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Brazil
How to Revitalize Infrastructure Investments in Brazil

Public Policies for Better Private Participation

(In Two Volumes) Volume I: Main Report

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CURRENCY EQUIVALENTS
Currency Unit - Real (R$)

EXCHANGE RATE
December 30, 2003 - R$2.90 = US$1
December 30, 2004 - R$2.65 = US$1
December 30, 2005 - R$2.34 = US$1
October 31, 2006 - R$2.14 = US$1

WEIGHTS AND MEASURES
Metric System

FISCAL YEAR
January 1 - December 31

Acronyms and Abbreviations

ANTAQ	Agência Nacional de Trasportes Aquaviários	National Water Transport Agency
ANTT	Agência Nacional de Transportes Terrestres	National Land Transport Agency
CREMA	Contrato de Restauração e Manutenção da Malha Rodoviária Federal	Federal Road Network Maintenance Contract
DNIT	Departamento Nacional de Infra-estrutura de Transporte	Department of Transport Infrastructure
EPE	Empresa de Pesquisa Energética	Energy Research Company
FGV	Fundação Getúlio Vargas	Getúlio Vargas Foundation
FUST	Fundo de Universalização dos Serviços de Telecomunicações	Universalization Fund for Telecommunication Services
GDP	Produto Interno Bruto	Gross Domestic Product
IBGE	Instituto Brasileiro de Geografia e Estatística	Brazilian Institute for Geography and Statistics
ICA	Análise do Clima de Investimentos	Investment Climate Assessment
IGP-DI	Índice Geral de Preços-Disponibilidade Interna	General Price Index-Domestic Availability
IGP-M	Índice Geral de Preços do Mercado	General Market Price Index
IPA-OG	Índice de Preço por Atacado – Oferta Global/ Máquinas e Equipamentos Industriais	Wholesale Price Index-Global Supply/Industrial Machinery and Equipment
IPCA	Índice de Preços ao Consumidor Amplo	Consumer Price Index
IST	Índide de Serviços de Telecomunições	Telecommunication Services Index
LAC	América Latina e Caribe	Latin America and the Caribbean
OECD	Organização para Cooperação Econômica e Desenvolvimento	Organization for Economic Cooperation and Development
PPI	Participação Privada em Infra-Estrutura	Private Participation in Infrastructure
PPP	Parceria Público-Privada	Public-Private Partnerships
RFFSA	Rede Ferroviária Federal S.A.	Federal Railway Network S.A.
TCU	Tribunal de Contas da União	General Accounting Office

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How to Revitalize Infrastructure Investments in Brazil: Public Policies for Better Private Participation

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HOW TO REVITALIZE INFRASTRUCTURE INVESTMENTS IN BRAZIL: PUBLIC POLICIES FOR BETTER PRIVATE PARTICIPATION

EXECUTIVE SUMMARY

1. More than US$164 billion was invested in infrastructure projects that involved private participation in Brazil during 1994-2004. This amount corresponds to more than two-thirds of the total spending on private infrastructure projects in the East Asia and Pacific region. Despite the high level of investment, public opinion shows frustration with private provision of infrastructure services and policymakers are disillusioned with private financing of infrastructure projects. This is not a phenomenon unique to Brazil: governments throughout Latin America and multilateral organizations that once supported privatization are discussing how to increase public investments in infrastructure. The policymaking pendulum has swung back to public provision.

2. Amid a shifting policymaking environment, this report discusses how public policies could attract more and better private investments. Given Brazil's current fiscal dilemmas and infrastructure needs, revitalizing infrastructure investments in the next coming years will require bringing back the private sector. **Brazil can transform infrastructure needs into private opportunities essentially by reducing the cost of capital and raising long-term returns of concessions**, translating infrastructure opportunities into projects with competitive rates of return. This requires curbing regulatory risk and raising projects' revenues, two tasks for which the role of the public sector is central: governments are ultimately responsible for regulatory risks, and through tariff policies, subsidies and related mechanisms can, directly or indirectly, influence projects' revenues.

3. In attracting back private capital, this report argues that Brazil needs to (a) **eliminate remaining regulatory bottlenecks and policy uncertainties** in selected sectors, (b) design infrastructure concessions to **avoid "excessive" renegotiations**, simultaneously guaranteeing an adequate rate of return for investors and protecting consumers' welfare, and (c) **strengthen the quality of the regulators** for technically sound and coherent decision-making processes. In addition, Brazil should improve the process through which public investments in infrastructure are selected, implemented and evaluated. In a nutshell, Brazil should avoid the simplistic solution of swinging the pendulum back to public financing and forge public policies to attract more and better private participation. The main messages and policy recommendations of this report are detailed below.

Main Messages

4. **Infrastructure investments fell mainly due to the collapse of the institutional framework of the 1970s and not due to sector reforms.** Infrastructure investments in Brazil plunged dramatically in the 1980s and 1990s, a decline twice as large as that of the

Latin American and the Caribbean (LAC) region. Most of this fall occurred during 1986-95, when the institutional framework for public investments in infrastructure completely deteriorated, and rising federal current expenditures further crowded-out capital expenditures. Public financing for infrastructure investment, a central piece of that institutional framework, collapsed with a sequence of events that included the impact of the 1982 Mexican default on indebtedness levels of state-owned enterprises; the undervaluation of tariffs for inflation control purposes; the elimination of sector-specific federal taxes by the 1988 Constitution; and, new priorities for public spending established by the same Constitution. Infrastructure reforms and fiscal adjustment followed these events and had relatively little impact on the overall decline.

5. On the other hand, the 1990s rise of private financing for infrastructure was not enough to compensate for the public decline. Private investments in Brazil during the 1990s were basically directed to asset transfer (asset divestiture) and not to the expansion of infrastructure stock. Other countries applied private funds mainly to new (green-field) projects as illustrated by the case of Indonesia. In Chile, private financing more than compensated for the fall in public expenditures since 1989, with a net positive impact on total investments. In Colombia, a rise in private financing combined with sustained public investment avoided a major decline in infrastructure investments as in most LAC countries during the 1990s.

6. **Infrastructure investment needs to increase if Brazil wants to further improve its economic and social performance.** Brazil's infrastructure stock compares well with the LAC region, but poorly with international peers from East Asia, for example. Access to infrastructure improved during the last decade, but major gaps in rural areas and in access by the poor still exist. Water coverage, in particular, declined by almost 4 percent in the two lowest deciles between 1991 and 2000, which may reflect the lack of appropriate subsidy mechanisms to compensate for affordability problems. Small and medium firms in labor-intensive industries are the most affected by inappropriate infrastructure services. Although it is not possible to claim that infrastructure is a bidding constraint to higher sustainable growth rates in Brazil – especially when compared to high current expenditures and high levels and incidence of taxation – evidence shows that higher infrastructure investments may lead to higher growth rates and better social indicators.

7. Growth accounting exercises show that low capital deepening is the main "cause" of low growth rates. Estimates of long-run elasticity of GDP to infrastructure investments vary between 0.5 and 0.6 while estimates for the elasticity of output to expenditures in maintenance are much higher (2.52). In addition, infrastructure has important social effects. For an afro-descendant female child in the São Paulo state, this report estimated that access to infrastructure services is associated with a decrease of 20 percent in the probability of 6 or more absence days per year, and proficiency results improve by 11-13 percent.[1] Impacts vary inversely with the state's infrastructure endowments and family

[1] Good conditions are associated with 4 residents in the house, non-precarious neighborhood, and house built in an owned and paid terrain. Bad conditions are defined as 8 residents in the house, precarious neighborhood, and house built in a terrain provided by employer or other means. Estimated for an afro-

income. The impact of housing conditions was tested, with similar results: for instance, access to good housing conditions is associated with performance 7.1 and 4.6 percent higher in the 4th and 8th grades, respectively, in 2001.

8. Private participation may not only provide additional finance but also improve the provision of services. This report concluded that the impact of privatization on former state-owned enterprises was overall positive even though limited in time and in the type of effect. Privatized companies presented important gains in technical efficiency, as shown by indicators of distribution losses and labor productivity; as well as in quality and coverage. However, most of the gains from private participation were reached during the pre-privatization period; with the pace of improvements reducing after privatization was concluded. Moreover, gains were not always passed-though consumers, particularly when prices are taken into account. Conceived essentially as a mechanism to improve technical efficiency, improve management, and reduce budgetary pressures, privatization seems to have reached most of its objectives.

9. **In revitalizing infrastructure investments in Brazil, the primary objective of public authorities should be to enable more and better private investments in infrastructure.** Given the magnitude of infrastructure needs, the constraints on reallocation of public expenditures and the impacts of the expansion of public debt on long-term solvency, the revitalization of infrastructure investments in Brazil will need to rely on private financing in the next coming years. Creating fiscal space for public investments is, naturally very important, but the use of public funds should be restricted to those circumstances where social returns tend to be superior to private investments. Public-Private Partnerships (PPPs) allows a better use of public resources but it does not circumvent Brazil's fiscal constraints or its inadequate regulatory environment for infrastructure concessions.

10. The report estimates annual expenditures of 3.2 percent of GDP per annum as a lower bound scenario for Brazil in 2010 (a cumulative figure that includes responding to increased demand, universal coverage, and maintenance). A much higher amount (up to 9.0 percent of GDP) would be required to bring Brazil to the current levels of coverage in Korea. While ambitious, this effort, which would add more than 4 percentage points to the Brazil's GDP growth, is not unrealistic. Similar increases were achieved by Indonesia, Korea, and Malaysia from the late 1970s to the late 1990s. Indeed, Korea's infrastructure endowments 25 years ago were substantially worse than Brazil's at that time. Overall, regardless the scenario taken into consideration, the numbers are fairly incompatible with the additional funds that can be obtained by either reallocating public expenditures or reducing the primary surplus in the short- to the medium-term.

11. Moreover, opportunities for private investments seem far from exhausted, even though private transactions have collapsed to less than a quarter of the peak level in the mid-1990s due to investors' disaffection with emerging markets. Private participation in infrastructure in Brazil is low in comparison with countries outside or within the LAC

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descendent girl living in an urban area, whose parent's education is inferior to 4th grade and attending a public school.

region. For example, private participation in infrastructure per capita in Brazil is lower than half of the value for Malaysia. Private participation in electricity generation in Chile is almost three times larger than in Brazil; at least additional 6,700km of federal highways can be concessioned after the second round concessions, according to the sector regulator; and, private provision of water and sanitation is limited to roughly 5 percent of Brazilian consumers (in roughly 70 out of more than 5,000 municipalities). The central question for Brazilian policymakers, therefore, is how to better manage private participation in infrastructure such that private finance is mobilized towards these infrastructure opportunities.

12. **Yet, private concessions are only adequately profitable in the long-run, when the full concession period is taken into account.** This report estimates that the average internal rate of return with terminal value for projects in 1997-2003 was negative for telecommunications (-26 percent) and energy (-5 percent), indicating returns below their opportunity cost of capital, and positive for water (16 percent). The average return-on-equity for infrastructure services varied between 3 percent (in water) and 5 percent (in telecommunications). These estimates for short-term returns in Brazil do not differ substantially from those for the LAC region, except for the relatively worse performance for telecommunications (which can be explained, at least in part, by relatively higher investment requirements in the early years in Brazil) and the better performance for water. Thus, infrastructure concessions have not been adequately profitable, in the short-run.

13. Concession returns are also volatile, indicating that infrastructure investment is a risky business in Brazil. The level of risk of infrastructure investments in Brazil is consistent with other LAC countries but it is at odds with the OECD countries, where infrastructure investments are long-term, low-risk/low-return alternatives for conservative investors. The level of risk becomes a particularly important issue in attracting equity capital, given the higher exposure to risk of this type of investment (in comparison with the debt). It explains, in part, the difficulties in attracting institutional investors, particularly pension funds, for infrastructure investments in Brazil.

14. **Enabling more and better private investments in infrastructure requires, therefore, enforcing a stable and credible regulatory environment, allowing investors to collect adequate dividends in the long-run.** Turning infrastructure concessions in Brazil into a low-risk/low return business is the core of the strategy to transform infrastructure needs into private opportunities and revitalize infrastructure investments in Brazil. By curbing regulatory risk and improving cost recovery, Brazil would reduce the cost of private capital and raise long-term returns of infrastructure concessions, expanding the volume of infrastructure projects that could be privately financed.

15. A stable and credible regulatory environment should be complemented by the design of cost-effective programs that increases the access of the poor and by a regulatory enforcement that fully protects consumers and the economy from abuse of dominance by incumbent firms. Without efficient regulation, benefits of private participation are unlikely to be fully appropriated by consumers and will be time-limited. Effective

regulation contributes to encourage further productivity gains and their transfer, at least in part, to consumers. The design of cost-effective programs to expand the access of the poor to infrastructure services is not only an important tool to improve social indicators, as discussed in this report. It also helps to prevent the emergence of poorly designed contracts that eventually fail to generate enough returns to attract the private sector or lead to opportunistic renegotiations.

Policy Recommendations

16. **The first step to attract back the private sector entails eliminating the remaining legal and policy bottlenecks for private participation.** This goal should be seen in the broader context of improving the overall investment climate. In the power sector, private investment is often hindered by unsolved legal loopholes, incentives embedded in the design of energy auctions, and stranded costs generated by recurrent changes in sector legislation. The current legal framework for natural gas is unable to generate supply contracts suitable for thermal plant operation in a predominantly hydropower system and it was ineffective in curbing anticompetitive behavior – two needed steps to unleash opportunities for private investments in the sector. Bolivia's recent approach to the natural gas sector represents an additional challenge in terms of the sustainability of the gas supply in Brazil.

17. In logistics, factors deterring private investment in the sector include the five-year delay of the second phase of the federal road concession program, a paralysis of the non-truck highways decentralization process, and an interruption of the port reform. In water and sanitation, regardless of the solution for the allocation of awarding rights in the sector (i.e., the "poder concedente" problem), a well-known limitation factor for private investment in this sector, Brazil will have to address the issues of economies of scale and agglomeration, appropriate regulatory design and the adequate level of tariffs if a larger number of municipalities is to be efficiently served by the private sector. Improving corporate governance of state-owned enterprise, improving access to information and transparency are also important goals.

18. Despite recent progress, the remaining obstacles in environmental licensing should be further reduced; the impact of courts' revision of regulatory decisions on regulatory risk should be mitigated; and, collaboration among public institutions involved in the concessioning/regulatory process should be improved, especially the roles of *Ministério Público and Tribunal de Contas da União.*

19. **As a second step, Brazil needs to improve contract design to avoid "excessive" concession renegotiations and unnecessary increases in regulatory risk and, thus, the cost of capital.** Recent history of contract renegotiation of infrastructure concessions in Brazil shows evidence of "excessive" government-generated renegotiations. Brazil had a greater proportion of concession contracts renegotiated (41 percent) than the LAC region (30 percent). Roughly three-fourths of the renegotiations were initiated by the government, compared to one-quarter in LAC. The average time until the first renegotiation occurs is also lower in Brazil than in LAC. Renegotiations

were initiated because of tariff revisions and changes in investment plans or needs, as opposed to the rest of the region.

