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Drivers of and barriers to capital market investments in low-carbon infrastructure in Brazil

JULY 2021

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<tr>
<td>ABC</td>
<td>Low Carbon Emission Agriculture Program</td>
</tr>
<tr>
<td>ABDIB</td>
<td>Brazilian Association of Infrastructure and Basic Industries</td>
</tr>
<tr>
<td>Abrapp</td>
<td>Brazilian Association of Closed Private Pension Entities</td>
</tr>
<tr>
<td>ANBIMA</td>
<td>Brazilian Association of Financial and Capital Market Entities</td>
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<tr>
<td>AUM</td>
<td>assets under management</td>
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<tr>
<td>BNDES</td>
<td>National Bank for Economic and Social Development</td>
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<tr>
<td>CAGR</td>
<td>compound annual growth rate</td>
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<tr>
<td>CBI</td>
<td>Climate Bonds Initiative</td>
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<tr>
<td>CNseg</td>
<td>National Confederation of Insurance Companies, Private Pension Plans and Life Insurance, Complementary Health Insurance and Capitalization</td>
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<tr>
<td>CVM</td>
<td>Securities and Exchange Commission of Brazil</td>
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<td>DB</td>
<td>defined benefit</td>
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<td>DC</td>
<td>defined contribution</td>
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<tr>
<td>EBITDA</td>
<td>earnings before interest, taxes, depreciation, and amortization</td>
</tr>
<tr>
<td>EDC</td>
<td>Export Development Canada</td>
</tr>
<tr>
<td>ESG</td>
<td>environmental, social and corporate governance</td>
</tr>
<tr>
<td>ETF</td>
<td>exchange traded funds</td>
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<tr>
<td>FenaPrevi</td>
<td>National Private Pension Federation</td>
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<tr>
<td>FIDC</td>
<td>Credit Rights Investment Funds</td>
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<tr>
<td>FIIs</td>
<td>real estate funds</td>
</tr>
<tr>
<td>FIP</td>
<td>equity investment funds</td>
</tr>
<tr>
<td>FIP-IE</td>
<td>equity investment funds - Infrastructure</td>
</tr>
<tr>
<td>GDP</td>
<td>gross domestic product</td>
</tr>
<tr>
<td>GHG</td>
<td>greenhouse gas</td>
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<tr>
<td>HNWI</td>
<td>high net worth individuals</td>
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<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<td>IPO</td>
<td>initial public offering</td>
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<tr>
<td>Lamsa</td>
<td>Linha Amarela S.A.</td>
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<td>MLP</td>
<td>master limited partnerships</td>
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<tr>
<td>NDC</td>
<td>Nationally Determined Contribution</td>
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<tr>
<td>NPV</td>
<td>net present value</td>
</tr>
<tr>
<td>OECD</td>
<td>Organization for Economic Co-operation and Development</td>
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<tr>
<td>PAYG</td>
<td>pay-as-you-go</td>
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<tr>
<td>PPA</td>
<td>power purchasing agreements</td>
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<tr>
<td>PPI</td>
<td>Investment Partnership Program</td>
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<tr>
<td>PREVIC</td>
<td>National Superintendency of Complementary Pensions</td>
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<tr>
<td>R$</td>
<td>Brazilian real</td>
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<tr>
<td>REIT</td>
<td>real estate investment trust</td>
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<tr>
<td>RPC</td>
<td>Private pension regime</td>
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<tr>
<td>RPPS</td>
<td>Pension Regimes for Government Workers</td>
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<tr>
<td>SPV</td>
<td>special purpose vehicle</td>
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<tr>
<td>SUSEP</td>
<td>Superintendency of Private Insurance</td>
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<tr>
<td>TCFD</td>
<td>Task Force on Climate-related Financial Disclosures</td>
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<tr>
<td>UK</td>
<td>United Kingdom</td>
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<tr>
<td>US</td>
<td>United States of America</td>
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<tr>
<td>US$</td>
<td>US dollars</td>
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Executive summary

Institutional investors represent a promising source of capital for infrastructure investments. In theory, the long-term horizons of these investors’ liabilities match the long time horizon of infrastructure assets that, in turn, have low correlation with other asset classes, contributing to portfolio diversification. Internationally, some institutional investors have increased their exposure to infrastructure, but general uptake has been slow (Inderst, 2016).

The global gap for new investments in infrastructure is concentrated in middle-income countries. However, these nations often lack the conditions to attract institutional investors, such as sound policies, effective institutions, reliable contract enforcement and clear capital market regulations. Hence, local governments need to adopt policies and pursue actions that foster a conducive environment for attracting private investments in infrastructure (Bielenberg, Kerlin, Oppenheim, & Roberts, 2020; Yamahaki, Felsberg, Koberle, Gurgel, & Stewart-Richardson, 2020).

In view of this context, this report set out to identify the barriers and drivers that explain current patterns of capital market investment in infrastructure in Brazil, with a special focus on low-carbon infrastructure. Furthermore, the report explored possible actions that could assist in maximizing existing drivers or create new ones, as well as remove or mitigate current barriers, thus contributing to narrowing the infrastructure gap in the country.

Drawing on 14 interviews with stakeholders from Brazilian capital markets, the results from this study suggest that structural factors appear to be the most relevant (i.e. most frequently mentioned by interviewees). Improving these structural aspects is key for emerging markets, given the weaker legal, macroeconomic and political conditions, in concert with less developed capital markets.

Second, retail investors are one of the most important classes of capital market investors in infrastructure in Brazil due to a tax exemption available to them. To the best of our knowledge, such a prominent role is a unique feature of Brazil’s outlook.
Even though these investors fill an important infrastructure gap, their shorter-term preferences and need for higher liquidity also influence and shape the infrastructure bond market, with a lack of a proper match between investment vehicles and asset time horizons.

With regard to pension funds, the industry’s culture is notably one of risk aversion, with most assets allocated to fixed income, especially domestic sovereign bonds, which were sufficient to achieve actuarial targets in the past. More recently, declining interest rates (among other factors) may be motivating managers to seek riskier investments, although most pension funds still have room to diversify into other asset classes, such as listed equity, and into other sectors besides infrastructure.

Moreover, the largest pension funds in Brazil tend to have a higher share of retired participants, thus requiring high levels of liquidity in order to pay beneficiaries. Newer funds with higher ratios of active participants could match their long-term liabilities with higher-yield, less-liquid assets, but tend to lack the financial and human resources and expertise to make investments in infrastructure.

Lastly, local structural barriers represent substantial challenges for foreign investors that might be interested in investing in Brazil, particularly since they could find more favorable conditions (e.g. investment grade countries with less volatile currencies) in other emerging markets. Still, the appeal of low-carbon, “green-labelled” infrastructure assets and bonds in Brazil, as well as the prior knowledge of the local landscape held by some investors, may help mitigate these barriers, especially for private equity investors.

Overall, the research findings corroborate the literature, suggesting that some of the barriers faced by investors in Brazil are similar to those found in other developed and developing countries. Hence, there seems to be room for some form of policy learning (transfer) from the international experience.

In addition, the report offers valuable contributions to the academic literature by providing a higher level of granularity in the analysis, with an in-depth evaluation of a specific emerging market, as well as a greater degree of differentiation among barriers and drivers (those pertaining to the institutional environment, those related to direct investments and those linked to capital markets) by investor type.

The results may also help local policymakers identify priorities for action, as well as offer better insights into the decision-making processes of different investors, their needs and conditions in order to invest in the pipeline of infrastructure projects available in the country. More generally, the report also showcases the importance of ensuring that the topics of low-carbon infrastructure and ESG investing are on the agenda of capital market investors.
Investments in infrastructure provide numerous benefits to the recipient countries, given that infrastructure development has a multiplier effect on job creation, income equality, productivity and economic development (Aschauer, 1989; Bielenberg et al., 2020; Roller & Waverman, 2001; Standard & Poor’s, 2015). When infrastructure construction incorporates climate change mitigation and resilience, it also contributes to a low-carbon growth pathway, reducing climate-related losses, protecting the most vulnerable populations and increasing the likelihood of complying with a two-degree (warming) scenario (Bhattacharya, Oppenheim, & Stern, 2015).

Globally, infrastructure spending on energy, transport, telecommunications, and water and waste ranges from US$ 2.5 trillion to US$ 3 trillion per year. In 2015 alone, total spending amounted to US$ 2.539 trillion. While half of these investments come from the public sector, the other half originates from private sources, of which 65%-75% comes from corporations and the rest from institutional investors (Bielenberg et al., 2020; Woetzel, Garemo, Mischke, Kamra, & Palter, 2017).

In order to meet current and future demands for infrastructure that is aligned with a low-carbon economy, The Global Commission on The Economy and Climate (2014) estimates that investments must double over the next 15 years to US$ 6.27 trillion annually. Of this gap, 65% lies in middle-income countries. Investment needs are also found to be unequally distributed per sector, with energy accounting for 54% of the gap, water and waste for 24%, and transport for 22% (Bielenberg et al., 2020).

Considering the fiscal constraints of the majority of emerging markets, it is unlikely that this investment gap will be fully financed by the public sector. Banks also face constraints when funding infrastructure due to the Basel III regulation, which, by discouraging mismatches in the maturity of assets and liabilities, makes it more expensive for banks to issue long-term debt, such as project financing loans. In this context, the potential for mobilizing additional infrastructure investments lies primarily with corporations and institutional investors (Bhattacharya et al., 2015; Croce & Yermo, 2013).

Institutional investors are attracted by countries that offer a conducive environment for investment, with sound policies, effective institutions, reliable contract enforcement, transparency and clear capital market regulations. As the investment gap is concentrated in middle-income countries, where a poor enabling environment is more likely to be found, governments in these countries will need to cultivate suitable conditions in order to unlock private investments in infrastructure (Bielenberg et al., 2020; Yamahaki et al., 2020).

1 See more at https://www.bis.org/bcbs/basel3.htm.
In view of this context, this study seeks to identify the barriers that hinder, and the drivers that foster, an increase in capital market investments in infrastructure development in Brazil, with a focus on low-carbon infrastructure\(^2\). There is a need for annual investments equivalent to US$ 53.15 billion\(^3\) per year in the country (or 4.3% of the GDP) over the next ten years to overcome infrastructure bottlenecks. In contrast, only 1.71% of the GDP was invested in infrastructure in Brazil in 2019 (ABDIB, 2020). Through examining the challenges that preclude capital market investments and the incentives that enable them, this study seeks to explore actions that could be employed to create a more attractive environment for institutional investors, thus contributing to remedying the lack in low-carbon infrastructure in the country.

Drawing on 14 interviews with stakeholders from Brazilian capital markets, the results from this study suggest that structural factors appear to be the most relevant (i.e. most frequently mentioned by interviewees). Improving these structural aspects is key for emerging markets, given the weaker legal, macroeconomic and political conditions, in concert with less developed capital markets (Yamahaki et al., 2020).

Second, retail investors are one of the most important classes of capital market investors in infrastructure in Brazil due to a tax exemption available to them. To the best of our knowledge, such a prominent role is a unique feature of Brazil’s outlook. Even though these investors fill an important infrastructure gap, their shorter-term preferences and need for higher liquidity also influence and shape the infrastructure bond market, with a lack of a proper match between investment vehicles and asset time horizons.

With regard to pension funds, the industry’s culture is notably one of risk aversion, with most assets allocated to fixed income, especially domestic sovereign bonds, which were sufficient to achieve actuarial targets in the past. More recently, declining interest rates (among other factors) may be motivating managers to seek riskier investments, although most pension funds still have room to diversify into other asset classes, such as listed equity, and into other sectors besides infrastructure.

Moreover, the largest pension funds in Brazil tend to have a higher share of retired participants, thus requiring high levels of liquidity in order to pay beneficiaries. Newer funds with higher ratios of active participants could match their long-term liabilities with higher-yield, less-liquid assets, but tend to lack the financial and human resources and expertise to make investments in infrastructure.

Lastly, local structural barriers represent substantial challenges for foreign investors that might be interested in investing in Brazil, particularly since they could find more favorable conditions (e.g. investment grade countries with less volatile currencies) in other emerging markets.

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2 From the outset, the research team has not provided to the interviewees a definition of low-carbon infrastructure, leaving it to their discretion to discuss the sectors that they considered to be low-carbon. As shown in Figures 9 and 10, the sectors identified were renewable energy, railway, maritime and inland waterways, and sanitation, sectors covered by the Climate Bonds Standard. Urban mobility was not mentioned.

3 R$ 284.4 billion (exchange rate Feb. 8, 2021 USD1 = R$5.35. Source: Brazilian Central Bank)
Still, the appeal of low-carbon, “green-labelled” infrastructure assets and bonds in Brazil, as well as the prior knowledge of the local landscape held by some investors, may help mitigate these barriers, especially for private equity investors.

The results from this study may help local policymakers identify priorities for action, as well as offer better insights into the decision-making processes of different investors, their needs and conditions in order to invest in the pipeline of infrastructure projects available in the country. In Box 1, we provide a list of actions suggested by the interviewees to tackle barriers to capital market investments in infrastructure.

**BOX 1**

**Measures suggested by the interviewees to tackle barriers to capital market investments in infrastructure**

› Creating a shared database for due diligence of infrastructure projects;
› Outsourcing infrastructure investments to specialized infrastructure fund managers;
› Bundling smaller pension funds;
› Creating a new series of incentivized debentures, as stipulated by Draft Bill 2,646/2020;
› Issuing bonds in US$;
› Allowing non-qualified investors (those with investments lower than R$ 1 million) to invest in FIP-IEs;
› Creating platforms, hubs or events to match foreign investors with local partners;
› Having the government certify infrastructure projects so that they will be eligible for green bond issuance after auction;
› Government supporting attraction of capital market investments to infrastructure;
› Creating new investment vehicles, such as hybrid securities that have fixed and variable income components.

