Ifc Economics Notes
Note 2
The Impact of Private Participation
on the Performance of Infrastructure in Developing Countries:
Summary of the Academic Evidence
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The debates on the extent to which private participation in infrastructure (PPI) is good or bad news for developing countries is at least over 20 years old.¹ A lot has been written about it. However, much of this has too often been driven by ideology—on all sides of the debate. This is why it is often hard to sort out fiction or partial interpretations from facts.

The dominating interpretation of these facts has also fluctuated. After clear support during the 1990s, in recent years, the image of PPI had taken a beating in developing countries. High profile rejections or failures (e.g. Argentina, Bolivia, Mali, Senegal or Venezuela) casted doubts on the scope for PPI as of the mid-2000s.

This rejection has however not spread to Asia where China and India were, and still are, very active signing contracts during that period. Since the 2008 crisis, the Asian enthusiasm has spread among politicians in the US and Europe as part of the plans to recover. It continues to be on the agenda in many countries in Africa, Eastern Europe or Central America. The hard evidence however shows that the political expectations have not been met on the ground—even if in Africa, there are some signs that PPI is picking up, it is still quite concentrated in a few countries and far from meeting the enormous needs of the region.

For many countries, the current weak markets for PPI is due more to a lack of access to international capital flows resulting from an increase in risk aversion—sui generis or driven by regulation in the source countries—than to a lack of interest of potential host countries. The new global environment is indeed now riskier and the lending capacity of many commercial banks traditionally active in developing countries has decreased—e.g. many European banks have had to increase their reserves. The relative importance of bilateral and multilateral actors in the sector should be growing for developing and transition economies which are not on the top of the agenda of global financial sponsors.

For these actors, the revival of business opportunities in the sector is also an opportunity to take stock and learn from the experience with PPI so far, including the mistakes which explain rejections, excessive renegotiations, and missed opportunities to use sector specific projects to improve the welfare of infrastructure users in a sustainable way.

This note briefly summarizes the economic research on the main lessons that deserve consideration as a new generation of PPI. The main source is the literature published since end of 2007—with a few exceptions. The older literature has by now been quite well internalized in that research and covered in recent surveys used in what follows.

The note is organized as follows. First, it summarizes the main policy criteria used by researchers to assess PPI. Next it offers a brief digest of the evidence available on each criterion. It then offers some implications for the key operational actors of the sector.

What did we learn conceptually that is relevant to the way PPI should be thought of in practice?

Many surveys take stock of the recurring debates on the impact of PPI. Conceptually,
the first characteristic to stand out in these surveys is that, for about 20 years, researchers have highlighted that assessments of PPI need to rely on at least 4 criteria:

(i) **efficiency**—is it cutting cost, are cost minimized and do prices reflect costs?,
(ii) **equity and poverty alleviation**—are the poor among the winners or the losers of PPI?,
(iii) **fiscal/financial viability**—is the public sector really meeting its fiscal objectives—which may include subsidies—with PPI and is the operation financially sustainable for the private actors involved.
(iv) **governance**—does PPI impact the institutional support to sector policy and its accountability for mistakes, incompetence or corruption? Does it make it worse or better?

In practical terms, this implies that when considering a deal, it is useful to assess this deal against these four standard policy evaluation criteria. (This note focuses on the evidence on the efficiency, fiscal and governance effects of PPI. Note 3 will provide a self standing assessment of the growing literature on its impacts on poverty and equity.)

The second characteristic to stand out is the widespread confusion between PPI and privatization. Privatization is a much wider concept with much broader and complex consequences than those that can be credited or blamed to a specific project. The consequences of PPI can however approximate those usually credited to privatization when the project is large enough in relation to operation and management of the sector. This is the most common implicit assumption in the academic literature.

**On the fiscal impact of PPI**

Although not always recognized, the need to address fiscal concerns is often, if not generally, the main initial justification for the demand for PPI by governments. During most of the 1990s up to the mid-2000s, large scale private participation in infrastructure was expected to cut the fiscal burden imposed by public operation of infrastructure. Operational and capital expenditures were to be reduced while revenues were to be increased through taxes and through the sale or rental of assets.