20. Contributing factors for renegotiations in Brazil included the lack of an independent regulator, the fact that the regulatory framework was embedded in a contract and not in a sector law, the use of price-cap as the tariff policy, and the use of the lowest tariff as the concession awarding criterion. Although contract renegotiations cannot be considered negative *per se,* the phenomenon in Brazil may be a symptom of poorly designed concession contracts and a cause of inadequate risk-premium rates for infrastructure projects. The design of concession contracts is further complicated by the definition of concession objectives and risk allocation.

21. The 1999 exchange rate devaluation contributed to lower returns on infrastructure services in 1998-2003 as prices of telecommunications, energy, and water services in Brazil declined in real terms (when measured in U.S. dollars), contrary to most LAC countries. A second factor was weak enforcement of tariff policies caused by an incomplete regulatory framework or political interference. A third factor may be the persistence of non-technical losses, particularly in the electricity and water sectors. Another important cause of the low profitability of infrastructure concessions was the high investment levels in the initial years.

22. Appropriate definitions of coverage objectives and allocation of risk, particularly exchange rate and regulatory risks, are likely to continue to be a central issue in attracting private capital to infrastructure investments. Coverage objectives should be consistency with adequate rates of return and cost-effective subsidies should be used to cover more ambitious social objectives. The new Public-Private Partnership (PPP) Law provides for guarantees against the federal government's failure to comply with the financial obligations established by any PPP contract but not against regulatory risk. In 2005, the federal administration considered the possibility of replacing the IGP-M with sector-specific cost-related indexes. This may eliminate the implicit and imperfect hedging mechanism that existed in the contracts indexed by the IGP-M but does not fully solve the exchange rate risk problem. The second phase of highway concessions will probably include awarding mechanisms that discourage strategic bidding by opportunistic operators but will not protect serious investors against regulatory risk and opportunistic behavior by the public sector.

23. **As a third step, Brazil needs to enhance the effectiveness of its infrastructure regulators, improving regulatory governance.** Without adequate regulatory governance, good sector laws and well-designed contracts will be poorly enforced, increasing regulatory risk and the cost of capital. A survey of 21 regulatory agencies in Brazil in early 2005 showed that most of the general elements for good governance transferable by law seem to have been put in place. The challenge, then, is how to develop the more detailed attributes that could not be covered by law, and how to effectively enforce them.

24. For instance, despite the fact that regulatory independency is granted by almost all sector laws, more than half of the regulators reported that the Executive branch interfered

at least once in their final decision. Also, the majority of regulators (eighteen) were formally required to document their decision-making process but few (seven) were required to cite jurisprudence in support of their decisions, which affects the consistency of their decisions over time. Few agencies provided for legal sanctions against informal meetings between directors and stakeholders, which may also affect the *fairness* of the decision-making process. Only one-fifth of the agencies' personnel, on average, were admitted by public exams. Salaries offered by agencies for top technical and managerial positions were considered to be much lower (at least 25 percent) than the salary of the attorney-general or the state finance secretary (used as benchmarks) by 12 of the 21 surveyed agencies.

25. Initiatives to improve the state of regulatory governance include the Bill concerning regulatory agencies *(Lei das Agências)* and the Career Development law. The *Lei das Agências* includes some important achievements, such as the transfer of the power to award concessions and the reassignment of planning policies to sector Ministries. The proposed introduction of management contracts between agencies and the Executive branch may threaten regulators' autonomy and no major change has been proposed in terms of improving the detailed attributes of regulators. The approval of a career development law has allowed the application of public exams by some regulatory agencies but the existing salary structure and benefits seem to be inferior to other comparable careers within the public sector.

26. As in many other countries, infrastructure regulators were created in Brazil with the objective of increasing the credibility of the government's long-term commitment to honor concession rights. However, to fully accomplish this objective, regulatory governance has to be in place. Weak regulatory governance leads to inadequate implementation of regulatory rules and concession contracts, thereby influencing the return-risk ratio of infrastructure projects.

27. **In sum, Brazil needs to forge a coherent set of public policies to enable more and better private investments in infrastructure.** Given the magnitude of the needs, as well as the constraints on reallocation of public expenditures and expansion of the public debt, the private sector must play a critical role. This does not mean that the role of the government should decrease, but rather that the country should avoid swinging the pendulum back to the pure public financing option. The challenge Brazil currently faces is how to bring back the private sector – how to translate infrastructure opportunities into projects with competitive rates of return. This requires curbing regulatory risk and raising projects' revenues, two tasks for which the role of the public sector is central: governments are ultimately responsible for regulatory risks and, through tariff policies, subsidies and related mechanisms, can, directly or indirectly, influence projects' revenues. A second challenge is to make sure that the benefits of private participation are transferred to consumers and the economy as a whole.

28. **The strategy to reinvigorate the infrastructure sector in Brazil should encompass three main pillars, as summarized by the Table below:**

- *Further strengthening the fundamentals for infrastructure concessions.* This involves: (a) completing the regulatory reforms and eliminating policy uncertainties in the port, natural gas and water and sanitation sectors, (b) raising regulators' effectiveness by building into their decision-making processes the incentives to enforce technically sound and coherent decisions and the tools required to do so, such as well-motivated and trained staff, particularly at the state-level, and (c) improving contract design to avoid excessive contract renegotiations that eliminate the economic benefits achieved through competitive biddings and augment the perceived regulatory risk. As a basic step, Brazil should fully explore existing opportunities for private participation by advancing the second phase of highway concession program (2,700 km and an expected flow of resources estimated in US$ 9.3 billion); aligning the incentives of the energy auctions with possibilities of private participation; and, streamlining the awarding process in railways, given that most of the fundamentals for private participation seems to be in place in that sector.

Investing in regulatory credibility. Even when the regulatory environment has been correctly reformed, it will take time to establish a reputation for stability and good regulation. Partial risk guarantees against regulatory risk may be a way of buying regulatory credibility – particularly regarding the aspects of the regulatory environment over which the government has reasonable control. Because infrastructure investments are sunk and projects have long-term maturities, the stability and credibility of the institutional environment for infrastructure is at the heart of private participation. The expectation that governments may have strong incentives to fail to honor concession rights or that sector rules could change may discourage investments in the first place. It may elevate the premium required for investing in a given project, thus augmenting the costs of capital and tariffs to be charged to consumers. The Brazilian government may consider this option, building on the experience of the guarantee facility supported by the World Bank in Peru.

- *Improving institutions for decision-making by the public sector.* First, Brazil needs to recover its capacity to plan according to standard principles of cost-benefit analysis, which, in turn, may impose unduly large information demands. Even though financial and economic rates of return are expected to diverge in several cases, projects with low financial returns should be subject to careful additional scrutiny before receiving public support in order to avoid the emergence of "white elephants." Second, given the possibility that PPP contracts crowd-out pure concessions, a sound institutional framework for the use of public resources in infrastructure projects should be consolidated and made public. One possibility is to build on the existing initiatives of PPP units in different Ministries and within the Pilot Infrastructure Program (*Programa Piloto de Infraestrutura*, PPI). Third, Brazil could generate some additional savings by improving the quality of its public expenditure in infrastructure.

Improving the quality of public expenditures. More funding is required for maintenance. Over the last six years, annual averages of about RS$ 600 million for rehabilitation and RS$ 150 million for maintenance have been spent on the paved federal road network in Brazil, a level that is supposed to be enough to avoid further deterioration of the network. But in order to increase the share of road in good conditions from the current 25 percent

to 63 percent, and avoid wasteful expenditures on reconstruction in the future, the World Bank estimates that roughly RS$ 1.2 billion a year will be required over the next six years, at least. Moreover, the quality of public expenditures can be further improved through better planning and the stability of funds. In road maintenance, for instance, the adoption of output-based contracts and the provision of a stable flow of resources could avoid contract renegotiations and cost increases due to delays in startup, interruption in implementation and non-payment by the government, and could bring significant cost-savings. A World Bank analysis showed that the unit costs of output-based contracts are 30 percent less than those of traditional contracts – while contract renegotiations have increased contract costs by at least 50 percent. The approval of a multi-year highway expenditure program would be an important instrument. These issues are further discussed in the forthcoming report on fiscal spending.

- *Developing the institutional foundations for an efficient infrastructure policy.* First, Brazil needs an infrastructure strategy to coherently and systematically address its long-term infrastructure needs. This requires consolidating a planning process that is still fragmented and embryonic either among Ministries or among different federal entities. It should involve a rationalization of programs aimed at improving access to the poor, better leveraging the impacts of infrastructure on poverty alleviation. It ought to identify potential sources of financing, both private and public, including expected contributions by different levels of government and potential bottlenecks for private participation. Ideally, it would cover other strategic issues as well, such as the active use of competition as a tool to promote private sector participation and economic efficiency. Second, the infrastructure strategy should be fully incorporated in Brazil's budgetary process. The infrastructure strategy could be part of the government's multi-year plan (*Plano Pluri-Anual*) formulation and subsequently mapped into the multi-annual budgetary program (*Lei de Diretrizes Orçamentárias*) and the annual budget (*Lei do Orçamento Anual*). Third, the infrastructure strategy should be fully monitored and evaluated, with lessons learned included in its periodic revisions.

Broader issues. Increasing public expenditures in infrastructure will inevitably involve a redefinition of public priorities, a reallocation of revenues and a more flexible use of "earmarked" expenditures. Several intermediate solutions – as for instance conditioning flexibilization of earmarking to the achievement of pre-defined social indicators – but as consensus building seems to be still required, bringing in objective measurement and evaluation of the impacts of access to infrastructure on poverty alleviation may ease the debate. Lastly, defining an appropriate infrastructure strategy at federal level will require addressing an institutional inadequate set-up for budget formulation. Infrastructure expenditures suffer from the same free-riding and coordination problems as the provision of pure public goods but these problems are exacerbated, in the case of Brazil, by the decentralization of public revenues to states and municipalities and by a political setting that favors short-term local objectives to the detriment of long-term national ones in the process of budget formulation and approval by Congress. Improving coordination among the three-tiers of the government and redesigning the institutional framework to facilitate the adoption of national infrastructure projects are, therefore, critical long-term challenges. These issues are further discussed in the forthcoming report on fiscal spending.

How to revitalize infrastructure investments in Brazil: key actions

Pillar	Short-Term Actions	Medium-Term Actions
1. Further strengthen the fundamentals for infrastructure concessions		
Eliminate regulatory bottlenecks and policy uncertainties	• In the water sector, address the "poder concedente" issue for metropolitan regions and define overall regulatory framework • In the port sector, clarify the role of regulators and advance the decentralization process • In the road sector, complete the decentralization of non-trunk federal roads • In the electricity sector, further align auction design with private participation and approve the new sector law for the natural gas sector	• In the water sector, improve corporate governance of state-owned enterprises, in particular, provision of information • In the port sector, address labor issues and improve corporate governance in dock companies • In the energy sector, strengthen EPE to improve the quality of projects offered and enhance its transparency; in the natural gas sector, define the role of thermal generation in the national energy policy • Further reduce remaining obstacles in environmental licensing, mitigate the impact of courts' revision of regulatory decisions on regulatory risk, and improve collaboration among public institutions involved in the concessioning/regulatory process should be improved, especially the roles of *Ministério Público* and *Tribunal de Contas da União*
Avoid "excessive" contract renegotiations	• Fully address in contract design exchange rate and regulatory risks • Assure that coverage objectives are consistent with adequate rates of return • Establish clear conditions and processes for contract renegotiations	• Consider the use of partial risk guarantees to cover regulatory risk
Improve regulatory governance	• Improve consistency by requiring the citation of jurisprudence in supporting of regulatory decisions • Increase fairness by introducing penalties for "off-the-record" meetings between regulators and stakeholders	• Develop a career and salary structure compatible with comparable careers within the public sector • Increase the number of staff, hired by public exams • Improve training and personnel with graduate studies
2. Improve institutions for efficient decision-making by the public sector		
Recover sector planning capacity	• Explore existing opportunities for private investment in railways, roads, and energy (generation)	• Recover its capacity to plan according to cost-benefit analysis and prioritize projects with higher financial returns, avoiding the emergence of "white elephants"
Institutionalize decision-making for PPPs	• Institutionalize PPP framework for efficient use of public expenditures (possibly based on the PPI experience)	• Create mechanisms to induce the design of concessions in the water sector with minimum efficient scale and efficient subsidies to the poor in known metropolitan regions
Improve the quality of public expenditures	• Stabilize funds for road rehabilitation and maintenance and the use of output-based contracts • Strengthen decision-making, planning, and prioritization capacity by DNIT	• Increase public funds for road rehabilitation and maintenance to avoid unnecessary spending with reconstruction
3. Develop the institutional foundations for efficient infrastructure planning in the long-run		
Develop a coherent infrastructure strategy	• Prepare a national infrastructure strategy addressing Brazil's long-term needs, possible sources of funding and possible strategies to increase the access of the poor	• Address the possibility of consolidating fragmented programs that
Incorporate the infrastructure strategy into the existing budgetary processes	• Monitor, Evaluate and disseminate the impact of infrastructure investment	• Consider to incorporate the infrastructure strategy in the PPA and, subsequently, map it to the *Lei de Diretizes Orcamentarias*
Address broader issues	• Measure and publicize the impacts of access to infrastructure on poverty reduction	• Discuss the possibility of flexibilizing earmarking of social expenditures to expand infrastructure investments, possibly using social targets as conditionality • Create coordination mechanism for infrastructure planning among municipal state and federal governments

Source: Own elaboration.

HOW TO REVITALIZE INFRASTRUCTURE INVESTMENTS IN BRAZIL: PUBLIC POLICIES FOR BETTER PRIVATE PARTICIPATION

MAIN REPORT

1. More than US$164 billion was invested in infrastructure projects that involved private participation in Brazil during 1994-2004. This amount corresponds to more than two-thirds of the total spending in private infrastructure projects in the East Asia and Pacific region. The surge of private participation resulted, at least in part, from the implementation of ambitious infrastructure reforms: while privatization received most of the attention, the reforms also involved a radical transformation of the regulatory environment, the breaking up of formerly vertically integrated monopolies and, when feasible, the introduction of competition.

2. Despite starting later in the reform process, Brazil was a fast and eager reformer. In 1998, telecommunications services were fully privatized after the *Telebrás* system was broken into three regional providers and one international carrier. Three large energy generation companies and 17 distribution companies were sold between 1997 and 2000, enabling competition to play an increasingly central role in the power sector. The entire railway network was privatized in 1995-99, as were most port terminals; and concessions were granted for about 5,000 km of federal roads. Laws governing various infrastructure sectors were reformed and the management of concession contracts was delegated to independent regulators.