Source: the authors based on the interviews

This report is structured as follows: the literature review identifies the main drivers of and barriers to capital market investments in infrastructure. It also explains the different types of investment vehicles adopted by capital market players to invest in infrastructure and provides an overview of global institutional infrastructure investments.
The next section provides an overview of the capital market in Brazil and its main players, quantity of investments in infrastructure debentures and the country’s infrastructure investment gap. Then, the methods are explained, followed by a presentation of interview findings. A brief discussion explores the connections between the most relevant barriers and drivers affecting capital market investors when investing in low-carbon infrastructure in Brazil, as well as solutions suggested by the interviewees. A concluding section summarizes the main findings and contributions, discusses the limitations of the study and indicates room for future studies.

Given that the SNAPFI project, of which this report is a part, aims to support implementation of the Nationally Determined Contributions (NDCs), a description of Brazil’s climate goals under the Paris Agreement and the measures planned to achieve them are briefly presented below.

1.1 Brazil’s Nationally Determined Contribution and low-carbon infrastructure

To achieve the objectives of the Paris Agreement, Brazil’s Nationally Determined Contribution (NDC) stipulates that the country intends to reduce its greenhouse gas (GHG) emissions by 37% compared to 2005, for the entire economy by 2025. It also indicates a subsequent commitment to reducing emissions by 43% compared to 2005 levels by 2030.

In order to achieve these goals, Brazil initially listed sectoral measures and objectives, consistent with a two-degree-Celsius warming goal:

› **Land use change and forests:** by 2030, achieve zero illegal deforestation in the Brazilian Amazon, compensate emissions from legal suppression of vegetation, and restore and reforest 12 million hectares of forests;

› **Energy:** by 2030, increase the share of biofuels in the energy mix to approximately 18% and achieve 45% of renewables in the energy mix;

› **Agriculture:** by 2030, restore an additional 15 million hectares of degraded pasturelands and enhance 5 million hectares of integrated cropland-livestock-forestry systems;

› **Industry:** promote new standards for clean technology and further enhance energy efficiency measures and low-carbon infrastructure;

› **Transportation:** promote efficiency measures, and improve infrastructure for transport and public transportation in urban areas.

4 In addition to the goals of the Low Carbon Emission Agriculture Program (ABC).
With regard to low-carbon infrastructure, there are plans in the NDC to increase the share of renewable energy in the energy matrix. On the other hand, there are no explicit indicators and sectoral targets for the transportation sector. Moreover, measures for the transportation sector focus on urban areas (Brasil, 2016), even though road transport, mostly fueled by fossil fuels (diesel), accounts for 65% of all freight transport in the country (Ministério dos Transportes, 2018). Therefore, to achieve Brazil’s climate goals, the country would benefit from having stricter and more targeted measures to reduce emissions in the transport sector, shifting freight transport to less carbon-intensive modes such as railways and waterways.
CHAPTER TWO

Literature review
The literature review section is structured as follows. The first subsection identifies the main drivers of and barriers to capital market investments in infrastructure. It then explains the different types of investment vehicles adopted by capital market players to invest in infrastructure. Next, it provides an overview of global institutional investments in infrastructure, mapping the amount of investments made by institutional investors from OECD and G20 countries in infrastructure as well as the asset allocation patterns of global pension funds. Lastly, it provides a brief overview of the main players in Brazil’s capital market and the respective assets under management, the amount of capital market investments in infrastructure debentures (supply side of financing) and the current gap in infrastructure investments in the country (demand side of financing).

2.1 Drivers of and barriers to institutional investments in transport infrastructure

This subsection identifies the main drivers of and barriers to capital market investments in infrastructure.

Historically, infrastructure investments have been primarily made by the public sector. Nonetheless, due mostly to fiscal constraints, since the 1990s several countries have started searching for ways to increase private sector participation in infrastructure investments, including via capital markets (Croce & Yermo, 2013).

Institutional investors represent a promising source of resources for existing and new projects, and a growing number of investors — such as large pension funds and insurance companies — have begun pursuing opportunities to invest in infrastructure (Inderst, 2016). One of the reasons behind this recent behavior relates to their long-term investment horizon (OECD, 2013):

- Pension funds have long-term investment horizons because they start collecting contributions when individuals enter the workforce and only commence paying benefits when individuals retire, thirty to forty years later, therefore with liabilities with a long time horizon;
- Insurance companies, particularly life insurers, also have long-term liabilities and offer products such as annuities and others that resemble retirement products;
- Sovereign wealth funds can also have long investment horizons as well as a need to invest large sums of capital, which are more aligned with bigger, long-lived projects.
Infrastructure assets provide a good match with institutional investors’ liabilities because they both have a long economic life, stable long-term cash flows that are often explicitly protected from inflation, and attractive risk-adjusted returns. They also tend to reduce overall investment portfolio volatility because their characteristics differ from those observed in traditional equities and real estate (see, for instance, Table 1) (Torrance, 2009). In addition, investors are interested in investing in infrastructure assets to enhance portfolio diversification and have alternative sources of income (Inderst, 2016; Sharma, 2012).

**TABLE 1**

**Infrastructure correlations July 2000 - September 2015**

<table>
<thead>
<tr>
<th></th>
<th>US Equities</th>
<th>Non-US Equities</th>
<th>Global Bonds</th>
<th>REITs</th>
<th>Commodities</th>
<th>Hedge Funds</th>
<th>Inflation-linked Bonds</th>
<th>Private Equity</th>
<th>Global Infrastructure</th>
<th>Canadian Equities</th>
<th>Cash</th>
</tr>
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<tbody>
<tr>
<td>US Equities</td>
<td>1.0</td>
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<tr>
<td>Non-US Equities</td>
<td>0.87</td>
<td>1.0</td>
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<tr>
<td>Global Bonds</td>
<td>0.10</td>
<td>0.33</td>
<td>1.0</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>REITs</td>
<td>0.62</td>
<td>0.62</td>
<td>0.29</td>
<td>1.0</td>
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</tr>
<tr>
<td>Commodities</td>
<td>0.31</td>
<td>0.43</td>
<td>0.22</td>
<td>0.17</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hedge Funds</td>
<td>0.67</td>
<td>0.76</td>
<td>0.26</td>
<td>0.48</td>
<td>0.51</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inflation-linked Bonds</td>
<td>0.00</td>
<td>0.12</td>
<td>0.69</td>
<td>0.23</td>
<td>0.23</td>
<td>0.23</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Equity</td>
<td>0.85</td>
<td>0.89</td>
<td>0.23</td>
<td>0.73</td>
<td>0.40</td>
<td>0.74</td>
<td>0.12</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Infrastructure</td>
<td>0.66</td>
<td>0.80</td>
<td>0.43</td>
<td>0.60</td>
<td>0.41</td>
<td>0.69</td>
<td>0.28</td>
<td>0.70</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canadian Equities</td>
<td>0.80</td>
<td>0.82</td>
<td>0.25</td>
<td>0.53</td>
<td>0.58</td>
<td>0.79</td>
<td>0.17</td>
<td>0.79</td>
<td>0.67</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td>-0.16</td>
<td>-0.10</td>
<td>0.05</td>
<td>-0.07</td>
<td>0.00</td>
<td>-0.01</td>
<td>0.04</td>
<td>-0.18</td>
<td>0.05</td>
<td>-0.07</td>
<td>1.0</td>
</tr>
</tbody>
</table>

REITs: Real Estate Investment Trusts.

In particular, transport infrastructure investments are attractive to investors because they feature low competition (due to the monopolistic characteristic of the assets), high barriers to entry and often inelastic consumer demand (Sharma, 2012, 2013).
Moreover, brownfield investments are generally preferred by investors because they afford less risk and greater alignment with long-term investments (Croce & Yermo, 2013).

Still, even though there is at least a theoretical match between the long-term liabilities and risk preferences of institutional investors and the characteristics of most infrastructure assets, only 2% of large pension fund assets were allocated to infrastructure in 2017 (OECD, 2019) and uptake has been slow overall (Sharma, 2013). Some challenges and barriers remain, as described below.

### 2.1.1 Limited resources and expertise to make infrastructure investments

Infrastructure assets are heterogeneous and inherently complex, with political, reputation, governance, environmental, construction, operational and financial risks associated with them, as well as uncertainties related to funding and regulatory frameworks (Inderst, 2014; Sharma, 2013). Therefore, infrastructure assets call for specialist knowledge of local conditions and require analysis methods distinct from those for traditional assets such as bonds and corporate stocks (OECD, 2020). In this sense, investors with limited resources and capability often face constraints when investing in infrastructure, especially considering that the costs of capacity and skill development are difficult to justify for a one-off opportunity (Inderst, 2016; OECD, 2020).

### 2.1.2 Investor size

Closely related with the point above, infrastructure investing is typically done by larger pension funds, with smaller ones often not investing in infrastructure. For instance, in Australia, two-thirds of pension funds still do not invest in unlisted infrastructure, suggesting that fund size matters when investing in less liquid assets such as infrastructure (Inderst, 2014).

Sharma (2013) argues that size also influences the type of investment vehicle adopted. While pension funds are the largest institutional investors in the global infrastructure investing market, the majority do not have sufficient resources and in-house capability to make investments directly and must resort to the fund management route.

### 2.1.3 Supply of infrastructure projects

Challenges are also found on the supply side, due to a lack of suitable projects, project size and poor procurement processes (Inderst, 2016). The unavailability of sufficient investment-grade projects affects all types of existing and potential investors looking for projects or products in which projects are bundled (OECD, 2020).

---

5 Infrastructure investing, specially direct investment, requires adequate size (Inderst, 2016).
2.1.4 Intermediation processes

Intermediation processes also have limitations, with inappropriate, expensive investment vehicles and a lack of secondary markets and weak capital markets (Inderst, 2016).

2.1.5 Regulatory barriers

The legal framework of certain countries may restrict or prevent pension funds from investing in equity, corporate bonds, directly in projects or abroad, hampering infrastructure investment (Inderst, 2016; OECD, 2020). For instance, the Mandatory Provident Fund System in Hong Kong, a defined-contribution system of privately managed funds, only allows investment in listed markets such as stocks and bonds (OECD, 2019).

2.1.6 Lack of high quality data

An additional challenge for infrastructure investment relates to the unique spatial/geographical information attached to infrastructure assets. That is, the successful development of these assets is affected by their regional political, economic and regulatory framework in the long term, with data that are commonly only available locally (Torrance, 2009). Indeed, a general lack of high quality data on infrastructure makes it harder for investors to assess both the risks of these assets and their correlation with other investments (Croce & Yermo, 2013).

In this sense, and in order to make informed investments, institutional investors usually conduct extensive due diligence processes and partner with investment banks, lawyers, operators and other local specialists to become knowledgeable about the specific metrics surrounding their long-term investments in foreign markets. Alternatively, investors develop relationships with fund managers specialized in infrastructure assets when investing indirectly in the sector (Torrance, 2009).

On this point, Sharma (2013) highlights the importance of long-term relationships and trust between institutional investors and financial intermediaries to facilitate private investments in infrastructure, as well as the assurance that government policies will remain aligned with the long-term interests of investors throughout the duration of the contractual agreements in the case of public–private partnerships, including concessions.
2.2 Infrastructure investment vehicles

This subsection explains the different types of investment vehicles adopted by capital market players to invest in infrastructure.

There is a wide range of investment vehicles — broader in developed markets than in emerging economies — available to institutional investors to increase their exposure to infrastructure assets (Inderst & Stewart, 2014), as exemplified in Figure 1. The choice of vehicle depends on the nature of the asset and on the role envisaged by investors of the infrastructure assets in their portfolios (Sharma, 2013).

Capital market direct investments refer to those investments made directly in transport companies or projects, either through equity or debt, while capital market indirect investments are those mediated, for instance, by a fund manager. The decision between direct or indirect capital market infrastructure investing is largely dependent on an investors’ size, resources and internal capabilities (Sharma, 2013).

FIGURE 1

*Infrastructure investment vehicles*

![Diagram of infrastructure investment vehicles](source: Sharma (2013))
Drawing on Figure 1, the following are examples of infrastructure investment vehicles:

› **Listed Companies**: There are infrastructure companies with publicly traded shares in stock markets. Globally, only about 5 to 6% of the equity universe is represented by listed infrastructure and utility companies (Inderst, 2016). It should be noted here that, as highlighted by the OECD (2020), investing in corporate stocks through secondary markets does not channel capital to the investee company, and thus has a limited effect on new asset creation.

› **Listed Infrastructure Indexed Funds**: There are portfolios designed to match or track infrastructure indices (Sharma, 2013).

› **Listed Infrastructure Funds**: In this case, an external manager invests on behalf of investors in various infrastructure assets. While the fund is publicly listed, the assets in which the fund invests may or may not be (Sharma, 2013).

› **Unlisted Infrastructure Funds**: These funds are usually managed by an investment bank or management firm (general partner), who invests the contributions of the funds in several infrastructure assets on behalf of other investors (limited partners) (Sharma, 2013).

› **Unlisted Direct Equity Investment**: It refers to capital market direct investment in infrastructure assets/companies not listed on the stock market, whose value is, consequently, not influenced by overall stock market sentiment and volatility (Sharma, 2013). Sharma (2013) recognizes unlisted equity vehicles as the greatest opportunity for institutional investors seeking to invest in infrastructure, and a route that has contributed to characterizing infrastructure as a distinct asset class (Croce & Yermo, 2013).

› **Infrastructure Debt Funds**: These funds are vehicles for investing in various infrastructure companies backed by debt (Sharma, 2013).

