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WRI ROSS CENTER FOR SUSTAINABLE CITIES

PRIVATE INVESTMENT IN PUBLIC TRANSPORT

Success Stories from Brazilian Cities

EMBARQ®

DAVID LEIPZIGER AND BENOIT LEFEVRE

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Design and layout by:

Carni Klirs
cklirs@wri.org

Julie Moretti
jmoretti@wri.org

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FOREWORD

In recent decades, most cities have been designed more for automobiles than for people. This is proving to be a costly strategy. City leaders are recognizing that traffic congestion and air pollution can each choke off more than 5 percent of city Gross Domestic Product (GDP). Traffic accidents add additional costs. More important than the economic costs are the human costs of ill health, stress, and premature death.

With another 3 billion people being added to urban populations in the next 40 years, there is greater recognition that things must change. A "new urbanism" is emerging, in which more compact form and better public transport play a central role.

But how can a city finance public transport? Few governments at the central or city levels have the public resources to enable adequate investment, leading many to seek private sector solutions, which can bring expertise as well as money. But this, in turn, has proven difficult. Private investors are wary of unreliable policies, weak public administration, and the difficult local politics that often surrounds public transport decisions.

There are, however, important examples of success and it is important to understand their lessons. This report, produced by the WRI Ross Center for Sustainable Cities, highlights two projects from Brazil that managed to secure private investment for effective public transport infrastructure and operations. These successes indicate that federal governments have a role to play in creating legal and regulatory contexts to support public-private collaboration; and that local governments can effectively craft projects and contracts to reduce private sector risks at the project level. Understanding and managing the risks faced by private investors is central to success. This requires capacity building within central and city administrations to ensure appropriate project structuring. Most importantly, there is no substitute for trust between public and private sectors. If both parties can work together, all will benefit. Given the extensive benefits of robust urban transportation networks, collaboration cannot start soon enough.

Andrew Steer
President
World Resources Institute

EXECUTIVE SUMMARY

High rates of motorization and urbanization, particularly in developing countries, underpin strong growth in the transport sector. Global investment in transport infrastructure is expected to increase by more than 50 percent to meet demand over the next two decades (Dulac 2013). Burgeoning demand has made transport the world's fastest-growing source of carbon emissions. The integration of urban transport financing and land-use strategies is a key element in managing growth in transport demand and emissions (IPCC 2014). The promotion and financing of public transport networks requires action from federal, state, and municipal governments, but the private sector can play an instrumental role.

There are three main reasons why the public sector may turn to private investment for public transport: operational expertise, financial capacity, and efficiency. While the cost of capital for the private sector is typically higher than for the public sector, the private sector often has deeper experience and the ability to deliver adequate financing with high value for money (Boeuf 2003). Moreover, for low-carbon transport projects, public funds are insufficient to meet infrastructure needs. Climate finance flows (that is, funding mechanisms that explicitly support climate change mitigation or adaptation) remain far below the level of investment that will be necessary to scale low-carbon transport to meet mitigation or adaptation needs.

Market and institutional barriers pose investment risks and uncertainties that might limit a larger role for the private sector in urban public transport. The high level of perceived risk, low rates of return, and lack of confidence in the public sector are the main deterrents to investment. In order to highlight strategies and approaches that effectively minimize risk for private partners, this report examines two case studies from Brazil: Linha 4 of the São Paulo Metrô, and Estação Barreiro bus terminal in Belo Horizonte. Based on WRI research on private climate finance (Polycarp et al. 2013; Venugopal and Srivastava 2012), we adopt a framework that analyzes public interventions on two levels: supporting enabling conditions at the market level and implementing de-risking instruments at the project level.

Private sector involvement falls into four broad categories, which are (in order of least to most ownership granted to private firms) brownfields, concessions, greenfields, and privatizations (Estache and Serebrisky 2004). To encourage private investment, public actions can be taken to reduce risk for investors. Risk factors for transport projects are diverse and can relate to changing economic or political fortunes, social or environmental shocks, or implementation issues (for example, quality issues, cost overruns, and time delays). To mitigate these risks, public entities can deploy a range of de-risking instruments, including financial and non-financial guarantees, swaps and derivative products, local currency loans, liquidity facilities and lines of credit, and concessional finance (Venugopal and Srivastava 2012).

Our analysis demonstrates that, since the 1990s, the Brazilian government has made great efforts in the areas of policy, institutions, industry, and finance to encourage private investment in infrastructure. The urban transport sector, however, has seen comparatively little investment. Even the recent boom of transport investment undertaken in preparation for the 2014 World Cup and 2016 Rio Olympics has been financed almost entirely by the public sector. Recent unrest over public transit fare increases in Brazilian cities has also underscored the perceived inadequacy of investment. To accelerate investment in urban transport, federal and local

governments need to focus on reducing investor risk and refrain from crowding out private money with cheap public finance.

The case of Linha 4, a 12.8-kilometer subterranean metro line with six stations, is notable as the first urban transport public-private partnership (PPP) to be implemented under Brazil's formal PPP laws. The line adds critical capacity to the São Paulo metropolitan region's transit network and connects poor suburban communities to central employment areas. It was therefore in the interest of development banks—including the Inter-American Development Bank (IDB), World Bank, and Japanese Bank for International Cooperation (JBIC)—as well as private investors to finance the $1.8 billion project. The operation and rolling stock were obligations of private partners, the ViaQuatro consortium, which negotiated additional guarantees on top of the initial project structure.

Linha 4 successfully integrated disparate transit lines in São Paulo and exceeded its capacity goals even though its cost (per km) is among the lowest of any line in the São Paulo Metropolitan Region (SPMR). Our analysis of the Linha 4 case demonstrates how contract structures can effectively balance risks and how project structure can be improved. The project utilized a financial guarantee backed by the state's transit receivables (revenues from the state's integrated transit system)—a creative solution that was brokered through negotiation and demonstrated the flexibility of both public and private players. The involvement of multilateral development banks lent credibility, and the project was undertaken in an area with pent-up demand. The risk of separating construction and operation contracts, however, was demonstrated by serious delays in construction, which have led to the private partner seeking compensation for deferred revenues in operation (Bland 2014). A recent metro PPP in São Paulo (Line 6) was able to combine construction and operation; it is too early, however, to speculate on the outcome.

Our second case study is Estação Barreiro, a transit-oriented development in the city of Belo Horizonte. The innovative project involved the city partnering with a private company to develop a property in the working-class neighborhood of Barreiro into a mall with a public bus terminal on the ground floor. After the concession auction without public compensation received no bids, LGN, a developer, negotiated with the city to receive a payment of $3.9 million and developed the site with a $21 million investment of its own. Numerous risk mitigation strategies, like reducing transit competition and expanding the revenue-generating opportunities for the private partner, were embedded in the contract.

Estação Barreiro was a success for both public and private parties, although late public payment has soured private perceptions of government accountability. Still, our analysis of the project highlights how the dedication and flexibility of a local public transport authority can be crucial in leveraging private investment for urban transit. Other projects in Belo Horizonte with similar development models have been structured differently and have struggled to attract financing. At fault are contracts that leave little room for negotiation and low interest rates from public financial institutions that crowd out private financing.

At the project level, de-risking instruments have attracted private investors to public transport. Flexible, collaborative, and innovative local authorities are able to structure compensation in ways that effectively reduce risk, protect returns, and increase profitability. To help align incentives and monitor progress, a project integrator chosen by both public and private partners may be useful (one was sought for Linha 4 but not hired). Nevertheless, key impediments exist at the project-level. They include the following:

- Corruption, mismanagement, inefficiency, and political in-fighting lead to a lack of confidence in the public sector. Stronger credibility can drive more PPPs and reduce the need for public sector concessions.
- Projects are structured without properly aligned incentives and sufficient compensation. Designing more competitive projects can help to drive more private interest.

Estação Barreiro and Linha 4 offer examples of successful leveraging of private investment for public transport. Yet, neither financial model has been replicated in Brazil. More broadly, while the Brazil-

ian government has invested heavily in market-level conditions to support private investment in the transport sector, the private role has barely increased in the past decade. The effectiveness of these incentives is hindered by two main factors:

- Artificially low interest rates from public financiers have led to underdeveloped private capital markets, particularly for the transport sector. A focus on expanding private credit can help to drive more private investment.
- Stated public sector priorities are not aligned with market characteristics. While government rhetoric supports sustainable transport systems, actions have been insufficient to foster a financial ecosystem that matches projects with financing.

Given the centrality of transport to sustainable development and the presence of international investment in infrastructure development, there might be opportunities for climate finance to support the involvement of the private sector through strategic interventions. Climate finance (funding mechanisms that explicitly support climate change mitigation or adaptation) could be deployed in several ways. One role could be to subsidize public payments directly, in order to shore up guarantees of government payment. Another lower-cost option is to focus on the fundamental readiness conditions necessary to attract investment (Lefevre and Leipziger 2014). A third tack could aim to fund technical assistance for projects of interest to the financial community.

Lessons from Brazil are instructive for other countries as well. National-level policy and regulatory frameworks for PPPs are an essential first step. These cases demonstrate that even with such frameworks in place, capacity-building for structuring urban transit PPPs and a robust private capital market are needed. Finally, these Brazilian cases demonstrate that there is immense value in building trust between private firms and public authorities—a strategy with benefits far beyond climate change and transport imperatives.


SABO

INTRODUCTION

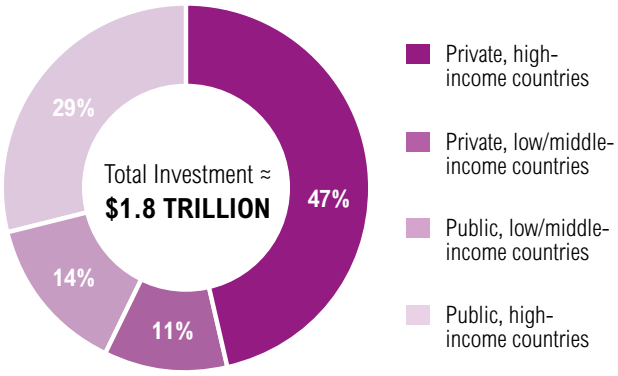
Transport is a fundamental component of economic growth and a giant global industry. The transport market is expanding rapidly: global investment in transport is projected to increase by more than 50 percent in the next two decades, and could reach $45 trillion in 2050 (Dulac 2013). And investments made today in transport infrastructure will have long-term lock-in effects on economic and environmental outcomes.

The transport sector is the world's second largest contributor to, and the fastest-growing source of, carbon emissions. Carbon dioxide emissions from transport, currently over 6.7 Gigaton CO_2 per year, are expected to double by 2050 (IEA 2012). At the local level, transport emissions can be responsible for 70-90 percent of air pollution in urban areas (Kim and Dumitrescu 2010). Low-carbon, sustainable transport modes reduce environmental damage while offering diverse positive externalities (Maizlish 2011; WHO 2010; Bannister et al. 2007; Schade and Rothengatter 2004).[1] Urban public transport is generally considered to be "low-carbon" because of its role in drawing demand away from private motorized vehicles; it also has broader co-benefits for health, efficiency, economic development, and equity (Litman 2013; Carrigan et al. 2013; INE 2006; Duduta et al. 2012).