In developing countries, these economies were not always achieved. The experience has shown that besides the short-term subsidies sometimes needed to support privatization processes, the public sector often has eventually had to commit subsidies for the long-term as well—usually as one of the outcomes of a renegotiation. The econometric evidence available from a large number of papers is that the potential short term fiscal profits from large scale PPI are not always sufficient to offset the long-term additional costs emerging from contract renegotiations. Anybody working on water in a poor region, on urban transport (rail in particular) can provide anecdotes that illustrate the econometric results. Sector specific evidence of situations in which the fiscal costs did not disappear or sometimes increased are provided next.

**a. Electricity**

In electricity, the story is that private generation is usually subsidies free. It only requires subsidies under specific circumstances—e.g. incentives to change technology in an effort to green the sector. Distribution, at the other extreme, often ends up involving some government subsidies. This is mostly observed in regions dominated by poor population and few industries. In many cases, subsidies end up being replaced by cross-subsidies to cut the fiscal costs. As for transmission line extensions, they can often get financed through special development funds which include significant subsidies as well (the story of the largest transmission expansion in Argentina in the 1990s).

**b. Telecoms**

For telecoms, the main fiscal cost tends to be the eventual (direct or indirect) subsidy requirements for supranational projects (such as the backbones) or for the financing of universal service access, in particular in rural areas. In the first instance, guarantees often do the trick and private
operators end up delivering the projects. As for universal service concerns, they are often turned into obligations for the operators and usually financed out of sector wide cross-subsidies.

In many countries, the telecoms sector, in particular mobile telephony, has in fact become a tax handle. The tax component of phone bills around the world is indeed quite often important. It often includes tax levies imposed by all levels of government (national, provincial and local).

c. Transport

In transport, in activities in which private investors are not ready to enter with cash—such as the railway sector in Africa—the state ends up guaranteeing some investments. But the main areas in which fiscal costs are still observed are in the support of passenger, and sometimes freight train. Few countries in the world, if any, operate their passenger transport totally without some form of subsidies.

In large cities, urban transport would often not be safe and financially viable without some fiscal support. This has been documented in all regions of the world, poor and rich. Affordability of urban public transport is politically often as important as affordability of water.

Equivalently, in many countries, the relative price of rail and road transport is often distorted by implicit and explicit subsidies to road users (road users charges—often including fuel taxes—seldom match the economic costs of roads—including their environmental and safety related costs—, even if they may match their financial costs in many countries).

Overall, the recurring scenario in which subsidies end up being part of the financial support of PPIs is so common that it is surprising it is not taken into account more often upfront. This is something that should change in the way transport PPI are conceived—whether in Rio, Bamako,... or any European city.

d. Water and sanitation (W&S)

The international rule of thumb is that tariffs should at least cover operational expenditures in W&S—25% of total cost is the figure often quoted as a rule. The many World Bank studies that have looked at the financing of the sector have recognized this for the longest time. Expecting private operators to do better than that without subsidies or allowing cross-subsidies was the dream of the 1990s. It often ended up a nightmare.

The water sector is the infrastructure subsector for which getting new deals signed has become the hardest. The sector is betting once more on management contracts—as in the late 1970s and 1980s. This can be seen as an explicit recognition that this sector cannot be expanded without public financing. This is well recognized for Africa in Jerome (2008) or in Foster and Briceno (2010) for instance.

e. Summing up on the fiscal criteria

Overall, the main lesson to be learned from the analytical assessment of the experiences is that subsidies are often going to be part of the PPI financial sustainability. When dealt with ex-ante, it allows governments to factor them in the contracts and their budget. What is particularly important to recognize is that it may, as it should, influence project design ex-ante to minimize fiscal costs. Avoiding doing so forces governments to take on, ex post, project related costs which are not consistent with their ability to pay. This is what is being done for the water sector.