› **Corporate Bonds**: These are debt securities issued by infrastructure companies. In some countries, the supply of debt instruments is limited, with few bonds with maturities extending over 15 to 20 years and therefore capable of matching both the long-term profile of infrastructure projects and pension fund and insurance company liabilities (Croce & Yermo, 2013).

› **Project Bonds**: These are debt instruments with revenues generated by the projects to which they are linked as a source of amortization (Faro & Nicastro, 2018).

The OECD (2015) also lists hybrid instruments, such as subordinated bonds, convertible bonds and preferred stock, as vehicles for infrastructure investment. These instruments are often debt instruments with equity-like participation. For instance, subordinated loans are riskier and pay higher yields than senior issues and may appeal to institutional and retail investors looking for investments with higher yields than sovereign bonds.
2.3 Institutional investments in infrastructure in G20 countries

This subsection provides an overview of global institutional investments in infrastructure, mapping the amount of investments made by institutional investors from OECD and G20 countries in infrastructure as well as the asset allocation patterns of global pension funds.

In 2020, the OECD (2020) mapped the amount of investments made by institutional investors\(^6\) from OECD and G20 countries\(^7\) in infrastructure. As of February 2020, these investors allocated US$ 1.04 trillion to infrastructure assets, US$ 314 billion (30%) of which was to green infrastructure. These estimates exclude direct investment in stocks because, as mentioned earlier, listed stocks through secondary markets do not channel capital to the investee companies, and thus have a limited effect on new asset creation.

With regard to investment by type of institutional investor, pension funds invested US$ 371 billion in infrastructure (36% of total), 90% of which was through direct project equity and unlisted funds (Figure 2). This indicates that long-term capital appreciation is the main driver for pension fund infrastructure investments, and that illiquidity is incentivized by the illiquidity premium. In the insurance industry, life insurers are the main investors in infrastructure in view of their long-term liabilities. In total, insurers invested US$ 101 billion in infrastructure (about 10% of the total), 81% of which was through unlisted funds and direct project equity.

Unlike pension funds and life insurers, asset managers prefer to invest in more liquid investment vehicles, given that some of their clients (e.g. retail investors) have less tolerance to illiquidity and lower risk appetite. As a result, 30% of the US$ 517 billion in assets under management were invested in YieldCos\(^8\) and 14% in master limited partnerships (MLPs)\(^9\).

Sovereign wealth funds appeared to have limited exposure to infrastructure investments (US$ 8 billion), possibly explained by their lower level of investment disclosure and reduced size in comparison to the pension fund industry.

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6 For the purposes of OECD’s report (OECD, 2020), institutional investors include pension funds, insurance companies, sovereign wealth funds and asset managers.

7 40 countries: Argentina, Australia, Austria, Brazil, Belgium, Canada, Chile, China, Colombia, the Czech Republic, Denmark, France, Germany, Greece, Hungary, Iceland, India, Indonesia, Israel, Italy, Japan, the Republic of Korea, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, Norway, Poland, Portugal, Russia, Saudi Arabia, the Slovak Republic, Slovenia, South Africa, Sweden, Switzerland, Turkey, the United Kingdom and the United States.

8 “Yieldcos are publicly traded companies created by a parent company that bundle operating infrastructure assets to generate predictable cash flows that are then paid out in dividends to shareholders” (Bielenberg et al., 2020)

9 Master limited partnerships (MLPs) are business ventures that exist in the form of a publicly traded limited partnership. They combine the tax benefits of a private partnership — profits are taxed only when investors receive distributions — with the liquidity of a publicly traded company (PTP) (OECD, 2015).
In terms of sectoral allocation, energy represented the largest sub-sector of institutional holdings, totaling US$ 488 billion (excluding corporate stocks), of which US$ 278 billion was in renewables (US$ 60 billion in wind and US$ 27 billion in solar). Investments in transport accounted for US$ 13 billion, with 16% allocated to green infrastructure.

In a separate Sankey chart, the OECD (2020) analyzed the quantity of institutional investments in corporate stocks (Figure 3). In total, US$ 2.3 trillion were invested in corporate stocks, 90% of which were held by asset managers, another indication that these investors prefer more liquid investments.
As for cross-border investments, Figure 4 shows that, in general, institutional investors prefer to allocate capital in their own regions. Moreover, when cross-border investments take place, they target assets in more mature markets, highlighting the role of an enabling environment that can attract and scale up institutional investment in infrastructure.
2.3.1 Pension fund asset allocation

In addition to the previous survey, OECD also conducts annual surveys to identify the asset allocation patterns of global pension funds. In the 2019 survey, data was collected through questionnaire responses from 99 pension funds from 46 countries, including some non-OECD countries, such as Brazil, India and Indonesia (OECD, 2019).

In 2017, of the funds surveyed, large pension funds (76 funds) allocated 2% of their assets to unlisted infrastructure (Figure 5), while public pension reserve funds (23 funds) allocated 1%.

### Cross-border investment holdings of OECD and G20 institutional investors

<table>
<thead>
<tr>
<th>INVESTOR REGION</th>
<th>ASSET REGION</th>
<th>Africa</th>
<th>Asia</th>
<th>Europe</th>
<th>Middle East</th>
<th>North America</th>
<th>Oceania</th>
<th>South America</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td></td>
<td>2,413</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25</td>
<td>2,438</td>
</tr>
<tr>
<td>Asia</td>
<td></td>
<td>3,412</td>
<td>14,051</td>
<td>6,811</td>
<td>734</td>
<td>2,474</td>
<td>3,723</td>
<td>380</td>
<td>31,585</td>
</tr>
<tr>
<td>Europe</td>
<td></td>
<td>3,854</td>
<td>6,298</td>
<td>134,764</td>
<td>1,242</td>
<td>26,640</td>
<td>4,536</td>
<td>1,709</td>
<td>179,043</td>
</tr>
<tr>
<td>Middle East</td>
<td></td>
<td>87</td>
<td>880</td>
<td>1,632</td>
<td>2,475</td>
<td>4,674</td>
<td>130</td>
<td>101</td>
<td>9,978</td>
</tr>
<tr>
<td>North America</td>
<td></td>
<td>1,072</td>
<td>12,620</td>
<td>59,938</td>
<td>490</td>
<td>123,755</td>
<td>14,765</td>
<td>15,149</td>
<td>227,789</td>
</tr>
<tr>
<td>Oceania</td>
<td></td>
<td>6</td>
<td>628</td>
<td>7,659</td>
<td>27</td>
<td>2,920</td>
<td>19,939</td>
<td>369</td>
<td>31,548</td>
</tr>
<tr>
<td>South America</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3,833</td>
<td>3,833</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>10,844</td>
<td>34,477</td>
<td>210,805</td>
<td>4,967</td>
<td>160,463</td>
<td>43,118</td>
<td>21,541</td>
<td>486,215</td>
</tr>
</tbody>
</table>

Source: OECD (2020)
Capital market investments in low-carbon infrastructure in Brazil

Forty-nine out of the 99 investors reported having invested in infrastructure in 2017 (US$ 120.8 million, in total) in the form of unlisted equity (i.e. infrastructure funds or direct investments in projects) or debt (Table 2) (OECD, 2019).

**TABLE 2**

**Pension fund infrastructure investments in 2017**

<table>
<thead>
<tr>
<th>Investment vehicle</th>
<th>Total assets, in US$ millions</th>
<th>% of total assets of the 49 funds that reported investing in infrastructure (US$ 2.8 trillion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unlisted equity</td>
<td>110.5</td>
<td>3.9</td>
</tr>
<tr>
<td>Debt†</td>
<td>10.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Total infrastructure investments</td>
<td>120.8</td>
<td>4.3</td>
</tr>
</tbody>
</table>

† Exposure to direct loans and bonds

Source: OECD (2019)

10 The remaining 50 funds did not report their infrastructure investments or did not have infrastructure investments to report.
Of the funds that differentiated their allocations by investment vehicle (43 funds), unlisted infrastructure funds were the most frequent vehicle, with 61.8% of total investments, followed by direct and co-direct investments with 38.2%.

Among the funds that reported the sectoral allocations of their unlisted infrastructure equity portfolios (37 funds), the transport sector was the largest component, receiving an average of 28.6% of investments, followed by renewable energy (20%) (OECD, 2019).

Looking at country-wide patterns, other studies note that pension funds based in Australia and Canada have the highest asset allocation in infrastructure, about 5% of their total assets, while the global average remains closer to about 2%. Recently, some pension funds in these two countries have even raised their allocations in infrastructure to as high as 10-15% (Croce & Yermo, 2013).

Likewise, with regards to the largest infrastructure fund managers, Australia is home to eight of the twenty largest global funds, while one (Brookfield) is based in Canada. Indeed, Australia and Canada do not have restrictive investment regulations that limit allocation to certain asset classes (Inderst, 2014). Also, Canada relies less on bank financing and has a more developed project bond market than other countries, in which infrastructure bonds are commonly structured to be investment grade (Inderst, 2014).

### 2.4 The Brazilian context

In this subsection, we provide a brief overview of the main players in Brazil’s capital market (pension funds, asset managers, insurance companies and retail investors) and the respective assets under management, the amount of capital market investments in infrastructure debentures (supply side of financing) and the current gap in infrastructure investments in the country (demand side of financing).

#### 2.4.1 Capital market investments in Brazil (supply side of financing)

In comparison to other international markets, the degree of development of the Brazilian capital market is modest (Table 3). Hence, it has the potential, with development, to become more active in capital provision for long-term investments such as infrastructure.

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11 For instance, in 2005, Canada removed the Foreign Property Rule, which had previously restricted the amount of foreign assets that Canadian retirement and pension funds could hold to 30%.
The pension system

In Brazil, the pension system is based on three different schemes:

i) a mandatory PAYG benefit system, known as the General Social Security Regime (RGPS);

ii) a specific regime for public-sector employees, the Pension Regimes for Government Workers (RPPS\textsuperscript{12}), also financed as a PAYG system; and

iii) the Private Pension Regime (RPC\textsuperscript{13}) which provides occupational and individual plans on a voluntary basis and can be offered either by pension funds or insurance companies and open entities (Abrapp, 2014).

Pension funds (closed pension entities)

Also called closed complementary pension entities, pension funds operate pension plans exclusively for employees of a corporation or corporate group; public employees from the federal, state or municipal administration; or associates/members of professional or sectoral associations (CVM, 2019).

### TABLE 3

**Capital market development indicators — international comparison**

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Issuance of private bonds (% GDP)</th>
<th>Market capitalization/GDP</th>
<th>Number of listed companies per 1,000 inhabitants</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>7</td>
<td>106.1</td>
<td>118.8</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>16</td>
<td>15.7</td>
<td>117</td>
</tr>
<tr>
<td>South Africa</td>
<td>24</td>
<td>17.1</td>
<td>204.8</td>
</tr>
<tr>
<td>Germany</td>
<td>28</td>
<td>38.2</td>
<td>43.9</td>
</tr>
<tr>
<td>Brazil</td>
<td>35</td>
<td>22.1</td>
<td>49.0</td>
</tr>
<tr>
<td>China</td>
<td>36</td>
<td>27.9</td>
<td>46.6</td>
</tr>
<tr>
<td>Russia</td>
<td>37</td>
<td>5.3</td>
<td>53.1</td>
</tr>
</tbody>
</table>

*Source: Accenture (2018)*

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\textsuperscript{12} In Portuguese, *Regime Próprio de Previdência Social*.

\textsuperscript{13} In Portuguese, *Regime de Previdência Complementar*.
The National Superintendency of Complementary Pensions\textsuperscript{14} (PREVIC) is the agency responsible for monitoring and supervising the activities of closed pension fund entities, as well as implementing and enforcing policies for their operation (CVM, 2019). According to PREVIC (2020), as of September 2020, a total of US$ 167.1 billion\textsuperscript{15} was under the management of the 295 closed pension funds, 38% of which are managed by private entities and 61% by public entities (Graph 1).

\textbf{Graph 1}

\textit{Pension assets under management by type of fund manager (\%), in September 2020}

Historically, the majority of pension fund assets have been allocated to fixed income investments. As of December 2020, 72.6\% of all assets were allocated to fixed income — 55.3\% to investment funds and 15.4\% to government bonds. In comparison, 20.4\% were allocated to equity — 12.9\% to investment funds and 7.5\% to the stock market. Only 2.1\% were allocated to structured (or alternative) investments, comprising real estate, multimarket and private equity investment funds (Figure 6).

\textsuperscript{14} In Portuguese, \textit{Superintendência Nacional de Previdência Complementar}.

\textsuperscript{15} R$ 942,453,576,000 (exchange rate on Sept. 30, 2020 US$ 1 = R$ 5.64, Source: Brazilian Central Bank)
According to the OECD’s annual survey (OECD, 2019), there has been a gradual increase in alternative investments globally, but not of the same magnitude in all regions. Particularly in Brazil, the 9 pension funds surveyed have been increasing their investments in fixed income and cash and reducing exposure to alternative investments.

Finally, it should be highlighted that, for Brazilian closed pension schemes, Resolution 4,661/2018 establishes investment limits per asset class (see Table 4). Therefore, pension funds are legally discouraged from having significant exposure to assets such as foreign investments and alternative investments.
## BOX 2

**Defined benefit, defined contribution and variable contribution pension plans**

In terms of pension fund investment strategies, there are three scheme categories:

- **Defined benefit (DB):** the amount of benefits received after retiring is defined when the participant joins the fund, while contributions vary over the years in order to reach the pre-determined amount. Actuarial balance is key.

- **Defined contribution (DC):** plan in which the amount of contributions is defined at the moment of joining the fund, while the amount to be received in benefits varies depending on total contributions, duration and investment returns.