3. Although privatization produced some positive results, opinion polls show frustration with infrastructure services in Brazil. This frustration serves to shift policy makers' opinion against private participation in infrastructure. From 1998 to 2004, the proportion of the population that was dissatisfied with privatization increased from 40 to 60 percent. Yet, this is not a phenomenon unique to Brazil: according to *Latinobarómetro*, support for privatization fell by half (from 56 to 25 percent) in 1998-2002 in Latin America.[2] Public authorities and multilateral institutions that once supported privatization now are discussing how to increase public investments in infrastructure without jeopardizing sound fiscal management. The policymaking pendulum has swung back to public investments.

[2] Some caveats on the data collected by *Latinobarómetro* should be introduced. It only shows the preferences of key decision-makers of the parties regarding more or less state control of the economy, and does not include some of the other dimensions of the orientation such as religion, regional, and rural characteristics. Although the measure shows the difference between left and right, it does not show the relative position of the center. Surveys of reported well-being can contribute to such measures, but alone they are insufficient. Their potential contribution increases markedly when they can be matched with objective income data for the same respondents.

4. This report addresses the question of how policymakers can facilitate effective investment in infrastructure in Brazil. Part I takes stock of the situation and argues that more infrastructure is needed and, as current fiscal constraints limit major public investment, the levels of future investment in infrastructure will depend in large part on private sector participation. Part II looks ahead and discusses how to revitalize private investments in infrastructure in Brazil. It assesses the profitability of infrastructure concessions and the performance of privatized firms in Brazil, addresses the main challenges for private financing of infrastructure in Brazil, and suggests policies to help overcome these challenges.

I. Infrastructure and Growth in Brazil: Taking Stock of the Situation

5. This section explains why more infrastructure is needed and why private infrastructure financing will eventually play a major role in revitalizing infrastructure investments in Brazil.

A. Where Do We Stand?

6. **International benchmarking indicates that Brazil's infrastructure stock compares well within Latin America and the Caribbean (LAC) countries but less so with international peers from East Asia**. This is particularly the case of the transport sector. In telecommunications, indicators show that figures for Brazil are much better than those for LAC and, in general, surpass those for other regions. In electricity, indicators show that Brazil ranks better than or near its peers in the LAC region. Brazil's paved roads network, however, lags behind the average for LAC and other regions. Brazil's coverage is less than a third of the LAC average and less than one-tenth the coverage of South Asia, the best performing region. The length of paved road per 1,000 inhabitants shows that Brazil's coverage is less than one-third that of LAC but is not as bad in comparison with East-Asia and Pacific, highly populated regions encompassing Bangladesh, China, and India.

7. **Access to infrastructure services in Brazil improved in the last decade, but with major gaps in rural areas and in access by the poor.** There is also a large variance among states. According to the 2000 Census, approximately 92 percent of the population had access to electricity services; 75 percent had access to potable water; 50 percent to sewerage services; and 37 percent to telecommunications services (fixed telephones) with much greater access to mobile services. States with lower per capita income show lower coverage rates, but there is evidence of some "catching up" effect: states with lower coverage levels in 1991, such as Ceará, Piauí, Rondônia, and Tocantins, presented relatively higher coverage growth rates. With the exception of electricity, there is a significant gap between urban and rural areas in terms of coverage. Regression analyses indicate that for people living in rural areas, the probability of having access to infrastructure services is 95 percent lower than for those who live in metropolitan regions. Perhaps more important, it seems that the poorest benefited less from improvements in infrastructure. Between 1991 and 2000, coverage rates for electricity, sewerage, and water improved in all but the lowest two deciles of income distribution, with the gains being proportionally higher for the highest deciles. Water coverage, in

particular, declined by almost 4 percent in the two lowest deciles, which may reflect the lack of appropriate subsidy mechanisms to compensate for affordability problems (see Figure 1).[3]

8. **The lack of appropriate infrastructure services also exists at the enterprise level.** This is particularly evident in labor intensive industries and in the states of Amazonas and Goiás. Accumulated losses caused by inadequate infrastructure services varied from 1.15 percent in Rio Grande do Sul to 9.22 percent in Amazonas. The footwear industry, which lost more than 10 percent of the value of 2003 sales due to infrastructure outages, seems to have been the most affected, followed by garments, textiles, and furniture industries. Electricity outages and transport damages or delays are the main causes of infrastructure outages, responsible for three-fourths of outages in Amazonas and two-thirds of outages in the footwear industry. The largest losses in the transport sector were reported by the auto-parts industry (4.71 percent). Infrastructure losses are caused by both the frequency and the duration of service interruptions, indicating reliability problems. Power interruptions were the most frequent and transport interruptions were the longest. To mitigate the risks of power outages, almost 60 percent of Brazilian large firms in the manufacturing industry report owning power generators. This percentage declines according to firm size and reveals the regressive nature of inadequate infrastructure services.[4]

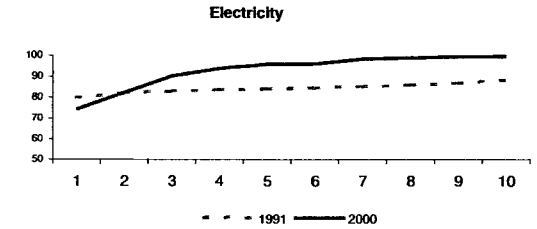
B. The Fall in Infrastructure Investments and its Causes

9. **Infrastructure investments fell during the last two decades.** As in many other LAC countries, infrastructure investments in Brazil fell dramatically from 1980 to 2002, with the largest decline occurring in the 1980s. Investments in infrastructure plunged from an average of 5.22 percent of GDP during 1981-85 to 2.35 percent of GDP in 1996-2000. In 2001, levels of infrastructure investment corresponded to half of what they were in 1981. The drop of 2.87 percentage points between the two periods is much larger than the regional average of 1.2 percentage point, reflecting Brazil's higher initial investment levels in the early 1980s. Most important, this fall was concentrated during 1981-1996, when levels dropped 2.61 percentage points (or 93 percent of the total). Despite partial recovery in subsequent years, the steepest decline in infrastructure investment in Brazil occurred in 1987-89, when it dropped by roughly 50 percent (see Figure 2).

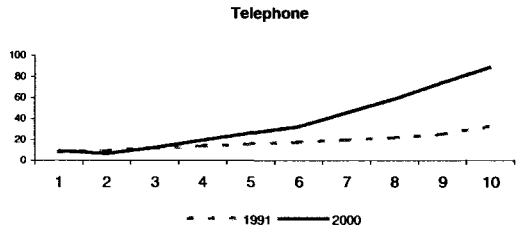
[3] For further details, see Volume II, Chapter 1, Section 1.2. Based on "Acesso a Serviços de Infra-Estrutura," background paper prepared by M. Neri for this report.

[4] For further details, see Volume II, Chapter 1, Section 1.3. Based on World Bank (2005) "Chapter 8: Infrastructure Services and Firm Performance in Brazil: The Need for Creative and Efficient Partnerships between the Public and Private Sectors." In: World Bank, "Brazil Investment Climate Assessment – Volume II: Background Documents." *Mimeo.*

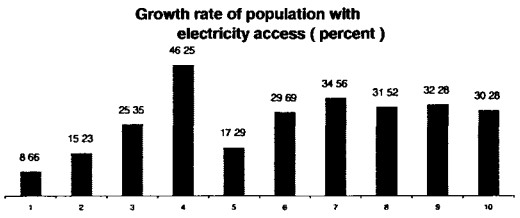
Figure 1. Brazil: share of population with infrastructure services per income deciles (%), 1991 and 2000

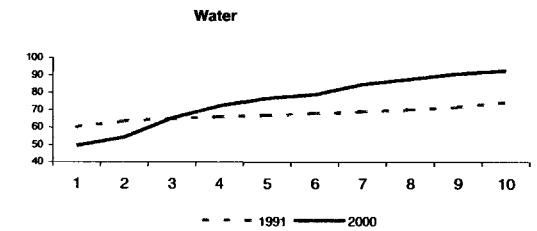


Fonte: CPS/FGV a partir dos microdados da PNAD/IBGE

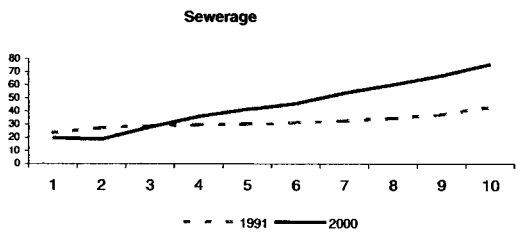


Fonte: CPS/FGV a partir dos microdados da PNAD/IBGE

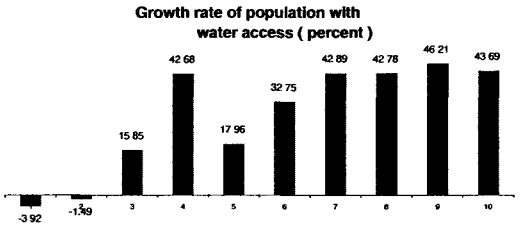




Fonte: CPS/FGV a partir dos microdados da PNAD/IBGE



Fonte: CPS/FGV a partir dos microdados da PNAD/IBGE

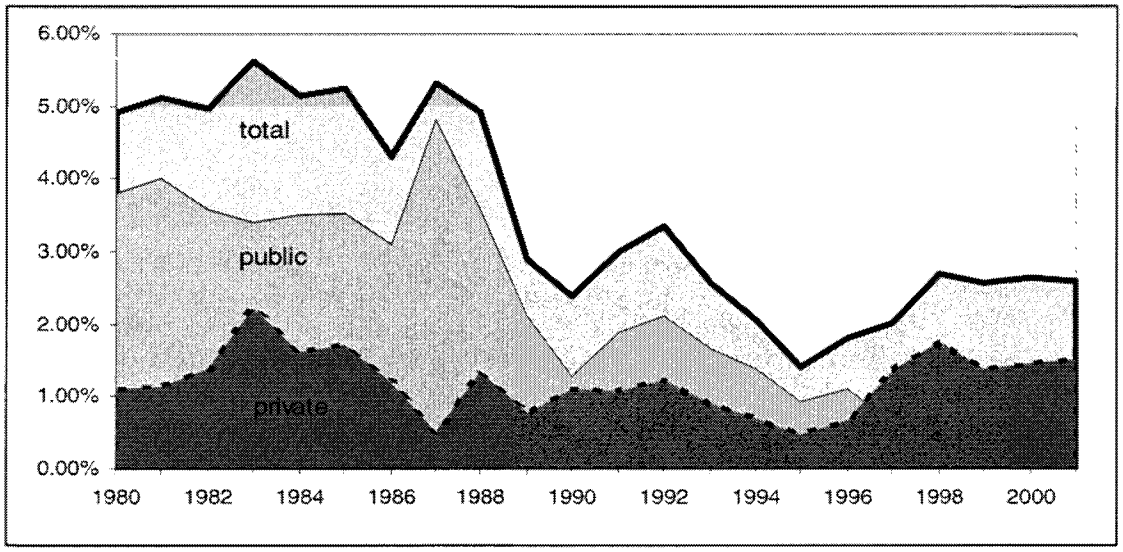


Source: IBGE/*Censo Demográfico* 1991 and 2000.

10. **The fall in infrastructure investments in Brazil was caused by a substantial contraction of public sector spending.** This trend is common to most countries in the LAC region at the time. Public investments in infrastructure in Brazil fell from 3.6 percent of GDP, on average, during 1981-85 to 1.0 percent of GDP in 1996-2000. This constitutes a drop of 2.6 percentage points that accounts for 90 percent of the overall decline (2.87 percent). More than half of this decrease occurred between the periods 1986-90 and 1991-95, prior to most of the privatizations in infrastructure (1995-98) and the fiscal adjustment (1999-2002). The rest of the decline in public investment could be split, almost equally, between the remaining two periods (before 1986 and after 1995). Public investments in LAC fell 2.1 percent between 1981-85 and 1996-2000. Argentina, Chile and Mexico are among the countries with reductions in public investments comparable to that of Brazil, while Colombia managed to sustain larger public funds for infrastructure. Countries in other regions, such as the Philippines and Thailand, sustained growing levels of public expenditure.

11. **Contrary to other countries, the raise in private investments in Brazil was not enough to compensate the fall in public spending**. Chile illustrates the opposite case. In other countries, such as Colombia – where public investments remained unchanged – private investments increased almost fivefold in the 1990s. Another difference in Brazil is that the growth of private financing for infrastructure in the 1990s was mainly directed to asset transfer (divestiture) and not to the expansion of infrastructure stock. In other countries, such as Indonesia, most of the resources were applied to new (greenfield) projects. Even in telecommunications, where concession contracts induced new investments and led to an expansion in coverage, the largest amounts of resources were disbursed for the acquisition of the 12 companies divested from the *Telebrás* system.

Figure 2. Investments in infrastructure in Brazil: total, public, and private (percent of GDP), 1980-2001



Source: Own elaboration based on data from Calderon and Serven (2004).

12. **The gradual deterioration of the institutional framework for the provision of infrastructure led to the eventual decline in infrastructure investments.** First, the centralization of most of the planning, regulatory, and operational attributions of the state-owned enterprises had failed to improve corporate governance and performance of public companies. By the late 1980s, Brazilian state-owned utilities provided highly inefficient services and contributed to the public sector's deficit, accounting for approximately half of the overall debt during 1983-88. Second, the financial strategy based on external borrowing and self-financing through the tariff structure was undermined by two external crises, particularly in 1982 (with the Mexican default) and the undervaluation of the infrastructure tariff for inflation control purposes. This had a direct effect on electricity companies, as they had tapped international financial markets during the 1970s for increasing amounts of debt. As a result, investments from the *Eletrobrás* system, which in 1980-82 reached 0.84 percent of GDP on average, were reduced to 0.72 percent in 1984-86 and 0.48 percent in 1988-91 – a fall of 43 percent in ten years. The overall deterioration of the fiscal situation indirectly affected sectors dependent on the federal budget, such as transport.

13. **The 1988 Constitution contributed to weakening the institutional framework for infrastructure.** Public sector financing – a central part of the institutional framework for the infrastructure sector – collapsed with the 1988 Constitution. First, the 1988 Constitution replaced sector-specific federal taxes – available for energy, transport, and telecommunications – with non-specific state-level ones. For instance, the road tax, which contributed to federal road investments, was transferred to the states, while the electricity tax from the electricity sector was incorporated into the states' VAT system. Second, the Constitution raised transfers of federal funds to sub-national governments, particularly municipalities: the municipal share of the federal income and industrial tax revenues, for example, increased from 17.0 to 22.5 percent. This reduced the amount of federal funds available for capital expenditures and introduced potential coordination problems among the three tiers of the administration when sub-national governments are needed to co-finance federal infrastructure projects. Lastly, the 1988 Constitution increased and earmarked certain current public expenditures – particularly on health and education – while capital expenditures, in general, and infrastructure investments, in particular, were left to the discretion of policymakers.