A primary driver of the increase in transport demand, and related environmental consequences, is the boom of urbanization in developing countries. Between 2000 and 2010, passenger kilometers from urban private motorized transport increased by 35 percent in the developing world (Ang and Marchal 2013). In the next few decades, more than two thirds of global growth in motor vehicle use will occur in cities in developing countries (Kim and Dumitrescu 2010). In a business-as-usual scenario, from 2010 to 2050 the world's fleet of light-duty motor vehicles will increase by 33 percent in Organisation for Economic Co-operation and Development (OECD) countries and by 700 percent in non-OECD countries (Kim and Dumitrescu 2010). Burgeoning demand necessitates increased investment in transport networks, because current financial flows are insufficient to develop the transport infrastructure necessary to sustain economic growth (Ang and Marchal 2012).

Meeting global growth in demand for transport will depend on private investment. To date, the private sector has played a dominant role in transport sector investment, by some accounts providing more than 50 percent of capital investment worldwide (Figure 1). The private sector contribution is generally larger in developed countries. In developing countries, where transport demand growth is most intense, private investment remains smaller but shows signs of potential growth. While municipal, state, and national governments can prioritize low-carbon

Figure 1 | **Estimated Global Capital Investment in Transport, 2012**



Source: Lefevre et al. 2014.

modes (Bailey et al. 2008; Wagner et al. 2011; UITP 2011), public budgets are constrained. In the past decade, the average allocation of public budgets to transport has remained relatively constant (around four percent of Gross Domestic Product (GDP) as a global average), while the involvement of the private sector has surged ahead (IMF 2013). According to the World Bank (PPI 2012), private participation

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in transport infrastructure projects in low- and middle-income countries increased from under $10 billion in 2000 to just under $50 billion in 2012. These trends imply a high degree of unmet demand for private investment in the countries where transport growth is highest.

The Private Investment in Public Transport: Success Stories from Brazilian Cities report addresses the question: how can national and local public authorities in developing countries attract more private investment to sustainable urban transport? Private investment has the potential to transform the environmental profile of the transport sector, particularly through low-carbon modes like public transport. Harnessing private finance is essential to sustainable low-carbon development (IPCC 2014; Buchner et al. 2013), especially for transport and other infrastructure sectors (Kennedy and Corfee-Morlot 2012). Given limited public coffers, it is imperative to determine which strategies encourage private investment and which impede it. Recent research describes high levels of risk and uncertainty that create barriers to private investment and limit the expansion of low-carbon transport (Ang and Marchal 2012). The situation is especially acute in developing countries. This report aims to provide insights into how to overcome these barriers and stimulate investment in sustainable, low-carbon transport.

The report analyzes cases from Brazil in order to draw conclusions that are relevant to developing countries more broadly. In 2012, Brazil was one of the largest recipients of private investment in transport projects in developing countries (World Bank 2013). And yet, over the past decade, private investment has grown very little. As a country with limited success in private investment in transport, Brazil offers good lessons for what has, and has not, worked. While Brazil's political and economic circumstances are not fully transferable, the instruments and policies that create favorable investment conditions for low-carbon transport can provide reference points for national and local strategies that might be implemented in other countries. Specifically, this report examines market conditions and two case studies in Brazil. The two case studies examined are a metro line (Linha 4) in São Paulo and a bus terminal (Estação Barreiro) in Belo Horizonte.

Analytical Framework

Our analytical framework is based on existing analyses from WRI concerning leveraging private investment in sustainable development. We examine two key levels of intervention that can mitigate risk for investors: the creation of enabling conditions at the market level and the deployment of de-risking instruments at the project level. The market-level lens is derived from a study highlighting strategies that governments in developing countries can undertake to promote an enabling environment for private sector participation in sustainable infrastructure (Polycarp et al. 2013). The authors focus on the policy, institutional, industrial, and financial conditions that motivate private investors.[2] At the project level, another study frames investment potential in low-carbon markets in the context of risk mitigation from public financial instruments (Venugopal and Srivastava 2012). While neither of these publications focuses explicitly on transport, our framework applies their conclusions to the sector because of its pivotal role in climate change, economic growth, and the potential for social and environmental co-benefits.

Methodology

There are few cases of successful Brazilian PPP in low-carbon urban transport. Two recent projects, however, have demonstrated great success: Linha 4 in São Paulo was Brazil's first project carried out under the country's explicit public-private partnership legislation, and was cited by analysts as a landmark project for the industry. Less well known but equally impressive is the Estação Barreiro project in Belo Horizonte, a unique transit-oriented development that was thought to be a watershed for the city. This report analyzes these two case studies because they serve as exemplars for leveraging the private sector to enhance urban sustainability and accessibility. In addition to consulting primary materials, research, and public records, our methods included on-site visits and interviews with industry and academic experts. In total, we conducted fourteen interviews. It was important to avoid biases by selecting interviewees from a range of stakeholders involved in the implementation of these two specific projects. Interviewees (some of whom asked to remain anonymous) included project financiers, representatives of private companies participating in the PPP, World Bank technicians,

transportation consultants, members of advocacy organizations, and officials from local transportation and environmental agencies. Interviews were critical because research on these projects is scarce. They provided invaluable context, directed us to primary sources, and conveyed details about the kind of conditions that were drivers of success. Our aim is to determine the conditions that had an impact on the execution of these projects and what can be done from the public sector perspective to incentivize other effective projects.

The report is structured in four sections. Section II examines urban public transport in the context of privatization efforts in developing countries. It reviews existing literature on the rationale for tapping the private sector for transport investment, offers a market analysis of private investment in transport, and demonstrates the specific barriers to investment in low-carbon urban transport in developing countries. Section III comprises a national-level analysis of the enabling conditions supporting private investment in urban transport in Brazil. It attempts to demonstrate how specific policy, institutional, financial, and industry interventions have influenced private investment

How can national and local public authorities in developing countries attract more private investment to sustainable urban transport?

in Brazilian urban public transport. Section IV examines two case studies, a new line of São Paulo's metro and a hybrid public bus station-retail development in Belo Horizonte. It draws lessons relevant to local authorities wishing to play a strategic role in encouraging successful private investment in urban public transport. Section V concludes with explanations of why private investment in transit is being curtailed and offers proposed strategies to enhance it.


50-DIRETA

PRIVATE INVESTMENT IN PUBLIC TRANSPORT

Private investment in public transport is distinct from the solicitation of public transport contracts with the private sector. The former involves the replacement of a public sector capital asset by, or its transfer to, the private sector. The latter implies that a private entity is assuming some (or all) of the risk involved in construction of the transport asset or in service provision (Debande 1999). This section outlines the reasons for, and structure of, private participation in the transport sector in developing countries.

Private sector investment in transportation has been common (particularly in developed countries) for decades but it assumed greater importance in developing countries during privatization efforts in the 1990s (Zegras 2006). The World Bank estimates that, after a lull in the early 2000s, private participation in infrastructure development peaked in 2006, slowed in the wake of the global financial crisis in 2008, but is now rebounding (PPI 2012). Private concessions for transport grew by 71 percent worldwide between 2009 and 2011 (Kennedy et al. 2012). Even in the face of this burgeoning role for private firms in the development of transport networks, there is still a need to justify private participation. Given the intrinsically public nature of many transport networks, the advisability of transferring risk and ownership of transport assets to the private sector is controversial.

Justification for Private Sector Involvement

There are two main reasons why the public sector may turn to private investment for transport infrastructure and services: the first is operational expertise. The technical skills and market competitiveness of the private sector help to operationalize projects and can increase the efficiency and quality of transport services (World Bank 2012a). In the light rail and metro transit sectors, for example, the involvement of private firms augments limited government capacity with substantial benefit to local governments and transit users (Mandri-Perrot 2010).

The second reason the private sector is brought in is for financial capacity. In particular, the primary advantage of private sector involvement in transport development is not necessarily the volume but rather the efficiency of financial flows—its ability to deliver adequate financing with high value for money (Boeuf 2003). The involvement of the private sector can relieve pressure on governments to provide financing and open the door to additional financial resources (World Bank 2012b). This is especially true in developing countries, where demands for infrastructure are substantial, and fiscal deficits and indebtedness constrain public investment (World Bank 2012b). Even international financial assistance is small in comparison with private resources. For low-carbon transport projects, climate finance is an available option but too meager to impact global climate change mitigation or adaptation needs. In many cases, private investors can provide governments with the up-front financing otherwise unavailable to them, with the added political attraction of deferring expenditure (Shoaul et al. 2012).

Private involvement in public transport is not without its challenges. Procurement must be competitive in order to minimize government costs and to eliminate corruption. Unfortunately, corruption in the transport sector is rampant. Almost every major construction and engineering company in Brazil has been the subject of bribery accusations or investigations (Risk Advisory 2013). International firms are not immune; several are embroiled in a corruption scandal over bidding for Brazilian transport projects (Vilas Boas 2014). The pervasiveness of corruption has undermined confidence in the efficacy of mobilizing private investment. None of the firms that won contracts for this paper's case studies are implicated.[3] In addition, faulty contracts, government corruption, and costly renegotiation processes can drive up the cost of private contractors and therefore undermine the theoretical efficiency of private sector involvement (Engel et al. 2010; Estache et al. 2004). Above all, public authorities must ensure that private participation does not undermine the equity and affordability of service or misalign transport provision with other public planning efforts (Amos 2004; OECD 2008).

A more controversial argument against private

Table 1 | **Range of Roles for the Private Sector in Infrastructure**

PRIVATE SECTOR ROLE	FORM OF PRIVATE PARTICIPATION	DESCRIPTION
HIGH	DIVESTITURE	Full privatization of a public asset
	GREENFIELD	Private sector commissioned to build and operate public asset
	CONCESSION	Long-term contract for maintenance and operational liability
LOW	BROWNFIELD	Service contract for maintenance and operation

Source: Estache and Serebrisky 2004.

investment in transport is the typically higher cost of capital for the private sector. Some research suggests that the involvement of the private sector in infrastructure delivery can make projects more expensive for governments (Perkins 2013; Blanc-Brude et al. 2006). This notion has been challenged, however, on the grounds that risks borne by taxpayers are often unaccounted for (Meany and Hope 2012). And in Brazil, in particular, cities lack the fiscal responsibility to limit public expenditure and are therefore unable to assume sufficient financial debt to implement the necessary urban transport infrastructure development (Lindau et al. 2008).

