Private Participation in Infrastructure:

A Review of the Evidence

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Infrastructure services like electricity, water and sanitation, telecommunications and transport play a critical role in development, with important direct and indirect linkages to living standards and economic growth. Until the 1990s, most developing countries relied on public sector monopolies to finance and operate their infrastructure, with disappointing results. Technical inefficiencies in power, water, roads and railways alone are estimated to have caused losses of $55 billion a year in the early 1990s—equivalent to one percent of all developing countries' GDP, a quarter of annual infrastructure investment, and twice the annual development finance for infrastructure. Under public provision, services are often mispriced to meet short-term political goals, with mispricing in these sectors leading to additional losses of $123 billion annually. Inefficiencies and losses are large relative to infrastructure investment in developing countries (Figure 1). Mispricing has also contributed to insufficient resources to finance service maintenance, let alone expansion, with the result that in the developing world some two billion people lack access to adequate sanitation and electricity, one billion lack access to clean water, and half the world's population has never used a telephone. Public financing of infrastructure also represents a large fiscal burden on governments, consuming resources that might otherwise be available to meet other social needs.

Beginning in the late 1980s, countries around the world began turning to the private sector, both to take over the operation of existing infrastructure enterprises and to finance new infrastructure assets. Between 1990-2000, private infrastructure projects in developing countries had attracted over $680 billion in investment. Engaging the private sector in infrastructure financing and operations was expected to offer a number of benefits. These included access to private finance for expanding services, improved incentives for efficiency, and a reduced burden on strained public resources.

This paper reviews the evidence on the extent to which these objectives have been achieved. As background to the discussion, Part A provides a brief review of the trends in private participation in infrastructure in developing counties. Part B reviews the evidence from the privatization and concessioning of existing infrastructure enterprises. Part C looks at some of the evidence from private financing of new (or 'greenfield') assets. Part D draws on that evidence to highlight five key lessons. An Annex to the paper presents a summary of the key studies in this area.
A. TRENDS IN PRIVATE PARTICIPATION IN INFRASTRUCTURE

Throughout the 1990s, there has been a dramatic increase in the number of countries that have embraced private sector participation in infrastructure, with 121 developing countries introducing private participation in at least one infrastructure sector between 1990 and 2000. These countries awarded over 1,900 projects that involved investments of nearly US$683 billion in 2000 dollars.¹

Investment in private infrastructure projects began from a relatively low base in the early 1990s, reached a peak of $123.3 billion in 1997, declined in 1998 and 1999 in response to crises in emerging markets, and resumed their upward trajectory in 2000 (see Figure 2).

By sector, telecommunications has dominated investment, with some $292 billion during 1990-2000. Electricity accounted for $196.9 billion, transport for $124.9 billion, and water and sewerage accounting for $36.7 billion, and natural gas transmission and distribution for $32.7 billion (see Figure 3). Within the transport sector, roads dominated with $71.4 billion, followed by railways ($25.6 billion), ports ($16.6 billion) and airports ($11.3 billion).
By region, Latin America and the Caribbean dominated investment, with some $330.8 billion during 1990-2000. East Asia accounted for $190 billion, Eastern and Central Europe for $85.3 billion, South Asia with $38.1 billion, Middle East and North Africa for $20.3 billion, and sub-Saharan Africa lagging with just $2.6 billion (see Figure 4). This pattern reflects the number and size of projects governments in each region have made available to private participation and progress in creating an enabling policy and regulatory environment.

Private participation in infrastructure can take a number of forms, including the sale, concessioning or leasing of existing infrastructure enterprises, usually with rehabilitation or expansion obligations, as well as the construction and operation of new or 'greenfield' facilities. During 1990-2000, private participation in existing enterprises dominated investment flows, accounting for some $415 billion of investment, with the remaining $267 billion flowing to greenfield projects.

**B. PRIVATE PARTICIPATION IN EXISTING ENTERPRISES**

The privatization or concessioning of existing infrastructure assets—such as telephone companies, power and water utilities, railways, ports and airports—accounted for some sixty percent of investment in private infrastructure projects in developing countries. This section reviews some of the evidence from experience to date, focussing on the impact on expanding access and service quality, improving efficiency, as well as the impact on prices, labor and the government’s fiscal position.

1. **Network Expansion and Service Quality**

A major challenge in most developing countries is to expand the coverage and quality of infrastructure services. Under public ownership, a number of factors constrained network expansion. One of the most pernicious of these has been the political economy of infrastructure tariffs—because infrastructure services are widely consumed in society, governments face strong political pressures to hold prices below the full costs of supply. Apart from the efficiency losses arising from such mis-pricing, this strategy typically results in inadequate resources to maintain,
let alone expand, infrastructure services. While sometimes claimed to benefit the poor, the evidence suggests that the policy is in fact especially harmful to the poorest members of society, who are denied access to network services and often pay high prices for inferior alternatives. This disparity is shown in Figure 5. For example, households without access to piped water often pay twenty times the official price to receive water from informal vendors, and households without access to electricity often pay 10 to 20 times the utility price for paraffin for lighting or batteries to power radios or televisions.

![Figure 5: Population with Access to Water and Electricity, by Income Quintile](image)


Even when published tariffs reflect the underlying costs, public sector providers often face weak incentives to maintain appropriate commercial discipline, minimize costs, and deal with technical losses. Billing and collection is often weak, and theft through illegal connections rampant. These factors further constrain the ability of public providers to expand access.

Problems with service quality under traditional models of public provision have several sources. Inadequate financial resources to maintain and upgrade services are often a significant obstacle. But public enterprises can also often ignore quality regulations with impunity, and in the absence of effective regulation monopolies have weak incentives to innovate and to be responsive to consumers.

Introducing private sector participation helps to break this cycle in a number of ways. First and foremost, private investors will only invest in infrastructure enterprises if the government gives a credible commitment to cost covering tariffs. Commitments of these kinds are far more durable than the same undertakings given to managers of public enterprises, who have limited leverage to negotiate commitments and no effective sanction if governments succumb to populist pressures to renge. With appropriate regulatory or contractual commitments, private investors have incentives to expand services and the ability to finance the investments that expansion requires. Second, private investors face stronger incentives to ensure effective billing and collection, to control costs, and to stem technical losses, which contributes to greater resources for network expansion. Finally, unlike their public sector counterparts, private operators have stronger incentives to comply with quality standards and other regulatory obligations, as failure to do so is more likely to result in fines or other penalties.
The available evidence confirms the powerful effect private participation can have in expanding access and improving service quality.

The evidence on network expansion is particularly strong in telecommunications. A study of telecommunications privatization in Argentina, Jamaica, Mexico and Venezuela by Ramamurti found significant increases in the rates of network expansion following privatization. For example, the Jamaican telecommunications firm increased network expansion from 4.5 percent in the 11 years before privatization to 18 percent per year in the first four years following privatization. And Entel, the Argentine telecommunications firm, increased network expansion from 6-7 percent per year in the decade before privatization to 12 percent per year after privatization. In these instances, the network expansion resulted from a three or four-fold increase in capital expenditure compared to the period before privatization.

![Figure 6: Percentage Change in Rate of Telecommunications Network Expansion Following Privatization](image)

Sources: (1) Ramamurti (1996); (2) Ros (1999)

Similar results were found in a study by Ros on the impact of privatization on the performance of telecommunications firms in a sample including both developed and developing countries. He found that, holding other factors constant, privatization was positively associated with both a higher level of main lines per 100 inhabitants and higher growth in main lines per 100 inhabitants. This finding held true for low-income countries. In countries with GDP per capita less than $10,000 that have privatized their telecommunications networks, main lines per 100 inhabitants was 30.8 percent higher and growth in main lines per 100 inhabitants was 129 percent higher.

These results are shown in Figure 6.