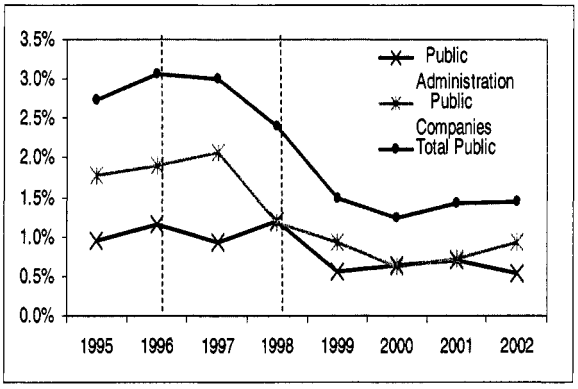
14. **Over time, federal public investments were further crowded out by rising current expenditures.** Central governments' primary expenditures rose from 13.7 percent of GDP in 1991 to 21.6 percent in 2002 while federal public investments declined from 1.45 percent to 0.75 percent of GDP. Roughly three-fourths of the increase in primary expenditures (6.9 percent out of 8.9 percent of GDP) was due to pension benefits, public employees' salaries and transfers to states and municipalities. On the one hand, this allocation of public expenditures was established by the 1988 Constitution: beyond the decentralization of revenues, it established higher social benefits for the whole population. These benefits were extended to rural workers, and the generous public employment regime was expanded to all the public sector employees. On the other hand, the increase in these expenditures over time can be explained by different institutional factors, such as the change in the minimum wage (affecting two-thirds of the social security benefits) and the increase in income tax revenues (of which almost half were

transferred to the municipal fund). Different institutional devices may have operated to guarantee an inter-temporal flow of budgetary resources for selected areas.

15. **The contribution of the 1995-98 privatizations to the decline in infrastructure investments is relatively minor.** A common criticism of the privatization process in Brazil is that it transferred control over a large share of the country's infrastructure investments to the private sector, as the option for "golden shares" (which gives the government some control over strategic decisions of privatized companies) was rarely adopted. Investments of state-owned enterprises (SOEs) in 1995-98, the period when most privatizations occurred, declined to 0.89 percent of GDP, but investments in telecommunications alone accounted for 0.93 percent of GDP. These figures suggest that the reduced investments of SOEs should have been restricted to the telecommunications sector, in which concession contracts provided enough incentives for additional investments and sector expansion. It is possible, therefore, that the effect of the 1995-98 privatizations was not only restricted to telecommunications, but also its "pass-through" effect on total infrastructure investments was low, as private investments may have partially compensated for the decline in public investments (see Figure 3).

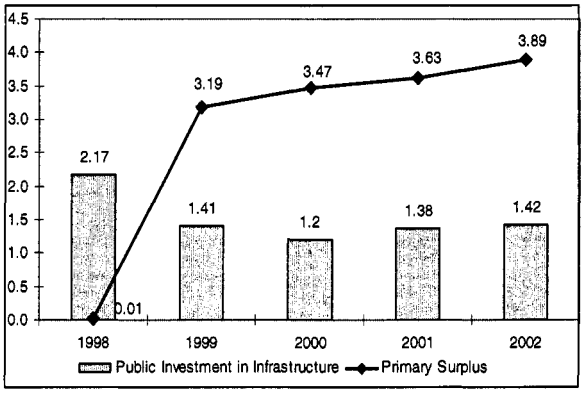
16. **The effect of the 1999-2002 fiscal adjustment on federal public investments was less severe than is commonly acknowledged.** During 1998-2002, public sector investment in infrastructure declined by 0.75 percentage points of GDP, with a drop of 0.18 point from SOEs and 0.57 point from the public administration. These are rather small numbers as compared to the fiscal policies implemented during this period. In addition, most of the decline in infrastructure investments, roughly two-thirds of the overall drop (0.5 percentage points), came from states and municipalities. This is not surprising, since the largest share of infrastructure investment was concentrated in these tiers of the public administration. Overall, an increase in current expenditures coupled with a high level of rigidity in the public budget made capital expenditures a major target for cuts. Political economy factors and well-known incentive problems with the provision of public goods further complicated the challenge of fiscal adjustment. The impact of the fiscal adjustment may have increased during 2003-05, given higher primary surplus targets set by the current administration (see Figure 4).

Figure 3. Public sector investment in infrastructure (percent of GDP), 1995-2002



Source: Own elaboration based on Afonso *et al.* (2005).

Figure 4. Brazil: primary surplus and public investment in infrastructure (percent of GDP),1998-2002



Source: Own elaboration based on Afonso *et al.* (2005).

C. Does Brazil Need More Infrastructure Investment?

17. **Low growth rates in Brazil are closely related to low investment ratios in the last decades.** Growth accounting analysis indicates that the capital's contribution to growth during the 1990s was very low, as compared to its contributions to labor and total factor productivity. Brazil's endowment of productive infrastructure per worker is usually inferior to countries that have shown better growth performances, such as Chile and Malaysia. Evidence suggests that Brazil experienced a decline in both private investments in manufacturing industries and public investments in infrastructure sectors. This is related to a poor investment climate (primarily a high and cumbersome taxation regime) that reduces the private sector's returns; a high level of public debt that crowds-out the private sector; and elevated current expenditures that, given the tight conditions for fiscal solvency in Brazil, reduce fiscal resources available for public investments. When asked about the main obstacles to growth, Brazilian businessmen ranked other factors, notably tax rates and the cost of financing, much higher than the problems related to infrastructure services.

18. **It is possible to argue that higher levels of infrastructure investments would lead to higher growth.** Using an overlapping generation model, Glomm and Rioja (2003) found that infrastructure investments in Brazil would have to reach about 5 percent of GDP to maximize impact on economic growth. Calderon and Serven (2004) found that the infrastructure compression of the 1990s reduced Brazil's long-term growth by 3 percentage points per year. Confirming previous results, Ferreira and Araujo (2004) concluded that long-run elasticities are close to or above one for most cases in infrastructure sectors, with stronger results holding for energy and transportation. Poor infrastructure services (transportation and energy) seem also to have a large and negative effect on firm's probability to export and productivity. Using ICA database for several LAC countries, the assessment of the impact of infrastructure on competitiveness, carried out by Escribano *et al.* (2005), shows that infrastructure services are major determinants of total factor productivity (TFP) in Brazil and other LAC selected countries.[5]

19. **Perhaps more important, an expansion of infrastructure stock may contribute to improved economic opportunities for the poor and greater income distribution.** In poor rural areas, infrastructure expands job opportunities for the less advantaged by reducing the costs of accessing product and factor markets (Smith *et al.*, 2001). It may also generate capital gains for poor farmers, as asset value in poor farm areas increases with the higher net present value of the profits generated by crops (Jacoby, 2000). Azzoni *et al.* (2003) generalized that access to infrastructure, together with human capital, were the main factors behind the differences in growth rates among Brazil states. Using a large panel data set encompassing over 100 countries during 1960-2000, Calderon and Serven (2004) found that bringing the stock and quality of Brazil's infrastructure to the median level of the East Asian tigers would reduce the Gini index by 9 percent. In a paper examining whether growth has been pro-poor in Brazil, Menezes-Filho and Vasconcellos (2004) show that poverty is associated with poor access to infrastructure, lower levels of education, having children, being non-white, being

[5] For further details, see Volume II, Chapter 3, Section 3.1.

unemployed or working in an informal agricultural job. The paper concluded that a 10 percent rise in income reduces extreme poverty by about 8 percent, on average, with the growth-elasticity of poverty depending positively on the initial level of income and negatively on initial inequality. While it found a positive effect of inequality on growth, it also showed that the trade-offs between growth and pro-poor growth strategies would not exist in the case of infrastructure investments.

20. **A growing body of empirical research confirms that improved access to infrastructure contributes to better social indicators.** Energy has a positive effect on education by making nighttime study possible and reducing the amount of time spent collecting traditional fuels, thus freeing up a child's time for education. Access to water and sanitation curbs water-related diseases, reduces child mortality and contributes to higher educational performance as well. For instance, it is estimated that the presence of sewerage systems cuts the probability of child mortality by half in Nicaragua and that lack of access to water reduced school attendance by 2-17 percent in Africa. Transport-related impacts occur mainly through reduced travel time to schools, easier establishment of schools, and reduced environmental hazards that affect educational performance. In Peru, for example, 56 percent of children within one-hour's travel time attend school, as compared to 29 percent for those who must travel 2-4 hours.

21. **Preliminary evidence linking infrastructure and social indicators is also available for Brazil.** For an afro-descendant female child in the São Paulo state, access to infrastructure services is associated with a decrease of 20 percent in the probability of 6 or more absence days per year, and proficiency results improve by 11-13 percent (see Table 1a).[6] Impacts vary inversely with the state's infrastructure endowments and family income. The impact of housing conditions was tested, with similar results: for instance, access to good housing conditions is associated with a performance 7.1 and 4.6 percent higher in the 4th and 8th grades, respectively, in 2001 (see Table 1b).[7] A recent IPEA study also found that an increase of 1 percent in the access to water and sewage services may reduce infant mortality by 108 and 216 per year, respectively, or 9.9 percent of total infant deaths (Seroa da Motta and Moreira, 2004). While alternative, less expensive solutions may seem preferable at first glance, further analysis shows that the benefits do not always match those of improved infrastructure. For example, the IPEA study found that increasing the mother's educational level was not the best approach to reducing child mortality, once environmental and wealth effects (through the value of property of the poor) were factored in.

22. **Far-reaching goals to meet Brazil's infrastructure needs are still attainable.** How much is needed for infrastructure depends on the chosen objective. This report estimates that annual expenditures of 3.2 percent of GDP per annum as a lower bound scenario for Brazil in 2010. This is a cumulative figure that includes responding to increased demand (1.55 percent in 2010, based on a 2 percent annual growth rate), the

[6] The report considers access to infrastructure services as access to electricity, water, sanitation, and telecommunications services.

[7] Good housing conditions are associated with 4 residents in the house, non-precarious neighborhood, and house built in an owned and paid terrain. For further details, see Volume II, Chapter 3, Section 3.2. Based on "Infrastructure and Educational Progression," background paper prepared by M. Neri and R. Moura.

estimated cost of universal coverage (0.2 percent) and maintenance costs (1.5 percent). A much higher amount (4.7-9.0 percent of GDP) would be required to bring Brazil to the current levels of coverage in Korea (universal coverage including maintenance costs). While ambitious, this goal – which would add more than 4 percentage points to the Brazil's GDP growth – is not unrealistic. Similar increases were achieved by Korea, Indonesia, and Malaysia from the late 1970s to the late 1990s. Indeed, Korea's infrastructure endowments 25 years ago were substantially worse than Brazil's at that time.[8]

Table 1a. Change in educational performance associated with *access to infrastructure* in São Paulo state (in percent)

Attribute	First Year		Last Year	
	A	B	A	B
Proficiency				
4th grade	11.4	12.3	10.9	11.8
8th grade	12.3	12.9	11.8	12.4
3rd year of high school	13.1	13.8	12.8	13.5
Attendance				
Never absent	49.9	44.7	--	--
6+ days absent	-20.8	-23.5	--	--
Enrollment	38.1	36.2	29.0	31.9

Notes: For proficiency: first year (1999) last year (2003). For attendance: only one year, considered first year, is available (2001). For enrollment: first year (2001) and last year (2004). "A" is associated with a household of four residents in the house. "B" is associated with a household with eight residents in the house. For attendance and enrollment, the household is located in a precarious neighborhood, built in a terrain provided by employer or other means. Estimated for an afro-descendent girl living in an urban area, whose parent's education is inferior to 4th grade and attending a public school.
Source: Neri and Moura (2005).

Table 1b. Results for difference in percentage for scenarios with *good housing conditions* in relation to those with bad housing conditions in São Paulo state (in percent)

Attribute	First Year	Last Year
Proficiency		
4th grade	7.1	6.8
8th grade	4.6	4.4
3rd year of high school	4.6	4.5
Enrollment	3.9	3.5

Notes: For proficiency: first year (1999) last year (2003). For enrollment: first year (2001) and last year (2004). Good conditions are associated with 4 residents in the house, non-precarious neighborhood, and house built in an owned and paid terrain. Bad conditions are defined as 8 residents in the house, precarious neighborhood, and house built in a terrain provided by employer or other means. Estimated for an afro-descendent girl living in an urban area, whose parent's education is inferior to 4th grade and attending a public school.
Source: Neri and Moura (2005).

23. **Given its current fiscal situation and infrastructure needs, Brazil will eventually require *larger* and *better* participation of the private sector to revitalize its infrastructure sector.** Willingness to invest in infrastructure diminished in recent years, but Brazil's potential has not been fully explored yet: the share of private provision of energy in Brazil is at least half that of Colombia; private provision of water and sanitation is negligible compared to Chile's; and contracts for more than 2,000 km of

[8] For further details, see Volume II, Chapter 3, Section 3.3. Based on estimates prepared by M. Fay and T. Yepes for this report.

federal roads will be awarded soon, while an additional 6,700 km are considered "concessionable." Overall, the amount of private projects for infrastructure in Brazil remained small relative to the size of its economy. Private participation as a share of GDP in Brazil in 1996-2000, for example, was inferior to the LAC average; approximately half the size reached in Colombia and far from the levels it reached in East-Asian countries such as the Philippines and Thailand. In the next section, we address the issue of whether private investors earned adequate returns in infrastructure concessions in Brazil and the performance of privatized firms.

D. Private Participation in Infrastructure

24. **Contrary to public perception, private concessions were not excessively profitable when the full cost of capital is considered.** The misperception is created by operational profit indicators that adjust neither for investment requirements nor for risk premiums. The estimated average internal rate of return for projects with terminal value in 1997-2003 is negative for telecommunications (-26 percent) and energy (-5 percent) – indicating returns below their opportunity cost of capital – and positive for water (16 percent). The average return-on-equity for infrastructure services varied between 3 percent (in water) to 5 percent (in telecommunications). High investment levels in the initial concession years, induced by the concession contracts, explain, in part, the low profitability levels in telecommunications. For electricity, the 2001 energy crisis and the induced consumption contraction contributed to lower returns. The weighted average cost of capital (WACC) varied between 14 percent and 16 percent, with the estimated cost of equity (C_E) between 19 percent and 24 percent – figures that are, on average, at least twice as large as in the US and Chile.