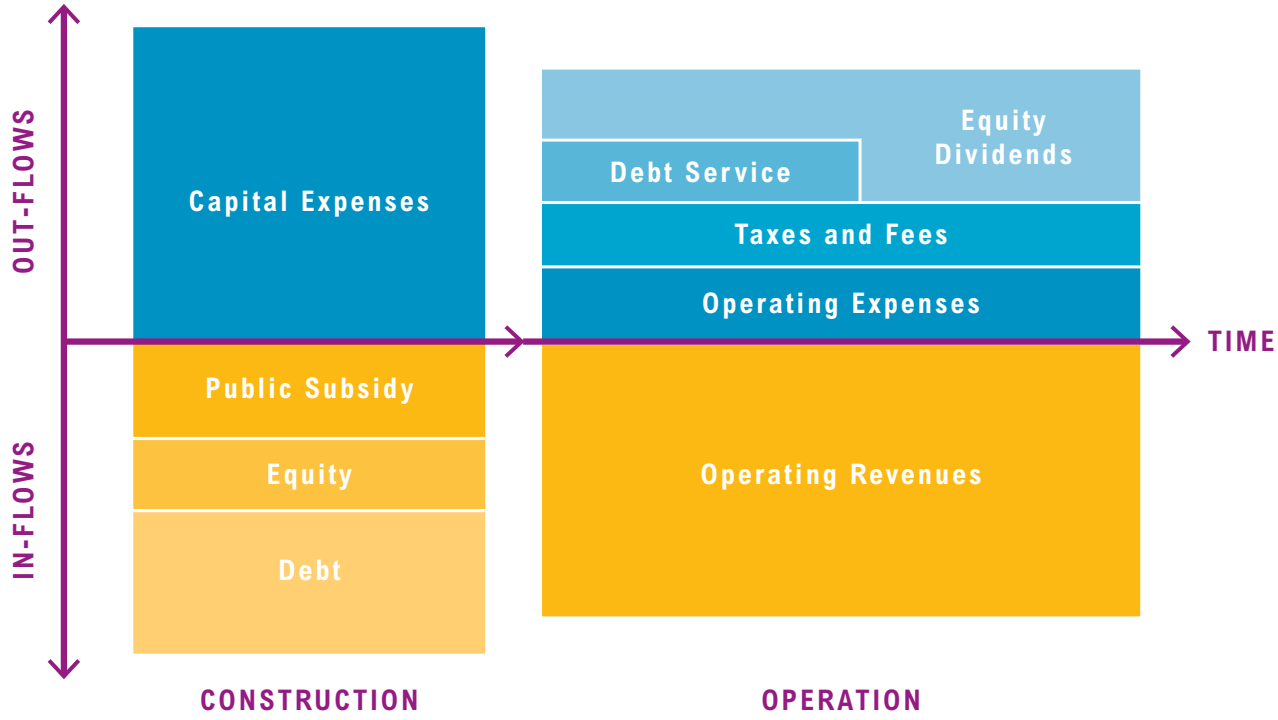
Nature of Private Participation in Transport

Modalities of private sector participation are determined by the choice of aspects of finance and operation that are contractually delegated to private actors (Nijkamp et al. 2001). The involvement of the private sector as a risk-sharing partner in public transport assets or service is often described as a Public-Private Partnership (PPP). This term is used loosely and widely to encompass a range of contract structures. Researchers have described four types of private participation in transport, shown in Table 1 (Estache and Serebrisky 2004). Divestiture is the most complete risk transfer, constituting an asset sale or lease to private operators. Greenfield projects are those in which the private sector assumes the risk of building and operating a transport asset.[4] Concessions, which can include leases, licenses, and franchises, are long-term contracts that transfer only the risk of system operation to a private operator. Finally, brownfield projects are service contracts for maintenance and operation that do not include investment obligations. Within all these categories are specific types of project intervention, which describe what actions the private sector takes: design, construction, operation, and transfer of authority can be combined in various ways to structure PPPs.[5]

Transport concessions have been the most common modality in developing countries since the early 1990s. According to the World Bank's Private Participation in Infrastructure database (PPI 2012), which tracks the total value of contracts and investments in infrastructure projects owned/operated by the private sector in developing countries, 59 percent of investments in transport PPPs between 1990 and 2012 served concessions contracts. The plurality of private investment in infrastructure has taken place in Latin America, where 42 percent of investments occurred. Concessions are the most common modality in all regions except East Asia, where there is a preponderance of greenfield projects requiring the added liability of building infrastructure. Increased liability translates to greater financial risk and potential costs that could materialize in the advent of an adverse event. Such a calculus may explain the popularity of concessions, which are believed to minimize government expenditure without forfeiting public ownership of infrastructure (Estache and Serebrisky 2004).

Most PPPs, regardless of project type, follow a simi-

Figure 2 | **Sample Cash Flow of Privately Financed Transport Concession**



Source: Adapted from Queiroz 2010.

lar financing path. Private vendors typically form a Special Purpose Vehicle (SPV), an independent entity often supported by several firms but legally distinct from each, and raise capital through project finance.[6] Transport investments are typically long term with high up-front costs. In addition to debt and equity capital stock, public subsidies can be required to ensure the economic viability of a project while preserving social outcomes like quality and affordability of service. In some cases, public subsidies continue through project operation.

Figure 2 shows the cash flows and financing structure of a hypothetical transport concession. Capital inflows are represented in the lower half of the pictogram; outgoing payments are represented in the upper half. As shown, debt, equity, and public subsidies form the initial capital expenses during the construction phase. Operating revenues continue for the operation phase. Debt service, taking priority over equity dividends, is paid off first, alongside operating expenses and taxes and fees. Figure 2 demonstrates why private financiers are so concerned about project risk. It illustrates how under-performance of a transport asset, and the impact on operating revenues, poses a huge risk to profitability.

Barriers to Investment in Urban Public Transport

Infrastructure projects pose barriers to investment that reduce profitability or increase risk. Greater perceived risk implies a higher premium on capital costs; this necessitates a higher return to cover costs. Common risks can be related to politics/policy, technology, finance, construction, operations, environment, and competition, as described in Table 2. Such risks have the potential to increase project costs, decrease revenues, or devalue investments. The more privatized an asset is, the more exposure for the private sector to these risks (Nash et al. 2001).

The major risk for infrastructure investment is the long-term nature of projects. Long construction periods leave ample time for mistakes, and cost overruns and delays are common. Risks may be imperfectly transferred where private partners assume that the public sector will bail them out

Table 2 | **Risks to Private Sector Involvement in Infrastructure**

TYPE OF RISK	TRANSPORT EXAMPLE	POSSIBLE EFFECT ON PROJECT
Politics/policy	Regime change leads to new national transport policy platform	Disruption of policy context for revenue generation
Technology	Obsolescence of project technology	Poor system performance or outperformance by competitor
Economics	Fluctuations in exchange rates	Investment devaluation; possible increase in debt
Construction	Construction delays impair service provision by private firm	Increased costs during construction period
Operations	Incorrect demand estimates based on poor data	Reduced revenues because of lack of demand
Environment	Road damaged by flooding precipitated by climate change impacts	Increased costs and decreased revenues
Competition	Informal buses poach riders from transit asset	Competition erodes revenues

Source: Adapted from Nash et al. 2001; Debande 1999; and World Bank 2011.

with new contract terms in the case of delays.

There are also barriers to infrastructure investment that are specific to the transport sector. Transport projects typically maintain high public visibility and participation; public sponsors are therefore more prone to underestimating risks, which then require re-evaluation later on (Correia da Silva et al. 2007). Evidence from Latin America suggests that contracts in the transport sector are almost twice as likely to require renegotiation as contracts in other sectors (Guasch 2004). Demand for transportation projects is often difficult to predict, making revenue models for large projects vulnerable. Finally, because of the large capital outlays required for transport projects, they are typically financed outside a firm's balance sheet through the creation of a project company—a method known as project finance. Such financing poses certain challenges. Project finance, for example, is typically more expensive and complex than the on-balance sheet alternative: in fact, for transportation investments, it can cost up to twice as much (Guasch 2004). The cost premium is due to higher transaction and legal costs associated with the creation of the project company that officially undertakes the venture (Jechoutek and Lamech 1995).

Urban passenger transport, in particular, faces additional barriers. Investment in an urban context typically involves more physical constraints and public scrutiny than does rural investment. From an investor perspective, the returns for freight and toll road projects are less risky because freight clients tend to have a higher capacity to pay for transport services than passenger clients, and because transit generally requires public subsidy to meet broader equity and accessibility objectives (Estache et al. 2007). In addition, because urban transit routes are often based on access, not just on market potential, opportunities for land-value capture can be less lucrative.

Sustainable transport systems pose three more challenges (Ang and Marchal 2013). First, services like public transport often involve a longer return on investment than projects like toll roads. Rail or metro systems are characterized by a costlier up-

front capital investment and often require government subsidy to be profitable. Second, because of poor policy support or economic disincentives such as fuel subsidies, demand for sustainable transport options may be kept artificially low. Finally, the unfamiliarity of less carbon-intensive transport modes may drive up the cost of capital. In the financial sector, a lack of certainty translates into greater perceived risk; returns from sustainable or low-carbon transport are less well established and therefore those transport modes are seen as riskier investments.

Mitigating Private Sector Risk

Public transport investments pose significant risk for private partners. The public sector can reduce risk through government policies, subsidies, or other actions to improve the risk-return calculus of investment decisions. Enabling laws and regulations at national, state, or city level can reduce market barriers to investment if designed appropriately (Ang and Marchal 2013). As shown in Table 3, there is also a range of specific instruments that can be applied to transport projects.

Financial guarantees protect the investment made by private partners. Insurance and loan guarantees can serve to insulate investors from payment default; swaps, derivatives, local currency loans, liquidity facilities, and special lines of credit can insulate against macroeconomic fluctuations; concessional financing can ensure that low-carbon transport investments can compete financially with traditional modes (Venugopal and Srivastava 2012).

Non-financial guarantees, such as minimum revenue agreements, are also common for urban transport projects. Such instruments mitigate risk associated with project revenues and so are essential when private operators make investments based on a predicted income stream. Private investors might be guaranteed minimum user demand, mini-

Table 3 | **De-risking Instruments**

INSTRUMENT	DESCRIPTION	TYPE OF RISKS TARGETED
Insurance and Guarantees	Product which assures repayment for a fee	Political/Policy; Operational
Swaps and Derivatives	Borrower pays a fee for risk coverage	Economic
Local Currency Loans	Loans issued and repaid in local currency	Economic
Liquidity Facilities and Lines of Credit	Institutions granting access to quick, short-term cash	Economic; Construction
Concessional Finance	Special exclusive interest rates and funds	Operational; Competition

Source: Venugopal and Srivastava 2012.

In the financial sector, a lack of certainty translates into greater perceived risk; returns from sustainable or low-carbon transport are less well established and therefore those transport modes are seen as riskier.

mum revenues, or protected, long-term contract terms for a transport asset (World Bank 2011). While non-financial guarantees may reduce the private sector's incentive to perform, they are often necessary to entice any private partner to join a PPP project.

In essence, the diverse barriers to private investment all boil down to risk. Private actors treat any uncertainty or challenge as additional risk which requires higher returns to justify investment. Reducing these perceived risks can be undertaken at the local or national level, but there are two general types of interventions. Public actions can improve conditions at the market level or the project level. The next two sections analyze how conditions for Brazilian urban transport have been improved at the market level, looking at the institutional, policy, industry, and financial characteristics of the country's enabling environment, and at the project level, examining de-risking instruments and strategies.

MARKET ANALYSIS: URBAN PUBLIC TRANSPORT IN BRAZIL

Brazil is often criticized for its poor transport infrastructure and high logistics costs (Biderman and Galal 2013; Gregoire 2011). Under-developed nationwide transport networks shift freight and passenger transport onto roads and through cities. Road congestion, particularly in urban areas, drives down productivity, restricts mobility, increases public health costs, and increases the cost of goods and services.