A review of the welfare consequences of privatizing the telecommunications company in Chile by Galal et al is consistent with these findings. The authors attribute more than 84 percent of the overall change in welfare resulting from the privatization of CTC, the Chilean telecommunications company, to network expansion. CTC’s gross fixed capital formation increased substantially post-divestiture, enabling the improved coverage.

There are fewer studies documenting the impact of service expansion in electricity and water. A study of the effects of electricity privatization in Chile by Estache et al found strong evidence of network expansion benefiting the poor. Between 1988 and 1998, the percentage of households in the lowest income per capita decile without an electricity connection fell from 29.4 percent to 7.0 percent, and the percentage of unconnected households in the second lowest decile fell from 19.9 percent to 4.0 percent. A study of the effects of concessioning the water and sewerage system in
La Paz and El Alto in Bolivia, also shows positive results. After awarding the concession to the firm on the basis of the number of new connections they would make, the average annual rate of new connections increased by 66 percent, resulting in improved coverage of both services by about 20 percentage points in the poorer neighborhoods of El Alto.\textsuperscript{10}

Service quality has many dimensions, but there is evidence to confirm the positive impact of private participation. For example, in Brazil, Light, that distributes electricity in Rio de Janeiro, and Enersul, that distributes electricity in the state of Mato Grosso do Sul, have significantly reduced the outage duration and frequency since their privatization. In the first four years of their privatization, the outage duration per customer decreased by over 55 percent in Light and 40 percent in Enersul and the outage frequency per customer fell by 60 percent in Light and 25 percent in Enersul.

While these results are encouraging, it is clear that the magnitude and incidence of these effects depend critically on three main factors.

\textbf{The role of competition.} Most infrastructure sectors were once considered to be "natural" monopolies, in the sense that a single firm could supply a market at least cost. However, advances in technology and in economic thinking have shown that competition is not only feasible but desirable in a growing number of industry segments. This is most clearly the case in telecommunications, but is increasingly the case in power supply and many transport services. Competition is a powerful driver of efficiency, create strong incentives for improving service quality, and can help to reduce the regulatory burden. The impact of competition in expanding telecommunications line growth in Latin America is illustrated in Figure 7.\textsuperscript{11}

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{figure7}
\caption{Telecom Line Growth Rates in Latin America - Role of Ownership and Competition}
\end{figure}

\textsuperscript{11} Source: Wellenius (1997).

Even when competition in the market is not feasible, some of its benefits can be achieved by introducing competition \textit{for} the market. Under this approach, time-bound monopoly franchises are awarded by competitive bidding and periodically re-bid. This helps to ensure countries get
the best deal available from private firms, including in terms of investment commitments, and provides incentives for firms to perform well to retain the franchise.12

The regulatory framework. Where regulation is required to address monopoly power or deal with other market failures, the design and implementation of the scheme can have an important impact on access and quality. As noted above, credible commitments to cost-covering tariffs are essential to attract and sustain the private investment that allows service expansion and quality improvements to proceed. Doubts about the credibility of the government's regulatory commitments will result in reduced investment at higher prices, which has led governments to develop new regulatory models that include clear tariff adjustment rules, usually administered by independent regulators.13 The details of regulatory framework can also have an important influence the pace and priority of network expansion (such as when coverage targets are specified in concession contracts), the level of service quality required, and the penalties or other incentives for complying with these obligations.

The government's fiscal and other objectives. The government's priorities in involving the private sector will be reflected in a number of features of the transaction that can have an important impact on the pace of network expansion and quality improvements. For example, if a government places priority on minimizing tariff increases for existing customers, or realizing immediate budget revenues from the transaction, there will be fewer resources available to finance rapid service expansion or improvement. On the other hand, governments that place a priority on expanding access may reduce their fiscal take, allow accelerating progress towards cost-covering tariffs, and may further encourage expansion by the delivery of targeted subsidies for new connections. For example, Chile has used minimum subsidy concessions to expand rural access in electricity and telecommunications with positive results. The coverage of electricity in rural areas increased from 53 percent to 76 percent over the period 1992-97, and 80 percent of the rural population now has access to a public telephone.14

2. Operational Efficiency

Public sector monopoly providers of infrastructure services in most developing countries have a poor track record in operating efficiently. There are weak incentives to reduce costs and to deal with technical and non-technical losses. Staffing levels are also often inflated to meet political goals, and labor productivity is often further reduced by labor systems that offered few incentives for performance.

Private sector participation can help to improve the situation in several ways. First, in cases where competition can be introduced, firms face strong incentives to perform efficiently or lose customers to their competitors and ultimately go out of business or be taken over. Second, even firms that operate in monopolistic conditions can be subject to regulatory frameworks that create powerful incentives to minimize costs. Third, private firms and their managers are usually free of civil service regulations that can inhibit operating flexibility and innovation.

There is ample evidence that private participation has led to improved efficiency in telecommunications, where privatization is often accompanied by pro-competitive reform. In a study that reviews 31 privatized national telecommunications companies in 25 developed and developing countries, Bortolotti et al found that operating efficiency increased significantly after privatization.15 The study found that major efficiency gains resulted from better incentives and productivity, rather than from wholesale firing of employees. In a study of 23 developed and
developing countries, Ros found that privatization and competition in the telecommunications sector are positively associated with increases in labor productivity and higher labor productivity, measured as main lines per employee. Various country studies have confirmed the same results, including those in Argentina, Chile, New Zealand and Hungary.

Similar efficiency improvements have also been found in the electricity sector, where the main drivers tend to be the combined impact of ownership and regulatory reform, rather than direct head-to-head competition. In Argentina, for example, the electricity sector has experienced significant efficiency gains since privatization in the early 1990s. In the first five years of the reform, labor productivity (measure as GWh/employee) increased over 23 percent. Total electricity losses in the sector decreased from 18.32 percent to 12.73 percent between 1993 and 1999, reflecting performance improvements in all segments of the business. In transmission, technical losses decreased from 5.7 percent in 1992 to 4.4 percent in 2000. Among privatized distribution companies, Edenor and Edesur, that serve the capital, were among those that substantially reduced electricity losses (see Figure 8). In generation, the unavailability of thermal plants also decreased significantly after privatization. Until 1992 when most of the generation capacity was privatized, the unavailability rate of thermal plants was at 52 percent; by 2000, the unavailability rate had fallen to 26 percent.

The electricity sectors in Chile, Hungary and Peru also show improved performance after privatization. In Chile, by 1997 energy losses had fallen to about a third of historical levels; labor productivity had doubled from less than 300 clients/employee at the end of the 1980s to almost 600; and the number of GWh/employee had increased from less than 5 to almost 8. In Peru, Luz del Sur, one of the two distribution companies that serve the capital, reduced energy losses from 20 percent in 1994 to 9.5 percent in 2000, while labor productivity increased more than 150 percent. In Gabon, in the first two years of private operation under a 20-year concession Societe d'Energie et d'Eau du Gabon improved service continuity, measured as interruption time per customer, by 25 percent and the ratio of billed electricity/produced electricity from 83 to 88 percent. In the UK, efficiencies in the generation sector of the electricity system led to significant benefits from the reform program, although because of an insufficiently competitive power sector in its initial stages, virtually all of these benefits accrued to shareholders and taxpayers in the early years of the reform. A similar study conducted by one of the authors
showed that consumers started to benefit from reforms of the power sector after 2000, as a tighter regulatory control was imposed on the power distributors.26

Similar evidence is available from the water sector. In Buenos Aires, labor productivity improved significantly after a water concession was granted in 1993. The ratio of labor per thousand connections decreased from 3.3 in 1992 to 1.7 in 1998 and unaccounted water as a percentage of billed water fell from 0.45 in 1992 to 0.34 in 1998.27 As a result of these and other changes, total productivity factor also increased substantially, from less than 0.5 in 1992 to 0.9 in 1997. In Cartagena, Colombia, the ratio of employees per thousand water connections fell from 14 to 4.5 in the first six months of private participation under a lease arrangement.28 In Gdansk, Poland, the ratio of employees per thousand water connections fell from 10.3 to 8 in the first three years of reform.29 In Guinea, a private operator significantly increased total factor productivity in the sector.30 A comparison of the performance of public and private water companies in the Asia and Pacific region found that private water operators are consistently more efficient than public ones.31