More systematic ex-ante assessments of the government's needs and ability to subsidize approach should be considered in poor countries and countries in which the ability to pay of the poor and the scope for cross subsidies are limited. It will eventually make PPI easier. This is because it will reduce the opportunities to conduct opaque renegotiations which are seldom in the interest of users and taxpayers. And this will eventually reduce the fiscal cost of the sector.

At the project level, there is a reasonably good understanding of the sorts of deals for which subsidies are needed to bring the rate of return close to the cost of capital for the projects. Subsidies can also often help smooth cash flows, speeding up the positive cash flows or at least supporting them in the initial phases of a project. Getting this right
can lead to deals that would otherwise be perceived as unattractive.

**On efficiency and PPI**

Efficiency is one of the areas in which the distinction between privatization and PPI can be quite determinant of the assessment of interaction between the public and the private sector in infrastructure. For small projects, there is no reason to believe that private participation should change efficiency—after all many public projects are procured and implemented by private operators. However, the evidence suggests, often, there may be, although the drivers of the differences may differ with the size of the PPI.

There is a large volume of papers showing that the larger operational freedom from political interference allowed by the private management of small and medium projects under a PPI can pay off in term of efficiency for small and medium projects. This is particularly strongly the case in countries where public procurement is poorly organized. Indeed, when public sector rules limit or distort competition in public markets to deliver infrastructure needs, such as roads or water and sanitation facilities, costs tend to be higher and service users and taxpayers pay more than they should (Estache and Iimi, 2011).

However, when the project is large enough to imply a partial or total privatization of the sector, it can be associated with a number of important institutional changes to the sector. This may include the need to interact with an independent regulator—often created in the context of the sectoral changes that lead to the PPI.

This is the case for the concession of an electricity or water company. In general, the ex-ante bet is again that the private sector will do better than the public sector as a service provider. This assumes that there is an enabling regulatory structure that supervises without interfering, while ensuring that the efficiency gains will eventually materialize and will eventually be shared with the users (and the taxpayers).

The evidence on this broader vision is largely in favor of PPI but not for every region, not at any point in time and not equally strong across sectors. Both total factor productivity and labour productivity have increased in the sector. But once again, it is crucial to point out that research shows also that PPI alone will not always lead to gains. The main message of this research is that competition and effective regulation are crucial for the private sector to deliver on the expected efficiency gains. This is not only a theoretical finesse. It matters in practice. The econometric evidence abounds (Estache and Wren-Lewis, 2010).

From an operational perspective, it may also be useful to point out that research shows that the efficiency gains are clearly context and timing specific. Efficiency gains tend to appear early when regulation allows firms to capture these gains temporarily, as predicted by theory. But this is something that has to be managed in the regulatory design. The sector specific details can be summarized as follows.

**a. Electricity**

For electricity, the evidence suggests that PPI in generation and large scale PPI such as distribution and transmission concessions have generally, but not always, lead to significant improvements in efficiency. In Asia or Latin America, PPI deals were usually associated with improvements in labour productivity and reductions in power losses. In Sub-Saharan Africa, the results are not as clearcut. Some of the research shows that poor regulation was often to blame or unwillingness of the private actors to play by the rules of regulation. The factors explain why many of the deals were cancelled or in distress and when they worked out, they often did not increase performance lastingly, when they did (Estache and Wren-Lewis, 2010).

Across regions, research also shows that the efficiency gains were not fairly shared with the users. In Latin America for instance, the sharing of the efficiency rent from PPI was often highly taxed so that neither the operator, nor the consumer really benefited from the gains. The taxpayers would and should have benefited, if these revenue sources had been used to cut other taxes or debt. But there is no documented experience in which this was the case.
b. Telecoms

The evidence on the impact on efficiency of PPI in the telecoms sector is overwhelming. Competition has both been facilitated by and stimulated the adoption of new technologies and costs have been cut. Some of the research suggests that deregulation may have sometimes gone too far in many countries and allowed firms to transform technology improvements into rents. Indeed, rates reductions are still far from reflecting the cost reduction allowed in many telecoms related activities. Residual regulation of the sector in many countries still needs work to make sure that consumers get their faire share of the very large rents generated by the sector. This evidence cuts across regions and performance indicators.

c. Water and sanitation.