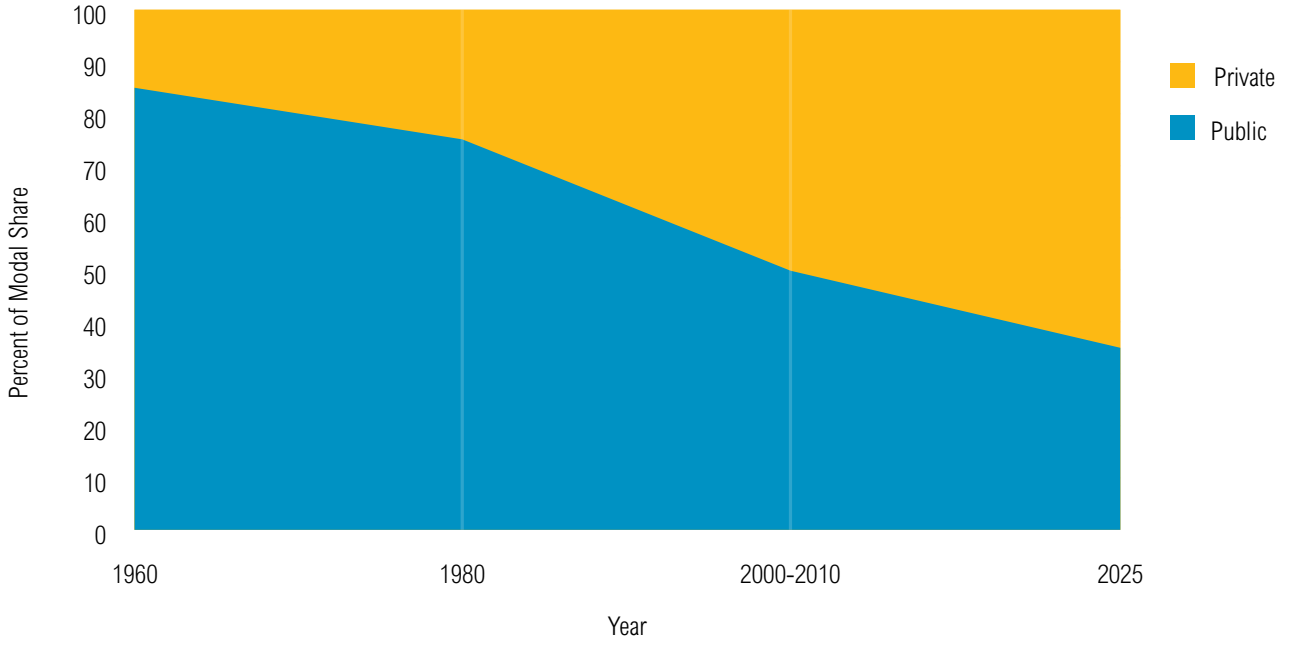
Brazil's urban public transport infrastructure is uneven. With 825 km of priority bus corridors moving 12 million people per day in 2014, Brazilian cities are heavily reliant on bus networks (BRTdata.org 2014). Brazil's seven metro systems combined serve an urban population of about 52 million people annually with only 278 km of track (KfW 2011). By contrast, the city of Madrid serves five million people each year on a network of 293 km (EIU 2011). The majority of metro transit investment takes place in one city (São Paulo) although demand continues to grow around the country (KfW 2011). From 2005 to 2010, for example, commuter ridership in five state capitals—Recife, Belo Horizonte, João Pessoa, Natal, and Maceió—grew by 37 percent, while the total length of track in those cities grew by only four percent (EIU 2011).

Meanwhile, private motorized transport dominates urban mobility. Car ownership is high—Brazil is the world's fourth-largest car market with a private motorization rate of 339 per 1,000 people (BCG 2013)—and the role of public transport is waning. Figure 3 shows the relative decline in public transport use since the mid-twentieth century. In 1980, 75 percent of trips in Brazil's metro areas were by public transport; today the proportion is below 50 percent and, by 2025, it is projected to drop to 18 percent (EIU 2011). The federal government has encouraged this trend by suspending the sales tax on automobile purchases.

Transportation access has recently proven a critical social issue in Brazil. In June 2013, in response to fare hikes for São Paulo's bus system, a series of riots and protests focused citizens' frustration with urban transport and wider social and political issues. The Brazilian government, which invested heavily in sports infrastructure for the FIFA World Cup in 2014 and Rio de Janeiro Summer Olympics in 2016, was faced with pressure to bolster investment in transport and social services. President Dilma Rousseff promised to invest heavily in public transport in late June 2013.

Transport also plays a significant role in Brazil's contribution to climate change. The country's transport sector is responsible for 40 percent of energy-

Figure 3 | **Public and Private Mode Share in Brazilian Urban Transport**



Note: 2025 figure estimated.
Source: EIU 2012.

related greenhouse gas emissions, a ratio higher than in China, Russia, India, or South Africa, and the highest ratio in Latin American (WRI 2014).[7] Road transport accounts for 90 percent of those emissions (World Bank 2012c). Brazil is also one of the most urbanized countries in the world. Urban sprawl, rising vehicle ownership, and congestion exacerbate the environmental impacts in urban areas. Brazil's transport emissions, almost three-fifths of which occur in cities, are expected to grow by 60 percent a year (World Bank 2012c). Traffic problems threaten the economy as well as the environment and public health. São Paulo might have lost as much as $21 billion, 10 percent of its GDP, in productivity due to traffic congestion in 2008 (EIU 2012).[8]

Political, institutional, and economic obstacles are holding back private investment in low-carbon urban transport. Brazil's municipal budgeting conventions restrict private sector allocations to one percent of annual net revenues, paid over one fiscal year at a time (Lindau et al. 2008). This artificially limits compensation and leads investors to worry that political partisanship will prevent successive administrations from upholding payment obligations. Keeping public costs down has been a struggle. Renegotiations of contracts and the costs and risks associated with eminent domain and urban construction processes can be expensive. Moreover, there remains an economic imperative to improve transport infrastructure across all modes. Brazil still lags behind wealthier nations in the size of its overall freight and logistics networks.

Efforts to Increase Private Participation

Private participation in urban transport investment was historically strong in Brazil (see Box 1), but the private role diminished significantly in the mid-twentieth century. Over the past several decades, the Brazilian government has tried to revive private investment in the transport sector through reforms at the institutional, policy, industry, and financial levels. These reforms have sought to formalize the legal and regulatory conditions for PPPs.[9]

Institutional support for private involvement in transport was set in motion with decentralization of urban transport governance. A new constitution drafted in 1988 recognized municipalities as official administrative entities and ended the centralized

development of urban transport. Cities were given a larger share of federally allocated funds and freedom to develop local transport projects. Urban rail systems were decentralized to state and municipal governments in 1991 (Rebelo 2003). In a critical omission, the decentralization of authority was not extended to the metropolitan regions—which comprise dozens of individual municipalities. Thus, while transport networks extend across multiple municipal governments, there is no planning authority to coordinate activities at the necessary scale (Lindau et al. 2008). To help support cities and states, the Ministry of Cities, a federal agency to support urban infrastructure development, was created in 2003. The federal agency helps to coordinate the development of transportation systems across cities in order to cover the metropolitan areas that meet the scale necessary for mass transit systems.

At the policy level, the Brazilian government has crafted legislation to empower local governments to engage with private partners for urban transport provision. In 1995, a concessions law (No. 8.987/1995) empowered the public sector with the

Urban public transport has received only limited private support. According to the watchdog website, Copa2014.org, none of the approximately $4 billion spent on tournament-related urban transport projects from 2007-2014 has come from private sources.

legal framework to employ the private sector for transport concessions. Most of the private participation in transport, however, has been concentrated on freight rail and toll roads (Donayre 2012). In 2001, a federal statute (Estatuto da Cidade, No. 10.257/2001) required cities and metropolitan regions with more than 500,000 inhabitants to develop integrated urban mobility master plans, which highlighted urban transit needs. In 2004, a PPP Law (No. 11.079/2004) provided a legal basis for public compensation paid directly to private providers of transit services. Before this law, public entities could not directly subsidize private entities supporting transportation development—a necessity to keep fares on urban transit low enough for public use. This compensation is capped, as previously mentioned, at one percent of agencies' annual net revenues. A new push to expand urban transit projects came in 2012 with the Urban Mobility Law. The law (No. 12.587/2012) stipulates that cities with more than 20,000 inhabitants must develop a mobility plan in order to access federal grants.

Private industry has been most proactive in the freight rail and toll road markets of the transport sector.[10] However, most bus operators are private, and there are several Brazilian conglomerates involved in urban transport infrastructure construction, system engineering, and operations (Golub 2004; Lindau et al. 2008). In order to help governments and lenders evaluate which projects are the most cost-effective, BNDES and eight other banks formed the Estruturadora Brasileira de Projetos (EBP) in 2008. This entity is a commercial non-profit partially owned by the government. It undertakes feasibility studies for local governments around Brazil on how to structure PPPs.

While recent improvements in banking oversight and regulation have strengthened the overall financial system, public investment continues to dominate (IMF 2012). The mobilization of funds for the Ministry of Cities and the heavyweight state-owned financial institutions—Banco do Brasil, Caixa Econômica Federal (Caixa), and Banco Nacional de Desinvolvimento Econômico e Social (BNDES)—has improved access to credit for infrastructure investment, and generated numerous concessions for the transport sector.[11] However, the vast majority of projects have served to expand or improve existing roads and railways rather than upgrade urban transit (Amato et al. 2012).

The Brazilian government has relied on a series of financial incentives to drive greater private investment in transport. A new type of bond, the infrastructure debenture bond, was created in 2011 to help raise more long-term private funds for infrastructure projects like transport (Russo et al. 2012). In addition, foreign investors receive tax benefits for investing in transport infrastructure. Overseas investors in private equity infrastructure funds are not subject to income or capital gains taxes in Brazil (PWC 2013). Residents and non-residents are also granted tax benefits for income from funds with at least 85 percent of equity invested in infrastructure debt (PWC 2013).

The PPP law, which sanctioned compensation of private investors in public services like transport, also created a guarantee fund to ensure the payment of federal government obligations to private partners. This Fundo Garantidor de Parcerias Público-Privadas (FGP) was launched in 2005; however, to date, it has been utilized only once (for an irrigation project in the city of Pontal). Complicated and prolonged bureaucratic processes and poor public perception help explain the FGP's limited use (Donayre 2012). Moreover, the fund guarantees payments at the federal level only. Urban transport projects negotiated by local governments cannot use it.

The State of São Paulo created its own guarantee fund in 2004. The State established the Companhia Paulista de Parcerias Publico-Privadas (CPP) with capital generated from the sale of shares in SABESP, the state water utility (World Bank 2012a). Over time, other resources from the sale of state-owned assets filled the CPP coffers. The CPP manages these assets as a fiduciary fund that, similar to the FGP, provides revenue guarantees for force majeure risk and government default. Contrary to the FGP, however, the CPP manages both guarantees and subsidies together (World Bank 2012a).