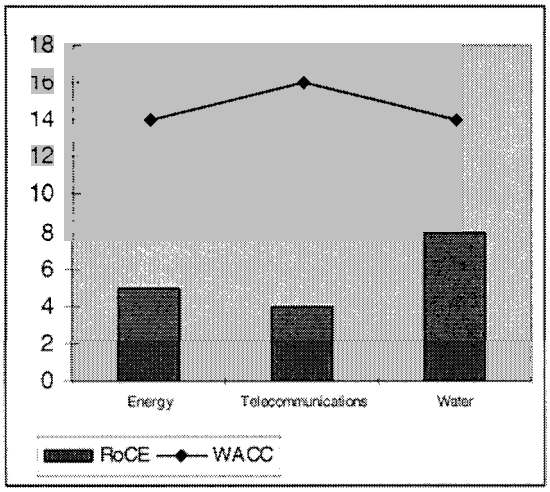
25. **More important, perhaps, returns volatility indicates that infrastructure investment in Brazil is a relatively risky business.** The level of risk of infrastructure investments in Brazil is consistent with other LAC countries but it is at odds with the OECD countries. Infrastructure services are normally monopolistic services, posing low commercial risks to investors as compared to other businesses. Demand for infrastructure services tends to be relatively price-inelastic and linked to underlying economic or demographic growth. Monopoly-type market environments may imply predictable returns through regulation or long-term contracts. Ongoing operational-maintenance expenditures may be relatively low and stable, once an infrastructure asset is developed, potentially increasing free cash flow. In OECD countries, therefore, infrastructure investments are long-term, low-risk/low-return alternative for conservative investors.

26. **The level of risk becomes a particularly important issue if Brazil intends to attract equity capital.** Brazil was found to have had the fourth highest average cost of capital and the fifth highest cost of equity among a group of ten Latin American countries, according to 2004 data. More important, the difference between Brazil's average C_E (6 percent) and WACC (3 percent) reflects the additional premium required by equity investors as a result of them undertaking more risk than debt holders. These results illustrate the difficulties associated with attracting institutional investors, particularly pension funds. Given expected commercial returns, higher levels of risk will tend to further restrict the availability of equity capital for infrastructure concessions.

27. **Despite these negative short-term prospects, concessions are capable of generating adequate returns in the long-term.** For that, however, shareholders must rely both on various sources of remuneration (including dividends, management fees and capital gains) and on consistently outperforming historical market growth over the entire length of their concession. While the internal rate of return (IRR) is negative – and therefore lower than the WACC – for all countries in the sample, the IRR with TV is above the average WACC when future growth is at least equal to each country's average historical economic growth and the residual value added is taken into account. These results suggest that concessionaires operate with long-term perspectives and rely on the entire concession period in order to build an adequate return (Sirtaine *et al.*, 2005).

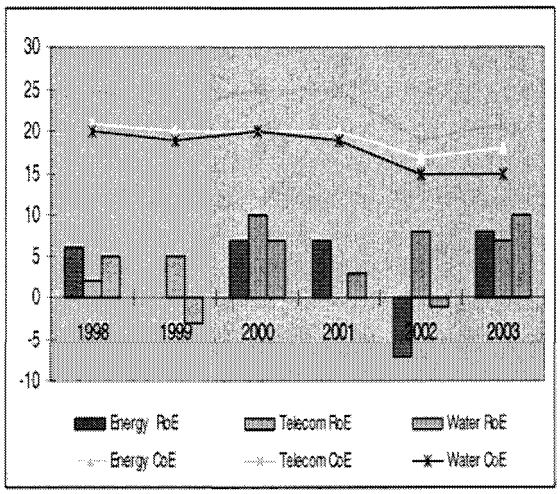
Figure 5. Returns on infrastructure concessions in Brazil

(a) Returns on capital employed and average cost of capital, 1997-2003



Source: Own elaboration based on Sirtaine *et al* (2005).

(b) Returns on equity and cost of equity, 1998-2003



Source: Own elaboration.

28. **Inadequate returns to infrastructure investments, as compared to the opportunity cost of capital, may be a result of low returns, high opportunity cost of capital or a combination of both.** These factors also affect each sector in a different way and it is unlikely that one single story fits it all. One contributing factor for lower returns on infrastructure services in 1998-2003 may have been the 1999 exchange rate devaluation. At least other three factors may have contributed to low returns on infrastructure concessions: (a) is poor enforcement of tariff policies, (b) persistence of non-technical losses, particularly in the electricity and water sectors, and (c) the 2001 energy crisis. One important cause of the low profitability of infrastructure investments is the high investment levels in the initial years of concession.

29. **Yet, there are signs that Brazil's cost of capital may have declined in recent years.** Despite their high levels, both cost of capital indicators (C_E and WACC) show signs of recent decline. Brazil has one of the highest opportunity costs of investing in infrastructure among Latin American countries (9 percentage points higher than Mexico and 10 percentage points higher than Chile, in 2004). Capital costs for the three sectors

analyzed remained stable from 1996 to 2001 and started to decline after 2001. A positive factor favoring the decline of the opportunity cost of capital for infrastructure concessions is the reduction of the country risk premium. The country risk premium is the main discriminating factor for the C_E and the WACC. There is a noticeable correlation between the C_E and the country risk premium. Not surprisingly, the C_E in Brazilian infrastructure sectors has been falling since 2001. The cost of capital, estimated by the WACC, follows the same pattern as the C_E. In particular, the decrease in the C_E after 2002 can be explained by the mitigation of the political uncertainty associated with the 2002 presidential elections.

30. **The reduction in country risk is a reason for optimism, as the country may find it easier to attract private capital to its infrastructure projects.** As country risk reduces, Brazil can obtain significant gains by creating a credible and stable regulatory environment for infrastructure investments. Stability is essential so that the adequate level of returns can be achieved in the long run. Ideally, such stability should be credible as well. In turn, this will require: (a) strengthening the legal and policy sector frameworks, (b) improving contract design, then avoiding excessive renegotiations, and (c) improving the quality of regulators (regulatory governance), so that laws and contracts are more appropriately enforced.[9]

31. **In terms of the performance of privatized firms, the best outcomes were related to improvements in the firms' technical efficiency.** In electricity, labor productivity (amount of energy distributed per employee) doubled; in water, distributional losses fell by 40 percent; and, in telecommunications, the total number of lines per employee rose almost five times while the number of uncompleted calls fell by 33 percent. Both output expansion and employment reduction led to productivity gains. Most of these gains occurred during the "transition" period, when the privatizations were being prepared and implemented. The pace of improvements fell significantly after that.

32. **Improvements in technical performance and coverage are noticeable as well.** The frequency of interruptions in electricity distribution dropped 48 percent while the digital portion of the telecommunications network grew by 116 percent. With the exception of water, the pace of improvements in quality indicators diminished in the post-privatization period. The coverage of services provided by privatized companies improved. Coverage grew 109 percent in telecommunications, 22 percent in water, and 15 percent in electricity distribution, with these last two slightly lower than the results for the region as a whole. In part, this is due to higher coverage levels in Brazil prior to privatization, which made further expansions of the system more costly and reduced margins for expansion of the networks. Growth in coverage ratios accelerated in the "post-privatization" period, possibly as a consequence of coverage targets established in the concession contracts.

33. **Utility tariffs declined when calculated in US dollar terms but increased when measured in local currency**. An exception is the charge for the installation of the residential telephone line, which was reduced after privatization regardless of the

[9] For further details, see Volume II, Chapter 4, Section 4.2.

currency used. One interpretation for this result is that the tariff policy provided an imperfect indexation to the US dollar: sufficient to keep utilities' prices above average consumer prices but insufficient to guarantee their full parity with US currency. By comparison, utility prices in the LAC region increased both in real local currency terms as well as in US dollar terms. Most of the tariff rise was concentrated during the post-privatization period, most likely because of the use of IGP-M (a price index that closely follows the US dollar) as the reference for tariff readjustment by most concession contracts.

Table 2. Brazil: summary of the effects of privatization on the performance of utility companies

Sector	Labor Productivity	Distributional Losses	Coverage	Prices (in *Real*)
Electricity distribution	●●●●	○○○	=	●
Fixed telecommunications	●●●●●	○○○○	=	3-minute call: ●● monthly charges: ●●● installation fee: ○○○
Water distribution	●●●	○○	=	N.A.

Notes: ● = increase. ○ = decrease. N.A. = not available. Price results for the water sector were not robust (sample size = 1). See Volume II, Chapter 4, Section 4.2 for details.
Source: Own elaboration.

34. **Although privatization produced some impressive results, public opinion shows frustration with infrastructure services.** Opposition to private participation in infrastructure in Brazil has many causes. First, some observers question the actual success of the reforms – whether privatization improved the provision of infrastructure services in terms of price, quality, and access. The quality of infrastructure services is one of the major sources of formal complaints to consumer protection authorities. Second, questions have arisen regarding whether reforms led to the neglect of infrastructure investments and, thereby, constrained recent economic growth. Low infrastructure investment in recent years is often attributed to the conservative fiscal strategy that was adopted in 1999, thereby implying that the recovery of infrastructure investments in Brazil would require an increase in spending by the federal government. However, the government may not be willing or able to significantly increase its spending on infrastructure.

35. **Negative perceptions of privatization may be due to economic downturns.** Public discontent may be linked to disappointment that outcomes have not matched expectations. Also, the perceived transparency of the privatization process is likely crucial in shaping public perceptions. In particular, privatizations have often been perceived as unfair, rightly or wrongly. Game theory shows that people would rather gain nothing than agree to a deal in which they feel they gain less than their fair share. This seemingly irrational result, combined with a common perception that concessionaires or governments may have benefited disproportionately, may be a key part of the privatization paradox. The implication for governments is that perceptions of fairness must be carefully managed. That means not only that transactions must be transparent

and above board, but that the proceeds of privatization be used in a way that offsets any possible sense of injustice.[10]

II. How to Revitalize Infrastructure Investments in Brazil

36. **Given the magnitude of the needs, the constraints on reallocation of public expenditures and the impacts of the expansion of public debt on long-term solvency, the revitalization of infrastructure investments in Brazil will need to largely rely on private financing.** Creating fiscal space for public investments is, naturally, very important but, nowadays, the expansion of public investments is limited by taxation and current expenditure levels in the context of budgetary rigidity and historically high public indebtedness. As shown by Ferreira and Araujo (2006), public indebtedness is so high that an expansion of infrastructure expenditures, if entirely financed by additional debt, would lead to an increase in the short to medium run debt-to-GDP ratio, putting public sector solvency at risk and triggering interest rate rises that would offset future revenue gains. The country, thus, should avoid swinging the pendulum back to public financing.

37. **Moreover, opportunities for private investments seem far from exhausted, even though private transactions have collapsed to less than a quarter of the peak level in mid-1990s given investors' disaffection with emerging markets.** Private participation in infrastructure in Brazil is low in comparison with other countries outside or within the LAC region. For example, private participation in infrastructure per capita in Brazil is lower than half of the value for Malaysia, while private participation in electricity generation in Chile is almost three times larger than in Brazil. Private provision of water and sanitation is limited to 5 percent of consumers in roughly 70 out of more than 5,000 municipalities. According to the regulator, the second phase of the highway concession program will award approximately 2,600km, generating approximately US$9.3 billion, with an additional 6,700km in conditions of being awarded later on. A central question for Brazilian policymakers, therefore, is how to better manage private participation in infrastructure such that private finance is mobilized towards the efficient provision of infrastructure services.

38. **Infrastructure concessions in Brazil are capable of generating adequate returns only when the full concession period is taken into account.** Enabling more and better private investments in infrastructure requires, therefore, allowing investor to collect adequate dividends in the long-run. This implies, in turn, enforcing a stable and credible regulatory environment, turning private infrastructure concessions into a low-risk / low return business. With this goal in mind, Brazil will need to complete the legal and policy framework in selected sectors; improve contract design to avoid "excessive" contract renegotiations; and enhance the quality of regulators (regulatory governance).

[10] See Fay and Morison (2005).

A. The Legal and Policy Framework

39. A stable and efficient legal framework reduces incentives for opportunistic behavior from the state and protects consumers from abuse of dominance from incumbent firms. This leads to reduced regulatory risk and appropriate provision of infrastructure services. Clear and stable policies are also important, as they affect profitability of infrastructure investment. The provision of infrastructure services shares several of the problems attributed to the provision of pure public goods: economies of scale and scope and externalities distort price signals and competition, making some planning futile. The bulleted paragraphs below review the regulatory environment for each sector and discuss challenges to overcome to improve the legal and policy framework. Table 2 summarizes the main legal and policy bottlenecks.[11]

40. **Telecommunications.** The regulatory environment for telecommunications in Brazil is probably the most complete. The challenge remains in developing a strategy to dismantle cross-subsidization without jeopardizing present coverage levels. The expansion and universalization of telecom services were achieved in large part through allowing some level of cross-subsidization among services. Due to the goal of universal service, portions of the fixed telephony concession companies' plants are not profitable. Concession companies are concerned by the possible adoption of measures to promote competition with no revision of the universal service goals. Incumbents believe that competitors will adopt *cream-skimming* strategies, "stealing away" lucrative customers. As a result, operators maintain that universal service goals are not feasible, and suggest revision or substitution by another set of goals. From the policy side, there has been no decision on how to use the resources from the Universalization Fund of Telecommunication Services (*Fundo de Universalização para os Serviços de Telecomunicaçãoes*, FUST) created in 1998.

41. **Electricity.** Over the last three years, Brazil has used a new conceptual model for the power sector with the aims of increasing and securing the supply of energy, and applying tariff threshold.[12] The model adopted in 2004 centralizes distribution companies' purchase of energy through unified auctions to increase stability of supply and the bargaining power of the distributors in order to reduce energy prices for consumers. It does not create a single buyer, but one important characteristic of the new framework is that the progressive role of the price mechanism and competition that was envisaged in the pre-crisis model has been virtually abandoned. However, the transition to the new model also generated "stranded costs," as the model imposes a differentiated treatment between "new" and "old" (existing or amortized) generation acquisitions. The issue is that market expansion will take place via new investments, thereby excluding the old generation of investments. This creates a sustainability problem for the model, as new investors will make their decisions based on their appraisal of current conditions,

[11] For further details, see Volume II, Chapter 5.

[12] In 2003, the Brazilian government decided to reformulate the power sector model. In March 2004, Laws No. 10,847 and 10,848 were approved with the goals of securing energy supply, and applying tariff threshold. The new model focuses on the long term planning with the creation of the Energy Research Company (EPE), which works as a pool in a market of regulated and free energy acquisition, considering that distributors must forecast and acquire enough power to supply 100 percent of their demands.

government reputation, and past behavior. If the current rules penalize old investments, potential investors might be discouraged from entering the market.