The level and form of efficiency benefits available under private participation will depend in large part on incentives created by competition and the regulatory framework. The impact of competition can be particularly powerful, and Ros found that the introduction of both competition and privatization in telecommunications resulted in greater efficiency improvements than either policy alone.32

The regulatory framework can affect the opportunities and incentives for efficiency in various ways. For example, different types of rules governing tariff adjustments can create different incentives. Rules that are based on assuring a specified rate of return on capital invested can encourage investment but provide weak incentives for cost reduction.33 This may help explain why a number of studies of US utilities historically found little significant difference in efficiency between private utilities and public utilities that both operated under 'rate of return' regulation.34 Conversely, pricing rules that provide stronger incentives for cost reduction may in some cases increase the risks faced by firms and so possible curtail investment.35 Other aspects of the regulatory framework and privatization contract can also affect the availability of efficiency improvements, including covenants that limit the operators' ability to adjust employment levels or to adopt alternative technologies.

3. Prices

Under public ownership, infrastructure prices were often controlled to meet short-term political objectives. As mentioned above, this resulted in significant efficiency losses, and limited funds for maintenance and expansion, usually to the detriment of the poorest members of society who paid much higher prices for inferior substitutes. At the same time, operating costs were often inflated due to weak incentives for efficiency, but nominal financing costs were often low due to access to government-guaranteed loans, including from international financial institutions.

In principle, the move to private sector participation might thus affect the level of infrastructure prices in three main ways:

- To the extent pre-privatization prices were held below cost-covering levels for political purposes, prices might need to increase;
- To the extent efficiency improvements reduce the costs of service provision, and these benefits are passed on to consumers, prices are able to decrease;
• To the extent private financing increases the cost of investment, prices might need to increase.

The last issue—the cost of private capital—is often misunderstood when considering the choice between private and public ownership, and is discussed in further detail in section B.4 on the fiscal impact of private provision of infrastructure.

Analysis can also be complicated by several other variables:
• Privatization may coincide with (or even be motivated by) rising environmental, quality or other standards, that can increase costs. This was the case in the UK water sector, for example, where tariff increases where required to meet the substantial investment requirements needed to comply with EU quality standards.
• Price levels may be influenced by the detail of the regulatory system established at the time of privatization, including the balance struck between ensuring resources for expanding the network and passing on efficiency gains to consumers.
• Prices faced by different categories of consumers or different services may adjust in different directions. For example, the transition to competition in telecommunications in many countries requires the cross-subsidies between long-distance and local services to be re-balanced in a way that may lead to increases in local call charges but a fall in long-distance charges. Similarly, consumers who have hitherto stolen or otherwise not paid for electricity or water services might face an effective increase in prices, while other consumers may benefit from lower tariffs as a result.
• Prices immediately following private participation might be influenced by a government's desire to introduce required tariff increases progressively, or by the bidding strategies of private firms who competed for the concession on the basis of the least tariff required and expect to renegotiate more favorable prices over time.

Given the large number of factors at work, it is not surprising that examples can be found of prices increasing, decreasing, and remaining constant.

There are many cases where consumers received benefits in the form of lower prices. In the electricity sector, tariffs in Argentina fell by 40 percent five years after privatization, and in Chile fell by 25 percent between 1988 and 1998. The productivity improvements associated with privatization in Cote d'Ivoire were also largely passed on to consumers. In the water sector, prices in Buenos Aires fell around 14 percent following the award of a concession to a private operator. In the telecommunications sector, aggregate prices in the United Kingdom rose in 1980 and 1982 but fell thereafter.

There are several examples of privatization being accompanied by little or no movement in prices. Using the counterfactual approach Galal et al found that, in the case of the Chilean telecommunications company, divestiture did not affect prices at all since the government would have introduced the same tariff structure in any case. Similarly, in the case of Chilgener, a Chilean electricity generator, and Malaysia's Kelang Container Terminal, Galal et al found no change in the prices charged to consumers as a result of the privatization. In a study on the impact of privatizing the UK's the Central Electricity Generating Board, Newbery and Pollitt found that there was a small decrease in real final prices, with the benefits of lower costs largely flowing through to the new owners and the government, at least in the short run.

As elsewhere, competition can play an important role in not only reducing costs, but also creating pressures to ensure these benefits are shared by consumers. In the absence of competition, a well-
designed regulatory system seeks to mimic this effect. Chisari, Estache and Romero estimate the macroeconomic and distributional effects of regulation and privatization on the performance of utilities in Argentina after 1989. They find an important link between the privatization process and effective post-privatization regulation and, in particular, that while privatization predominantly benefits the new owners via efficiency gains which are not passed on immediately in terms of lower prices, the gains from effective regulation tend to benefit the poorest income groups more as these efficiency gains translate into lower prices. In particular, they find that the gains from effective regulation add up to almost $1 billion, or 16 percent of the average utility bill.44

Where tariffs are expected to increase as a result of privatization, governments have a number of options for reducing the impact on the poorest members of society. These include so-called "lifeline" tariffs that ensure that some minimum level of consumption is available at less than full cost recovery levels, more general systems of cross-subsidies, and targeted subsidy schemes.45

4. Fiscal Impact

Under public ownership, infrastructure provision is usually a direct burden on government budgets. To the extent state-owned utilities did not recover their full costs through tariffs, subsidies have to be provided from taxpayers. Loss-making infrastructure enterprises have traditionally been a major drain on public budgets. Borrowings by state-owned firms involves explicit or implicit government guarantees, ultimately impacting on the flexibility and creditworthiness of the government.

Private participation allows some of the financing burden to be transferred from taxpayers to private investors and consumers. The key to this change is efficiency gains by the private sector, relative to the public sector, as outlined in section 2. These gains allow privatized firms to pay taxes, rather than require operating subsidies, and borrow without a government guarantee. As a result, taxpayers are better off, and the government has more fiscal space to pursue other social purposes.

One question arises is whether the efficiency gains made by private firms are not diluted by what are considered the higher returns or profits the private sector expects to make on its investments. In other words, the question is whether private financing is more expensive than public financing, and perhaps for this reason the public sector should finance infrastructure projects. The nominal the cost of capital faced by private firms is indeed usually higher than the cost of capital faced by governments. However, the lower cost of borrowing by governments does not reflect superior capabilities to choose or manage projects. Instead, it reflects the fact that governments have recourse to taxpayers, who de facto provide an open ended credit insurance to the government. In general, the difference between quoted public and private borrowing rates provides a measure of the contingent liabilities that all tax payers bear in the case of public sector projects. In private projects with cost-covering prices, these risks are borne by the users. If taxpayers were remunerated for the risk they assume in tax financed projects, then ex ante there would be no systematic capital cost advantage to government finance. A priori, therefore, there is no reason to believe that the social costs of private finance are higher than the social costs of public finance.46

The immediate impact of the introducing private provision for governments is often the proceeds of the sale of shares or the right to operate. However, private participation may also have important implications for the government's long-run financial position. It will gain from not
having to incur regular subsidy payments if the public provider was operating at a loss, and also gain a stream of corporate taxes. It will lose some or all of any dividend stream that might have come from ownership of a profitable public enterprise. The former will usually exceed the latter, only if the performance of the enterprise improves post-privatization. The details of the regulatory regime may also have an impact on the government's position, insofar as it influences the profitability of the enterprise and seeks to pursue non-commercial objectives, such as cross-subsidies. It is the combination of these immediate and ongoing impacts that will determine how the government's fiscal position is improved by private participation, not just how much it receives in proceeds.