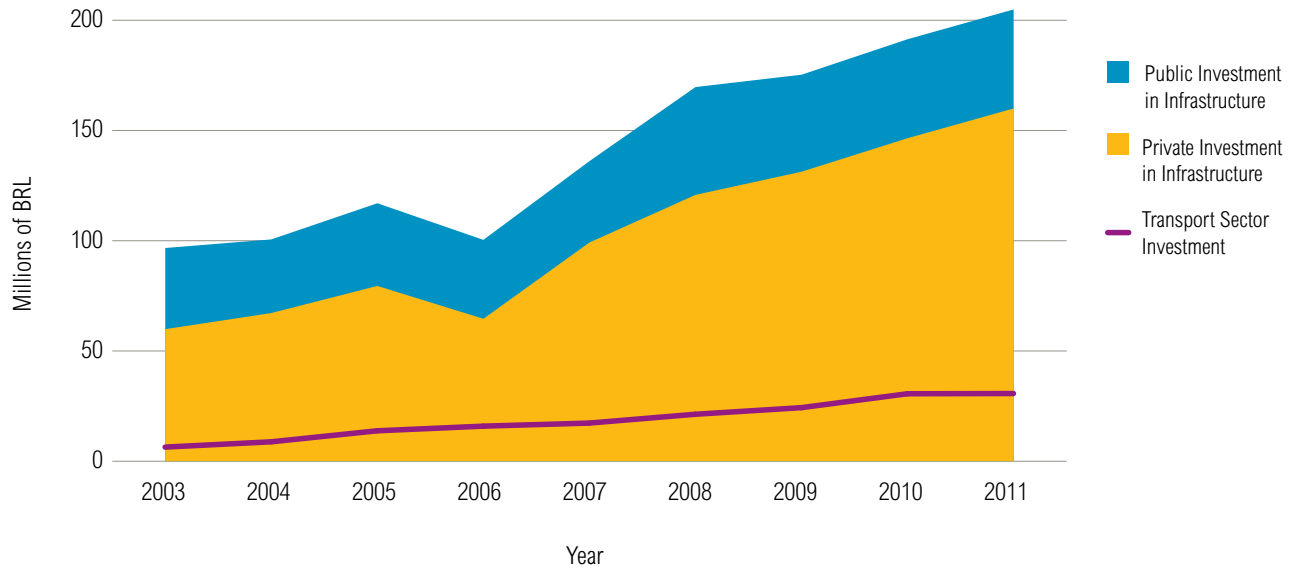
The success of the CPP spurred replication across Brazil. As of 2014, there are operational PPP guarantee funds in at least seven states (São Paulo, Minas Gerais, Bahia, Amazonas, Santa Catarina, Goias, and Pernambuco) and six cities (Curitiba, Porto Alegre, Manaus, Sorocaba, São Sebastião, and Salvador). The arrival of these local guarantees coincided with increased investment in transport infrastructure. But, as shown in Figure 4, private investment in Brazilian infrastructure has remained relatively stagnant while the public role has increased.

Discussion

Significant reforms and incentives have been enacted to support the enabling conditions for private investment in transport in Brazil. Yet, while infrastructure investment has grown, the private sector role has hardly expanded at all. The public and private sectors have directed roughly $85 billion of investment into transport from 2003 to 2011, especially in the last few years, but the proportion from public sources remained unchanged (Alvarenga 2012). Moreover, the increased investment in the transport sector has been modest.

Urban public transport has received only limited private support. According to the watchdog website, Copa2014.org, none of the approximately $4 billion spent on tournament-related urban transport projects from 2007-2014 has come from private sources. Caixa or BNDES fund the majority. With a few exceptions, enticing private investors to urban transport remains a challenge.[12] Rather, the focus of Brazilian transport investment in the past decade has favored concessions for toll roads and freight rail. Partly this reflects the ease and lower cost of brownfield road projects compared to greenfield urban mobility ones. A select few urban public transport projects have successfully (and without flagrant signs of corruption) leveraged private participation. Two examples are explored in the next section.

Figure 4 | **Brazil's Investment in Infrastructure and Transport from 2003 to 2011**



Source: Biderman & Galal 2013; Alvarenga 2010; WRI analysis.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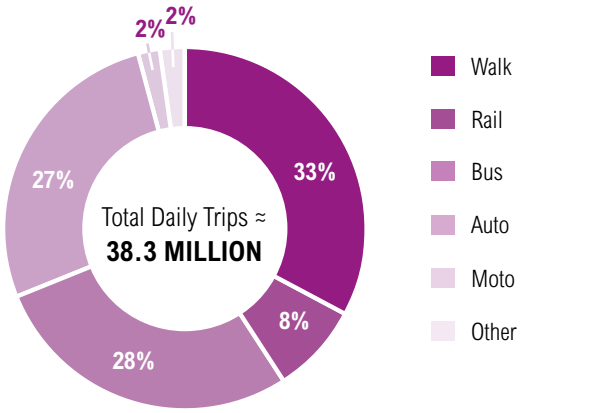
PROJECT ANALYSIS: TWO PRIVATELY-FINANCED TRANSIT PROJECTS

Two projects in large Brazilian cities illustrate major barriers and solutions to attracting private investment for urban passenger transport. Both cases—the fourth line (Linha 4) of the São Paulo Metrô and the Barreiro bus terminal and shopping mall (Estação Barreiro) in Belo Horizonte—are private concessions that have influenced subsequent approaches to similar projects elsewhere.

Metrô Linha 4 (São Paulo, SP)

The São Paulo metropolitan region (SPMR) is one of the largest urban areas in the world. It is composed of 39 municipalities, home to 20.2 million people across 7,947 square kilometers (SEADE 2014). The SPMR generates about 20 percent of Brazil's national GDP. But, while highly productive, the area has one of the most crowded transit systems in the world. The 168-mile rail network boasts more than 16 million annual trips per mile of track (Rebelo 2012). Mexico City, Buenos Aires, and Santiago, by comparison, have between 9 and 12 million; London and Madrid have fewer than 5 million. A 2007 survey by the city of São Paulo shows the modal share of rail is 8 percent of passenger trips (Figure 5).

Figure 5 | **Modal Share of Daily Passenger Trips in São Paulo (2007)**



Source: STM São Paulo 2007.

Public transport in the region is fragmented. The above-ground commuter rail, Companhia Paulisa de Trens Metropolitanos (CPTM), and the metropolitan bus network, Empresa Metropolitana de Transportes Urbanos de São Paulo (EMTU-SP), are owned and operated by the state. The state also operates the separate underground metro rail system, Metrô. The city of São Paulo's transit authority, SPTrans, has authority over the municipal bus network. There is a lack of integration between the various transit operators, although a single card, Bilhete Unico, was introduced in 2001 to integrate fares in the SPMR.

The transit system has struggled to serve commuters as the city's economy has evolved. A decline of industrial production and associated employment in the poorer, more industrial periphery of the city has led to a greater concentration of service sector jobs located in more centralized employment clusters (World Bank 2012). These conditions lead to overcrowding during peak commuting hours, high fares faced by the urban poor, and average travel times of 2.5 hours per day (Rebelo 2012).

Project Overview

Line 4, or "Linha 4," of São Paulo's metro system was designed in 2000 to integrate multiple transit systems and increase job access for the suburban poor. But Brazil's federal government has control over subnational borrowing, and the state of São Paulo was authorized to borrow only about $418 million of the $934 million required for the first phase of Line 4 (Rebelo 2012). A public-private partnership model was developed to cover the rest. The project was designed as a turnkey contract for civil infrastructure construction and a private operational concession. Work was divided into two phases; this case analysis focuses on phase one.

Linha 4 connects the western suburb of Vila Sonia to Luz, the central railway station. It provides interchanges with Metrô lines 1, 2, and 3, and the suburban rail network (CPTM). The transit line is

intended to link poorer, suburban districts to previously inaccessible employment centers. The first phase of Linha 4, completed in 2010, comprised 8.9 km of double underground track, 6 stations (plus the shell of 3 intermediate stations to be completed in phase two), a rail yard, and a workshop. The corridor was built for an expected daily ridership of over 700,000. The State of São Paulo developed the infrastructure components in a traditional contracting process and used a sponsored 30-year concession for the provision of 14 trains, logistics systems, and operation of the line. As a sponsored concessionaire, the private operator depends on fare box, retail, and advertising revenue, as well as public subsidy payments, to make the metro line profitable. The winner of the international competitive bid, ViaQuatro, submitted a bid requiring the smallest public subsidy: $40 million over four years. The project service order was signed in November 2006 and the Linha 4 first opened in May 2010.

Project Structure

The structure of the Linha 4 project is a concession contract, signed for a term of 32 years, intended for publicly funded civil works construction lasting two years, and for ViaQuatro to assume operation for 30 years. The private concessionaire was required to invest in rolling stock, operations and data systems, and management of the rail yard at Vila Sonia. Total investment in phase one of Linha 4 was about $1.85 billion (in 2003 USD), with the public sector spending about 80 percent of that total (Table 4). Initial projections assumed that the public sector contribution would be closer to 60 percent of the project cost. However, costs escalated because of procurement litigation, a serious construction accident, the devaluation of the dollar, and capital cost increases. The total contribution by the State of São Paulo, $992 million, was composed of general outlays and limited revenues from land value capture instruments called CEPACs (explained in Box 2). The State received loans from the Japanese Bank for International Cooperation (JBIC) and the

Table 4 | **Financing Structure of Linha 4 (USD Millions)**

INSTRUMENT	AMOUNT	SOURCE
Loan	$304	IBRD to SSP
Loan	$304	JBIC to SSP
Loan	$69.2	IDB to ViaQuatro
Subsidy	$922	State of São Paulo (SSP)
PUBLIC TOTAL **$1,599.2**		
Loan	$37	Banco Santander
Loan	$37	SMBC
Loan	$37	KfW
Loan	$37	Banco Espirito Santo
Loan	$37	BBVA
Loan	$30.5	Société Générale
Loan	$30.5	WestLB
PRIVATE TOTAL **$246**		
GRAND TOTAL **$1,845**		

Source: IJ Global 2009; World Bank 2012c.

World Bank amounting to $304 million from each. The Inter-American Development Bank arranged a $69.2 million, 15-year senior loan for the ViaQuatro consortium.

Private investment in the project was about $246 million (Business Resource Direct, 2013). About 40 percent of that was equity. The ViaQuatro consortium involves stakes held by the largest road concession operator in Brazil, CCR (58 percent); Montgomery (30 percent), a subsidiary of Odebrecht, the country's largest contractor; Mitsui (10 percent); the French metro operator, RATP (1 percent); and Benito Roggio (1 percent). Seven private arrangers (Banco Santander, SMBC, KfW, Banco Espirito Santo, and BBVA, Société Générale, and WestLB) offered ViaQuatro a $240 million, 12-year subordinate loan in coordination with the IDB's A-loan. The project was ineligible for support from BNDES because many components, like the rolling stock, were purchased outside Brazil. The involvement of many financiers complicated the contract but helped to spread risk.

Compensation and Risk Guarantees

The private operator earns revenue from passenger tariffs, retail, and advertising in metro stations. It also receives a $40 million subsidy from the public sector, paid in monthly payments over four years (IBRD 2012). For the duration of the contract, ViaQuatro is entitled to 100 percent of the fares from passengers riding exclusively Line 4 and 50 percent of the fares from passengers that use Line 4 in addition to other integrated rail lines. Fares were negotiated to start at about $1 with contractually determined annual readjustments. Additional revenues from business operations in metro stations were expected to amount to 5 percent of fare box revenues (IBRD 2012). Non-operational revenue, largely from station vendors and advertising, was estimated at 5 percent of revenue from fares (Rebelo 2012).