In W&S, the evidence of an increased efficiency due to private sector participation is at best mixed in all developing regions. The reason is that, at the end, what matters often more than ownership, and it is true for all infrastructures, is the environment in which the private sector participation will be implemented. Factors such as competition, the possibility for cost recovery, good governance and regulatory levels have an influence on performance and efficiency. But the importance of these factors and the difficulty of implementing them in this sector have often been underestimated.

e. Transport

For the transport sector, the story is again largely quite positive in general. This is not really surprising since intermodal competition has improved significantly across the world in the last 20 years or so and competition is good for efficiency. It works better in the market (inter-modal), than for the market (when auctions are needed to sort out the future operators of a local (road or buses), regional (airport, port, trains or partial road networks) or national (rail or airports)).

The road sector offers the less positive situation. The large number of renegotiations of toll roads may be the best indicators of the failure to achieve politically and financially sustainable improvements in the sector. However, there is no clear evidence that PPI has helped improve the overall performance of the sector significantly in a lasting way. Partially, this is explained by the fact that it is not easy to measure evidence at the road level. This shows in the lack of interest shown by researchers—empirical academics working in the field conduct research when data is available; they seldom generate new data. But the data challenge alone would not explain the large number of renegotiation. Weak institutions do, as discussed later.

In the seaport sector, most of the large countries in Latin America, Africa and Asia have seen the private sector take over the public one. Yet, only a few studies have focused on port efficiency in developing countries. Most found that private ownership had a positive influence on efficiency but it is not the only influential factor.

In the railway sector, the private sector has taken over a half of the companies in Latin America and Africa and in a large part of the companies in East Asia. Efficiency improvements resulted in all regions. However, these improvements come from different factors. In Africa, it is a reduction in inputs which increased labour and asset productivity, at the base of the efficiency increase, while improvements in Latin America came from the output side.

In the airport sector, conclusions on the efficiency improvements are difficult to draw because of the short history of airport privatization, especially in Africa where PPPs are a few among many public airports. Nevertheless, some studies did reach the conclusion that companies with a private majority ownership were more efficient than those with public majority ownership.

e. Summing up on efficiency

Overall, it is in the telecoms sector that efficiency gains have been the highest. The transport and electricity sector follows close by—when competition and regulation were allowed to work. Private sector participation in the water sector has however not worked out as well in terms of efficiency and to a large extent because it is harder to introduce or mimick competition in this sector and the
institutions needed to do this were not developed.

**On governance and PPI**

There is quite a large and broad ranging literature generated by economists but also political scientists focusing on the various dimensions of governance. It ranges from the analysis of the sources of weaknesses of institutions surrounding PPI—in particular the importance of regulatory agencies—to the politics of PPI.

The telecoms and the electricity sectors have been the most researched. For the transport and the water sector, it is quite difficult to find analytical information on the importance of institutions for the sector. For transport, this is because intermodal competition allows sector specific governance requirements to be minimal and fairly well targeted (e.g. safety, time tables, access prices,...). For water, most of the research on institutions is build around case studies rather than detailed analytical research. It provides useful information but it makes it harder to compare across experiences.

A common theme across sectors in the literature on governance is the role of sectoral regulatory agencies. In general, Dagdeviren (2009) suggests that regulatory effectiveness is quite weak in developing countries. Independence is often the missing characteristic of regulatory agencies in these countries even though it is often argued to be the most important element for PPI's efficiency before the sole existence of these agencies (Estache and Wren-Lewis, 2009). Wren-Lewis (2010) suggests that badly governed independent regulatory agencies (IRA) can even have a negative impact on efficiency.

The details of the evidence available in all cases can be summarized as follows.

a. **Electricity**

This is the sector in which the institutional changes achieved in the context reform seems to have been the most important, usually leading to the creation of an autonomous (but not always) independent regulator. In many countries, this regulator supervises the new actors of a usually more competitive market when the reform has managed to go that far.