- **Variable contribution:** plan in which programmed benefits have characteristics of DC during the active phase, and characteristics of DB (lifetime incomes) during the retired phase.

Source: Secretaria de Previdência (2020)

### TABLE 4

**Regulatory investment limits per asset class for closed pension schemes**

<table>
<thead>
<tr>
<th>Asset class</th>
<th>Investment limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic sovereign bond</td>
<td>100%</td>
</tr>
<tr>
<td>Fixed income</td>
<td>80%</td>
</tr>
<tr>
<td>Incentivized debentures (Statute No. 12.431/2011)</td>
<td>20%</td>
</tr>
<tr>
<td>Listed equity</td>
<td>70%</td>
</tr>
<tr>
<td>Alternative/structured investments</td>
<td>20%</td>
</tr>
<tr>
<td>Real estate</td>
<td>20%</td>
</tr>
<tr>
<td>Operations with participants</td>
<td>15%</td>
</tr>
<tr>
<td>Foreign investments</td>
<td>10%</td>
</tr>
</tbody>
</table>

Source: the authors, based on Banco Central do Brasil (2018)
2.4.1.3 Open pension schemes

Open pension schemes are offered by insurers and open complementary pension entities to provide pension plans and complement the monetary retirement contribution offered by the governmental PAYG system (SUSEP, 2020b).

FenaPrevi (National Private Pension Federation⁶), a non-profit civil association affiliated with the National Confederation of Insurance Companies, Private Pension Plans and Life, Complementary Health Insurance and Capitalization (CNseg)⁷, represents organizations and entities that operate in the private pension and life insurance segments in Brazil (FenaPrevi, 2019). The Superintendency of Private Insurance⁸ (SUSEP) is responsible for overseeing the activities of insurance companies and open pension entities.

In February 2021, assets under the management of open pension schemes reached US$ 187.45 billion⁹ (FenaPrevi, 2021). To our knowledge, there is no publicly updated information available on breakdown per asset class.

2.4.1.4 Asset managers

Asset managers are delegated managers who manage portfolios, risk, and trading of securities and off-balance-sheet positions on behalf of clients under an investment management agreement for a fee (International Monetary Fund, 2015). The Brazilian Association of Financial and Capital Market Entities²⁰ (ANBIMA) is the main representative of capital market entities in Brazil, representing asset managers, brokers, securities dealers and investment advisers.

In April 2021, investment funds registered net assets of approximately US$ 1.19 trillion²¹. Of this amount, 36.2% were from fixed income funds and 23.5% were from multimarket funds (ANBIMA, 2021).

2.4.1.5 Insurance companies

Insurance companies enter into contracts with insured clients to indemnify them for losses resulting from future risks specified in contract in exchange for a premium (SUSEP, 2021). In Brazil, this market is regulated and monitored by SUSEP.

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⁶ In Portuguese, Federação Nacional de Previdência Privada e Vida
⁷ In Portuguese, Confederação Nacional das Empresas de Seguros Gerais, Previdência Privada e Vida, Saúde Complementar e Capitalização
⁸ In Portuguese, Superintendência de Seguros Privados
⁹ R$ 1,026.3 billion (exchange rate on Feb. 28, 2021 = US$ 1 = R$ 5.475. Source: Brazilian Central Bank)
¹⁰ Associação Brasileira das Entidades dos Mercados Financeiro e de Capitais
¹¹ R$ 6,382,001 million (exchange rate on April 29, 2021 US$ 1 = R$ 5.366. Source: Brazilian Central Bank)
In 2019, insurance industry revenues amounted to US$ 29.6 billion\(^{22}\) and the total amount of technical provisions\(^{23}\) was US$ 31.93 billion\(^{24}\). The main segments of the insurance industry are life insurance (36%) and automotive insurance (30%) (SUSEP, 2020a). With regard to portfolio allocation, insurance firms allocated 77.1% to fixed income, predominantly to government bonds (FGV CERI & World Bank Group, 2018).

### 2.4.1.6 Retail investors

The participation of retail investors in the Brazilian capital market is increasing. According to a 2020 study by Brazilian financial market infrastructure company B3, the number of individuals investing in equity products doubled, from 1 million in July 2019 to 2 million in April 2020. In terms of profile, these investors are young (49% are 25-39 years old), have a long-term horizon and are concerned with diversifying their investments (B3, 2020). Retail investors are also allocating resources to incentivized infrastructure debentures, as shown in the next section.

### 2.4.2 Investments in incentivized infrastructure debentures

Statute No. 12,431\(^{25}\) was enacted in 2011, offering income tax exemptions for retail investors that invest in incentivized infrastructure debentures. These debentures can be issued either by companies or by special-purpose vehicles to fund infrastructure projects that are considered priority projects by the federal government (Brasil, 2011). Projects that are part of the Investment Partnership Program (PPI)\(^{26}\) are automatically considered eligible to issue debentures. Alternatively, eligible debentures can be approved by the appropriate sectoral ministry. For instance, a debenture from a railway company may be deemed incentivized once approved by the Ministry of Infrastructure, whereas a debenture from an electric power transmission project needs to be approved by the Ministry of Mines and Energy (ANBIMA, 2018).

As shown in Figure 7, there has been a substantial increase in issuance of infrastructure debentures since 2012, particularly in the energy sector. In 2020, US$ 23.15 billion\(^{27}\) were issued in incentivized infrastructure debentures, 72.6% of which were issued by the energy sector (Ministério da Economia, 2020).

---

\(^{22}\) R$ 119,254,587,000 (exchange rate on Dec. 31, 2019 US$ 1 = R$ 4.03. Source: Brazilian Central Bank)

\(^{23}\) Technical provisions refer to the liability account that reflects the obligation pension funds and insurers have due to the insurance plans provided (ANS, 2021).

\(^{24}\) R$ 128,698,851,000 (exchange rate on Dec. 31, 2019 US$ 1 = R$ 4.03. Source: Brazilian Central Bank)


\(^{26}\) The program, currently under the aegis of the Ministry of the Economy, is focused on expanding infrastructure through privatization and partnership contracts with the private sector (PPI, 2020).

\(^{27}\) R$ 120,277 billion (exchange rate on Dec. 31, 2020, US$ 1 = R$ 5.196. Source: Brazilian Central Bank)
As a result of the tax incentive, retail investors have been the main investors in infrastructure debentures, acquiring 29.3% of total issuances directly, as well as indirectly through investment funds (Graph 2).

**Graph 2**

*Issuance of infrastructure debentures per sector (2012-2020)*

*Source: Ministério da Economia (2020)*

*Distribution of infrastructure debentures (%)(2012-2020)*

*Source: Ministério da Economia (2020)*
2.4.3 Infrastructure investment needs in Brazil (demand side of financing)

One of the main reasons for Brazil’s poor infrastructure performance is lack of investments. While similar emerging economies like South Africa and Russia spend 4% to 5% of gross domestic product (GDP) annually on infrastructure, Brazil spent 2.08% of GDP per year between 2000 and 2013 (Raiser et al., 2017) — despite the fact that depreciation costs exceed this (Raiser et al., 2017), which means infrastructure stock may deteriorate further if expenditures do not increase in the future.

**GRAPH 3**

*Infrastructure spending by country 2000-2013 (% of GDP)*

Source: Raiser et al. (2017)

ABDIB (Brazilian Association of Infrastructure and Basic Industries)\(^{28}\) estimates that US$ 53.15 billion\(^{29}\) in annual investments, or 4.3% of the GDP, are needed over the next ten years to overcome infrastructure bottlenecks, especially in the transport and logistics sector (Table 5). In contrast, current investments represented only 1.71% of GDP in 2019 (ABDIB, 2020).

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\(^{28}\) Associação Brasileira de Infraestrutura e Indústrias de Base.

\(^{29}\) R$ 284 billion (exchange rate on Feb. 8, 2021 USD1 = R$5.35)
Capital market investments in low-carbon infrastructure in Brazil

According to ABDIB, the level of investments has been below that expected since 2014 in comparison to other developing countries with similar economies. In the 2010–2014 period, Brazil’s investments, measured by the ratio of the country’s gross fixed capital formation and the GDP, amounted to 20.5% on average (Graph 4). However, with the 2014–2016 recession and other structural and contextual factors, total investments decreased to 15.4% in 2019 — private investments decreased 17.8% between 2014 and 2019, and public investments, 52%.

**TABLE 5**

**Actual investments in 2019 vs. required annual investments (%) of GDP) schemes**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Actual investments in 2019</th>
<th>Required annual investments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport/logistics</td>
<td>0.34</td>
<td>2.26</td>
</tr>
<tr>
<td>Electricity</td>
<td>0.71</td>
<td>0.84</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>0.46</td>
<td>0.45</td>
</tr>
<tr>
<td>Sanitation</td>
<td>0.20</td>
<td>0.45</td>
</tr>
<tr>
<td>Total</td>
<td>1.71</td>
<td>4.31</td>
</tr>
</tbody>
</table>

Source: ABDIB (2020)

According to ABDIB, the level of investments has been below that expected since 2014 in comparison to other developing countries with similar economies. In the 2010–2014 period, Brazil’s investments, measured by the ratio of the country’s gross fixed capital formation and the GDP, amounted to 20.5% on average (Graph 4). However, with the 2014–2016 recession and other structural and contextual factors, total investments decreased to 15.4% in 2019 — private investments decreased 17.8% between 2014 and 2019, and public investments, 52%.

**GRAPH 4**

**Brazil’s annual investment rate (gross fixed capital formation/GDP) (in %)**

Source: ABDIB (2020)

*Capital market investments in low-carbon infrastructure in Brazil*
In Brazil, the private sector plays a significant role in infrastructure investment, representing 60% of all investments over the last decade and 72% in 2019 (Graph 5). This is partially due to the PPI, which has provided a portfolio of infrastructure projects for concession and privatization that is attractive to private direct investors (ABDIB, 2020). Private investments are likely to be even more critical in view of fiscal constraints. With the covid-19 pandemic, when the government has had to adopt a series of measures to support the health system and people in vulnerable situations, the rate of public investments is expected to decrease.

**Graph 5**

*Brazil’s investments in infrastructure, per source (%)*

<table>
<thead>
<tr>
<th>Year</th>
<th>Private sector</th>
<th>Public sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>56%</td>
<td>44%</td>
</tr>
<tr>
<td>2011</td>
<td>61%</td>
<td>39%</td>
</tr>
<tr>
<td>2012</td>
<td>59%</td>
<td>41%</td>
</tr>
<tr>
<td>2013</td>
<td>61%</td>
<td>39%</td>
</tr>
<tr>
<td>2014</td>
<td>61%</td>
<td>39%</td>
</tr>
<tr>
<td>2015</td>
<td>67%</td>
<td>33%</td>
</tr>
<tr>
<td>2016</td>
<td>67%</td>
<td>33%</td>
</tr>
<tr>
<td>2017</td>
<td>67%</td>
<td>33%</td>
</tr>
<tr>
<td>2018</td>
<td>70%</td>
<td>30%</td>
</tr>
<tr>
<td>2019</td>
<td>72%</td>
<td>28%</td>
</tr>
</tbody>
</table>

Source: ABDIB (2020)
CHAPTER THREE

Methods
To investigate whether the barriers and drivers for infrastructure investments identified in the literature review apply to the Brazilian context, this study adopted a qualitative approach, interviewing stakeholders from the Brazilian capital market for data collection, and employing content analysis of the interview transcriptions for data analysis.

### 3.1 Sampling and data collection

The interview sample is comprised of 14 individuals representing investment managers, infrastructure private equity management firms, federal government, renewable energy companies, academia and independent consultants, as shown in Table 6.

The interviewees were selected based on their professional experience and expertise with infrastructure investments and/or institutional investments:

- Two of the three private equity managers specialized in infrastructure investments;
- Of the four investment managers, three had expertise in managing infrastructure debenture funds and one was a specialist in equity investments, offering an overview of Brazilian listed infrastructure companies;
- Of the academic representatives, one had expertise in finance and professional experience in pension fund management, and the other was a specialist in infrastructure, with extensive professional experience in the field;
- The foreign investment perspective was provided by two foreign investment consultants and one foreign private equity manager operating in Brazil;
- A government representative discussed the regulatory issues affecting infrastructure investments;
- The perception from the demand side was offered by a representative from a renewable energy company.
Low-structured interviews were chosen as the method for data collection in order to confer greater discretion on interviewers regarding the questions and topics to be addressed, and in particular to better explore the different expertise and professional backgrounds of the interviewees. The interviews started with an open-ended question related to drivers of and barriers to investing in infrastructure in Brazil, and then the interviewees were allowed to respond freely, discussing what they viewed important in their explanations, while interviewers probed further on points that seemed worthy of follow up (Bryman & Bell, 2007; Hsieh & Shannon, 2005; Huffcutt & Arthur, 1994).

Interviews were conducted between September 25, 2020 and March 18, 2021. Due to the covid-19 pandemic, all interviews were conducted online. Duration varied from 23 minutes (shortest) to 66 minutes (longest). All of the interviews were digitally recorded and later transcribed, except for when the interviewees did not allow recording or were not asked to be recorded (two cases), in which case extensive notes were taken.

### BOX 3

**Attempt at content analysis of annual reports of pension funds**

In order to provide a complementary source of data to the interviews, the research team investigated the possibility of perusing the annual reports published by pension funds in Brazil, in order to perform a content analysis and observe how often and in which contexts these reports addressed the topic of infrastructure investments, the quantity of investments allocated to (low-carbon) infrastructure and any mentions of drivers of and barriers to infrastructure investments.