Even where a government-owned firm is sold at a discount, governments are generally net beneficiaries of privatizations in the medium to long run because of the efficiency gains made by private operators. This is because the revenue from the post-privatized infrastructure enterprise (principally corporate taxation) is usually far greater than the dividends, if any, that the government received as owner of the firm, and the reductions in subsidies paid to the provider. A study of the impact on the UK government's financial position of the sale of shares in 33 companies is consistent with this view. The study found that the Government received an average annual net inflow of between £6.7 billion and £11.5 billion in the period from 1986/7 to 1994/5, compared to a net outflow in the pre-privatization period. Approximately half of the inflow of funds received by government came in the form of corporation tax receipts, interest payments, dividends and the repayment of government loans, with the remainder being sales proceeds.

To a large extent, impact on the government's financial position will depend on its objectives in the transaction. In some cases, the government may choose to reduce its fiscal take and instead seek to expand investment obligations or reduce the impact on tariff increases. Bolivia's "Capitalization" scheme illustrates a variation on this strategy. Funds that companies bid for control over the former state-owned enterprises were left in the enterprise to finance investment, with the remaining 50 percent of shares placed in pension funds to provide for a universal pension for all Bolivians over the age of 60.

In other cases, governments look to privatization not only to enhance efficiency and reduce ongoing financial commitments, but also to realize immediate budget revenues, and so may structure the transaction to enhance the government's fiscal take. Those privatization proceeds might be used to pay down debt (including debt incurred on behalf of the privatized utility) or to meet other budget priorities. Those priorities might be in the same sector—such as when proceeds are earmarked for subsidies for expansion of infrastructure in rural areas—or other sectors.

5. Labor

Under public ownership, infrastructure monopolies typically faced weak incentives to perform efficiently and indeed were often used to meet objectives beyond that of providing infrastructure services. As a result, staffing levels were often considerably above efficient levels. For example, many power utilities in Africa and South Asia have fewer than 50 customers per employee, compared with more than 200 in countries like Chile. In addition to low levels of labor productivity, employees often benefited from conditions that were the envy of their compatriots in the private sector. This may provide benefits to the employees concerned. But it does so at the expense of lower efficiency and higher costs, which are ultimately borne by consumers through
higher tariffs, by taxpayers, or by those members of society who lack access to services in part as a result of the weaker financial capacity of the enterprise.

As we have seen, private participation creates stronger incentives for operating efficiency, which may impact on the conditions under which employees work as well as on the overall number of employees. One might thus expect labor to be the main losers from private participation. The evidence is more encouraging, however, and suggests that employees that remain in employment generally gain from the privatization process and that, for those that are laid off in the process, the hardship may in part be mitigated by compensation or retraining schemes. 

It is well documented that privatization usually improves firm labor productivity and the resulting productivity improvements often benefit retained employees through higher wages and/or improved conditions. Galal et al found that workers were net beneficiaries in all of the infrastructure privatizations they studied. The privatization with the largest net gain for employees was Telmex. Even though the number of employees declined only slightly from 49,995 to 49,203 in the year following divestiture, worker productivity increased substantially and workers received a 43 percent pay rise in 1989 and a 50 percent pay rise in 1990. Galal et al consider whether labor force reductions and union concessions would have occurred regardless of the divestiture. They conclude that the increase in labor productivity in 1991 can be attributed to cost-cutting and reorganization by the new private owners.

The privatization of Malaysia’s Kelang Container Terminal also shows how workers can benefit from higher productivity and higher wages. The firm was divested between November 1983 and March 1986. By 1990, workers were paid 60 percent more per hour in real terms, put in 6 percent more hours and produced 76 percent more, as compared to immediately before divestiture. There were also higher wages and profit-sharing schemes following the sale of the Chilean electricity firms Chilgener and ENERSIS. In some cases the post-privatization productivity gains resulted from changed working conditions. For example, after the sale of ENTel, a telecommunications utility in Argentina, a new collective agreement was entered into that increased the work week from 35 to 40 hours, linked wages to productivity and eliminated certain types of overtime and leave.

The empirical evidence on changes to overall employment levels is mixed, with changes in employment levels varying markedly. The degree to which staff numbers change after a privatization will primarily depend upon:

- the opportunities for growth that the firm enjoys after it has been privatized. Where under-investment by a government-owned utility has resulted in a demand backlog, privatization may result in higher employment levels as the network expands, notwithstanding the counterbalancing effect of efficiency improvements. For example, there have been large increases in employment levels in the telecommunications sectors of many Asian and Latin American countries characterized by low penetration rates and rapid network expansion.

- the extent to which the firm was overstaffed before the privatization. A high level of overstaffing will generally result in either lay-offs by the government in the lead-up to privatization or lay-offs by the purchaser of the firm after the change in ownership.

- whether the terms of the privatization contract restrict the privatized firm from adjusting staffing levels.

There are a number of case studies pointing to declining employment levels either in the lead-up to or following the privatization of utilities in developing countries. A review of five major privatizations in Argentina, which included telecommunications, electricity, gas and water
utilities, found that 27 percent of the employees in those five firms lost their jobs in the lead-up to privatization. There are other examples: Ramamurti found a 78.7 percent decline in employment following the privatization of the Argentine railways and Estache et al found a decline of over 40 percent in the number of employees in the lead-up to the privatization of the Brazilian Federal Railways.

In addition to case studies, there are a number of studies that statistically compare pre- and post-privatization employment levels for various samples of firms. The results are mixed, but typically show a decline in employment. Most of this evidence focuses on employment within the same enterprise, however, and so can be misleading when private participation is accompanied by sector liberalization that leads to the entry of new firms in the sector. In telecommunications, for example, reform may lead to an overall increase in employment in the sector, even if the incumbent firm suffers a reduction in manpower. A comparative study of 26 countries found that, between 1990 and 1994, employment in telecommunications markets with at least some competition increase by 20.7 percent while employment in monopolistic markets increased by only 3.1 percent.

Where employment levels have fallen, many governments have implemented policies to minimize the impact on labor. These include compensating laid-off workers by providing severance pay and other income support; and helping workers on a targeted basis to reintegrate into the labor market.

C. PRIVATE FINANCING OF GREENFIELD PROJECTS

Some forty percent of the investment in private infrastructure projects in developing countries between 1990-2000 took the form of private financing of new assets, rather than taking over responsibility for existing enterprises. Examples include power generation plants, water and wastewater treatment plants, toll roads, ports and cellular telephone companies. This section reviews some of the evidence of impact to date, focusing on the impact on costs and efficiency, broader sector development and taxpayers.

1. Costs and Efficiency

The development of new infrastructure assets through private rather than public financing offers two main benefits to a country. First, the new asset is financed off the government's balance sheet, thus preserving the government's borrowing capacity. Second, in many cases private financing and operation is expected to result in lower costs and higher operating efficiency, flowing from the stronger commercial disciplines operating on private firms.

Indeed, there is evidence that drawing on increased commercial discipline and incentives for efficiency can reduce costs of greenfield projects relative to their public-financed alternative, notwithstanding higher nominal financing costs. The forces at work are substantially the same as with private participation in existing enterprises, although lending institutions can play a larger role in driving commercial discipline when substantial debt needs to be raised to finance construction. A large number of studies point to lower costs when contracting out supply to the private sector, at least when using competitive bidding. A series of studies in the 1980s showed savings of between 20-50 percent in solid waste collection when contracted out to private providers. A study of the UK's Private Finance Initiative found that projects financed under that
scheme are on average delivering savings of 17 percent over traditional forms of government contracting. And a recent survey of experience in contracting out a range of services in OECD countries found net cost savings averaging 6–12 percent, with savings of 50 percent or more in some cases.

Reflecting the stronger disciplines involved, there is also evidence that private projects can be built with fewer time over-runs than their public-financed equivalents. For example, a study comparing privately-financed and publicly-financed infrastructure projects in developing countries showed that private projects had average time over-runs that were 54-68 percent of public projects.