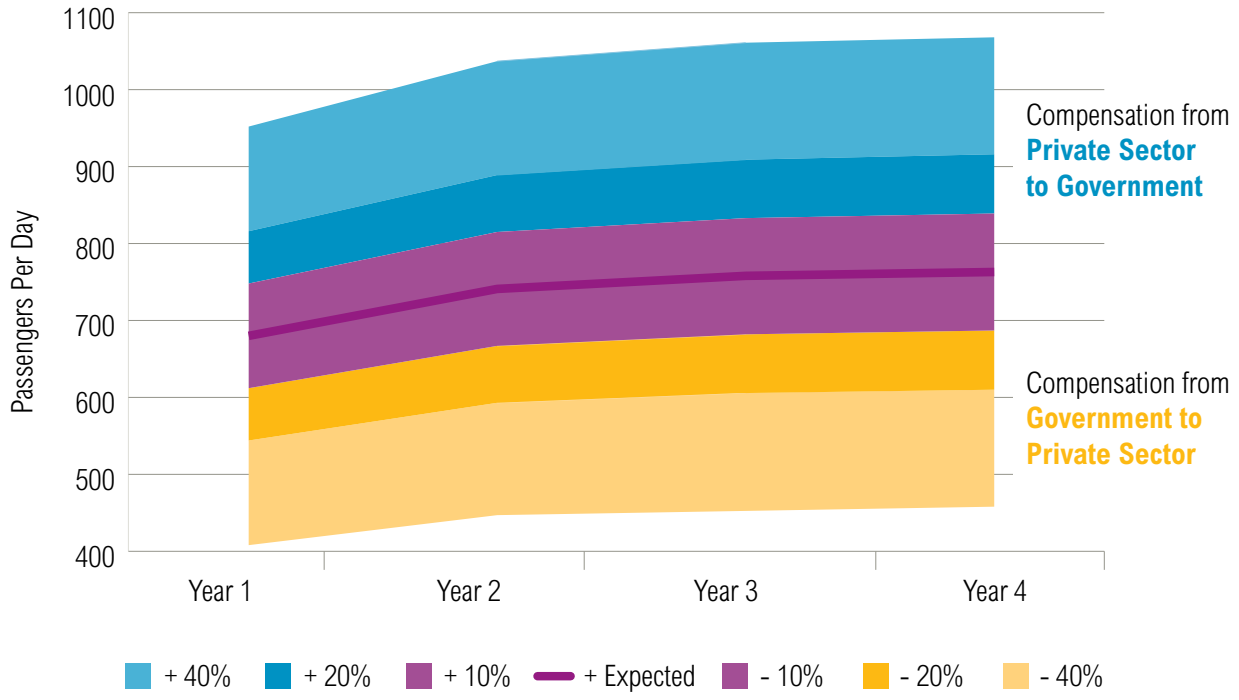
Because revenue was so dependent on ridership, user demand was a prominent concern of the concessionaire. To mitigate demand risk, the contract included ridership mitigation bands (Figure 6) based on travel forecasting. If ridership falls below the expected level, the government provides

financial compensation to ViaQuatro; if it exceeds forecasts, the government is compensated. The rate of compensation depends on the band within which the actual ridership falls. The re-routing of competing bus lines has been used to bolster Linha 4 travel demand.

The contract included several other stipulations to deal with additional project risks. Since investment was financed in foreign currency, but the revenue is paid in Brazilian Reals, price adjustment formulae were needed to reduce the risk of currency devaluation.[13] Construction risk was a concern because the civil works infrastructure had to be complete in time for the concessionaire to start line operation. The São Paulo state government agreed to give ViaQuatro a two-year advance warning. Finally, the risk of competition for ridership from other modes was a complicating factor. Transit system integration was therefore paramount to bolster Linha 4's projected travel demand.

The payment is guaranteed by the state-level guarantee fund, the Companhia Paulista de Parcerias Publico-Privadas (CPP). The use of the CPP as a financial guarantee was a crucial de-risking tactic, but it was not sufficient to boost investor confidence in repayment. Additional surety was needed for three main reasons. First, the CPP held only enough resources to guarantee six months of repayment; if the government were to default on its obligation, it was deemed unlikely to replenish the CPP after the six-month guarantee was paid out. Second, the concessionaire's other revenue source—passenger tariffs—faced serious risks: if the government-led infrastructure installation were late or faulty, the concessionaire's revenue would suffer. Finally, governments in Brazil cannot allocate funds for payment more than one year in advance, making budget-raiding a possibility.

Figure 6 | **Ridership Risk Mitigation Bands for Linha 4 PPP**



Source: Rebelo 2012.

In this case, the solution was to obligate the state of São Paulo to additionally guarantee default with citywide transit revenues. The pool of receivables from the state-owned Metrô, CPTM, and EMBTU networks is collected in a central coffer that is operated by a fiduciary agent. As part of the Linha 4 contract, this pool of money can also be tapped in the case of government default. Because of the size of São Paulo's transit system, this additional guarantee offered a significant liquidity cushion. A summary of the range of actions to defray risk is presented in Table 5.

Table 5 | **Risk Mitigation Strategies for Linha 4 Project**

TYPE OF RISK	MITIGATION STRATEGY
Political/ policy	■ Guarantee from CPP ■ Guarantee from transit receivables
Economic	■ Adjusted for inflation
Construction	■ Turnkey contract (public construction)
Operational	■ Demand mitigation bands with compensation formula ■ Public subsidy to concessionaire
Competition	■ Government payment to subsidize fares

Source: Authors.

Performance

The project has had a positive impact on public transport use in the SPMR. Linha 4 opened in April 2010; by 2012 it met its target to serve 700,000 passengers per day. The line successfully integrated with the metropolitan commuter rail (CPTM) and bus network (EMBTU). And, true to the objective to serve the city's peripheral communities, about 20 percent of Line 4 trips originate in the relatively poor eastern suburbs of the city. Commute times for poorer residents of the city's western neighborhoods have dropped by about half an hour (Economist 2012).

Financially, the line has also been a success. The construction cost of approximately $144 million/km is the cheapest metro line in the SPMR. ViaQuatro, the concessionaire, reports annual operating revenues of $32.7 million (IJ Global 2009). Their concessionaire's Internal Rate of Return for the project is estimated at 14.4 percent per annum and as high as 18.7 percent per annum for its shareholders (Millones 2010). The World Bank determined that the net present value of the project as a whole, including externalities to the SPMR and local economy, is $364 million (World Bank 2012).

The project changed the mindset of planners and decision-makers in the SPMR. It proved that collaboration with the private sector was possible. Still, there were challenges for the public sector. Implementation was delayed by four impediments to the turnkey infrastructure construction effort preceding private financing: procurement litigation, a fatal construction accident, the devaluation of the dollar, and capital cost increases. These problems caused cost over-runs for the state government and led to a legal battle between the public authorities and ViaQuatro. Overall, however, since the launch of Linha 4, the ratio of Metrô's operating costs divided by revenues has increased.

Lessons learned

Linha 4 was Brazil's first urban transport PPP after the creation of a PPP legal/regulatory regime. Based on interviews with local experts from the private sector, public sector, and civil society, three main reasons emerge to explain why the São Paulo State government was able successfully to attract private investment. First, the SPMR is an attractive place to invest because it exhibits clear unmet demand for mass transit, strong economic growth, and a well-funded transit system. Second, the role of the World Bank and IDB in structuring finance helped the public sector afford infrastructure investment and assured private investors that the project was viable. Finally, the use of three guarantees (from the CPP, the transit receivables, and demand risk mitigation) effectively reduced perceived repayment risk.

Financial professionals involved in the project indicate that the most important guarantee was the one backed by transit receivables. It was notable less for its size than its source. The private sector has little confidence in the persistence of budget allocations from local governments because, given frequent changes of political parties, the contractual obligations of previous administrations are not always honored. While the CPP fund was important to reduce private sector risk, it was the pool of São Paulo's transit receivables being independent of budget allocation that tipped the balance.

The project structure and its complications offer important lessons as well. The turnkey contract for Linha 4 gave the private concessionaire responsibility for rolling stock and operation but left the civil infrastructure construction to the state government. The massive investment required to implement a full-scale Design-Built-Operate-Transfer (DBOT) compelled the São Paulo government to split the contracts in order to maintain more public control, but ended up complicating accountability. Delays on the civil works construction (including a lawsuit from non-selected contractors and a tragic construction disaster that killed seven people) caused marketing and financial damage to the Linha 4 project. Because of the delayed start date of operations, ViaQuatro recently won arbitration with the state of São Paulo over compensation for lost revenues (Bland 2014). Learning from this lesson, São Paulo is developing a new metro line concession for Linha 6. This contract is for one firm to undertake both infrastructure and operation. The solicitation has been delayed largely because the government tried, unsuccessfully, to outsource the eminent domain process. Another factor that drove up costs was the devaluation of the U.S. dollar against the Brazilian real. Although dollar-denominating loans is often cited as a means of avoiding economic risk, this case proved that broader financial markets should be considered.

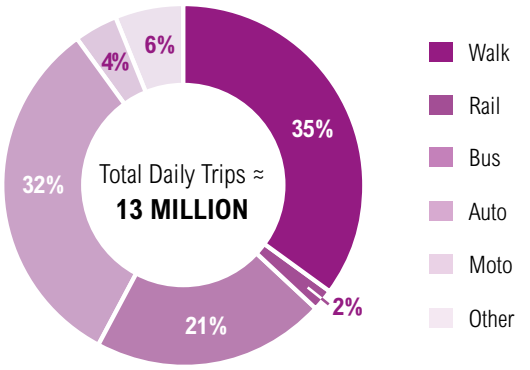
The Linha 4 case demonstrates how risk was successfully reduced for a private partner. Private sector participants in the project point to the use of the state's transit receivables as a creative and catalytic guarantee. The involvement of development banks lent credibility, and the project was undertaken in an area with pent-up demand. The risk of separating construction and operation contracts, however, is also apparent.

The Linha 4 case demonstrates how risk was successfully reduced for a private partner. Private sector participants in the project point to the use of the state's transit receivables as a creative and catalytic guarantee. The involvement of development banks lent credibility, and the project was undertaken in an area with pent-up demand.

Estação Barreiro (Belo Horizonte, MG)

Belo Horizonte is the capital of the state of Minas Gerais in the southeast of Brazil. The metropolitan region of Belo Horizonte is the country's third largest (after São Paulo and Rio de Janeiro). About 5.5 million people live in 34 municipalities covering 9,459 square kilometers, making it about one-quarter of the density of SPMR. The mode share of public transit in Belo Horizonte is 23.6 percent, very similar to São Paulo's (Figure 7). Buses comprise 93 percent of that total; the 28.2 km of metro rail account for the rest.