The evidence on this impact of these institutional changes is mixed (Estache and Wren-Lewis, 2010) but it yields overall messages that are quite supportive of efforts to beef up institutional reforms in the sector. Competition in the market was not always possible because of the size of the market, but when it was possible, it worked well in that it generated good returns on PPIs and allowed cost to fall. When competition for the market was a substitute, the regulatory needs were strong and the evidence suggests that the development of the institutional capacity to regulate was central.

The evidence is however not all that coherent. Ba & Gasmi (2011) focusing on mostly Latin American countries find that regulatory agencies have a significant influence on the performance of the electricity firms and improve access to their services. This is not in line with the results of Estache & al (2009) who find no positive influence of the IRA on access rates to electricity. However, they do find an improvement in affordability for households. Wren-Lewis (2010) also shows that, in addition, the presence of regulatory agencies in developing countries decreases the possibility of renegotiations and the negative influence of corruption on firms.

b. **Telecoms**

Concerning the influence of IRA on the performance of the telecoms PPIs, Estache (2006) finds that the existence of regulatory agencies coupled with privatization have a positive effect on access rates and they increase prices except for low income groups. Estache & al (2009) also suggest that the introduction of an IRA can increase the average cost of a local call while it decreases the negative effect of corruption on household connection charges. For Montoya and Trillas (2009), IRAs in Latin America have a positive influence on network penetration. This may explain the increased cost in the previous paper.
Note that econometric evidence also shows that the sequencing of creating a regulator and launching a PPP is also an important element that affects efficiency improvements of the telecoms infrastructure (Wallsten, 2003).

Research also provides test of the importance of the independence of these agencies. It seems that the more independent an agency is, the more it will affect positively technology diffusion in the telecoms sector (Howard, Mazaheri 2009). Mohammed and Strobl (2011) also suggest that there is a difference between functional and statutory independence. They find that functional independence influences positively mainline telecommunication penetration. However, they find no such evidence for statutory independence.

Concerning corruption in the telecoms sector, Berg & Jiang (2011) point out in their study that it affects more private firms than government-owned firms. According to them, the presence of corruption is higher in high income developing countries since the telecoms company may have more value. They also conclude that regulation works better in a competitive environment.

c. Water and sanitation

In W&S, regulatory bodies are often present—although not systematically—but they tend to lack independence and capacity to manage economic and financial regulation—even when they are quite good at the technical level. In Africa for example, half of the Sub-Saharan countries implemented a regulatory agency for the water sector and, generally, important improvements were made in the regulatory environment even though the autonomy of regulatory agencies stays questionable. Indeed, despite the fact that many African countries present a strong regulatory structure (e.g. Burkina Faso, Kenya, Mali, Niger or Uganda), very few Sub-Saharan countries managed to develop really autonomous regulatory bodies protected from political interference. Many observers would argue the same for Latin American water regulatory agencies.

This being said, whether they are totally independent or not, their existence in itself seems to matter and have an impact on key regulatory objectives. Estache & al (2009) find that these agencies are correlated with improvements in access rates in the sector as compared to countries which have chosen not to adopt these agencies.

d. Transport

In the transport sector, developing countries’ regulatory agencies exist for each sub-sector (railways, port, airport, roads) and sometimes, they can even be divided according to the customer characteristics—passenger and freight in the Latin American railways for example. While there exists no benchmark for the sector level at which regulatory agencies should work, Estache, Juan, Trujillo (2011) suggest that developing countries would be better off, in terms of human capital and of coordination, with a global regulatory agency for the transport sector. In addition, in the African railway sector, the regulatory environment differs in Francophone and Anglophone countries leading to different needs in regulatory reforms (Bullock, 2008). In Latin America, regulatory agencies have been in place before the bidding process for most of the PPP contracts (Guasch, Laffont and Straub, 2008) yet the independence of those agencies is questioned. Many toll road PPI contracts in Latin America have indeed been renegotiated due to a lack of enforcement regarding contract compliance. In Sub-Saharan Africa, many PPIs failed because of a weak regulatory environment in which political and bureaucratic conflicts exist while in Asia, it is the lack of a competitive environment which led to the failures (Soomro and Zhang, 2011).