Any assessment of cost savings needs to take into account the additional transaction costs that may be associated with private financing, including the costs of articulating a regulatory framework, conducting competitive bidding, and putting together complex security packages. These costs are not trivial, and in some cases have been estimated to reach as much as 5-10 percent of total project costs. While these costs can be significant, they can be effectively spread over multiple projects (e.g., a regulatory framework once established may support a number of projects in one or more sectors). Furthermore, initial transaction costs reflect learning economies on the part of the Government, the investor community, financiers, and the general public.

2. Sector Development

Greenfield private infrastructure projects are often evaluated on a stand-alone basis, comparing their costs and efficiency with putative public sector alternatives. Indeed, for this reason they are often seen as less challenging for governments, as they may not need to develop a broader sector strategy or regulatory framework, or deal with the additional challenges associated with transforming existing enterprises. However, in many cases the project may have important impacts on the broader sector.

In some cases, greenfield projects serve to introduce competition in a hitherto monopolistic sector, such as when cellular telephone operators compete with existing fixed-line networks, new merchant power projects vie to supply customers in a competitive market, or a new port facility puts competitive pressure on existing ports. In these cases, the new project not only represents additional supply capacity that is obtained without a burden on taxpayers, but an instrument for driving efficiency across the sector as a whole.

In other cases, greenfield projects complement existing enterprises (whether public or private), rather than competing directly with them. Examples include independent power projects that supply bulk power to existing power utilities or a new toll-road that complements an existing road network. Even in these cases, however, the project may have implications for the broader sector.

On the one hand, greenfield projects may play a positive role in introducing new technologies or practices, thus offering useful demonstration effects for existing infrastructure providers. To some extent they may also play a role in educating the government, the local financial community, and the broader population about the potential role of the private sector in infrastructure provision. In these cases they may act as a stepping stone towards deeper and broader ranging private participation in infrastructure.
The strategy of developing new privately financed greenfield investments, without reforming the existing utility operations is not without its risks, however. This is particularly true when the private project depends for its financing on long term take-or-pay contracts with incumbent state-owned utilities, as is the case with many independent power projects, for example. Some governments perceive these projects as the equivalent of a "free lunch": they acquire additional generating capacity without the need to deal with more complex and sensitive reforms to the power sector more generally, and do not adequately consider the contingent liabilities involved. In several notable cases, such as Pakistan, India and Indonesia, the governments proceeded to procure substantial new capacity through independent power projects without making at least parallel progress in improving the efficiency and financial self-sustainability of the state-owned power companies that had contracted to purchase the power. Ultimately, the power utilities were unable to afford the power they had contracted, leading to severe financial pressure and high-profile legal disputes that did not enhance the credibility of the countries in question. Moreover, in many cases these projects had explicit or implicit government guarantees, thereby exposing taxpayers to considerable financial liabilities that usually had not been budgeted for. Long-term take-or-pay contracts with government utilities can also complicate the process of privatizing the distribution companies and managing the transition to competitive power markets. As a result of these experiences, countries are now more alert to the potential hazards of procuring substantial new assets without considering the link with broader sector reforms.

3. Risk Transfer

Public financing leaves performance and other risks with taxpayers. Private financing presents opportunities to shift this risk to private investors and users. This sharpens incentives for prudent risk management and efficiency while strengthening the government's own financial position. There is ample evidence of this strategy succeeding across a range of sectors and countries.

Efficient risk allocation involves assigning risks to the party best able to manage or mitigate the risk. On this principle, commercial (including demand) risks are best born by investors and users, while non-commercial risks (such as those associated with a change of government policy or nationalization) are best born by government and hence taxpayers.

In some cases, however, governments have found themselves exposed to greater risk than they had counted on. This was the case with the Asian independent power projects noted above, where failure to progress sectoral reforms ultimately exposed taxpayers to substantial claims for compensation from investors. There have also been negative experiences with other BOT projects. In the case of Mexico, for example, a poorly designed and executed toll-road program ultimately required a government bailout of some $2.7 billion. Experiences of this kind reinforce the importance of sound project design, including appropriate risk allocation and mitigation.

D. LESSONS

The previous sections spelled out the potential benefits from ownership change, and the associated empirical studies which have estimated the level and distribution of these benefits. It also indicated that realizing the full measure of these benefits is not always easy. This section concludes by underlining where the primary source of these benefits derives from, and the key issues that shape the extent, distribution and sustainability of benefits from private participation in
infrastructure: competition both ‘in’ and ‘for’ the market, regulatory frameworks, and other possible forms of government support.

1. Benefits of Ownership Change

The previous sections highlighted the potential benefits that are attainable through private financing of infrastructure, whether this take the form of privatizing or concessioning existing enterprises or the financing of greenfield assets. This primarily relate to increased access to services and greater quality. This was most pronounced in the case of telecommunications, although similar results occurred in electricity in Chile, and water in Bolivia. Regarding operational efficiency, there has been substantial progress in almost all sectors with an increase in private participation. The question of pricing is more ambiguous, depending on the degree of subsidies which were in place prior to privatization, and the degree of competition and the effectiveness of regulation post-privatization. The impact on labor has been a general decline in numbers employed by the firm, although the employees that remain generally gain, total employment in the sector may increase, particularly in liberalized sectors where the total number of firms and overall sector size increases, and redundancy packages and retraining may soften the blow for those that are made redundant in the process. The impact on government and taxpayers depends on the degree to which the introduction of private operation increases the efficiency of operations, and the extent to which the government may forgo these benefits in favor of other stakeholders e.g. designing the scheme to promote access, or to fulfill other social goals, as in the Bolivian ‘Capitalization’ program.

In the area of greenfield investments, benefits can be achieved through increased access, cost savings through cheaper and faster construction of assets, but there are risks, particularly associated with greenfield investments where the purchaser remains an unreformed SOE, as occurred in Pakistan, India and, or where risk transfers are badly designed as in the example of Mexican toll roads.

2. Competition

Under traditional models of public ownership, infrastructure services are delivered through monopolies, which face weak incentives to perform efficiently and usually require close regulatory supervision. Private participation creates important opportunities to unleash competition. The evidence reviewed above highlighted the important role of competition in complementing ownership reform by driving efficiency improvements and helping to transfer demand risk from taxpayers to users and investors. This was most clearly the case in telecommunications, where there is now substantial experience with competitive markets, but is increasingly evident in power and a number of other industries.

A number of studies show the important beneficial effects of pro-competitive reform. For example, in reviewing US experience with pro-competitive reform in a number of industries, Winston found that deregulation in airlines, trucking, railroads and telecommunications alone produced annual gains of nearly $45 billion dollars, or over 7 percent improvement in the part of GDP affected by reform (see Table 1). Over 90 percent of these benefits were found to flow to consumers.73
For most infrastructure providers, an ever decreasing component of their overall business has the characteristics of a natural monopoly, notably the 'network' element of the service. Indeed, competing networks are now the norm in telecommunications, and close substitutes in transportation and energy are further eroding this notion in other infrastructure sectors.

In many countries, service providers are provided with legal protection from competition via exclusivity provisions. While this may be justifiable in some instances, it often unnecessarily restricts other firms from providing services to people not reached by the utility and also unnecessarily shields the monopolist from the threat of entry in parts of its business that do not have the characteristics of a natural monopoly.

Liberal entry policies can also benefit potential consumers by permitting competition for the business of those not connected to the network. At times, all that may be required is the removal of unnecessary legal barriers. In fact, many small scale infrastructure providers, from water providers in Paraguay, known as ‘Aguateros’, to power providers in Yemen operate in the absence of a formal legal or regulatory framework.