42. One important regulatory bottleneck is the lack of incentives to incorporate demand response into the industry's decision-making process. Auctions will be based on Discos' projections of future demand. Moreover, the success of the single buyer model is somewhat compromised by the fact that the government still controls 75 percent of power generation (hydro and "old energy"). On the positive side, the reform preserved institutions created by the old model and created the Brazilian Energy Enterprise (*Empresa de Pesquisa Energética*, EPE) with the mission of developing long term planning for the energy sector in Brazil. The first "new energy" auction took place on December 2005 and achieved mixed results. The objective was to contract electricity to supply the demand increase forecast for 2008, 2009 and 2010. The auction did not succeed in meeting the entire anticipated load for 2008 and 2009 and most private investors refrained from participating, while state enterprises played a big role. Also, results did not minimize the cost of expansion because the auction involved the purchase of thermal electricity at a higher cost than that established for hydroelectricity. Overall, results suggest that the auction structure and rules should be reviewed so that they approach a least-cost expansion and all forecast demand is met.

43. Finally, Brazil has a poor record regarding contract enforcement in the energy sector.[13] Contract design and enforcement are relatively new to the power sector. Only with the 1998 reform did contracts become the "glue" that binds together the multiple pieces of a vertically disintegrated system. Despite some progress since then, there have been many contract disputes. For instance, a large debt of the state-owned generators owed to the wholesale energy market (MAE) reduced the liquidity of the market by late 2000. During the discussions about gains and losses prompted by the 2001 crisis, there were multiple regulations and contractual clauses being challenged, involving large sums of resources. Post-rationing, there were additional unilateral attempts to breach contracts of thermal power plants and energy imports, involving substantial amounts. Investors also feel that the enforcement mechanisms are weak, since courts are slow and not prepared to deal with the nuances of the power industry. A recent suggestion was made to create a special tribunal to deal with matters pertaining to the electric sector.[14]

44. **Natural gas.** The institutional environment for private investments in natural gas is characterized by inappropriate contract design and inadequate access to pipelines. The risk taken by Petrobrás' contracts with Bolivian YPFB – which accounts for a large share of the supply of natural gas in Brazil – is transferred to local distributors and from these to Independent Power Providers (IPPs). The result is gas supply contracts that are unsuitable for thermal plant operation in a predominantly hydro system. In addition,

[13] Prior to the late 1990s reforms, there was not a tradition to establish purchase power agreements between buyers and sellers, since they were all state owned companies. Furthermore, any issues on the allocation of property rights were resolved by an administrative forum based on collaborative rules and coordinated by *Eletrobrás*. These functions have been absorbed by the *Operador Nacional do Sistema* and *Mercado Atacadista de Energia*. However, those new entities have no role in addressing contract disputes, except the ones emerging from the interpretation of Grid Code and Market Rules.

[14] See Table 5.2.1. For further details see Volume II, Section 5.2.

contracts for the supply of natural gas for thermal generation do not favor the development of secondary markets for gas. Finally, natural gas pipelines – the relevant transportation means for the largest sources of natural gas to Brazil – are controlled by Petrobrás through a subsidiary (*Transpetro*). Open-access is established by law and further regulated by the sector regulator. However, enforcement of these rules has been extremely cumbersome and costly, with potential entrants issuing successive legal complaints or simply voicing them publicly. Currently, a new draft law is being debated in Congress to reform the system and generate much-needed access to the pipelines. Overall, the sector lacks a long-term strategy based on a policy decision on the role of natural gas in Brazil's energy generation matrix.

45. Overall, the natural gas sector still lacks a long term strategy based on a policy decision regarding the composition of energy generation in Brazil. This involves developing a source of energy that does not depend on climate conditions, as is the case of hydro-based power generation. It is also related to the environmental (and social) costs of a strategy to expand the system, given the areas where hydro plants would be installed. As a result, Congress has started to debate a new legal framework for the natural gas sector (PLS No. 226/2005).[15]

46. **Ports.** Reforms have stalled in recent years after significant improvements. Although the dock companies have been included in the privatization program since 1996, there is no clear consensus yet on proceeding with their decentralization and/or privatization. As a result, twenty ports – including Santos and Rio de Janeiro – remain under federal control through eight dock companies. The dock companies are heavily indebted and face numerous judicial actions linked to labor disputes and restrictions resulting from their inclusion in the privatization program. Because of these difficulties, dock companies continue to be unable to effectively carry out their new Port Authority responsibilities, including maintenance and upgrade investments. Port labor is still responsible for a large portion of the high costs of cargo handling in Brazil's ports and has not yet been fully adjusted to account for the mechanization of the ports.

47. On the regulatory side, although the Port Modernization Law and the Transport Sector Restructuring Law provide guidance for the new organization of the industry, doubts remain regarding the responsibilities of a myriad of institutions (e.g., port authorities and their councils, dock companies, ANTAQ, the federal regulator).[16] Inter-port competition issues were neglected as each public dock company leased terminals independently, on somewhat differing terms. Regulatory and competition issues are also pending: cross ownership among terminals in the Santos and Rio de Janeiro Ports affects incentives for inter-port competition; and intra-port competition has been limited by the reduced number of private operators, verticalization and anti-competitive behavior by dominant firms. In 2004, the "*Agenda Portos*" identified the critical physical bottlenecks in the port system, and defined key investment priorities in 11 major ports. The private sector has been investing heavily in terminal facilities and equipment, but progress has been slow in undertaking major public investments. Given the weakness of the "*Agenda*

[15] See Box 2. For further details see Volume II, Section 5.2.
[16] Laws No. 8,630/1993 and No. 10,233/2001, respectively.

Portos," Brazil needs to establish a comprehensive strategy to deal with the main regulatory and policy obstacles for private participation in its port system.

48. **Roads**. A broad policy and institutional reform was initiated during the 1990s in the roads sector. The objectives of this reform included: (i) the transfer of highway sections with sufficient traffic to private concessionaires, and the recovery of all or part of the costs of operation, maintenance, and upgrading directly from road users through tolls; (ii) the reclassification of the highway network, with a view toward maintaining only the main interregional and interstate highways of national interest under federal jurisdiction and transferring to state jurisdictions highways of mainly local interest; and (iii) to contract out combined rehabilitation works and maintenance services on entire routes of the remaining network through long-term output based contracts (*Contratos de Manutenção e Reabilitação de Rodovias*, CREMA), with the contractors responsible for achieving specified levels of service.

49. Some progress has been achieved, but the pace of reforms has slowed during the last few years. A total of 5,000 km of highways, corresponding to 8 percent of the federal paved roads, is under concession. However, the second phase of the federal concession program, involving about 2,500 km of roads, has been postponed for more than five years due to bureaucratic and legal conflicts. Agreements for road transfers have been signed with 14 states to transfer up to 14,000 km of federal roads by 2006, but these agreements have not been fully implemented. In an attempt to advance the decentralization, the federal government reopened negotiations with the states in 2005 over the amount of federal funds needed for road maintenance and the conditions of roads to be transferred. Furthermore, the law that would reclassify the highway network and provide the legal basis for the decentralization agreements has stalled in Congress for years. The recently approved Law of National Transportation System was a step forward in this transferring process.[17] It stated that, in order to support this transferring process, DNIT is authorized to provide federal financial resources for construction work to maintain, fix, build, and signalize transferred roads, as well as supervise and develop essential studies and engineering works.

50. **Railways.** Most of the regulatory and operational bottlenecks inherited from the railway privatization process were addressed in recent years. The sector's reorganization started with ownership restructuring. Since no effective restrictions had been imposed on the acquisition of shares by major users or suppliers, or on the participation of different operators, several governance problems were created that affected sector's performance. For instance, the sometimes vertically integrated business structure that emerged from this ownership composition favored abuse of dominance (through price discrimination, blocking access and service rationing) and inhibited connectivity, jeopardizing the economic feasibility of concessions and the availability of new funds for investments.

51. The ownership restructuring process was complemented by operational restructuring that was consolidated by several resolutions from the sector regulator. The Brazilian rail network was historically fragmented and the privatization process

[17] Law No. 11,314/2006.

consolidated it by breaking up the federal railway network (*Rede Ferroviária Federal S.A.*, RFFSA) into six geographically dispersed monopolies. The operational fragmentation had limited the extension of the hauls undertaken by the railways and reduced the sector's competitiveness in relation to other modes of transport, thus affecting its financial sustainability. With the implementation of this reform, financial and operational results for the Brazilian railway sector improved: total shipment increased by 9.6 percent and investments rose 66.2 percent in 2003-04.

52. **Water and sanitation.** The important legal bottleneck for private participation in water and sanitation relates to the uncertainty as to who has the power to award concessions – the "poder concedente" issue. The Brazilian Constitution (article 175) specifies that water and sanitation services are to be provided by a public authority either directly or via concessions or permits. The Constitution also attributes the responsibility for the provision of public services of "local interest" (article 30) to municipalities and transfers the jurisdiction over the provision of services of "common interest" in metropolitan areas to states. The controversy is related to the difference in the legal definitions of "local" and "common" interests.[18] The "poder concedente" problem is amplified by changes in relative income caused by the ownership transfer of concession rights. In theory, its impact should be restricted to areas served by integrated systems and should not completely obstruct private investment in other regions. Regardless of the solution for the "poder concedente" problem for metropolitan regions, Brazil will have to address the issue of size – and of creating mechanisms to induce optimal scale through agglomeration – if smaller municipalities are to be serviced. Because smaller municipalities are generally poorer, it will be necessary to address issues related to the appropriate levels of tariffs (affordability) and subsidies. The recently approved Consortium Law provides an adequate legal framework for the association of municipalities seeking economies of scale.[19] However, municipal consortiums are not a sufficient condition to achieve efficiency in the provision of water and sanitation services. There is a need to provide service providers with the appropriate incentives, which are closely related to regulation, such that they take full advantage of these potential economies of scale.[20]

53. Attracting private capital for the water and sanitation sector in Brazil will also require a better definition of the regulatory framework. Several state companies operate under precarious concession contracts; key economic factors – such as investment levels

[18] "Local interest" has been most commonly characterized as an isolated water and sanitation system. On this basis, a municipality that has its own source of bulk water, its own storage reservoirs and treatment plants, its own distribution means, and its own collection and disposal facilities within its territory would have the right to award a concession for water and sanitation services. Municipalities within metropolitan regions, for the opposite reason, could not hold concession rights, which should belong to the corresponding state. This assumption has been recently challenged in the courts without success.

[19] Law No. 11,107/2005.

[20] The Consortium Law is an important means for municipalities to provide water and sanitation services more efficiently – but it was not sufficient to align the incentives for the establishment and sustainability of municipal consortiums. This Law will certainly permit municipalities with budget surpluses to improve the provision of water and sanitation services through consortiums. Thus, mechanisms to penalize municipalities that do not comply with either the consortium or loan payments for credit used to acquire equipment and machinery are essential to stimulate these municipal associations.

and tariffs – are controlled by state governments; and political interference is frequent and endorsed by the courts, as illustrated by the well-known Limeira case. Two draft laws are currently being reviewed by Congress, one of which is sponsored by the current administration.[21] Although several regulatory aspects are being addressed by both, neither draft clearly assigns concession rights in areas serviced by integrated systems. More important, by allowing municipalities to directly assign concession rights to state companies, the Consortium Law will tend to discourage private participation.

54. **Significant progress was also achieved in the field of environmental licensing.** Brazil's environmental licensing system is probably the most consolidated of the developing economies, but it can also be bureaucratic and impede infrastructure projects. Until recently, government procedures treated environmental issues outside the planning process – a situation that encouraged subsequent litigation and introduced additional regulatory risk. In 2005, the government managed to move the environmental scrutiny "upstream" in the awarding process, establishing that new concessions can only be awarded with a valid "prior" license. This license is the one required by environmental regulators for the start-up of new projects. While there is still ground to cover with respect to a more comprehensive environmental compliance process, this innovation tends to reduce the environmental risk to private investors.

55. **Another issue affecting the risk of infrastructure projects is the revision of regulatory decisions by the courts.** Disputes between private operators and regulators must be heard by judicial courts, as illustrated by several cases in which regular judges were asked to decide on the appropriate rate of tariff readjustment for electricity distributions, road concessions, and water and sanitation services. This may not be appropriate because the courts lack the technical expertise and have an historical bias towards social justice to the detriment of contract enforcement. Gradually, however, jurisprudence is being formed in which the courts avoid changing the substance of the decision taken by the regulator. While court revision of administrative decisions is needed to guarantee the appropriate accountability of regulatory decision, alternative mechanisms may be less burdensome and risky for all the parties involved.

B. Contract Renegotiation

56. A complete regulatory framework (legal and policy) may not be enough to reduce regulatory risk and facilitate private investments if concession contracts are poorly designed and favor opportunistic behavior by the private and the public sectors. Investments in infrastructure have high sunk costs, which cannot easily be recouped if the economic environment deteriorates. These sunk costs may tempt governments to behave opportunistically, taking regulatory actions that expropriate available quasi-rents once costs are sunk. That possibility is one important source of regulatory risk, which has an impact on levels of investment, costs of capital and tariffs and public subsidies, since additional premiums are required to cover the risk. It is not only the government that may

[21] PLS No. 155/2005 and PL No. 5,296/2005. For a comparison between the two draft Laws, see Table 5.4.1 in Volume II, Section 5.3.

behave opportunistically.[22] In order to obtain some insights on the dynamics and effects of concession re-negotiations in Brazil, the recent experience was analyzed.[23]

57. **Renegotiations**. Brazil had a greater proportion of concession contracts renegotiated (41 percent) than the LAC region (30 percent), with higher frequencies in water and sanitation (100 percent) and transport (57 percent) – a pattern also found in the region. Most of the renegotiations (roughly three-fourths) were initiated by the government (federal or state), compared to one quarter in LAC, which suggests that the election cycles had an impact on contract stability in Brazil. The average time until the first renegotiation occurs is lower in Brazil than in the LAC. Renegotiations were initiated due to tariff revisions and change in investment plans/needs, as opposed to the LAC region, where macroeconomic crises played a bigger role than the other two factors. As a consequence, all of the renegotiations in Brazil resulted in a change in investment plans or tariffs and no case of cancellation or of a government's take-over was registered. In LAC, almost one-third of the renegotiations resulted in a government takeover, cancellation or awarding of a new concession. It seems, therefore, that Brazil had a higher incidence of renegotiations in a shorter period of time than LAC as a whole. Although contract renegotiations cannot be considered bad *per se,* the phenomenon in Brazil may be a symptom of poorly designed concession contracts and a cause of inadequate risk-premium rates for infrastructure projects (see Table 3). What are the possible underlying causes?