### TABLE 6

**List of interviewees**

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of interviewee</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Investment manager</td>
</tr>
<tr>
<td>3</td>
<td>Consultant</td>
</tr>
<tr>
<td>2</td>
<td>Academic</td>
</tr>
<tr>
<td>2</td>
<td>Infrastructure private equity manager</td>
</tr>
<tr>
<td>1</td>
<td>Private equity manager</td>
</tr>
<tr>
<td>1</td>
<td>Government</td>
</tr>
<tr>
<td>1</td>
<td>Renewable energy company</td>
</tr>
</tbody>
</table>

*Source: ABDIB (2020)*
However, a cursory examination of the annual reports from the five biggest pension funds in Brazil (in terms of AUM) found no explicit mentions. This may be a consequence of the currently low levels of investment by domestic institutional investors in this asset class. It remains a possible avenue to be explored in the future if the levels of institutional investor exposure to infrastructure assets increase as a consequence of the drivers (or removal of the barriers) identified via the interviews.

Likewise, the research team created a questionnaire to survey institutional investors about their investments in infrastructure, investment vehicles adopted and drivers of and barriers to investment. The questionnaire was distributed through LinkedIn posts by the researchers, who have an extensive professional network in the financial sector in Brazil, and through the Fundação Getulio Vargas newsletter, with a broad subscription list of representatives from different companies and sectors. Only seven institutional investors started responding to the questionnaire and none of them completed it. The interpretation of the research team, again, is that the low level of responses was a consequence of the low levels of institutional investments in infrastructure, and that investors found that the questions were not applicable to their current investment practices.

Source: the authors

### 3.2 Data analysis

The data collected from the interviews was transcribed and analyzed following the usual steps of a content analysis (see Brazilian National Study Year 1; Krippendorff, 2004). Whenever possible, similar themes were reduced to a singular thematic unit based on the interpretation of the analysts (Lacity & Janson, 1994). Positive themes were identified as “drivers” of investments in low-carbon infrastructure in Brazil and negative themes were identified as barriers.” Possible venues to increase/create new or current drivers or decrease/remove existing barriers were then identified as solutions (or alternatives).
CHAPTER FOUR

Results: barriers to and drivers of investment in low-carbon infrastructure in Brazil
Before we discuss the interview findings, it should be highlighted that this piece of research builds on previous research conducted by the authors within and outside the SNAPFI project (Figure 8).

**FIGURE 8**

**Sources/levels of barriers to and drivers of investments in infrastructure in Brazil**

Institutional environment (legal, political, macroeconomic)

Barriers to direct investments (real economy)

- Railway
- Inland waterways and maritime cabotage
- Renewable energy
- Sanitation

Drivers of and barriers to capital market investments

- Retail investor
- Pension fund
- Foreign investor

Financial impact on capital market investors

Source: the authors

Figure 8 shows the different sources/levels of barriers to and drivers of capital market investments in infrastructure in Brazil.

First, capital market investments are impacted by the broader local institutional environment which encompasses the country’s legal, political and macroeconomic features. These factors (e.g. the low level of legal investor protection and the country’s speculative grade) were identified in a previous study from the authors (Yamahaki et al., 2020) and were also raised by the interviewees of this study, as discussed further below.
Second, the specific barriers and drivers that direct investors (i.e., companies building and operating infrastructure projects) encounter when operating in the country also affect capital market investors: these factors impact the financial returns of infrastructure companies, which then affect the investment returns of their shareholders and bondholders. In National Study Year 1, the Brazilian research team identified barriers to direct investments in railway infrastructure, and other factors pertaining to other sectors were identified by the participants interviewed for this study. It should be noted that these “direct” barriers also apply to private equity infrastructure investors, who also own and operate infrastructure assets.

Thirdly, there are aspects that hinder or drive the attraction of capital market investors towards (low-carbon) infrastructure investments in Brazil, affecting different types of investors (retail investors, pension funds and foreign investors) differently. As shown in the interview findings, what may be a driver for one type of investor to invest in infrastructure is a barrier for another.

In sum, while this report is focused on capital market investors, we present a broader picture that illustrates how different characteristics affect investment decisions at different levels. In addition, Figure 9 lists all of the barriers and drivers identified in the interviews, already categorized according to level, sector and type of investor, with the following captions:

- BS: structural barrier
- DS: structural driver
- BD: barrier for direct investments
- DD: driver for direct investments
- B: barrier for capital market investments
- D: driver for capital market investments

The specifics of each barrier and driver are explored individually throughout the remainder of this section. Greater emphasis is placed on those aspects that seem to be of greater relevance for capital market investors. The number of interviewees who mentioned each aspect is indicated in parentheses, immediately after the “title” of the driver or barrier. Whenever mentioned by interviewees, possible solutions to overcome existing barriers are also presented.
Research findings: barriers to and drivers of infrastructure investments in Brazil

Institutional environment

Structural barriers
- BS1. Political interference (5)
  - For domestic investors
    - BS2. High long-term interest rate (2)
  - For foreign investors
    - BS3. Exchange rate volatility (8)
    - BS4. Brazil’s speculative investment grade and more attractive emerging markets (5)

Structural Drivers
- DS1. Professionalism of the Ministry of Infrastructure (2)
  - For foreign investors
    - DS2. Low interest rates globally (8)
  - For domestic investors
    - DS3. Lower local interest rates (7)

Direct and private equity investments

General barriers
- BD1. Legal uncertainty (7)
- BD2. Poor project development and demand uncertainty (3)
- BD3. Protectionism, tariffs and trade barriers (3)
- BD4. High transaction costs (for foreign investors) (1)

Sectoral barriers
- Transport infrastructure
  - BD5. Scarcity of projects for concession (railway) (3)
  - BD6. Environmental licensing (1)
  - BD7. High risk-return ratio of rail projects.**

Drivers for foreign investors
- DD1. Pipeline of infrastructure projects (1)

Sectoral Drivers
- Transport Infrastructure
  - DD2. Connection with the agricultural sector (2)
  - DD3. Low competition in the railway sector (railway) (1)

Energy
- DD4. Stable cash flows of energy companies (4)
- DD5. Legal security (3)
- DD6. Capital intensiveness of the energy sector (1)
- DD7. Positive track record of investments (1)
- DD8. Known technology (1)

Sanitation
- DD9. Legal security (3)

Capital market investments

General barriers
- B1. Limited data on companies (3)
- B2. Limited infrastructure and project finance expertise (domestic investors) (3)
- B3. Low supply of infrastructure projects and companies (2)
- B4. Low liquidity of infrastructure “project debentures” (2)
- B5. Aversion to greenfield investments (domestic investors) (3)

Barriers for domestic pension funds
- B6. Lower than expected return of infrastructure debentures (5)
- B7. Perception of private equity funds (3)
- B8. Pension fund risk aversion (1)

General drivers
- D1. Portfolio diversification (3)
- D2. Green appeal (3)
- D3. Liquidity of infrastructure “corporate debentures” (3)
- D4. Convenience of investing in infrastructure listed equities (2)

Drivers for pension funds
- D5. Need to attain high actuarial targets (2)
- D6. Higher ratio of active participants (2)
- D7. Suitability (long-term horizon) (2)

Drivers for retail investors
- D8. Tax incentive for retail investors (5)
- D9. Eligibility of infrastructure debentures (1)

Drivers for foreign investors
- D10. Previous knowledge of the local landscape (2)

Source: the authors

Financial impact on capital market investors

**From Brazil National Study Year 1.
4.1 Drivers and barriers for capital markets investors

4.1.1Drivers for capital market investors

D1. Portfolio diversification (3 interviewees)

Relevant to: all capital market investors

Generally, returns from investments in infrastructure assets and companies are often uncorrelated with the performance of other assets and sectors. This aspect, already identified in the literature (see Table 1), was also mentioned by one interviewee. On this point, Brazil recently experienced a growth in initial public offerings (IPOs) (Graph 6) and some equities related to infrastructure may have been particularly attractive due to their lower degree of correlation with other stocks.

Moreover, the interviewee explained that diversification into listed equities may also assist some investors, such as pension funds, in achieving their actuarial targets in a scenario of lower interest rates (see more below). Similarly, another interviewee noted that opportunities for higher returns in Brazil are often scarce and, as a consequence, some investors may diversify into infrastructure due to a lack of opportunities in other sectors.

GRAPH 6

**Number of IPOs in Brazil, per year**

**Source:** Alvarenga (2021)
With regard to foreign investors, the strategy of diversifying also applies at the country level. One interviewee mentioned that, for these investors, to invest in Brazil (and in Brazilian reais) results in increased international diversification, if they understand how to operate in the country. Indeed, she supported this argument by pointing to a recent episode in which a Canadian pension fund acquired a substantial number of debentures from a Brazilian highway company.

**D2. Green appeal (3 interviewees)**

*Relevant to:* mostly foreign investors.

One interviewee recognized that, even though it does not affect asset pricing, a green “stamp” or recognition of an infrastructure asset as low-carbon does offer a certain appeal for some investors concerned with environmental, social and corporate governance (ESG) issues and with the impacts of their investments. In addition, she noted that a number of foreign institutional investors have specific investment policies, or asset managers that have specific mandates, that require investments in assets with green certification.

Specific investment policies or mandates do not apply to high net worth individuals (HNWI) and family offices, but, in these cases, a green appeal may align with the individuals’ personal preferences and values. According to the interviewee, for these investors, the main driver behind an investment decision may be the sustainability aspect. She added that indeed some investments by HNWI occasionally may resemble endowments, with not much concern for investment returns.

Another interviewee highlighted that, more broadly, environmental aspects represent one of the factors that may be taken into consideration by investors and that, although recent events show a strong demand for green bonds from Brazilian companies (issued abroad, in US$), the rate of return still needs to be attractive in comparison to other assets and investments in other emerging markets.

**D3. Liquidity of “corporate infrastructure debentures” (3 interviewees)**

*Relevant to:* All investors (mostly domestic, but also foreign).

Higher liquidity is an important characteristic for retail investors, as noted by the interviewees. Retail investors require liquidity since they have more difficulty in forecasting the future (for instance, an investor might lose her job or decide to buy a new house). Hence, it is important for that investor to be able to divest when she needs the money for other purposes.

Similarly, investment funds need liquidity in their portfolios given that, when a unitholder (often retail investor) chooses to withdraw or cash out her funds, she needs to be paid back in R$ (and not in debentures).
In this context, infrastructure debentures usually feature higher liquidity than other debentures, as shown in Graph 7.

**GRAPH 7**

**Turnover for incentivized and non-incentivized debentures (2020)**

As displayed above, throughout 2020, the share of debentures acquired in the secondary market (over the existing stock of debentures) was almost two times larger for incentivized infrastructure debentures than for other debentures.

However, an interviewee noted that not all infrastructure debentures are equally liquid. She observed that those with shorter terms and usually issued by larger, more well-known companies (commonly held by retail investors) tend to be more liquid and exhibit higher turnover within the class of incentivized debentures.

Indeed, she made the distinction that only those debentures that were issued by larger companies and backed by the issuers’ balance sheet, which she called “corporate debentures,” enjoyed high liquidity, while debentures tied to specific projects and issued by special purpose vehicles, which she called “project debentures,” tend to be somewhat illiquid (as further explored in barrier B4 below)30.

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30 In this sense, this distinction, although unofficial, is incorporated into the name of this driver.
D4. Convenience of investing in listed infrastructure equities (2 interviewees)

Relevant to: all capital market investors

As mentioned by one interviewee, shares of listed infrastructure companies may not even be perceived by investors as an infrastructure investment per se, and be perceived as simply another sector or company that features in an investors’ equity portfolio. Listed equity offers higher liquidity and allows for quicker adjustments (increases or decreases) in investor exposure to stocks of that company as new information about its financial prospects becomes available.

Indeed, this argument is also supported by the literature and, internationally, one of the first and most traditional ways through which pension funds have invested in infrastructure has been via bonds or shares of listed companies that operate in this segment (Inderst, 2009).

Being publicly listed also gives rise to positive effects for infrastructure companies, as noted by another interviewee, since it offers an additional source of funding, decreasing reliance on debt. For instance, a listed company may obtain funding for new investments via follow-on offerings, that is, via a secondary sale of shares.

4.1.1.1 Drivers for capital market investors – focus on pension funds

D5. Need to attain high actuarial targets (DB plans) (2 interviewees)

Relevant to: Pension funds with defined benefit plans

According to one interviewee, with the SELIC interest rate dropping, pension funds with defined benefit plans and, thus, with actuarial targets to deliver pre-defined benefits, may find themselves in a situation in which their liabilities (their obligations) grow at a faster pace than their assets (the contributions they receive plus the returns on their portfolio). In this scenario, the interviewee argued that pension fund managers may need to either increase contributions from active participants, or seek riskier investments, such as infrastructure, that may yield higher returns. Another interviewee agreed that pension funds will need to find higher-yield investments, although fund managers could seek greater exposure to risk by investing more in listed equities, real estate, or even some other debt instruments.

D6. Higher ratio of active participants (2 interviewees)

Relevant to: pension funds

Generally speaking, two interviewees mentioned that a higher number of active participants in a pension fund — in comparison to the number of retired participants — may create a scenario in which it is less risky for fund managers to increase exposure to illiquid (or less liquid) alternative assets, with longer time horizons, which may include infrastructure.
Put differently, when the ratio of active to retired participants is favorable, managers may pay less attention to liquidity concerns (see Box 3).

This is often the case in defined contribution schemes: the share of retired to total participants (also known as population maturity) for these plans in 2020 was 6.1%, compared to the 63.6% observed for defined benefit plans (Abrapp, 2020).

