064.
- Andrés, Luis, Dan. Biller, and Matias. Herrera Dappe, 2013. Reducing Poverty by Closing South Asia's Infrastructure Gap. World Bank, Washington, DC. Extracted from http://www.worldbank.org/content/dam/Worldbank/document/SAR/Reducing%20Poverty%20by%20Closing%20South%20Asia's%20Infrastructure%20Gap_Web.pdf on June 15, 2013
- Andrés, Luis, Jordan Schwartz, and J. Luis Guasch. 2013. “Uncovering the Drivers of Utility Performance, Lessons from Latin America and the Caribbean on the Role of the Private Sector, Regulation, and Governance in the Power, Water, and Telecommunication Sectors” The World Bank
- Andrés, Luis, Foster, Vivien, Guasch, José Luis; Haven, Thomas. 2008. The Impact of Private Sector Participation in Infrastructure: Lights, Shadows, and the Road Ahead.
- Banerjee, S., V. Foster, Y. Ying, H. Skilling and Q. Wodon (2008) “Cost Recovery, Equity, and Efficiency in Water Tariffs. Evidence from African Utilities”, World Bank, Washington DC.
- Benitez, Chisari and Estache. 2003. “Can the gains from Argentina’s Utilities Reform Offset Credit Shocks?” in C. Ugaz and C. Waddams Price, Utility Privatization and Regulation : A fair deal for consumers?” Northampton; mas . Edward Elgar pp 175-202.
- Bensch Gunter, Kluge Jochen, Jorg Peters Impacts of rural electrification in Rwanda, Journal of Development Effectiveness Vol. 3, No. 4, December 2011, 567–588
- Briceno, Cecilia, Antonio. Estache and N. Shafik (2004), “Infrastructure Services In Developing Countries: Access, Quality, Costs and Policy Reform”, The World Bank,
- Calderón, César, and Luis Servén. 2010a. Infrastructure and Economic Development in Sub-Saharan Africa. *Journal of African Economies* (19), AERC Supplement 1, 13–87.
- Calderón, César, and Luis Servén. 2010b. “Infrastructure in Latin America”. Policy Research Working Paper 5317, World Bank, Washington, DC.
- Calderón, César, Enrique Moral-Benito, and Luis Servén. 2011. “Is Infrastructure Capital Productive? A Dynamic Heterogeneous Approach.” Policy Research Working Paper 5682, World Bank, Washington, DC.
- Canning, D., and E. Bennathan, 2000, “The Social Rate of Return on Infrastructure Investment,” World Bank, Policy research working paper 2390, Washington, D.C.
- Clarke, G., K. Kosec and S. Wallsten (2009) “Has private participation in water and sewerage improved coverage? Empirical evidence from Latin America”, *Journal of International Development*, 21, pp.327-361
- Duflo, Esther and Pande, Rohini (2007). “Dams”, *Quarterly Journal of economics*, The Quarterly Journal of Economics (May 2007) 122 (2): 601-646.

- Égert, Balázs, Koźluk Tomasz and Sutherland Douglas (OECD 2009). Infrastructure and growth : empirical evidence – OECD Economics department Working paper No. 685
- Esfahani, H. S. and M. T. Ramírez. "Institutions, infrastructure, and economic growth." *Journal of Development Economics* 70, pp. 443– 477
- Estache, A., M. Gonzalez and L. Trujillo (2002), “Efficiency Gains from Port Reform and the Potential for Yardstick Competition: Lessons from Mexico” (2002), *World Development*, Vol. 30, No.4., 545-560 Hurlin
- Estache, Antonio, 2006. PPI Partnerships vs. PPI Divorces in LDCs. *Review of Industrial Organization* (2006) 29:3–26
- Estache, Antonio, 2006. Infrastructure: A survey of recent and upcoming issues. The World Bank. Mimeo, April 2006 (version 2.0).
- Estache, Antonio, and Grégoire Garsous. 2012. The impact of infrastructure on growth in developing countries. *Economics Notes* 1, International Finance Corporation, Washington, DC.
- Estache, Antonio and Stéphane Saussier, "Public-Private Partnerships and Efficiency: A Short Assessment", CESifo DICE Report 12 (3), 2014, 08-13 | <http://www.cesifo-group.de/ifoHome/publications/journals/CESifo-DICE-Report.html>
- Estache, A, Ianchovichina, E, Bacon, R and Salamon, I. 2013 “Infrastructure and Employment Creation in the Middle East and North Africa.” Mimeo. The World Bank
- Estache, A and, Rossi, M. 2004 “Have Consumers Benefited from the Reforms in the Electricity Distribution Sector in Latin America?” - [Policy Research Working Paper Series](#) number 3420- The World Bank
- Estache, A. and Q. Wodon (2011), “Infrastructure and the poor in Sub-Saharan Africa”, draft book, ECARES, ULB, Brussels
- Galiani, S., Gertler, P., and Schargrotsky, E. (2005). Water for Life: The Impact of the Privatization of Water Services on Child Mortality. *Journal of Political Economy*, 113(1):83–120.
- Garsous, G. (2012): “How Productive is Infrastructure? A Quantitative Survey,” ECARES Working paper, Université libre de Bruxelles.
- Gassner, Katharina, Alexander Popov and Nataliya Pushak (2007), “An Empirical Assessment of Private Sector Participation in Electricity and Water Distribution in Developing and Transition Countries" The World Bank
- Gassner, Katharina, Alexander Popov and Nataliya Pushak (2009), “Does Private Sector Participation improve performance in Electricity and Water Distribution? " *Trend and Policy Option #6*. PPIAF, The World Bank.
- Gonzalez-Navarro, M. and C. Quintana-Domeque (2011), “The microeconomic effects of infrastructure: Experimental evidence from street pavement”, University of Toronto, mimeo