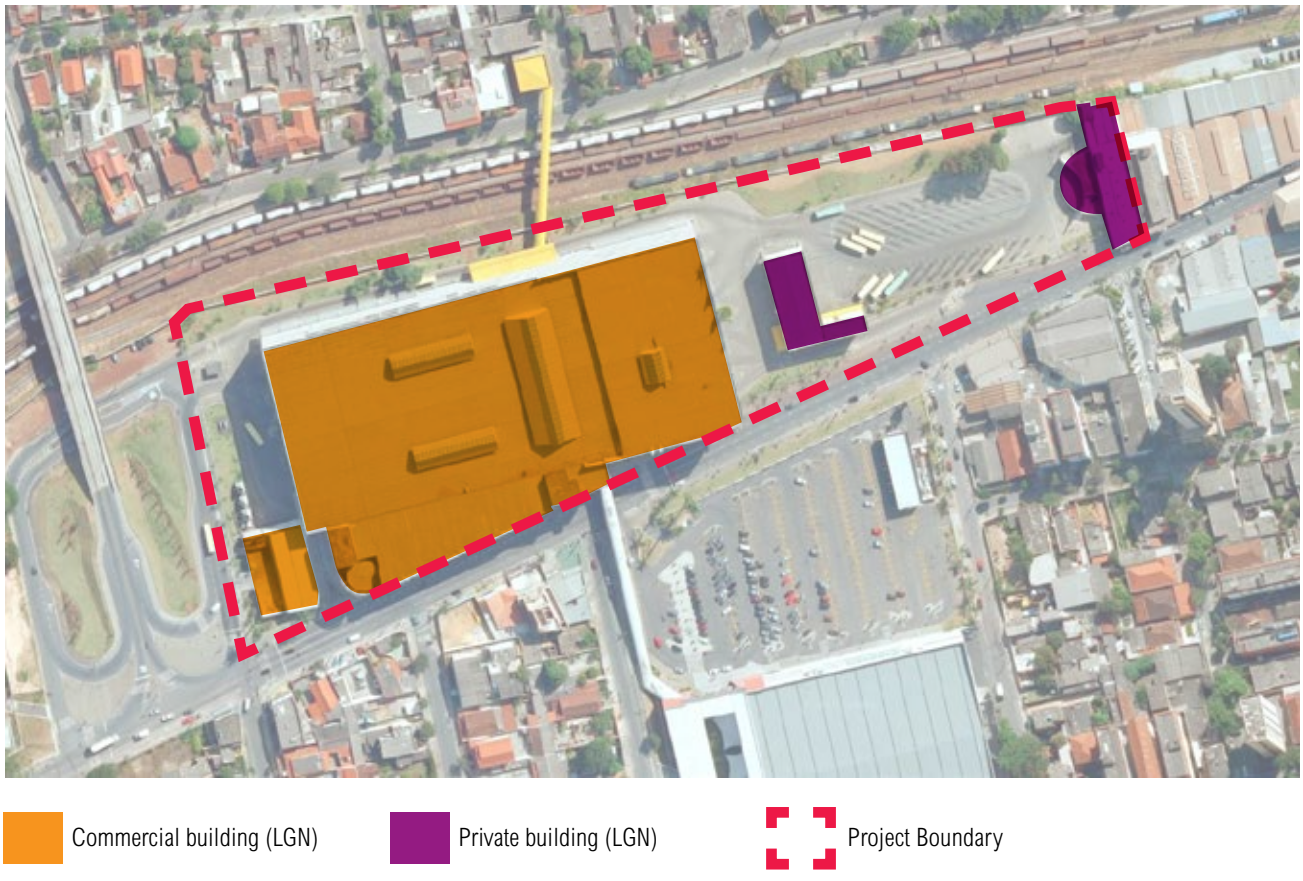
Figure 7 | **Modal Share of Daily Passenger Trips in Belo Horizonte (2012)**



Source: BHTrans 2014.

Belo Horizonte has a sophisticated bus system that is responsible for about 3 million passenger trips per day (CAF, 2011). The municipal transport agency, BHTrans, oversees the local, feeder, and express routes that are served by two thirds of the city's bus fleet (Santos & Orrico, 2000). The remaining one third comprises inter-municipal buses under the control of the state-level Secretaria de Estado de Transportes e Obras Publicas. Major terminals are transfer points between different types of bus routes. They are closed systems so that riders can transfer between lines without paying two full fares. The city embarked on a PPP to create a transit-oriented development for a bus terminal in the neighborhood of Barreiro, where many lines come together and where the city's planned metro line would terminate. The project attempts to integrate a business opportunity with improved public transit access.

Figure 8 | **Estação Barreiro Project Area**



Sources: Google Maps and authors.

Project Overview

Estação Barreiro is a bus terminal and shopping mall in the city of Belo Horizonte. Barreiro, one of nine administrative municipal regions, is a working-class neighborhood with 300,000 residents who are highly dependent on public transport. The neighborhood has received limited large-scale commercial investment, although it provides 40 percent of Belo Horizonte's revenue from VAT (Value Added Tax on consumption) (Prefeitura BH 2013). It was therefore a strategic locale to develop a 978,400 ft² (90,900 m²) site, with construction of both a public bus terminal and a large private shopping center (Figure 8).

In 1999, a public-private partnership was struck to develop a new mixed-use property serving as a bus terminal and shopping mall. On the ground floor, Estação Barreiro serves 23 different local, municipal, and metropolitan bus lines; the four levels above comprise ViaShopping, a private mall with retail stores, a movie theater, public services, and parking. The public sector paid a lump sum to the winner of a competitive bid to develop the property and construct the city's transport authority (BHTrans) building, a storage facility, and the terminal/shopping center building. Project construction was completed in 2002 and operation began in 2003.

Project Structure

The project has elements of a concession and a greenfield contract. BHTrans selected a private firm to develop a property with both public and private functions and to operate only the commercial

Table 6 | **Financing Structure of Estação Barreiro (USD Millions)**

INSTRUMENT	AMOUNT	SOURCE
Loan	$3	BNDES to State of Minas Gerais
Loan	$5	BNDES to LGN
Subsidy	$0.4	State of Minas Gerais
PUBLIC TOTAL **$8.4**		
Equity	$21	LGN
PRIVATE TOTAL **$21**		
GRAND TOTAL **$29.4**		

Source: Interviews with Nogueira 2013 and Silva 2013.

activities on site. The land ownership of the lot was to be split 60/40 between private and public sectors. The initial solicitation from BHTrans included no public monetary contribution, preventing any private firms from bidding; the project received no responses after three rounds of solicitations. The ultimate winner, LGN, a subsidiary of a large supermarket chain, negotiated to increase the public contribution as a precondition to assume the contract. BHTrans paid LGN about $3.9 million, of which about $3.5 million was a loan from BNDES. To develop the site, LGN spent about $26 million, of which 80 percent was existing capital and 20 percent was a BNDES loan. LGN was responsible for developing the site, constructing three buildings (of which it owns one—the mall) and the necessary bus infrastructure.

Compensation and Risk Guarantees

The concessionaire, LGN, owns the shopping center building and earns revenue from leasing commercial space and parking revenues. It does not profit from bus tariffs. Risk to private sector investment was mitigated through use of a range of non-financial guarantees and incentives (see Table 7).

Table 7 | **Risk Mitigation Strategies for Estação Barreiro Project**

TYPE OF RISK	MITIGATION STRATEGY
Construction	■ Combined construction/ operation contract
Competition	■ Exclusive use of bus terminal building ■ Partial ownership of property
Operational	■ Public subsidy to developer ■ Commuters able to enter commercial areas without exiting the closed bus network ■ 10-year lease on first-floor retail

Creative project structuring and remuneration strategies galvanized a project that was struggling to attract private financing. Success was almost undermined by delayed government payment but, because the project was located in an area with strong demand, the private partner was able to turn a profit.

Additional strategies were negotiated through the project contract. The stores on the terminal's second floor (where bus tickets can be bought and the transit system accessed) were leased to the private sector for the first ten years of the contract in order to boost short-term rental revenue. They have since reverted to public ownership. Further, at the request of LGN, the city increased the ability of passengers within the bus system to access retail space. Passengers who arrive at Barreiro are able to leave the transit area for approximately one hour and return without having to pay a new fare. Offering more time in the mall area has the potential to increase foot traffic and revenues for mall establishments.

Performance

Estação Barreiro has been a largely successful transit-oriented development. The project upends the traditionally car-focused commercial development common in Brazil. Car-centered malls, while popular, promote carbon-intensive transport modes that are often less accessible to lower-income populations.

The Belo Horizonte transit agency states that the government is satisfied with the terminal's impact (Silva 2013). It moves 105,000 passengers per day and serves as an anchor for local development. Estação Barreiro also hosts several offices for public services where citizens can acquire licenses, permits ,and other documents. BHTrans has attempted to recreate the PPP model used for Estação Barreiro in other transit projects in the city.[14]

The private owner, LGN, has enjoyed moderate success with the ViaShopping mall. Although the exact rate of return is difficult to estimate, the mall's profit margin is about 0.6 percent—slightly below the average for similar LGN properties. Representatives from LGN contend that the public payment was late and unnecessarily complicated. An estimated 25 percent of mall traffic and 10 percent of sales derive from customers who arrive via the transit system. Most importantly, however, the project has been lucrative enough to spur additional development. Currently, LGN is building another mall across the street from ViaShopping; it will be connected by a pedestrian walkway.

Lessons learned

Estação Barreiro's successes are due in large part to strong institutional support and flexibility. The rate of return presented by the initially proposed no-compensation model was not favorable enough to elicit responses from the private sector. However, local leadership was determined to realize the project. Creative project structuring and remuneration strategies galvanized a project that was struggling to attract private financing. Success was almost undermined by delayed government payment but, because the project was located in an area with strong demand, the private partner was able to turn a profit.

Replicating the Barreiro model, however, has been a challenge. Two similar projects, for the Pampulha and São Gabriel bus terminals, were proposed in 2011; neither was as successful at attracting private investment. Instead, these two terminals are being developed with almost exclusively public financing. Both represent the relative inflexibility of contract design after the federal government put in place mechanisms to formalize concessions in the transport sector.

Easily available public investment can crowd out private financing. In the road sector, 100 percent of concessions are financed by BNDES (Brochado and Vassallo 2012). It is a challenge for private financial markets to develop if public lenders consistently undercut their rates.

For example, the federally backed Estruturadora Brasileira de Projetos (EBP) proposed the initial financial model for Pampulha, which required private investment to cover 100 percent of the project costs (PBH 2012). With no bids received, the state government suspended the project (do Vale 2012). Private developers have speculated that, as with the first round of the Estação Barreiro solicitation, no firms were interested in bidding (Nogueira 2013). Instead of restructuring the contract or leaving room for negotiation, the project was re-launched in 2013 without a concession contract, and funded by Caixa as part of Brazil's 2014 World Cup infrastructure program. Instead of leveraging private investment in the model of Estação Barreiro, Pampulha was funded entirely by the government, demonstrating how public policy can crowd out private financing.

Another advantage enjoyed by Estação Barreiro was flexibility in project design and contract structure. BHTrans conducted its own feasibility study and was able to negotiate a private contract based on its conclusions. Since 2010, the federal government of Brazil has contracted the EBP to study the viability of all transport concessions. While this relieves financial pressure on local governments, it is difficult to negotiate terms outside of those that the EBP

explicitly recommends. The EBP determined that the Pampulha project should be structured with no public subsidy, but this decision probably did not take sufficient account of market conditions.