Therefore, a higher ratio of active participants presents an opportunity for fund managers to seek high-risk, high-return investments, whereas an unfavorable ratio of active to retired participants with DB translates into a short-term need to seek higher returns (and incur higher risks). The latter tend to be older and associated with public sector companies, are no longer enrolling new participants, and correspond to a substantial share of the AUM by pension funds. Table 7 (and Appendix 2) presents the numbers for active and retired participants for the ten largest defined benefit plans in Brazil (as measured by AUM)\(^{31}\).

Nevertheless, both this and the previous driver, as strongly emphasized by one interviewee, are hard to generalize for all pension funds and may be more or less applicable on a case-by-case basis.

### TABLE 7

**Characteristics of the ten largest defined benefit plans in Brazil**

<table>
<thead>
<tr>
<th>Fund</th>
<th>Plan</th>
<th>Year of creation</th>
<th>Active participants</th>
<th>Retired (assisted) participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREVI</td>
<td>Plano de Benefícios 1</td>
<td>1967</td>
<td>7,190</td>
<td>82,129</td>
</tr>
<tr>
<td>FUNCEF</td>
<td>REG/REPLAN</td>
<td>1977</td>
<td>84,451</td>
<td>51,685</td>
</tr>
<tr>
<td>PETROS</td>
<td>PPSP-R</td>
<td>1970</td>
<td>70,100</td>
<td>73,200</td>
</tr>
<tr>
<td>REAL GRANDEZA</td>
<td>Plano de Benefício Definido</td>
<td>1972</td>
<td>776</td>
<td>6,932</td>
</tr>
<tr>
<td>FAPES</td>
<td>Plano Básico de Beneficios</td>
<td>1975</td>
<td>2,681</td>
<td>2,227</td>
</tr>
<tr>
<td>BANESPREV</td>
<td>Plano V</td>
<td>2007</td>
<td>2</td>
<td>11,877</td>
</tr>
<tr>
<td>SISTEL</td>
<td>Plano de Benefícios da Sistel</td>
<td>1977*</td>
<td>1,745</td>
<td>22,690</td>
</tr>
<tr>
<td>PETROS</td>
<td>PPSP-NR</td>
<td>1970**</td>
<td>70,100</td>
<td>73,200</td>
</tr>
<tr>
<td>VALIA</td>
<td>Plano de Benefício Definido</td>
<td>1973</td>
<td>7</td>
<td>15,151</td>
</tr>
<tr>
<td>VIVEST***</td>
<td>PSAP/Eletropaulo</td>
<td>1979</td>
<td>4,890</td>
<td>9,229</td>
</tr>
</tbody>
</table>

Obs.: Plans ranked from largest to smallest by AUM.

* Year of creation, from Sistel.

** Pension funds from Petros were dismembered into different plans in 2018.

*** Numbers of participants, from 2018.

Source: the authors

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31 Appendix 2 shows the characteristics of the largest pension plans in Brazil.
BOX 4

Participants’ age and asset allocation in pension funds

Although discussions on the optimal allocation of portfolios according to participants’ age in pension funds lie beyond the scope of this report, theoretically, life-cycle models suggest a negative relationship between age and exposure to risk.

As summarized by Bikker et al. (2012):

“An important outcome of these models is that the proportion of financial assets invested in equity should decrease over the life cycle, thereby increasing the proportion of the relatively safer bonds. The key argument is that young workers have more human capital than older workers. As long as the correlation between labor income and stock market returns is low, a young worker may better diversify away equity risk with their large holding of human capital.”

In effect, when testing this prediction for Dutch pension funds, the authors do find that higher average active-participant age leads to reductions in exposure to equity investments.

D7. Suitability (long-term horizon) (2 interviewees)

Relevant to: pension funds (as equity investors)

The match between the long-term horizon of infrastructure assets and the liabilities of pensions funds was identified in the literature review. On this point, one interviewee noted that institutional investors, especially pension funds, have a greater ability to operate portfolios that mix high liquidity in the short term, some liquidity in the medium term and low liquidity in the long term due to their greater ability to foresee their liabilities over time. In this sense, another interviewee highlighted that one can find a variety of terms for contracts, ranging from 20 to over 50 years, for different infrastructure assets.

The existence of a match between long-term liabilities and long-lived infrastructure assets, however, was challenged by other interviewees when talking about domestic pension funds. One noted that commitment and exposure to an asset over extended periods could only be achieved when pension funds operate as equity investors. This may not be possible due to limitations in their investment policies, which often go beyond the legal requirements (displayed in Table 4).

Another interviewee also pointed to the fact that, on average, the time span between the year when a pension fund starts receiving contributions from a participant and the year when it starts making payments to the same individual is shorter than ten years, and investing in assets with longer time horizons would represent a liquidity risk for the fund. Once again, the profile of the participants will vary on a case-by-case basis and may increase or decrease the significance of this driver accordingly.
4.1.1.2 Drivers for capital market investors – focus on retail investors

D8. Tax incentive for retail investors (5 interviewees)

Relevant to: retail investors

According to several interviewees, the income tax exemption to encourage retail investors to invest in infrastructure debentures, as provided by Statute No. 12,431/2011, has been a powerful driver in: i) increasing private investments in infrastructure; and ii) turning retail investors into one of the largest groups of infrastructure investors via incentivized debentures.

Graph 8 corroborates the first point, by showing that the amount of funds disbursed from these debentures now rivals the amount paid out annually by the State-owned National Bank for Economic and Social Development (BNDES).

GRAPH 8

Disbursements from BNDES vs. Incentivized (infrastructure) debentures (in US$32)

Source: (Ministério da Economia, 2021)

Note: Exchange rate on Feb. 28, 2021 = US$ 1 = R$ 5.475. Source: Brazilian Central Bank
Graph 2 highlights how retail investors are indeed the largest buyers of incentivized debentures, as nearly a third of all the incentivized debentures issued since 2012 were directly purchased by retail investors.

Investment funds that allocate at least 85% of their portfolio to incentivized debentures pass the tax benefits on to their clients (as specified in Statute No. 12,431/2011) and, as mentioned by some interviewees, are likely to cater and be more attractive to retail investors as well. Pension funds, however, hold only 0.55% of all of the infrastructure debentures issued up until 2020.

Finally, one interviewee also noted that incentivized debentures are inflation-protected (i.e., offering returns above the inflation rate), another feature that is highly attractive to retail investors in Brazil. Another interviewee mentioned that Brazilians are culturally “averse” to paying taxes and generally prefer a tax-exempt asset rather than having to pay taxes on returns — sometimes they do not do the calculations and therefore do not realize that the net returns of infrastructure debentures may be lower than those of other, non-exempt investments.

**BOX 5**

**Listed Equity Investment Funds (FIP)**

Another way in which retail investors can allocate resources to infrastructure with income tax exemption is through what are called “Equity investment funds – Infrastructure” (FIP-IE)33, that is, listed, collective investment funds that allocate funds to stocks, debentures, and other bonds issued by companies that develop new infrastructure projects34.

As noted by one interviewee, FIP-IEs have become increasingly relevant since they may include non-incentivized debentures in the fund and offer incentivized (i.e. tax free) fund units to retail investors (as specified in Statute No. 12,431/2011). Also, FIP-IEs offer another avenue for investors to increase their exposure to equities from infrastructure special purpose vehicles (SPVs) through the purchase of fund units. However, as highlighted by another interviewee, currently, FIP-IEs are only available to “qualified investors,” that is, individuals who have R$ 1 million or more in investments. A third interviewee defends that the law should be modified so that non-qualified investors (i.e. those with less than R$ 1 million in investments) could also invest in FIP-IEs, arguing that these funds offer lower risk to retail investors than direct investments in incentivized debentures because the former is managed by a professional fund manager.

*Source: the authors, based on interviews*

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33 In Portuguese, “Fundos de Investimentos em Participações - Infraestrutura.”
34 As stipulated by the Securities and Exchange Commission of Brazil (CVM) in “Instrução CVM 578.” Available at: [http://conteudo.cvm.gov.br/legislacao/instrucoes/inst578.html](http://conteudo.cvm.gov.br/legislacao/instrucoes/inst578.html).
D9. Eligibility of infrastructure debentures (regulatory change) (1 interviewee)

Relevant to: retail investors

One interviewee noted that regulatory changes extended the scope of debentures eligible for tax exemption. For instance, in June 2017 the Ministry of Mines and Energy published a decree\(^{35}\) allowing companies to issue debentures to finance their operations as a whole, instead of having to require approval for issuance on a project-by-project basis (as required prior to 2017).

This change contributed to increasing the number and quantity of incentivized debentures issued (as shown in Graph 8), as well as the share in the energy sector (Graph 9).

According to the interviewee, potential downsides of this regulatory change are a weakened link between the instrument and investments in new, greenfield infrastructure projects, in addition to a higher share of funds being allocated to larger companies, which are more familiar to and preferred by retail investors.

Graph 9

Share of infrastructure debentures issued per sector (2012-2020)

- **72.6%** Energy
- **22.4%** Transport/Logistics
- **4%** Telecommunications
- **0.9%** Sanitation/Urban mobility

Source: Ministério da Economia (2020)

\(^{35}\) “Portaria Nº 245, de 27 de junho de 2017” (available at [https://www.in.gov.br/materia/-/asset_publisher/KuijrwOTZC2Mb/content/id/19145619/doi:2017-06-29-portaria-n-245-de-27-de-junho-de-2017-191456530](https://www.in.gov.br/materia/-/asset_publisher/KuijrwOTZC2Mb/content/id/19145619/doi:2017-06-29-portaria-n-245-de-27-de-junho-de-2017-191456530)).
D10. Prior knowledge of the local landscape (2 interviewees)

Relevant to: foreign investors (mostly private equity investors)

Two interviewees mentioned that, if an investor perceives that she has a greater degree of knowledge and familiarity with the Brazilian landscape than other foreign investors, she might be better positioned to understand and manage the risks associated with investing in the country, thus enjoying certain opportunities that other investors and fund managers would miss.

This driver, however, as noted by one interviewee, is more applicable to private equity investors due to the costs associated with building local partnerships or even setting up a local team to increase this context-specific knowledge. For instance, another interviewee provided the successful example of a Canadian asset manager that has had operations in Brazil for several decades and, therefore, has established relationships with local partners as well as with regulators.

4.1.2 Barriers for capital market investors

B1. Limited data on companies and projects (3 interviewees)

Relevant to: all investors

Three interviewees cited the limited availability of data on listed companies and infrastructure projects as barriers to investments in infrastructure.

On the listed equity side, one interviewee observed that many domestic listed companies lack improved corporate disclosure, compromising the equity analyst’s ability to assess the firm’s level of competitiveness, its profitability in the long term and, as a result, its fair share value.

Regarding project investments, another interviewee mentioned that, as an infrastructure investor herself, she perceives that there is limited data available, such as data concerning the quantity of infrastructure assets and energy prices, which would support better investment decision-making. Another interviewee noted that due diligence of infrastructure projects is expensive, especially when documents are in another language, and time-consuming, taking up to three months in a best-case scenario. She added that, while an equity research report may have approximately 40 pages, the analysis of infrastructure projects involves numerous consultants and extensive reports.

This interviewee remarked that, to overcome this issue, there was an attempt in the United Kingdom (UK) to build a shared, blockchain-based database in which different stakeholders would provide and validate information about infrastructure projects (e.g. cases of corruption, delays and contract amendments) so as to support due diligence. However, the initiative was apparently discontinued.
B2. Limited infrastructure and project financing expertise (3 interviewees)

Relevant to: all investors (mostly smaller pension funds)

In the pension fund industry, one interviewee argued that pension funds, particularly large ones, have the required expertise to analyze infrastructure investments at the corporate level, assessing the level of risk of that operation by analyzing the company’s balance sheet. On the other hand, the same interviewee claimed that, for investments in infrastructure projects, pension funds lack expertise, as assessing infrastructure projects is a more complex task.

Additionally, another interviewee noted that assessing “project debentures” requires expertise in project finance because these debenture indentures have numerous covenants. She also mentioned that investment managers of open-ended funds (consisting of “corporate debentures” targeted at retail investors) do not have project finance expertise.

To overcome this lack of expertise, the first interviewee suggested that pension funds outsource infrastructure investments to specialized infrastructure fund managers, although a third interviewee highlighted that the administration fees of these fund managers are significantly high.

This interviewee also suggested that bundling smaller pension funds could contribute to building the required staff structure and expertise for alternative investments. She recalled that, when the UK Government mandated that municipal pension funds unify, it helped to create larger organizations able to have dedicated investment teams, rather than being dependent on investment consultants.

B3. Low supply of infrastructure projects and companies (2 interviewees)

Relevant to: all investors

The low supply of low-carbon infrastructure projects and of listed companies in low-carbon infrastructure sectors was also identified as a challenge to infrastructure investments.

On the listed equity side, one interviewee noted that there is a limited number of Brazilian listed companies whose businesses are entirely focused on low-carbon infrastructure. For example, in the renewable energy field, this interviewee mentioned that there are only the wind blade manufacturer Aeris and the motor and generator company WEG, which also develops products for wind and hydro energy generation. On the topic of waterway transportation, another interviewee observed that, currently, the logistics company Hidrovias do Brasil, which raised capital in an IPO in 2020, is the only one listed.

With regard to project investments, this interviewee also noted that there are limited investment opportunities, even though she has noted that there is the possibility in Brazil of raising capital market investments by bundling different low-carbon energy infrastructure projects into investment funds.
B4. Low liquidity of “project debentures” and direct investments in infrastructure projects (2 interviewees)

Relevant to: all investors

One interviewee observed that infrastructure debentures that finance greenfield projects (“project debentures”) have longer terms and limited liquidity. As a result, these types of debentures are seldom included in open-ended infrastructure funds, as these funds target retail investors, who are more likely to divest in the short term, thus requiring more liquid investments.