- Guasch 2004. "Granting and Renegotiating Infrastructure Concessions: Doing It IFC Jobs Study: 'Assessing Private Sector Contributions to Job Creation and Poverty Reduction', January 2013
- Hausmann, R., D. Rodrik, and A. Velasco (2005). 'Growth Diagnostics'. In *The Washington Consensus Reconsidered: Towards a New Global Governance*, (eds) J. Stiglitz and N. Serra. New York: Oxford University Press.
- IFC (2012a). IFC Economics Notes: Note 1. "The impact of infrastructure on growth in developing countries." Antonio Estache and Grégoire Garsous, April 2012.
- IFC (2012b). IFC Economics Notes: Note 2. "The Impact of Private Participation on the Performance of Infrastructure in developing countries: Summary of the academic evidence." Antonio Estache and Caroline Philippe ECARES, Université Libre de Bruxelles, April 2012.
- IFC (2012c). IFC Economics Notes: Note 3. "The Impact of PPI on poverty in developing countries Antonio Estache and Caroline Philippe, April 2012.
- IFC (2012d). IFC Economics Notes: Note 4. "The scope for an impact of infrastructure investments on jobs in developing countries." Antonio Estache and Grégoire Garsous, April 2012.
- Jacoby Hanan, "Access to markets and the benefit of rural roads" - *The Economic Journal*, 110 (July), 713±737. # Royal Economic Society 2000. Published by Blackwell Publishers,
- Leigh, Andrew and Neill Christine, 2011. "Can national infrastructure spending reduce local unemployment? Evidence from an Australian roads program." *Economic Letters*, 113, pp. 150-153
- McKenzie, David, Mookherjee, Dilip, 2003. "The Distributive Impact of Privatization in Latin America: Evidence from Four Countries" *Economía*, Vol. 3, No. 2 (Spring, 2003), pp. 161-233
- Marin, Philippe 2009. "Public- Private Partnerships for Urban Water Utilities – A review of experiences in developing countries" *The World Bank, PPIAF, Trends and policy option No 6*
- Meggison William, Netter, Jeffrey. 2001. "From State to Market: A Survey of Empirical Studies on Privatization" *Journal of Economic Literature*, Vol. 39, No. 2 (Jun., 2001), pp. 321-389
- Ministry of Foreign Affairs Netherlands, 2013. 'Public Private Partnerships in developing countries: a systematic literature review', IOB study No 378
- Munnell, Alicia H. 1992. "Infrastructure Investment and Economic Growth." *Journal of Economic Perspectives- Volume 6, Number 4-Fall 1992-Pages 189-198*
- Pi, Jiancai and Zhou, Yu (2012). "Public infrastructure provision and skilled–unskilled wage inequality in developing countries." *Labour Economics* 19 (2012) 881–887
- Rémy Prud'homme 2004 "Infrastructure and Development." Paper prepared for the ABCDE (Annual Bank Conference on Development Economics), Washington, May 3-5, 2004. Extracted from <http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2004/05/13/000265513>

- 20040513160037/Original/28975.doc. Washington, DC: World Bank Institute Development Studies.
- Rodrik, D. (2008), *One Economics, Many Recipes: Globalization, Institutions, and Economic Growth*. Princeton University Press, Princeton, NJ.
- Sahoo, Pravakar, Ranjan Dash, and Geethanjali Natarj. 2012. "China's Growth Story: The Role of Physical and Social Infrastructure." *Journal of Economic Development* (37), 53–75.
- Schwartz, Jordan, Luis A. Andres and Georgeta Dragoiu. 2009. "Crisis in Latin America Infrastructure Investment, Employment and the Expectations of Stimulus." World Bank Policy Research Working Paper No.5009
- Seethepalli, Kalpana, Maria Bramati, and David Veredas. 2008. "How Relevant is Infrastructure to Growth in East Asia?" Policy Research Working Paper 4597, World Bank, Washington, DC.
- Senerviratne, Dulani, and Yan Sun. 2013. "Infrastructure and Income Distribution in ASEAN-5: What are the Links?" Working Paper WP/13/41, International Monetary Fund, Washington, DC.
- Shirley, Mary M. "Reforming Urban Water Systems: A Tale of Four Cities." In *Regulatory Policy in Latin America: Post-privatization Realities*, edited by Luigi Manzetti. Coral Gables, FL: North-South Center Press, Univ. Miami.
- Shirley M. and C. Menard (2002) in their book "Thirsting for efficiency- the economics and politics of urban water system reforms"
- Straub,Stephane, 2008. 'Infrastructure and Growth in Developing Countries: Recent Advances and Research Challenges', World Bank Policy Research Working Paper No 4460.
- Straub,Stephane, 2008. "Infrastructure and Development: A Critical Appraisal of the Macro Level Literature" World Bank Policy Research Working Paper No 4590.
- Warner, Andrew. 2014. "Public Investment as an Engine of Growth." Working Paper WP/14/148, International Monetary Fund. Washington, DC.
- World Bank. 2014. *Public-private partnerships: reference guide version 2.0*. Washington, DC: World Bank Group. <http://documents.worldbank.org/curated/en/2014/01/20182310/public-private-partnerships-reference-guide-version-20>
- World Bank 2013. *Impact evaluation for infrastructure: General guidance and existing evidence*. 2013 (Andres, Limi et al)
- World Bank: *Infrastructure for Sharing Prosperity in LAC - LAC Regional Studies Series – Concept Note*, February 10, 2015.
- Zheng, S. and M. Ward (2011) "The effect of market liberalization and privatization on Chinese telecommunications", *China Economic Review*, 22, pp.210-220.