58. **The regulatory regime.** Renegotiation seems to be less likely to occur when an independent regulatory body is in place, as the existence of a technically sound arbitrator reduces the expected return of opportunistic strategies. In Brazil, all the contracts in sectors for which no regulatory body existed were renegotiated, in comparison to one-fifth of the contracts in sectors where there existed a regulatory body. (In LAC, these figures were 61 percent and 17 percent, respectively.) Also, renegotiation seemed to be more likely when the regulatory framework was embedded in the contract rather than in a law, as a stronger legal grounding lessens the probability of a successful outcome in terms of rent-extraction. In Brazil, no cases of contracts with regulation established by law were renegotiated, compared to 41 percent of the cases in which the regulation is embedded in the contract. Finally, the rate-of-return regulation seems to lower the probability of renegotiation because the costs of potential adverse events are borne by the consumer. With price cap regulation, the risk is borne by the operator, and eventually a renegotiation process is triggered so as to restore the financial equilibrium of the concession. Brazil used more price cap regulation than the rest of the LAC region. The riskier nature of price-cap regulation may in part explain the higher incidence of renegotiation in Brazil than in LAC. Since price caps are also the dominant mode of regulation in LAC, other factors may explain this discrepancy.

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[22] Once an enterprise has been granted a concession or franchise in an infrastructure sector, that enterprise may correspondingly be able to take actions that "hold up" the government, for example through insisting on renegotiating the regulatory contract *ex post*, or through regulatory capture to extract supernormal rents from the users, in detriment of efficiency.

[23] The results are based on a sample of more than 80 concession contracts, distributed among telecommunications, energy, transport and water and sanitation. They are a special tabulation prepared for this report from the dataset used by Guasch (2004).

Table 3. Summary of the main sector issues

Sector/Main Issue	Detailed Explanation	Where the Government Stands	Key Next Steps
Telecommunications Dismantling cross-subsidization without risking coverage levels	Service expansion and universalization through cross-subsidization (high income consumers + interconnection fees); operators concern about competition promotion without universal goals revision (financing from FUST could be used)	No investment policy for the use of FUST resources	Consider the use of FUST for reduction of cross-subsidy
Power			
Electricity: Private generators feel harmed by changes in sector law	Change in rules did no preserve all rights for hydro concessions, which might affect rate of return of plants under-construction; first action for "new energy" was not completely successful	Waiting for the first results of the new model; first auction did not achieve the expected outcomes	Fully align auctions incentives with private participation/ improve public information on the expansion of the systems (EPE's project)
Natural gas: Policy definition of the role of natural gas/ access to pipelines	Pending optimization of hydro and gas (both volatile markets) in thermal generation; high fixed costs of developing gas infrastructure still to be amortized; *Petrobrás* monopolizes operations of pipelines and gas transportation (also shareholder of some thermal plants and distribution companies)	Draft law (PLS No. 226/2005) with a new institutional framework for the natural gas industry is under discussion in Congress	Approve the revision of the sector law and define the role of natural gas industry in Brazil's energy policy
Transport			
Ports: Non-continuation of reforms	Reform (privatization, competition promotion, and decentralization) stalled due to the absence of clear policies and guidelines; dock companies have not been privatized; cross-ownership among terminals and small number of operators prevent inter- and intra-port competition, respectively; labor issue remains (oversized gangs and excessive compensations); unclear regulatory functions	*Agenda Portos* of 2004 not fully implemented; hiring program for dock companies is being implemented (benefits 4 ports)	Increase corporate governance of Dock companies/complete labor reform / clarify regulatory attributes of regulators
Highways: Lack of policy definition	Reforms aimed at addressing elimination of road fund and improve maintenance policy; agreement with states for road transferring not always implemented; contract management and execution still inefficient; DNIT not performing functions effectively	Waiting for the next round of concessions /improving the institutional capacity on managing maintenance and rehabilitation	Implement the second phase of the concession program/ make decentralization effective/ complete DNIT capacity building.
Railways: Attracting *new wave* of private investments	Sector reform was successfully implemented: privatization in the mid-1990s, but ownership structure entangled interests of shareholders and companies; since 2003, ANTT's Resolutions addressed ownership and operational bottlenecks	Restructuring completed; ANTT improved interconnection tariffs methodology and supporting enhancement of multimodal transportation	Expedite the process of concession award
Water and sanitation: Sector legal framework still to be defined	Uncertainty on legal concessionary for provision of services of "common" interest; lack of appropriate regulatory bodies; overall poor institutional environment; economies of scale in services provision not taken into account (Brazil: 90% of municipalities account for 35% of population);	Consortium Law (No. 11,107/2005) allows state companies to be concessioned by municipalities; 2 draft laws (PL No. 5,296/2005 and PLS No. 155/2005) for the sector under Congress revision	Approve sector law; Increase corporate governance of SOEs Induce concessions/PPPs that address the appropriate scale and cost-effective subsidies

Source: Own elaboration.

59. **The awarding criteria and concession design.** In addition to regulatory issues, renegotiation seemed more likely when concession awards were based on the lowest tariff rather than the highest concession fee. This is partly because the minimum tariff imposes little "sunk" commitment on the concessionaire, thus reducing the costs of opportunistic behavior. In Brazil, 95 percent of the contracts awarded by the lowest tariff were renegotiated (60 percent in LAC). By comparison, 5 percent of the concessions awarded by the highest transfer fee in Brazil were renegotiated (11 percent in LAC). Concession designs may induce contract renegotiations when affordability and expansion/coverage issues are not addressed in a consistent way, as indicated by the frequency of renegotiations motivated by changes in tariff or investment plans in Brazil. For instance, large investment might have contributed to an increase in tolls on state roads in Paraná, triggering a contract renegotiation by the newly elected government. Although other factors such as cost-plus regulation may have exacerbated this outcome, the fact is that a less ambitious investment plan would have resulted in lower toll charges, reducing the incentives for political interventions. The difficult trade-off between coverage and tariffs is critical in water and sanitation and may be mitigated by targeted output-based mechanisms.

60. **Concession contracts must be better designed to avoid "excessive" renegotiations.** Renegotiations can be a good instrument to address the incomplete nature of concession contracts but the characteristics of renegotiation activity in Brazil suggests that it was "excessive," motivated more by opportunistic behavior than win-win opportunities. Ideally, renegotiation should occur only when justified by initial contract's built-in contingencies or by major unexpected events. The object should be to improve the design of concessions to secure long term sector efficiency, fostering compliance with the terms agreed to by both the government and the operator.

61. **The design of concession contracts is additionally complicated by the definition of concession objectives and risk allocation.** For instance, the objective to secure increased coverage, particularly of the poor, often reduces the cost recovery of the project and involves the use of public subsidies, adding to the regulatory risk and cost of capital. While investors in developing country infrastructure projects have been willing to accept greater risks in order to achieve higher returns, there are some forms of risk that private investors have been reluctant to bear, as they cannot manage them well and significant potential losses may be involved. Exchange rate fluctuations and regulatory risks are examples of risks normally required to be managed by host governments; however, governments must be careful to neither take on too much risk nor to over-compensate for it.[24]

62. **One contributing factor for lower returns on infrastructure services in 1998-2003 may have been the 1999 exchange rate devaluation.** Contrary to most LAC countries, prices of telecommunications, energy, and water services declined in real terms when measured in U.S. dollars. Prices increased substantially in real terms, however, when measured in local currency. This dichotomy may be explained, at least in part, by an incomplete indexation to the U.S. currency provided by the General Market Price

[24] See Mas (1997) for a discussion on whether governments should take this risk or not.

Index (IGP-M), used in almost all concession contracts. It reveals that the index was imperfect substitutes for traditional financial-hedging, underlining the need for future concession contracts to appropriately address the issue of exchange rate risk.[25] In January 2006, tariffs of telecommunications services began to be indexed by the Telecommunications Services Index (IST), discounting the productivity factor calculated based on the rules set by regulatory agency (ANATEL), and price increases were effective in July 2006. [26,27] The IST's methodology was designed to reflect the telecommunications sector-specific cost-related structure, being monthly published by ANATEL and its composition should be revised in every two-year period.

63. **A second factor contributing to low returns on infrastructure investments is poor enforcement of tariff policies.** This can be due to weaknesses in sector laws or concession contracts. For example, telecommunications present better returns than the other sectors. This is not surprising because telecommunications is the sector with the most stable and consolidated regulatory environment – indeed, it was established before privatization occurred. In the water sector, an extreme case, the regulatory environment is incomplete and contracts are subject to systematic political interference (see Chapter on Regulation and Contract Renegotiations).

Table 4. Brazil: party that initiated the renegotiation for transportation and water sectors

Sector	Concessionaire	Government	Total
Transport	0	32	32
Water	22	28	50
Total	22	60	82

Source: Own elaboration based on Guasch (2004).

64. **A third factor may be the persistence of non-technical losses, particularly in the electricity and water sectors.** *Light*, the electricity distribution company that operates in the city of Rio de Janeiro, reports that 30 percent of the energy that it distributes is stolen through clandestine connections. The state-owned company of water and sanitation in São Paulo state (SABESP) had economic losses due to illegal network connections that reached RS$ 48 million in 2003 just for the metropolitan region of São Paulo city. This accounted for 1.2 percent of the company's profits or 45.7 percent of the investments made by the company in 2004.

65. **Another important cause of the low profitability of infrastructure concessions is the high investment levels in the initial years.** Also, as network expansion reaches more remote areas, the profitability of the privatized distribution companies tends to be further reduced. The local telecommunications companies in

[25] For further details, see Volume II, Chapter 4, Sections 4.1 and 4.2.

[26] The IST is a bundle composed of the Consumer Price Index (IPCA), the Wholesale Price Index-Global Supply/Industrial Machinery and Equipment (IPA-OG), and the IGP-M in the proportions of 46 percent, 34 percent and 6 percent, respectively. The reminder 14 percent is composed by several price indexes calculated by IBGE and FGV.

[27] Price increases of telecommunications services for 2006 will be based on the General Price Index – Domestic Availability (IGP-DI) for the period June-December 2005 and on the IST for the period January-May 2006.

Brazil had ambitious expansion targets in the first years after privatization: the number of fixed lines per 100 habitants increased from 8.5 in 1994 to 27.8 in 2003. Universalization targets also existed in the energy and water sectors but on a much lower scale.[28] In the case of the LAC region, average investment levels as a share of total revenues in the first initial years varied from 21 percent in energy to 32 percent in water. As the investment levels stabilize over time, concession returns tend to increase.

66. **Appropriate definitions of coverage objectives and allocation of risk, particularly exchange rate and regulatory, are likely to continue to be central issues in attracting private capital to infrastructure investments, despite some recent important steps.** In particular, the new Public-Private Partnership (PPP) Law provides for guarantees against the federal government's failure to comply with the financial obligations established by any PPP contract but not against regulatory risk. Preliminary discussions within the federal administration in 2005, considering the possibility of replacing the IGP-M by sector-specific cost-related indexes may be a good strategy to eliminate the implicit and imperfect hedging mechanism that existed in the contracts but does not solve the exchange rate risks problem. The second phase of highway concessions will probably include awarding mechanisms that discourage strategic bidding by possible operators but will not protect investors against regulatory risk and opportunistic behavior by the public sector.

C. Regulatory Governance

67. As in many other countries, infrastructure regulators were created in Brazil with the objective of increasing the credibility of the government's long term commitment to respect concession rights. However, this objective can be fully accomplished only when the appropriate regulatory governance is in place. Namely, there must be (a) autonomy to exercise effectively the powers that are granted by statute, (b) a decision-making process that guarantees consistency and avoids arbitrariness, (c) access to adequate means and regulatory tools to make and enforce decisions, and (d) accountability. Weak regulatory governance leads to inadequate implementation of regulatory rules and concession contracts, thereby influencing the return-risk ratio of infrastructure projects (see Figure 6). The current state of regulatory governance in Brazil was assessed for a background paper prepared for this report, based on the results of a survey of 21 federal and state regulatory agencies. The relevant results are summarized below.[29]

68. **Autonomy.** In almost all cases, infrastructure regulators have the power to regulate tariffs and most of the formal attributes for political autonomy are in place. Autonomy is provided by law to almost all regulators. With the exception of 6 state level agencies, there are legal restrictions on the dismissal of directors. In the majority of cases, directors have fixed-term tenures that do not coincide with the government's tenure. Yet formal attributes do not always translate into effective outcomes. Among the directors, one-third did not complete their terms. Thirteen agencies reported that ministries or state governments have interfered in their decision-making process, with a higher incidence

[28] For the case of LAC see Sirtaine *et al.* (2005).
[29] Based on Correa *et al.* (2006).

among state agencies. Regarding financial autonomy, the majority of the regulators report having had their revenues impounded (*contingenciados*) by the Executive. This caused "very high" (46.2 percent) or "high" (30.8 percent) negative impacts on the agencies' operations.

69. **Decision-making.** Most of the regulators (18 out of 21) are legally required to formally document the decision-making process, detailing the actions of each actor involved. However, only 8 agencies are required to cite jurisprudence in support of their decisions. This weakens regulatory consistency over time. Formal documentation of the decision-making process is legally required and must contain every action of actors directly involved in the process. Nevertheless, only in a few cases is the informal exchange of information among board members prior to the decision meeting ("decision-rigging") formally prohibited and subject to sanction. In a lower number of cases, a legal apparatus prohibits informal meetings between directors and stakeholders ("cheap-talk"). In 17 agencies, external actors and those affected by the agencies' decisions are entitled to take part in the decision-making process. This has created substantial participation, especially since such participation has led to changes in decisions in 15 agencies.

70. **Decision tools and means**. Almost all surveyed agencies considered themselves to have the legal means to secure compliance with their decisions. Standard regulatory tools were available for the majority of regulators, but a surprisingly high number (8 out of 21) did not answer or did not have access to such tools. More sophisticated instruments related to economic regulation (as opposed to technical regulation) were less available. Only one-fifth of the agencies' personnel, on average, were admitted by public exams (26 percent and 18 percent among federal and state agencies, respectively). Salaries offered by agencies for top technical and managerial positions were considered to be much lower (at least 25 percent) than the salary of the attorney general or the state finance secretary (used as benchmarks) by 12 of the 21 surveyed agencies.