This interviewee mentioned, as an exception, a Brazilian closed-end fund (KDIF136) whose portfolio is composed of “project debentures” and whose units are traded on the Brazilian stock exchange B3. If a unitholder decides to divest, he can sell his units on the secondary market and hence no capital leaves the fund.

In terms of listed equity, one interviewee noted that, in the short term, it is fairly simple to divest from shares from large companies, such as from oil company Petrobras, without significant financial losses. In direct and private equity investments, however, the investor must be invested for longer periods. As a result of this lower liquidity, the level of investments in infrastructure projects is impacted negatively.

B5. Aversion to greenfield investments (2 interviewees)

Relevant to: all investors

One interviewee representing a large infrastructure fund posited that large traditional funds like themselves prefer to invest in brownfield investments because operational infrastructure projects can generate revenue in the short term, as opposed to greenfield projects, which depend on a large quantity of up-front investments, and are generally riskier due to uncertainties over client demand, revenue flows and the possibility of delays.

Another interviewee agreed, arguing that it is challenging to estimate future revenues from a “special-purpose vehicle that has just been created.” Nonetheless, this interviewee mentioned that global infrastructure private equity funds such as Actis, Denham Capital and Brookfield Asset Management prefer to invest in greenfield investments due to the high-risk, high-return profile of these projects. Therefore, additional private equity funds need to be interviewed in future studies in order to further investigate their preferred strategy in Brazil.

36 The closed-end fund is called “Fundo de debêntures incentivadas de infraestrutura com benchmark em juros reais.”
4.1.2.1 Barriers for capital market investors – focus on pension funds

B6. Lower than expected returns of infrastructure debentures (5 interviewees)

Relevant to: domestic pension funds

Five interviewees mentioned that the income tax exemption that is granted to retail investors through Statute No. 12,431/2011 for incentivized debentures is a barrier for domestic pension funds interested in investing in these same debentures. As one interviewee explained, because of the tax incentive, retail investors are investing heavily in these vehicles, generating high demand and causing the spread paid by these debentures above Treasury bonds to be low in relation to the risk of the debenture issuers (see Graph 10 and Figure 10).

Pension fund managers are not influenced by these tax incentives, since the beneficiaries are the individuals who pay taxes on the appreciation of their shares, when cashing out. That fact, combined with the lower spread paid in comparison to other corporate bonds, means that pension funds are not encouraged to invest in these debentures.

**GRAPH 10**

*Spread curve of incentivized infrastructure debentures (secondary market)*

Source: the authors, based on Ministério da Economia (2020)
In order to attract pension funds to investments in infrastructure debentures, five interviewees mentioned Draft Bill 2,646/2020. As explained by one interviewee, this draft bill proposes creating a new series of incentivized infrastructure debentures that grant the tax incentive to the issuing company rather than to retail investors, thus enabling the issuer to pay higher returns to institutional investors (since avoided tax payments could be “converted” into higher returns to investors). Another interviewee recalled that this draft bill is one of the federal government’s top priorities and is expected to be voted on in Congress in the first semester of 2021.

**B7. Perception of private equity investment funds (3 interviewees)**

**Relevant to:** domestic pension funds

Three interviewees mentioned the perception of pension funds with regard to private equity investment funds (FIPs) as another barrier which prevents greater influxes into those funds. One interviewee noted that private equity funds are considered a “cursed product.” Another interviewee recounted that this is because many pension funds, particularly public pension funds, had problems in the past investing in infrastructure funds, including political and corruption-related issues, which caused these funds to default. As a result of this track record, the pension fund industry is wary of investing in infrastructure.

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37 Available at: [https://www.camara.leg.br/proposicoesWeb/fichadetramitacao?idProposicao=2252649](https://www.camara.leg.br/proposicoesWeb/fichadetramitacao?idProposicao=2252649)
A third interviewee claimed that pension funds are not interested in investing in private equity funds because of the “chain of cash waterfall.” As investors from private equity funds buy units of infrastructure funds, these investors are effectively equity investors and, thus, subordinate to debtholders. Hierarchically, the revenues generated by the projects will first pay the projects’ expenses, then pay debtholders, cover the fund’s administrative costs and lastly remunerate the fund’s unitholders. Therefore, this interviewee explained that the aversion of pension funds to private equity funds relates to the subordinate position of the funds’ investors.

**B8. Pension fund risk aversion (2 interviewees)**

*Relevant to: domestic pension funds*

One interviewee argued that pension funds are content with the interest rates that they are receiving from investing in Brazilian sovereign bonds, and that many of them may still have long-term investments in sovereign bonds that are paying well above actuarial targets. Additionally, she argued that pension funds with defined contribution plans are not encouraged to seek many high-risk, high-return investments because, unlike defined benefit plans, there is no promise of paying a specified benefit to the employee upon retirement.

Also, two interviewees noted that pension funds with a larger proportion of retired members (or members who are close to retirement) than active members tend to have specific investment behaviors: as their liabilities grow at a faster pace than contributions, this situation curbs the funds’ ability to allocate funds to less liquid and long-term investments. This was briefly mentioned in D6.

### 4.2 Drivers and barriers for direct investors

As mentioned earlier, the drivers of and barriers to direct investment affect institutional investors indirectly because, by impacting the financial returns of infrastructure companies, they affect the investment returns of their shareholders and bondholders.

#### 4.2.1 Barriers to direct investors

**BD1. Legal uncertainty (7 interviewees)**

*Relevant to: all direct investors.*

The most frequent challenge for direct investments in low-carbon infrastructure in Brazil, and infrastructure as a whole, is the legal uncertainty stemming from both regulatory and judicial procedures.
For instance, one interviewee listed a series of aspects that are often questioned, challenged and altered by regulators and courts, such as: how to deal with contracts that are unbalanced from a financial point of view; which is the appropriate inflation index for adjusting contracts; and how to treat depreciation of (public) assets. In essence, concessions contracts are often perceived as “weak” by investors and subject to change, with disputes that take long periods to be settled.

On this point, another interviewee highlighted that, although not necessarily sufficient to prevent investments, these uncertainties at least delay them while investors wait for certain rules to be confirmed or disputes settled. Moreover, these uncertainties sometimes occur at different jurisdictional levels, for instance, with different practices in the different states and municipalities in which a company operates, as mentioned by one interviewee.

In this sense, one interviewee made reference to the fact that private equity funds that will remain invested in an infrastructure asset for close to ten years (or more) require a long-term view that the “rules of the game” will not change during that period. According to two interviewees, this is even more relevant for foreign investors who are less familiar with the local landscape and are also exposed to other risks, such as currency risks (see structural barrier BS3).

Finally, another interviewee explained that, even for more passive investors who seek some exposure to emerging markets, the regulatory risk is still relevant, since rules can be changed suddenly and the investor may find herself “stuck on the wrong side of the trade,” holding listed equities that abruptly become less attractive.

**BD2. Poor project development and demand uncertainty (3 interviewees)**

Relevant to: all direct investors

The lack of comprehensive studies to better understand the potential revenues associated with a new infrastructure asset is also mentioned as a barrier to direct investors. Indeed, a 2018 report from the General Secretariat of the Presidency recognized that high-quality preliminary studies are essential to attract a larger number of participants to concession auctions (SAE, 2018).

On this point, one interviewee emphasized the high number of wind farms that failed to deliver the energy initially expected in feasibility studies due to unrealistic assumptions about wind speed. Another interviewee highlighted that greenfield projects in the transport sector lack data on the amount of cargo (or passengers) and well-defined, anticipated cash flows. The combination of high uncertainty about demand and an absence of long-term contracts in the sector exacerbates this risk even further.
BD3. Protectionism, tariffs and trade barriers (3 interviewees)

Relevant to: all direct investors

The high levels of protectionism, import tariffs and trade barriers present in Brazil also hinder the attraction of direct investors to infrastructure projects, particularly foreign investors. As noted by one interviewee, the heavier the import duties a company has to pay on the technologies needed to develop and operate an infrastructure asset, the more complicated the financials of the project.

More generally, another interviewee mentioned that Brazil’s trade policies may also impact Brazilian companies’ ability to access foreign markets to export their goods, thus negatively affecting the demand for infrastructure services. For example, by one measure, the Index of Economic Freedom, Brazil has a trade freedom score of 64.6 (in comparison to a global average of 70.9), placing it among the bottom 50 out of 178 countries assessed.\(^{38}\)

BD4. High transaction costs (1 interviewee)

Relevant to: foreign investors

One driver for the attraction of foreign investors, as mentioned by two interviewees, is prior knowledge of the local landscape (driver D10). However, another interviewee noted that the costs of finding and maintaining either local staff or local partners may act as another barrier when these additional costs cannot be overcome by the investment opportunities available in the country.

4.2.2 Drivers for direct investors

DD1. Driver: Pipeline of infrastructure projects (1 interviewee)

Relevant to: foreign investors

One interviewee noted that, despite all of the difficulties and obstacles to investing in Brazil, the country already receives — and is likely to continue receiving — long-term investments from foreign private equity firms, since it is one of a few places that offers a pipeline of large-scale projects yet to be implemented and which could be financed by debt and/or equity through robust structures.

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\(^{38}\) The index is an annual guide published by The Heritage Foundation. It is available at: https://www.heritage.org/index/ranking.
4.2.3 Sectoral aspects

Transport infrastructure

On the positive side, one interviewee highlighted that there is low competition in the railway sector (DD3), with rail lines often operating almost like a monopoly and, therefore, able to sustain returns over the long term, whereas waterways or highways may suffer competition from other players, e.g. different water transport companies can operate on the same river.

Also with regard to railways, but also applicable to transport infrastructure, the sector is closely linked to the agricultural sector (DD2). One interviewee mentioned how the driving factor for EBITDA39 growth in rail companies in recent years has been the growth rate of agricultural production, while another suggested that this pattern (of joint growth) is likely to extend into the future.

On the negative side, three interviewees noted that there is currently a very limited supply of projects for concession in the railway sector (BD5) (see Table 8). Moreover, one interviewee discussed how the public sector often prefers large-scale projects, which are not necessarily the most attractive (or even economically viable) for private investors. The barriers that hinder the attraction of direct investors to railway projects were already explored in National Study Year 1.

<table>
<thead>
<tr>
<th>Name (in Portuguese)</th>
<th>Extension (km)</th>
<th>Greenfield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrovia de Integração Centro-Oeste</td>
<td>383</td>
<td>Yes</td>
</tr>
<tr>
<td>Ferrogrão</td>
<td>933</td>
<td>Yes</td>
</tr>
<tr>
<td>Ferrovia de Integração Oeste - Leste-FIOL</td>
<td>1,527</td>
<td>Yes</td>
</tr>
<tr>
<td>Estrada de Ferro Carajás</td>
<td>892</td>
<td>No</td>
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<tr>
<td>Estrada de Ferro Vitória a Minas Gerais</td>
<td>895</td>
<td>No</td>
</tr>
<tr>
<td>MRS Logística S.A.</td>
<td>1,686</td>
<td>No</td>
</tr>
<tr>
<td>Ferrovia Centro-Atlântica S.A.</td>
<td>&gt; 7,200</td>
<td>No</td>
</tr>
<tr>
<td>Rumo Malha Paulista S.A.</td>
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</tr>
<tr>
<td>Ferrovia do Pará</td>
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<td>Yes</td>
</tr>
<tr>
<td>Corredor Ferroviário Oeste de Exportação – Nova Ferroeste</td>
<td>(up to) 1,371</td>
<td>No</td>
</tr>
</tbody>
</table>

i) The railway is expected to have three stretches, the first two of which are already under construction.

Source: ABDIB (2020)

39 Earnings before interest, taxes, depreciation, and amortization.
Energy infrastructure

The energy sector was repeatedly highlighted by the interviewees as the most attractive for investments in infrastructure, for the following reasons:

› **Stable cash flows** (DD4) (4 interviewees): for example, the interviewees explained that a transmission line, once built, yields returns with almost no risk due to guaranteed long-term contracts, with constant revenue flows over time (that are adjusted by a price index). In addition, one interviewee noted that, for renewable energy generation, the fact that an energy generator may sell energy freely on the market (as stipulated by Statute No. 9,074/1995\(^{40}\)), with no prior authorization from the government, allows for long-term contracts between private companies.

› **Legal security** (DD5) (3 interviewees): interviewees mentioned that the current regulatory framework for the sector is clear and predictable. Both public and private power-purchasing agreements (PPA) are robust and understood by investors, thus rendering investment decisions easier than those in some other infrastructure sectors.

› **Capital intensiveness** (DD6) (1 interviewee): although all infrastructure investments are capital intensive, one interviewee noted that, in the energy sector, the need to raise additional capital is recurrent, with new bonds issued almost every week. This repetition, then, fosters learning and makes investors more at ease when investing in the sector.

In addition, one interviewee highlighted the positive track record of investments in the energy sector, with very few cases of default (DD7), while another noted that the technology behind transmission lines is well-known (including to investors) (DD8).

Sanitation infrastructure

Three interviewees highlighted the new regulatory framework for the sanitation sector (Statute No. 14,026, from June 15, 2020\(^{41}\)) as a positive accomplishment that should increase investments in the sector, for instance by allowing private companies to offer sanitation services under long-term contracts, with clear targets and performance indicators (DD9). Indeed, one interviewee pointed to the strong appetite for new investments displayed in the most recent concessions to be auctioned by municipalities in this sector.

\(^{40}\) Available at: [http://www.planalto.gov.br/ccivil_03/leis/l9074cons.htm](http://www.planalto.gov.br/ccivil_03/leis/l9074cons.htm)

4.3 Structural aspects and broader institutional environment

The interviewees also mentioned various factors related to the institutional environment (e.g. macroeconomic, legal and political factors) which either encourage or curb direct and capital market investments in infrastructure, as discussed below.