The introduction of competition into a formerly monopolistic sector may in some cases require the restructuring of the existing service provider. This may involve disaggregating a vertically integrated entity so that those parts of the firm that operate in a competitive environment can be separated from the elements of firm that have the qualities of a natural monopoly. This often occurs prior to the privatization of telecommunications and electricity utilities.

Restructuring of this kind has occurred throughout the world in order to try to introduce competition into hitherto monopolistic sectors. For example, generators now compete with each other to supply the wholesale electricity markets of many countries worldwide, from Europe, the US, Australasia, Southern Africa and increasingly in Asia in countries such as Korea and the Philippines, parts of Eastern Europe as well as much of South and Central America and Scandinavia, such systems having been pioneered in Chile and Norway. Such market systems have and are being developed, even in systems which have substantial degrees of public ownership in generation, such as Norway and Singapore. Even with restructuring, however, the introduction of competition is not always straightforward.
The recent difficulties faced by California, and to a lesser extent Brazil, in the power sector reflect mistakes made in the process of trying to introduce market-based systems, although elsewhere in the US deregulation has proceeded successfully. In California, a series of mistakes in the deregulation process, notably a fixing of the end-user price, plus a spot market system which prevented the distributors from entering into fixed price contracts to hedge their risk in the wholesale market, combined with what were tight supply conditions, led to a virtual break-down of the system. The State government eventually had to step in to undertake power purchase on behalf of the two main distributors, one of which had declared bankruptcy, and the other in severe financial distress. In Brazil, the issue was that of a partial transition to a market system, complicated by the lack of settlements in the market, excessive reliance on long term contracts, inadequate tariff levels, and the dominance of a large public sector generator, Electrobras, and public fuel supplier, Petrobras. These obstacles have meant it has been difficult for genuinely private new operators to enter the market, even with a predominantly private distribution sector.

While there can be significant challenges when managing the transition to markets in infrastructure, there are also examples of successful restructuring leading to greater competition in the sector, often in much smaller markets and in areas where there are fewer vested interests. It is, for instance, easier to restructure before the introduction of private operators while the firm is under the control of the government. Once a firm is wholly or partially privatized, reforms affecting the interests of that firm will often face resistance and in some cases may involve the payment of substantial compensation, as was the case in Singapore's telecommunications sector, for example.

3. Competition for the market

Where direct 'head to head' competition is not feasible of the type described in the previous section, competition for the right to serve the market is an important alternative. For instance, the award of water concessions in many developing countries including Brazil, Argentina, Peru, Romania, the Philippines and Guinea occurred via such a competitive process. Concessions are often auctioned in such a way that efficiency gains are promoted. In 1992 the concession for water and sanitation services in the Buenos Aires Metropolitan Region was competitively awarded – a concession that included investment commitments of approximately US $4,000 million. The government awarded the contract to the bidder with the lowest tariff. This resulted in a tariff reduction of 26.9 percent in the short term. Tariffs remained lower than before the auction of the concession even after they were increased following a renegotiation process that was necessary to bring forward capital investment. Despite the decline in tariffs, there was an increase in capacity of 26 percent and a decline in clogged drains of 97 percent in the three years following the sale of the concession. Given the typical length of the these contracts, and the sunk nature of the investments in infrastructure, however, there is a continuing need for regulation, which is covered in the next section.

As before, one of the key issues is ensuring that operators face similar incentives as under direct 'head to head' competition. The key to this is in ensuring that as well as upside benefits, operators face financial penalties when they fail to perform, for instance through posting a performance bond. Where significant failures arise, the key issue is to ensure service continuity, an issue which is discussed in further detail in section 5.
4. The Regulatory Framework

In most infrastructure sectors, some form of ongoing government control is required to deal with potential market failures, including the misuse of market power in activities that have a degree of monopoly power as well as environmental, safety and other concerns. Until the 1990s, most developing countries sought to achieve these goals through a model under which the government performed the roles of policymaker, regulator and owner. The inherent conflicts involved resulting in poor performance in each role. As discussed earlier, governments often misused control of prices to achieve a goals that were unrelated to the efficient control of monopolies, while public providers have often been able to ignore environmental, quality and other regulations with impunity.

Private participation creates an important opportunity to clarify and improve the regulatory framework. An arm's length relationship between the operator on the one hand and both policymakers and regulators on the other helps to avoid conflicts of interest, assists governments in making credible commitments to cost-covering tariffs, and increases the likelihood that quality and other regulations will be enforced. Separating the government's policymaking and regulatory roles by establishing independent regulators helps to promote stability in the regulatory environment, including by reducing the risk of regulation being misused to achieve short-term political ends and by fostering the development of regulatory expertise. This regulatory paradigm has a long history in the US, and has emerged as one of the key hallmarks of modern infrastructure reforms worldwide, including in developing countries.

The design and implementation on the regulatory framework can have myriad impacts on the benefits available from private participation.

Regulatory frameworks that provide investors with inadequate assurance that their interests will be protected once typically large and immobile investments have been made will result in a higher cost of investment capital to reflect the risks involved, resulting in reduced privatization proceeds, lower investment, and higher tariffs. This is a particular issue in many developing and transition economies, which have not yet established a long track record in treating investors fairly, and in some cases have expropriated private investments in living memory. But political and regulatory risks can also have an important impact on private investment in the US and other OECD countries. This reinforces the importance of clearly defined rules and additional safeguards to protect the interests of investors.

The content of the regulatory framework will also have important impacts on the results of private participation. For example, as mentioned before, different forms of price regulation can have different effects on the firm's incentives to reduce costs and to invest. In the short run, mechanisms such as price caps can create powerful incentives to cut costs, although the profits which this generates can be perceived negatively. As such, in the longer-run, a mechanism which controls the underlying rate of return the investor can earn on the assets may be more sustainable. And the regulatory framework can influence or direct the distribution of the benefits from private participation, both between the investor, the government and consumers, and also between different classes of consumer. For these reasons, successful private participation requires an up-front investment in carefully designing the regulatory framework, followed by ongoing support to regulators.
5. Other Forms of Government Support

Under traditional approaches, governments accepted responsibility for all aspects of infrastructure provision, from policymaking and planning through to financing, regulation and operation. The reforms reviewed in this paper point to a focusing of the government's role to that of facilitator and regulator of services provided primarily by private firms.

Beyond establishing an appropriate policy and regulatory framework, there are three main areas where ongoing government support may be considered.

First, some worthwhile infrastructure projects are difficult to finance from the private sector alone. This includes many roads, where user-fees remain problematic, as well as projects that offer significant positive externalities, and warrant public financial support for this reason. In these cases, public financing can be reconciled with the disciplines of private sector provision by well-designed contracting schemes that tie the payment of subsidies to the results achieved.

Second, governments may be concerned about the impact of cost-covering infrastructure tariffs on the poorest members of society. Traditional approaches of addressing this concern through public provision have largely failed. The alternative strategy of directing monopoly providers to cross-subsidize the poor by charging higher prices to more affluent users also has its weaknesses, and is not sustainable in competitive markets. Governments are now exploring new models for delivering subsidies in a more targeted and sustainable way. These include subsidies delivered through the general welfare system, as well as schemes that tie the payment of subsidies to the delivery of specified outputs.

Finally, governments may face pressure to step in support projects in a number of other settings. Natural disaster may be one situation. Beyond this, the disaster is often man-made, in the form of poorly designed or executed policies. This was the case with Asian power projects, for example, where failure to implement sectoral reforms required governments to support private projects through contracts entered by government utilities, thereby exposing taxpayers to substantial claims for compensation. Poorly designed or implemented projects or reforms have also created pressure for the government to bail-out investors more directly, with examples including Mexico's toll-roads and California's power utilities. Similar pressures are now evident in the wake of the financial collapse of Railtrack in the UK. The danger is that repeated bail-outs will lead to 'moral hazard', where private operators will not safeguard against such collapses. Progress in making the transition to competitive markets offers the most promising solution in many sectors. Where such approaches are not feasible, the challenge is largely one of continuing to make progress in the design and implementation regulatory systems that shift performance risk to private operators and users, and where failures do occur, ensuring that service continuity can be maintained, even as ownership changes. The key here is likely to be ensuring that there are a number of other providers that can provide the same service once an existing provider fails or goes bankrupt.