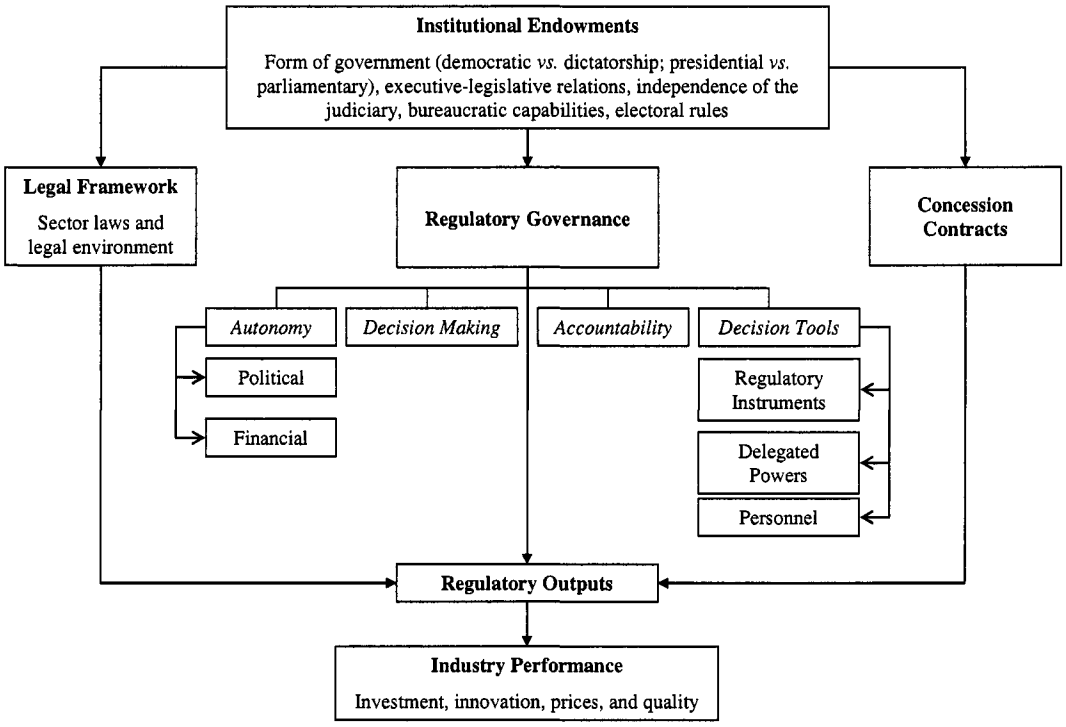
71. **Accountability**. Congress and state legislatures exert some control over 17 agencies, which includes (a) requiring public hearings, (b) summoning the directors, and (c) making official requests for explanations. Public hearings do affect agencies' decisions, as they have caused changes in decisions at least once in 15 agencies, while in one-forth of the agencies, at least one case has been settled by the Supreme Court.

72. **In sum, most of the general elements for good governance transferable by law were put in place and the challenge is related to the development of those more detailed attributes that could not be transferred by law, as well as to their effective enforcement**. For instance, while regulators are formally required to document their decision-making process, few agencies are required to cite jurisprudence in support of their decisions or provide for legal sanctions against informal meetings between directors and stakeholders. Moreover, there are no legal impediments for board members to rig decisions prior to decision meetings in most of the cases, and nothing precludes directors from participating in informal meetings or engaging in undocumented exchanges of information with stakeholders. Most of the agencies reported salary levels that may be interpreted as non-competitive, entrance through public exams for permanent positions was rather rare; and the share of staff with graduate studies was reported to be very low.

More sophisticated regulatory instruments, especially those related to economic regulation – such as benchmarking instruments and methodologies for the establishment of interconnection tariffs – are available only for a small number of regulators (normally federal agencies).

73. **Initiatives to improve the state of regulatory governance include the draft Bill concerning regulatory agencies** *(Lei das Agencias)* **and the Career Development law.** The draft *Lei das Agências* includes some important achievements, such as the transfer of the power to award concessions and the reassignment of planning policies to sector Ministries.[30] The proposed introduction of management contracts between the agencies and the executive power may threaten regulators' autonomy and no major change was proposed in terms of improving the detailed attributes of regulators.[31] The approval of a career development law has enabled some public exams for new hiring but the existing salary structure and benefits seem to be inferior to other comparable careers within the public sector.

Figure 6. Regulatory governance, effectiveness and industry performance



[30] The draft Bill concerning regulatory agencies *(Lei das Agencias)* was submitted to the House of Representatives in April 2004 and has not been voted yet.

[31] For further details see Volume II, Section 5.5. For a comprehensive review of the draft *Lei das Agencias* see Correa and Pereira Neto (2005).

III. Policy Recommendations

74. Amid a shifting policymaking environment, this report addressed the question of how policymakers can revitalize infrastructure investment in Brazil. More infrastructure in is needed and given Brazil's current fiscal dilemmas, the report focused on how public policies may attract *more* and *better* private investment by reducing the cost of capital for infrastructure investments and raising long-term returns of infrastructure concessions. This does not mean that the role of the government should necessarily decrease, but rather that the country should avoid swinging the pendulum back to the pure public financing option.

75. The challenge Brazil currently faces is how to bring back the private sector – how to translate infrastructure opportunities into projects with competitive rates of return. This requires curbing regulatory risk and raising projects' revenues, two tasks for which the role of the public sector is central: governments are ultimately responsible for regulatory risks, and through tariff policies, subsidies and related mechanisms can, directly or indirectly, influence projects' revenue. A second challenge is to make sure that the benefits of private participation are transferred to consumers and the economy as a whole.

76. This report argues that in order to ensure the needed private sector participation in infrastructure, the government should go "back to basics" and strengthen its fundamentals, including stable and comprehensive regulation, adequate risk assessment and clear and unchanging rules of the game. A long-term strategy and commitment to reform would restore the government's credibility and encourage greater private investment in infrastructure. Maintaining a high quality of public sector investment will leverage this private investment to maximize Brazil's growth potential. The remainder of this section summarizes some of the possible elements of new public policies.

77. **A first component of a strategy to reinvigorate the infrastructure sector in Brazil should be to further strengthen the fundamentals for private participation.** This involves: (i) completing the regulatory reforms in the port, natural gas and water and sanitation sectors; (ii) raising regulators' effectiveness by building into their decision-making processes the incentives to enforce technically sound and coherent decisions and the tools required to do so, such as well-motivated and trained staff, particularly at state-level; and (iii) improving contract design to avoid excessive contract renegotiations that eliminate the economic benefits achieved through competitive biddings and augment perceived regulatory risk. In this respect, a central issue is how to manage and allocate risk, particularly exchange rate risk: while some risk protection instrument may be needed to make risk-return ratios of projects attractive, the government must be careful to neither take on too much risk nor over-compensate for it.

78. **The importance of stable and credible regulation in making infrastructure investments in Brazil a low-risk/low return long-term investment, as in most OECD countries, should be recognized.** From the 2001 energy crisis and the delay in launching the last batch of road concessions, to the high incidence of contract renegotiations in water and sanitation, to the change in the energy model and the long-lasting debate over the role of regulators, the picture that emerges is not one that favors the recovery of

private investments in infrastructure. Thus, even though it will be impossible to address all of the regulatory issues simultaneously, Brazil must address a significant number of them at once in order to re-create momentum for a new wave of private participation in infrastructure. The start of a new administration always has a certain amount of natural momentum, and is a good opportunity to promote a new initiative. Effective public communications, perhaps including the creation of a "white-paper" on infrastructure strategy, would reinforce such an initiative's chances of success.

79. **Second, providing partial guarantees against regulatory risk** – particularly regarding the aspects of the regulatory environment over which the government has reasonable control. This may be an effective way of leveraging public resources as illustrated by the partial risk guarantee offered by the World Bank in Peru. Because infrastructure investments are sunk and projects have long maturities, the stability and credibility of the institutional environment for infrastructure is at the heart of private participation. The expectation that governments may have strong incentives to fail to honor concession rights – or that sector rules may change – may discourage investment in the first place or elevate the premium required for investing in a given project, thus augmenting the costs of capital and tariffs to be charged to consumers. Even when the regulatory environment has been correctly reformed, it will take time to establish a reputation for stability and good regulation. Partial risk guarantees against regulatory risk may be a way of buying regulatory credibility.

80. **A third component of such a strategy is improving the quality of public expenditure in infrastructure.** As an elementary goal, Brazil needs to invest more and efficiently on road maintenance and rehabilitation by defining a stable source of funds and expanding the use of output-based contracts. The approval of a multi-year highway expenditure program, under preparation, would be an important instrument. In addition, given the possibility that PPP contracts crowd out pure concession options, a sound institutional framework for the use of public resources in infrastructure projects should be consolidated and made public. One possibility is to build on the existing initiatives of PPP units in different ministries and within the Pilot Infrastructure Program (*Programa Piloto de Infra-Estrutura*). The Box below discusses in more details some of these initiatives. In addition, sector policies should be better defined, providing the appropriate information for both private and public sector planning. This is relevant in the road sector, where the decentralization strategy has stalled; and in energy, where the long term system expansion plan was recently released but major issues remain, particularly in terms of the role of the natural gas industry.

81. **Fourth, a systematic assessment should be undertaken of the direct and indirect impacts of access to infrastructure on income distribution and social indicators**. This would address the crucial issue of how to protect federal public infrastructure investments, given the incentives embedded in the current institutional environment. Infrastructure expenditures suffer similar free-riding and coordination problems as the provision of pure public goods. These problems are exacerbated by a political institutionalism that favors short-term local objectives to the detriment of the long-term national ones. In addition, the decentralization of public revenues to states and municipalities makes coordination and free-riding issues even more pressing. Finally,

given the current budgetary rigidity, the level of current expenditures, the high taxation and the costs of additional debt, any substantial increase in public investments in infrastructure will inevitably require a reallocation of revenues and a more flexible use of "earmarked" expenditures. These are politically sensitive issues, as they touch upon powerful vested interests and affect strong social preferences. This sensitivity may be reduced, however, through the proposed systematic measurement. Such an assessment should occur within the broader context of a long-term growth strategy for Brazil.

Box 1. "Buying Credibility" through Partial Risk Guarantees (PRG) against Regulatory Risk

Delegating regulatory functions to an independent institution addresses only partially the problem of creating the "credibility" that concession contracts will be enforced in the long-term and that the government will refrain from act opportunistically once investments are sunk. The problem is that regulators have to be credible themselves which may takes time to occur. The credibility of regulators depend essentially on the state of regulatory governance – the degree of independence, adoption of appropriate decision-making rules; access to regulatory tools and staff; and accountability. In addition, incomplete legal and policy frameworks and poorly designed concession contracts may also affect the reputation of the regulator.

One way governments could "buy credibility" in the context of stimulating private investments in infrastructure is offering a guarantee of risks under the control of government. On example of this class of public support to private investment is the PPP provision of guarantees for non-payment of federal government's financial obligations under this type of contract. But even under pure concessionable projects, there are risks under the control of the government, broadly speaking: from a change in sector law; to the disrespect of a contractual clause or a change in sector regulation that clearly affects the returns to the investment. In order to cover for regulatory risk, all needed is a set of incentives in which who ultimately absorbers the risk of regulatory failure is capable of sufficiently punish who causes it. By definition, the risk is limited to a certain amount of well-known states of nature and is therefore "partial." This structure of incentives may or may not involve an international institution such as the World Bank.

Consider a potential role for the federal government in a hypothetical PPP by a Brazilian municipality. The private investor faces at least three risks: (i) the commercial risk of the project; (ii) the risk of non-payment from the municipality; and (iii) the regulatory risk, associated with the *poder concedente* issue and other explicitly expressed in the concession contract (such as tariff re-adjustment, revision rules; quality targets, investment plans, etc). One alternative to reduce the regulatory risk in this case is by federal guarantee for the contractually agreed regulatory commitments – which are fully controlled by the municipality (and not for the *poder concedente* issue, which still requires further consolidation by the judiciary). The guarantee would be issued against the right to suspend federal funds once its use is triggered by the private investor. The fact that the municipality volunteers itself to such a deal would be, therefore, a powerful sign of regulatory commitment. Note that what is needed is a hierarchical financial relation between the institutions which takes the risk the institution that may affect it. A similar product is offered by the World Bank.

82. **Finally, more planning is need to help Brazil determine how to address its long-term infrastructure needs.** This requires defining and periodically reviewing a comprehensive infrastructure strategy, consolidating a planning process that is still fragmented either among ministries or between federal entities. It should involve a rationale of the programs aimed at improving access for the poor through better leveraging the impacts of infrastructure on income distribution and poverty alleviation. It ought to identify potential sources of financing, both private and public, including expected contributions by different levels of government and potential bottlenecks for private participation. Ideally, it would cover other strategic issues as well, such as the active use of competition as a tool to promote private sector participation and economic efficiency. The infrastructure strategy could be part of the government's multi-year plan

(*Plano Pluri-Annual*) formulation and subsequently mapped into the multi-annual budgetary program (*Lei de Diretrizes Orçamentárias*) and the annual budget (*Lei do Orçamento Anual*).

Box 2. The Quality of Public Expenditures

Supporting the right project, one of the conditions for efficient public expenditures, requires appropriate project selection and design. Adequate project selection involves identifying and ranking by economic return all alternative uses of available resources. This approach, although theoretically feasible, imposes unduly large information demands. Even when new investments represent the right choice, faulty engineering design may lead to project failures. Another challenge of infrastructure projects is financial sustainability. Even though financial and economic rates of return are expected to diverge in several cases, reliable financial projections at the project appraisal stage are essential to avoid inadequate financial rates of return. Such an outcome would undermine the sustainability of infrastructure projects and, in extreme cases, produce "white elephants." Therefore, projects with low financial returns should be subject to careful additional scrutiny before receiving public support.

More funding is required for maintenance. Ensuring availability of funds to pay for maintenance of non-revenue earning infrastructure projects poses a different challenge. The full cost of the project rarely incorporates the expected cost of maintenance. Either because political reasons disfavor the allocation of budgetary resources for maintenance in comparison with new investment, or because maintenance is more cost-effective than re-construction and less risky than new projects, countries usually benefit from reallocating resources to the activity. Over the last six years, annual averages of about RS$ 600 million for rehabilitation and RS$ 150 million for maintenance have been spent on the paved federal road network in Brazil, a level that is supposed to be enough to avoid further deterioration of the network. But in order to increase the share of road in good conditions from the current 25 percent to 63 percent, the World Bank estimates that roughly RS$ 1.2 billion a year will be required over the next six years, at least.

The quality of public expenditures can be further improved through better planning and the stability of funds. In road maintenance, for instance, the adoption of output-based contracts and the provision of a stable flow of resources could avoid contract renegotiations and cost increases due to delays in startup, interruption in implementation and non-payment by the government, and could bring significant cost-savings. Bank analysis show that the unit costs of output-based contracts are 30 percent less than of traditional contracts, while contract renegotiations have increased contract costs by at least 50 percent. More broadly, the type of support provided to infrastructure (e.g., output-based cash subsidies, in-kind grants, tax-breaks, guarantees, or even non-fiscal support) must be evaluated carefully because each instrument poses different costs and offers different levels of accuracy depending on the situation.

The approval of Law No. 11,079/2004 -- the Public-Private Partnership (PPP) law – is a major contribution to better public expenditures in infrastructure but there are important risks as well. The PPP law will introduce more flexibility to public procurement rules and allow for public funds to complement private resources when pure concessions are not feasible. Despite its potential benefits, one concern is that "PPP contracts" will crowd-out pure concession projects. The problem is that, given asymmetries of information, PPP contracts may end up compensating for regulatory risk instead of simply equalizing social and private returns, thereby artificially raising private returns. This would be a waste of public resources and create a perverse incentive against improvements in the regulatory framework. To prevent this, PPP contracts should be ruled by a set of regulations and a governance structure that would make sure that the instrument will not be used as a substitute for projects that would be otherwise concessionable under normal regulatory conditions.

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