Galilea and Medda (2010) suggest that corruption in the transport sector has a negative impact on the success of PPIs, with African and Latin American projects being the most affected. Yet, they also evaluate the influence of democratic accountability and find a positive association between a low accountability level and a PPP’s success for all transport sectors except toll roads. The reason they offer is that less accountable governments “seem more willing to fulfil the long-term requirements”. Mu & al (2011)
discuss the negative influence of corruption for China: it increases transaction costs linked to PPPs. This is due in part to the weaknesses of the regulatory bodies.

**e. Summing up on governance**

The main message is that most of the evidence suggests that the introduction of a regulatory agency has positive impact in terms of PPI performances (access, efficiency and quality) and helps in the reduction of corruption. However, sometimes, doing the right thing is not that popular. Indeed it may lead to increases in prices (to improve cost recovery). The message is however also quite subtle in pointing out the relevance of the interaction between competition and regulation and the various legal dimensions of what is needed to ensure that agencies can be effective. Dealing with these issues is not easy but it is essential to ensure the long run sustainability of PPI deals and reassure investors to get them to come in the first place. The real challenge is that building these institutions takes time and skills and this slow birth of competent agencies is often not compatible with the need to deliver quick PPI deals.

**Main messages to remember?**

The translation of the lessons from academic research for the impact of private participation in infrastructure that may also have operational messages can be summarized as follows. Some of the messages may appear obvious, but a lot of evidence suggests that they are not fully recognized or dealt with. This implies that they are either not taken into account in practice or poorly implemented, fuelling cancellations, renegotiations, or rejections. The main lessons are:

- Efficiency gains from private participation in infrastructure are common—although not systematic,
- The financial and political sustainability of these gains depends on the effectiveness of competition and/or regulation for all sectors
- Fiscal costs/subsidies are not systematic but in general, they are relatively easily predictable unless they are driven by major sector or project specific supply or demand shocks
- Private participation in large infrastructure projects requires a significantly more complex due-diligence than PPI for small projects or well targeted projects that do not drive the fate of the sector
- The challenges imposed by larger projects stems from their significantly larger complexity, and their demanding institutional, regulatory, fiscal and social requirements. These demand a lot more preparation time than allowed by project resources in cash, time and skills.
  - Institutions building, including for regulatory purposes, takes time; few projects, unless they include a strong lasting technical assistance component, last long enough to assist in that institutional building
  - For some projects, fiscal costs are, ex-post, a lot more sensitive to demand risk than allowed for and this cost should be estimated ex-ante and could then be built-in project design ex-ante to reduce renegotiation risks
  - For the most successful projects, unless regulation works, efficiency gains become rents which fuel conflicts between governments, users and operators. These can be managed ex-ante as well through the proper design of regulation and the rules of implementation of that regulation

A last word is aimed more at the evaluation units. Despite the possibility of drawing quite a wide range of conclusions from the available academic research and from many anecdotes and case studies, knowledge gaps remain. The achievements in terms of efficiency and its drivers are relatively well documented. The fiscal and governance related effects of PPI are a lot less well documented. Note 3 will also show that the evidence on the equity/poverty effects of PPI is not yet as robust as the evidence available on efficiency either.
**Bibliography (mostly 2008-2012)**

The bibliography is organized by sectors and focused to a large extent on the most recent papers, building on sources and lessons quoted in recent surveys to internalize the older results.

**General (all sectors)**


**Water and sanitation sector**


**Africa**


Asia


Latin America


Energy sector


Africa


Asia


**Latin America**


Silvestre, B., J. Hall, S. Matos and L. Figueira (2010) “Privatization of electricity distribution in the Northeast of Brazil: The good, the bad, the ugly or the naive?”, Energy Policy, 38, pp.7001-7013.


**Transport sector**


Viegas, J. (2010) “Questioning the need for full amortization in PPP contracts for transport Infrastructure”, Research in Transportation Economics, 30, pp.139-144.

**Airport**


**Port**


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Railways

Roads

Telecoms

Latin America

Asia