Discussion

The cases of Linha 4 and Estação Barreiro highlight some of the major barriers to private sector participation in financing transport infrastructure in Brazil. Principal barriers are the perceived risks of repayment and profitability as well as the high comparative cost of private financing. Controlling costs is a challenge because of exacting and complex regulation, tariffs and customs fees, and notorious delays common in Brazil (Biderman and Galal 2013). The risk of inflated cost is reflected in the lack of private sector interest in projects, such as Linha 4 and Estação Barreiro, that were deemed competitive when structured by public authorities. When revenues are threatened by the uncertainty of public transport income, private investors need additional reassurance.

The creative guarantee structure of the São Paulo Linha 4 project highlights private investor skepticism regarding government obligations. The variability of political regimes, especially at the state and municipal level, make the private sector wary of government guarantees and contracts. The private sector response to transport infrastructure concessions has been so lackluster, in fact, that the Brazilian government recently increased the projected rate of return for highway and railway concessionaires by 10-20 percent (Boadle and Goy 2013). Such a drastic and costly step on the part of the federal government illustrates the size of the challenge that faces private firms trying to make a profit in the Brazilian transport sector.

The difficulty of replicating Estação Barreiro in Belo Horizonte underscores further financial barriers to private sector investment in transport: Brazil's under-developed capital markets and the ready availability of public finance. Interest rates at institutions like the Brazilian development bank, BNDES, can undercut market rates by as much as 50 percent and crowd out other finance sources (Brochado and Vassallo 2012; Wheatly 2013). In the road sector, 100 percent of concessions are financed by BNDES (Brochado and Vassallo 2012). There is little reason to turn to private financial markets if public lenders offer more competitive rates.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CONCLUSIONS

The Brazilian government is publicly committed to greater involvement of the private sector in transportation investment. It has focused on creating market-level conditions necessary for increased private sector involvement, by implementing investment programs, policy reforms, legal frameworks, and financial incentives (Jeffris et al. 2012; Boadle and Goy 2013).

The effectiveness of these incentives for the low-carbon urban transport sector is hindered, however, by two main factors:

1. **THERE IS A MISMATCH BETWEEN THE EXPECTATIONS OF THE PUBLIC AND PRIVATE SECTORS REGARDING SUSTAINABLE TRANSPORT PROJECTS.** Prevailing public policy narratives may acknowledge the value of sustainability and accessibility, but Brazil's business environment is not conducive to undertaking low-carbon transport projects. Environmentally sustainable projects are in competition with unsustainable ones, and business-as-usual development favors the latter. The risks associated with pursuing sustainable transportation projects are substantial, and many hinge on a lack of trust between the public and private sectors. The misalignment of interests creates a climate in which projects are unlikely to be simultaneously viable, palatable, and economical.

2. **PUBLIC FINANCE CROWDS OUT PRIVATE CAPITAL.** Low interest rates from public financiers, particularly in the urban transport sector, are hindering ostensible policy pushes for increased private investment. In 2013, three big public banks accounted for half of all outstanding credit in Brazil (Reis 2014). Such cheap public financing has caused private banks to hold back on lending and many companies to rely on public credit instead of self-funding (Economist 2013b). Without reforms of the financial market that provide policy coherence and reduce the dependence on public sources of capital, private investment will lag behind.

More broadly, Brazil's investment policies to date have not succeeded in creating enabling conditions at the market level. Instead the federal government and the BNDES have favored a policy of supporting "national champions," an approach intended to transform hand-picked companies into multinational corporate leaders (Reid 2014). This approach has done little to increase private investment in transport, and may have run its course. One month after the credit rating firm Moody's downgraded both BNDES and Caixa, the Brazilian government claimed to be dismantling its industrial policy (Reuters 2013). A fresh strategy for BNDES could allow new firms to emerge and overall market competitiveness to improve.

Actions at the project level have also proven instrumental in encouraging private investment in urban transit in Brazil. Actions which reduce investor risk—such as revenue guarantees, co-financing from development banks, and contracts designed with performance incentives—can tip the balance for private investors in public transport. State-level guarantee funds were instrumental steps in the right direction, and other countries can learn from this example. Of course, these funds proved necessary but not sufficient. Flexible and innovative local authorities are able to structure compensation to effectively reduce risk, protect returns, and increase profitability.

Where transport systems cross inter-governmental boundaries, collaboration and consolidation is critical. This was the case in São Paulo, where the loans from development institutions, which shored up investor confidence, were paid at the state level. Although the role of value capture instruments (CEPACs) was limited in the case of Linha 4, such

The risks associated with pursuing sustainable transportation projects are substantial, and many hinge on a lack of trust between the public and private sectors. The misalignment of interests creates a climate in which projects are unlikely to be simultaneously viable, palatable, and economical.

strategies could have great potential. Key impediments at the project level include:

1. **LACK OF PUBLIC SECTOR CREDIBILITY.** Corruption, mismanagement, and political infighting create an aura of inefficiency and irresponsibility, which suppresses private investor interest. Better cooperation between administrations and political factions, increased accountability, transparent and competitive procurement, and the involvement of international development banks can all help to inspire greater private sector confidence in transport partnerships.

2. **POORLY-STRUCTURED DEALS.** Lack of interest on the part of the private sector, demonstrated so often in Brazilian transport concessions, reflects poorly aligned incentives and insufficient compensation. Public authorities need to have the flexibility and the capacity to structure projects competitively for the private sector. The EBP was intended to fill this gap, but has not been successful in the urban transport sector. While there is a danger of offering too much to private partners, transparent and competitive procurement can achieve outcomes that are mutually beneficial to public and private actors.

Given the centrality of transport to sustainable development and the presence of international investment in infrastructure development, there is some potential for climate finance to help overcome these barriers. International public climate finance is extremely small compared to infrastructure costs, but it could be used strategically to improve investment conditions or capacity in-country.

One role could be to subsidize government payments or reinforce guarantees. Learning from or

Better cooperation between administrations and political factions, increased accountability, transparent and competitive procurement, and the involvement of international development banks can all help to inspire greater private sector confidence in transport partnerships.

utilizing the guarantees from international finance institutions, like the World Bank's Multilateral Investment Guarantee Agency or the International Finance Corporation's Partial Credit Guarantee, is a first step.

A second, lower-cost option for climate finance could be to focus on the capacities of countries to plan for, access, receive, and report on climate finance. These so-called "readiness conditions" can help to strengthen the local financial and regulatory systems needed for increased investment (Lefevre and Leipziger 2014). At the urban level, for example, climate finance could support capacity building to obtain a sub-sovereign credit rating. New funding modalities like the Green Climate Fund and Nationally Appropriate Mitigation Actions (NAMAs) offer broad possibilities to increase funding levels and explore other innovative strategies.

A third approach could be to support transportation use and investment indirectly, through technical assistance to investors. In Colombia, for example, a NAMA was recently funded to support low-carbon transport. International funding will assist the Colombian bank, FINDETER, and its partners to develop real estate projects that are built around transportation nodes in Colombian cities. The program spurs private investment in transport-oriented development, which in turn promotes transit use and raises money through property taxes.

Lessons from Brazil are instructive for other middle-income emerging economies. Private capital market robustness is a priority in Brazil, where there are several multinational financial firms with experience and ambition in infrastructure investment. While this may not hold true in all countries, building up more basic financial infrastructure is a preliminary step. Brazil has dedicated resources to coordinating a national-level policy and regulatory framework for PPPs. The most successful aspects of the regulatory regime should be studied for broader application elsewhere. More simply, relatively low-cost strategies can effectively focus on issues like capacity building for urban transit policy prioritization and structuring PPPs. Finally, Brazil demonstrates that there is immense value in building trust between private firms and public authorities, a strategy that has benefits far beyond climate change and transport imperatives.

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ENDNOTES

1. Low-carbon, sustainable transport is defined as that which "reduces short-term and long-term negative impacts on the local and global environments, has economically viable infrastructure and operation, and provides safe and secure access for both persons and goods" (Dalkmann and Huizenga 2010).

2. Legal and regulatory factors are included in these categories, where appropriate. Laws governing private investment in public transport, for example, are characterized as policy issues; institutions which exercise regulatory authority over infrastructure investment are captured under institutional issues.

3. One of the companies embroiled in the scandal is the German conglomerate Siemens, which did serve as a subcontractor for the Linha 4 metro project.

4. Greenfield projects include contractual arrangements like Build-Own-Transfer (BOT), Build-Own-Operate (BOO), Build-Lease-Transfer (BLT), and other such configurations.

5. Thus the use of acronyms like BOT, DBO, DBOT, and DBFO, which stand for Build-Operate-Transfer, Design-Build-Operate, Design-Build-Operate-Transfer, and Design-Build-Finance-Operate, respectively.

6. Project finance describes investments where repayment is based on the cash flow of a project; it is attractive partly because, in accounting processes, the assets and liabilities of the project are kept off the company's balance sheet.

7. Although the large role of transport emissions in Brazil might be offset by comparatively clean electricity (which is ~80 percent hydroelectric). Vehicle fuel is also comparatively clean because of the large share of ethanol in gasoline—a minimum 25 percent ethanol blend (EIA 2013).

8. This number is highly disputed by Brazilian research from Eduardo Vasconcellos (ANTP) and Marcos Cintra (FGV), which put the figure closer to three percent. Whatever the exact percentage, it is clear that traffic costs São Paulo billions of dollars in lost productivity.

9. The definitions of these four perspectives are taken from Polycarp et al. 2013. In summary, "Policy" includes government plans and targets, laws, regulations, and economic incentives; "Institutional" encompasses the creation of new institutions, public capacity building, and institutional strengthening; "Industry" comprises private capacity building, resource assessments, and enabling infrastructure; "Financial" includes development, capacity building, and strengthening of financial institutions and offerings.

10. According to the Brazilian Ministry of Transportation (2011), about 95 percent of the national rail network is now operated by 12 private concessionaires; with more than 60 individual concessions to date, Brazil's toll road system is one of the largest in the world (Carpintero et al. 2012).

11. This includes the 2007 National Logistics and Transport Plan (PNLT), the 2007-2010 Growth Acceleration Plan (PAC 1), the 2012 Logistics Investment Program (PIL), the 2013 infrastructure investment programs for the 2014 World Cup and the 2016 Olympic Games, and the 2011-2014 Growth Acceleration Plan (PAC 2).

12. One major Brazilian public transport project, São Paulo's Metrô Line 6, recently attracted private financing. Although the process was repeatedly delayed due to lack of interest, the structure moving forward combines construction and operation (De Lorenzo, 2013).

13. The Brazilian government used the IGP-M (Market General Price Index), calculated by the Fundação Getúlio Vargas (FGV). The IGP-M is a composite of three separate indices: the Wholesale Price Index (IPA), Consumer Price Index (IPC) and Construction Cost National Index (INCC) that respectively represent 60 percent, 30 percent and 10 percent.

14. It should be noted the Belo Horizonte's Estação Vilarinho is also a bus terminal-shopping mall hybrid, but the shopping mall was constructed after the terminal and there was no public-private collaboration.

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ABOUT THE AUTHORS

David Leipziger was formerly a Research Analyst with the Energy & Climate team at EMBARQ and WRI Ross Center for Sustainable Cities.

Benoit Lefevre is the Director of Energy & Climate for EMBARQ and WRI Ross Center for Sustainable Cities.

Contact: blefevre@wri.org

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WORLD
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10 G STREET NE
SUITE 800
WASHINGTON, DC 20002, USA
+1 (202) 729-7600
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