6. Sectoral Implications

The issues faced in the move to private participation in infrastructure vary from sector to sector, notably in the degree of feasible competition. With a well-designed and enforced interconnection regime, telecommunications shows the greatest promise, and benefits in terms of increasing access and lower prices reflect this. In power, competition in generation and to a lesser extent in
supply\textsuperscript{84} are increasingly common, although this obviously depends on country circumstances which may limit feasibility, particularly regarding small-scale systems. In parts of transport, competition is also feasible, for instance between ports, freight services on rail, and in urban transport. Even in water and sanitation, there have been experiments in the UK with trying to increase the degree of competition in the sector. Nonetheless, there remains a regulatory challenge in designing schemes, ensuring interconnection in telecommunications, open access to networks in rail and gas, and designing and monitoring markets in power, as well as actively regulating those elements of the sector that remain monopolies, notably the transmission and distribution networks.

Where direct ‘head to head’ competition is not feasible, significant benefits can be yielded from competition for the market, that is bidding for the right to supply, a technique which is applicable across all the infrastructure sectors. In these instances, because of the often long-term nature of contracts, active regulation is still required of prices, quality and other characteristics. In fact, private participation often provides the impetus for designing an effective regulatory framework for the sector, where informal rules may have prevailed under the assumption that a public service monopoly would regulate itself without the need for formal monitoring.

Even with a regulatory framework in place, governments may have other policy responsibilities in the sector, for instance providing targeted subsidies to expand access. Another key responsibility is to ensure that where failures do occur, ensuring that service continuity can be maintained, even as ownership changes, to ensure that there can be a smooth transition from one operator to another.
I
2
3
World Bank staff estimates.
4
PPI Project Database, World Bank.
5
6
7
Ros (1999), pp.21-22.
8
Galal et al. (1994), p.277. It is worth noting that, while the access of consumers to the network increased substantially, the quality of services provided by CTC fell in several categories post-divestiture – p.278.
9
10
11
The figures are from Wellenius (1997), p.3. The countries in each category are: State monopoly – Brazil, Columbia, Ecuador, Peru and Uruguay; Privatized monopoly – Argentina, Mexico, Venezuela; and Privatized competition – Chile.
12
Klein and Roger (1994).
13
Irwin et al. (1997).
14
15
Bortolotti et al. (2001).
16
Ros (1999).
17
Telecom Argentina and Telefonica de Argentina, the two main fixed line operators in Argentina that were privatized 1990, increased labor productivity, measured as lines in service per employee, from 74 in 1990 to 406 in 2000. See Comision Nacional de Comunicaciones, www.cnc.gov.ar/estadisticas/lineas-empleado.htm.
18
See Galal et al. (1994), who found significant productivity gains in their analysis of the privatization of Compania de Telefonos de Chile.
19
De Boer and Evans (1996), found that privatization and deregulation of telecommunications generated significant productivity growth, resulting in an annual compound rate of cost reduction of 5.6 percent for the 1987-1993 period.
20
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23
Lasseni Debouze (1999).
24
See Newbery and Pollitt (1997).
25
See Donahue (1989); Viscusi, Vernon and Harrington (1992); Peters (1993); Hayashi, Sevier and Trapani (1985); Atkinson and Halvorsen (1986); Kwoka (1996); Teeples and Geyer (1987); Bhattacharyya et al. (1994).
26
27
28
The net price decrease was the main welfare benefit of the concession, although water quality, and access rose as well as a result of the concession. See Alcazar, Abdala and Shirley (2000).

Galal et al. (1994), p.73.


Galal et al. (1994), pp.196-7, 210-211.


Chisari, Estache and Romero (1999).

Estache Gomez-Lobo and Leipziger (2000), Ch. 4.

See Klein (1996).

There are many studies pointing to improved firm performance and higher profitability after privatization, including: Bortolotti, D’Souza, Fantini and Megginson (2001); D’Souza and Megginson (1999); Boubakri and Cosset (1998); Megginson, Nash and van Randenborgh (1994).


Ewing and Goldmark (1994).


See Kikeri (2001).

Ramamurti (1996), p.29, re the telecommunications firms in Jamaica, Mexico, Argentina and Venezuela. In all cases there were dramatic improvements in labor productivity – for example, 13 percent per annum in Mexico and 19 percent per annum in Argentina.


Galal et al. (1994), pp.443-444.


Network modernization accounted for only 29 percent of all telecommunications investments in developing countries in the mid-1990s. 71 percent was attributable to network expansion which is more likely to generate employment. Petrazzini (1996), p.2.

In many countries, purchasers have agreed to the inclusion of employment guarantees into the terms of the sale, obliging the purchaser to retain the existing workforce for a specified time. This has ranged from one year in Mozambique and Pakistan, to two years in Sri Lanka to five years in Malaysia, Kikeri (1998), p.11 and Galal et al. (1994) re Kelang Container Terminal.

Shaikh (1996), p.32. There was also a post-privatization impact. The number of employees at ENTel declined by only 3 percent in the lead-up to privatization but declined by a further 17.2 percent in the three years following privatization – p.94.

Ramamurti (1997).


See Kikeri (2001).


Arthur Andersen and Enterprise LSE (2000).

Hodge (2000).


Klein et al. (1996).


On this see Irwin, Klein et al. (1997).

Ruster (1997).


For example, there may be safety concerns arising from the provision of electricity network connections by the informal sector. However, even in this instance, the regulated accreditation of competitors may be more appropriate than a legally mandated monopoly.

See Ehrhardt (2000).
See PJM – Electricity Power Competition that Works, PA Consulting, which shows the benefits accruing from the establishment of a power market for the mid-Atlantic region of the US.


Singapore partially privatized its national telecommunications carrier in 1993. The prospectus indicated that the company would enjoy exclusivity until 2007. In 1996, however, the government decided to shorten the exclusivity period to 2000 to bring the benefits of competition forward. As compensation for revising the rules, the government paid the company S$1.5 billion ($1 billion).

Irwin et al. (1997).
See Brook and Smith (2001).
Supply refers to the wholesale purchase of power and resale to final consumers.
## ANNEX

### STUDIES ON THE IMPACT OF PRIVATE PARTICIPATION IN INFRASTRUCTURE

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<td><strong>THE IMPACT OF PRIVATIZATION ON KEY STAKEHOLDERS</strong></td>
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<td>Chisari, Omar, Antonio Estache and Carlos Romero. 1999 “Winners and Losers from the Privatization and Regulation of Utilities: Lessons from a General Equilibrium Model in Argentina”, <em>The World Bank Economic Review</em>, pp 357-78.</td>
<td>A study of the macroeconomic and distributional effects of the utilities privatization in Argentina. It uses a computable general equilibrium model.</td>
<td>The spillover effects from the private operation of utilities represents 0.9 percent of Argentina’s GDP, and the gains from effective regulation 0.35 percent of GDP. The direct gains of privatization are more significant for high income group. This is because in the absence of effective regulation, the gains from privatization are turned into a quasi-rent captured by the richest. The indirect gains from effective regulation accrue to all groups, but tend to favor the poorest group more.</td>
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<td>Estache, Antonio, Jose Antonio Schmitt de Azevedo and Ever Sydenstricker. 2000. “Labor Redundancy, Retraining, and Outplacement in Privatization: The Experience of Brazil’s Federal Railway.” <em>World Bank Policy Research Working Paper 2460</em>, Washington D.C., World Bank.</td>
<td>An overview of the experience in dealing with labor redundancy problems in the privatization of Brazil’s Federal Railways.</td>
<td>In reducing railways staff by 43 percent (from 41,991 to 18,047), the government implemented programs to alleviate hardship for redundant workers. They included: incentives for early retirement; severance packages for voluntary separation; training; assistance for outplacement; and severance packages for dismissed workers. Overall, the study finds that the program was reasonably successful.</td>
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<td>Estache, Antonio, Andres Gomez-Lobo and Danny Leipziger. 2000 “Utility Privatization and the Needs of the Poor in Latin America. Have We Learned Enough to Get it Right?” <em>World Bank Policy Research Working Paper 2407</em>, Washington D.C., World Bank.</td>
<td>Examination of the distributional effects of utility privatizations in Latin America. It focuses on welfare consequences for the poor and appropriate policy responses to them.</td>
<td>The effects of utility reform on poor households are complex. The evidence does not show that vulnerable households are hurt by the reform process – in fact, there are many examples to the contrary. Competition, as well as regulatory and social policy responses, influence the welfare consequence for the poorest.</td>
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| Galal, Ahmed, Leroy Jones, Pankaj Tandon and Ingo Vogelsang. 1994. *Welfare Consequences of Selling Public Enterprises*, Oxford, Oxford University Press. | A study of the privatization of 12 firms, including six utilities, in four countries (the United Kingdom, Chile, Malaysia and Mexico). The study employs the 'counterfactual' approach, which compares what happened after the firm's privatization with what would most likely have happened without privatization. | Findings of the study include:  
- Total net welfare change was positive in 11/12 privatizations (6/6 utility privatizations).  
- Workers benefited in 12/12 privatizations.  
- Consumers benefited in 7/12 privatizations (did no worse in 5/6 utility privatizations). Consumers were worse off in one utility privatization (Telmex), due to changes in the regulatory regime.  
- Government was better off in 9/12 privatizations and 4/6 utilities. Losses were minor in the remaining 2 utility privatizations. |
<p>| Newbery, David and Michael G Pollitt. 1997. “The Restructuring and Privatization of Britain’s CEGB – Was it Worth it?”, <em>Journal of Industrial Economics</em>, 45, 269-303. | A social cost/benefit analysis of the privatization and restructuring of the Central Electricity Generating Board of the UK. It employs the counterfactual approach. | Comparing the various counterfactual scenarios, the study favors the conclusion that the sale was overall beneficial. |
| Petrazzini, Ben. 1996. “Competition in Telecoms – Implications for Universal Service and Employment” <em>FPD Note</em> 96, World Bank, Finance and Private Sector Development, Washington D.C. | Examination of the impact of competition on telecommunications firms in developing countries. | Competition does not put universal service at risk – to the contrary, it is associated with higher network penetration. In addition, employment levels have grown more in competitive telecommunications industries in the 1990s than in monopolistic markets. |
| Plane, Patrick. 1999. “Privatization, Technical Efficiency and Welfare Consequences: The Case of the Cote d’Ivoire Electricity Company (CIE)”, <em>World Development</em>, 27, 343-360. | Analysis of changes in productive efficiency and TFP (estimated using a stochastic production frontier) of an electricity company privatized in Cote d’Ivoire in 1990. It also assesses the distribution of these gains. | The privatization resulted in higher TFP, which were associated with a cost-reduction strategy. Consumers benefited the most from the efficiency improvements through a decrease in the relative price of electricity, |</p>
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<td>Ramamurti, Ravi. 1996. “The New Frontier of Privatization”, in Privatizing Monopolies: Lessons from the Telecommunications and Transport Sectors in Latin America. Ravi Ramamurti, ed. Baltimore, John Hopkins University Press, pp1-45.</td>
<td>Survey of privatizations in Latin America. The study focuses on the privatization of the telecommunications industry in Jamaica, Mexico, Argentina and Venezuela, but also deals with the privatization of airlines.</td>
<td>The privatizations were followed by improved governments’ fiscal positions, rapid network expansion, improved labor productivity, and improved quality of services. Firms’ performance after privatization was affected by the level of competition they faced, as well as the post-privatization regulatory regime.</td>
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<td>Shaik, Hafeez. 1996. Argentina Privatization Program. A Review of Five Cases, World Bank, Private Sector Development Program, Washington D.C.</td>
<td>Review of five privatizations in Argentina, four of which involved the sale of utilities.</td>
<td>The study examines the outcome of privatization for different stakeholders. The result was mixed for employees: with retained employees gaining significantly while departing employees enjoying only mixed benefits or suffering losses. The outcome was positive for government. For consumers, outcome was positive in terms of quantity and quality of services, but mixed in terms of prices.</td>
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**IMPACT OF PRIVATIZATION ON FIRM PERFORMANCE**

| Bortolotti, Bernardo, Juliet D’Souza, Marcella Fantini and William Megginson. March 2001 “Sources of Performance Improvement in Privatized Firms: A Clinical Study of the Global Telecommunications Industry”, under journal review. | Comparison of the three year average pre-privatization financial and operating performance with the three year average post-privatization performance of 31 national telecommunications firms in 25 countries (11 developing and 14 industrialized) that were either fully or partially privatized through public share offering between October 1981 and November 1998. Methodology as in Megginson at al (1994). The study also examines separate regulatory and ownership effects using both random and fixed-effects panel data estimation techniques. | The study finds economically and statistically significant increases in profitability, output, operating efficiency and capital investment spending, but a significant decline in employment levels after privatization. Panel data results show that: privatization is significantly related to higher profitability, output and efficiency; competition significantly reduces profitability, employment and efficiency; and the creation of an independent regulatory agency significantly increases output. A significant fraction of the observed improvement in the performance of telecommunications firms resulted from regulatory changes rather than from privatization alone. |

**THE IMPACT OF REGULATORY REFORM**

| Moran, Theodore. 1999. | An overview of the political and the ‘obsolescng bargain’ model | |


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<th>AUTHORS</th>
<th>METHODOLOGY</th>
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<td>&quot;Political and Regulatory Risk in Infrastructure Investment in Developing Countries: Introduction and Overview&quot;, conference proceedings, September 1999, Rome, Italy.</td>
<td>Regulatory risks that apply to private investment in infrastructure in developing and transition economies.</td>
<td>It is at least partially applicable to private sector participation in infrastructure. Measures to reduce or mitigate investment risks could be broadly characterized as: ‘self-help’ measures, such as the strengthening of rule of law; the use of international treaties; and the use of insurance, guarantees and other risk reallocating products.</td>
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<td>Weder, Beatrice and Mirjam Schiffer. 1999. “Catastrophic Political Risk versus Creeping Expropriation: A Cross-Country Analysis of Political and Regulatory Risks in Private Infrastructure Investment in LDCs”, conference proceedings, September 1999, Rome, Italy.</td>
<td>Assessment of risks that explain the level of private sector participation in infrastructure investment in less developed countries. It considers two types of risk: <em>catastrophic political risks</em> (which include the risk of uncompensated outright expropriation and reneging on a contract); and <em>the risk of creeping expropriation</em> (which includes corruption, arbitrary changes to rules and regulations and general bureaucratic uncertainty).</td>
<td>Catastrophic political risks are most closely associated with the level of private infrastructure investment, notwithstanding the hedging and insurance arrangements that have been developed to mitigate these risks. The role of creeping expropriation risks are less clear. This may reflect the fact that infrastructure investors are large and can therefore self-insure and craft special deals with governments.</td>
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<td>Winston, Clifford</td>
<td>Survey of the impact of deregulation on US industry, including the telecommunications and energy sectors. It compares empirical results to what theoretical models predicted would happen after deregulation. When assessing the impact of deregulation, the study employs the counterfactual approach to take technological changes and the impact of the business cycle into account.</td>
<td>Prices usually fell upon deregulation as predicted by theory. Theoretical models were generally good at predicting changes to industry profits but were less successful in predicting changes in service quality and wage and employment levels.</td>
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BIBLIOGRAPHY