4.3.1 Structural drivers of infrastructure investments

SD1. Professionalism of the Ministry of Infrastructure (2 interviewees)

Relevant to: all investors (mostly direct investors)

One interviewee argued that the current team at the Ministry of Infrastructure has been doing a good job in terms of improving the business environment, improving concession contracts and conducting roadshows in Brazil and abroad to persuade investors of the benefits of investing in Brazil in the long term. Another interviewee highlighted the credentials of Minister Tarcísio Gomes, who has a solid professional background, technical expertise and a competent team, who is working to attract investors for infrastructure in Brazil.

SD2. Low interest rates in developed countries (8 interviewees)

Relevant to: foreign investors

Eight interviewees mentioned the low interest rates in developed countries as drivers attracting foreign investors to infrastructure investments in developing nations.

One interviewee observed that, as interest rates are low in Europe, investment returns on local bonds and equities are also low, encouraging European investors to pursue opportunities with higher returns abroad, including investments in infrastructure. Another interviewee noted that Canadian and Australian pension funds have always been interested in investing in infrastructure, and more so as interest rates in their countries decline, because infrastructure investments provide stable cash flows, protected from inflation.

A third interviewee posited that low interest rates also contributed to reducing the cost of capital in developed countries, favoring the search for high-risk, high-return investments abroad. She cited Singapore’s sovereign fund GIC as an example of an institutional investor interested in operating in Brazil. GIC partnered with Brazilian private equity firm Pátria in 2020 to bid for the concession of highway Piracica-Panorama in the state of São Paulo.
On direct investments, one interviewee mentioned that, as interest rates are low, investing in concession-type infrastructure, such as railways, is a suitable way to allocate resources to low-risk projects, given that concession contracts provide next to 50 years of cash flows.

**SD3. Low local interest rates (7 interviewees)**

*Relevant to: domestic investors*

Interviewees mentioned that the low interest rates in Brazil have also encouraged (or have the ability to encourage) investments in infrastructure by local pension funds and retail investors.

For local retail investors, an interviewee who used to be the manager of an infrastructure debentures fund mentioned that, when the interest rates lowered in 2018, she observed a swift rise in the number of debenture funds in 2019, motivated by the risk appetite of retail investors who also benefited from the tax incentive granted by Statute No. 12,431/2011.

**GRAPH 11**

*Evolution of the Brazilian interest rate SELIC, 2016-2021 (% year)*

![Graph showing the evolution of the Brazilian interest rate SELIC from 2016 to 2021.](image)

*Source:* Banco Central do Brasil (2021)
In the pension fund industry, one interviewee noted that, from 2014 to 2016, the interest rates were high enough to allow pension funds to attain their actuarial targets by investing in sovereign bonds only. Therefore, investing in infrastructure had an opportunity cost that pension funds were not interested in incurring in exchange for higher returns. On the other hand, with low interest rates, another interviewee argued that pension funds with defined benefit plans are oftentimes encouraged to seek higher-risk, higher-return investments, such as investments in listed equities, corporate bonds, real estate and infrastructure, to manage their liabilities. She complemented that investments in real estate and infrastructure assets contribute to attaining their actuarial targets because they are protected from inflation (although liquidity concerns need to be considered as well).

A third interviewee observed that the lower interest rates also caused a reduction in the country’s cost of capital. As a result, infrastructure projects started to show positive net present value (NPV), attracting investments from private financial institutions. She added that increased participation from private financial institutions also contributes to more agile processes and more flexible financial structures.

### 4.3.2 Structural barriers to infrastructure investments

**BS1. Political interference (5 interviewees)**

*Relevant to:* all investors

Five interviewees mentioned the Brazil’s political instability as a barrier to direct and capital market investments in infrastructure.

Four interviewees commented specifically about an event that occurred in the month when the interviews took place, in which President Jair Bolsonaro nominated General Joaquim Silva e Luna as president of oil company Petrobras to replace Roberto Castello Branco after complaining about fuel prices. One interviewee argued that recent events cause foreign investors to be skeptical about investing in the country because they become uncertain about whether or not the government will interfere with energy prices.

Another interviewee claimed that having the government intervening in energy and fuel prices repels foreign investors. She found that governments tend to adopt populist approaches by the middle of their mandates in order to win the following election, and that this increases the likelihood of interference in the running of state-controlled companies. In addition to Petrobras, the interviewee also cited the case of state power utility company Furnas, which has financed the construction of roads, even though transport infrastructure is outside its core business.
Two interviewees also mentioned the case of the Yellow Line, in Rio de Janeiro. In September 2020, the Superior Justice Court restored management of Yellow Line expressway to the City of Rio de Janeiro. It had previously been operated by concessionaire Linha Amarela S.A. (Lamsa), a company controlled by Invepar (Góes, 2020). One interviewee sustained that, for special purpose vehicle Lamsa and shareholder Invepar, the city “tore” the contract when it decided to remove the toll stations on the Yellow Line, increasing judicial uncertainty.

Another two interviewees mentioned the political approach of the Administration towards environmental issues as a negative factor, causing foreign investors to refrain from or to divest from Brazilian investments due to concerns related to their reputations.

**BS2. High long-term interest rate (2 interviewees)**

*Relevant to:* domestic investors

Although short-term interest rates (SELIC rate) are low in Brazil, one interviewee noted that sovereign bonds with longer terms still pay high interest rates, at 12% or 13% per year. Therefore, only infrastructure projects that are paying very high returns are worth investing in if compared to the long-term cost of capital. As another interviewee recalled, infrastructure projects that return 18% per year are difficult to find.

**BS3. Exchange rate volatility (8 interviewees)**

*Relevant to:* foreign investors

One interviewee noted that foreign investors risk losing their earnings in the short term when operating in a country with a volatile exchange rate, which is why investors prefer to operate in countries providing lower returns, but more stability and lower volatility. Another interviewee argued that the volatility of the Brazilian real in relation to other currencies is a “very big problem” for foreign investors, surpassing other factors such as the domestic regulatory environment.

A third interviewee claimed that it is difficult to attract foreign long-term investments with such a degree of foreign exchange rate volatility because it would be challenging for foreign private equity investors to operate in a country for 30 years, exposed to a volatile currency, while having to remunerate their limited partners in foreign currency.
As alternatives to overcome this issue, one interviewee suggested that issuing bonds in US dollars would help attract foreign pension funds, which would no longer be exposed to a volatile exchange rate. This is already done by some Brazilian companies to attract foreign investors to green bonds.

**BS4. Brazil’s speculative investment grade and more attractive emerging markets (5 interviewees)**

Relevant to: foreign investors

One interviewee stressed that Brazil competes for capital with other countries in a fragile position. For example, Brazil does not compare favorably with Mexico, a comparable emerging market, in terms of Credit Default Swap (CDS): Brazil has a 215 5Y CDS while Mexico’s is 102.94\(^{42}\).

Another interviewee highlighted the difficulty of doing business in the country. She contrasted Brazil and South Africa — countries with high regulatory and political risks and volatile currencies — with Asian nations such as Singapore, Thailand and Vietnam, where she claimed it is easier to do business, with higher levels of transparency, lower corruption and attractive growth rates.

A third interviewee explained that foreign private equity investors determine their expected returns by analyzing the country’s investment grade. Considering that Brazil has a speculative grade (Fitch: BB-)\(^{43}\), foreign investors are only interested in investing in the country in very high-risk, high-return projects, which are hard to find.

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\(^{42}\) Available at: [http://www.worldgovernmentbonds.com/sovereign-cds/](http://www.worldgovernmentbonds.com/sovereign-cds/)

\(^{43}\) Ratings available at [https://tradingeconomics.com/country-list/rating](https://tradingeconomics.com/country-list/rating)
4.4 Comparison with the literature findings

It is interesting to note that the results from the interviews largely corroborate and encompass the more general findings from the literature concerning capital market investors and infrastructure assets (see Table 9).

<table>
<thead>
<tr>
<th>Findings from the literature</th>
<th>Interview findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term investment horizon (OECD, 2013)</td>
<td>Suitability (long-term horizon) (D7)</td>
</tr>
<tr>
<td>Enhance portfolio diversification (Inderst, 2016; Sharma, 2012)</td>
<td>Portfolio diversification (D1)</td>
</tr>
<tr>
<td>Stable cash flows, protected from inflation; lower portfolio volatility (Torrance, 2009)</td>
<td>Stable cash flows (energy sector) (DD4)*</td>
</tr>
<tr>
<td>Attractive risk-adjusted returns (Torrance, 2009)</td>
<td>Positive track record (energy sector) (DD7)*</td>
</tr>
<tr>
<td>Low competition and high barriers to entry (transport infrastructure) (Sharma, 2012, 2013)</td>
<td>Low competition in the railway sector (DD3)*</td>
</tr>
<tr>
<td>Mature markets with enabling environment (cross-border investments) (OECD, 2020)</td>
<td>Structural barriers (BS1-4) (driver not applicable to Brazil)</td>
</tr>
<tr>
<td>-</td>
<td>Green appeal (D2)</td>
</tr>
<tr>
<td>-</td>
<td>Liquidity of infrastructure “corporate debentures” (D3)</td>
</tr>
<tr>
<td>Pension funds’ first and most common strategy for infrastructure exposure (Inderst, 2009)</td>
<td>Convenience of investing in listed infrastructure equities (D4)</td>
</tr>
<tr>
<td>-</td>
<td>Need to attain high actuarial targets (D5)</td>
</tr>
<tr>
<td>Negative relationship between age and exposure to risk (Bikker et al., 2012)</td>
<td>Higher ratio of active participants (D6)</td>
</tr>
<tr>
<td>-</td>
<td>Tax incentives for retail investors (D8)</td>
</tr>
<tr>
<td>-</td>
<td>Eligibility of infrastructure debentures (regulatory change) (D9)</td>
</tr>
<tr>
<td>-</td>
<td>Prior knowledge of the local landscape (D10)</td>
</tr>
</tbody>
</table>
In effect, the interviews allow us to better identify those barriers and drivers that are experienced by these investors globally, and those that apply more specifically to investments in Brazil, particularly those related to infrastructure debentures, e.g. how the tax incentive granted by Statute No. 12.431/2011 attracts retail investors, but discourages pension fund investments; how “corporate debentures” offer higher liquidity than “project debentures,” aligning with the short-term horizons of retail investors; and how cases of corruption in private equity funds have contributed to tarnishing the reputation of these funds, repelling institutional investments.

<table>
<thead>
<tr>
<th>Findings from the literature</th>
<th>Interview findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited resources and expertise to make infrastructure investments (Inderst, 2016; OECD, 2020)</td>
<td>Limited infrastructure and project finance expertise (B2)</td>
</tr>
<tr>
<td>Supply of infrastructure projects (Inderst, 2016)</td>
<td>Low supply of infrastructure projects and companies (B3)</td>
</tr>
<tr>
<td>Intermediation processes (Inderst, 2016)</td>
<td>-</td>
</tr>
<tr>
<td>Lack of high-quality data (Croce &amp; Yermo, 2013; Torrance, 2009)</td>
<td>Limited data on companies and projects (B1)</td>
</tr>
<tr>
<td>Regulatory barriers (Inderst, 2016; OECD, 2019, 2020)</td>
<td>-</td>
</tr>
<tr>
<td>Preference for brownfield investments (Croce &amp; Yermo, 2013)</td>
<td>Low liquidity of “project debentures” and direct investments in infrastructure projects (B4)</td>
</tr>
<tr>
<td>-</td>
<td>Aversion to greenfield investments (B5)</td>
</tr>
<tr>
<td>-</td>
<td>Lower-than-expected returns of infrastructure debentures (B6)</td>
</tr>
<tr>
<td>-</td>
<td>Perception of private equity investment funds (B7)</td>
</tr>
<tr>
<td>-</td>
<td>Pension fund risk aversion (B8)</td>
</tr>
</tbody>
</table>

* Aspects that mostly apply to direct investments.

**Source:** the authors
CHAPTER FIVE

Discussion and alternatives
In order to explore possible avenues for increasing the attraction of capital market investors towards infrastructure assets, projects and companies, four steps were followed:

i) Prioritization of most relevant aspects (barriers and drivers);

ii) Identification of interactions between barriers and drivers;

iii) Exploration of alternatives to minimize existing barriers;

iv) Exploration of alternatives to maximize existing drivers

Given the scope of this report, prioritization of the most relevant aspects began with the selection of those barriers and drivers that apply to capital market investors, as already categorized in Figure 9. On this point, an additional aspect was included in the analysis, namely exchange rate volatility, since it may be also be addressed by specific measures. A second indicator used to prioritize the most pertinent aspects was the frequency with which each was mentioned in the interviews, as ranked in Table 10 and Table 11.

### Table 10

<table>
<thead>
<tr>
<th>Code</th>
<th>Drivers</th>
<th>Mentions</th>
</tr>
</thead>
<tbody>
<tr>
<td>D8</td>
<td>Tax incentive for retail investors</td>
<td>5</td>
</tr>
<tr>
<td>D1</td>
<td>Portfolio diversification</td>
<td>3</td>
</tr>
<tr>
<td>D2</td>
<td>Green appeal</td>
<td>3</td>
</tr>
<tr>
<td>D3</td>
<td>Liquidity of infrastructure “corporate debentures”</td>
<td>3</td>
</tr>
<tr>
<td>D5</td>
<td>Need to attain high actuarial targets</td>
<td>3</td>
</tr>
<tr>
<td>D4</td>
<td>Convenience of investing in listed infrastructure equities</td>
<td>2</td>
</tr>
<tr>
<td>D6</td>
<td>Higher ratio of active participants</td>
<td>2</td>
</tr>
<tr>
<td>D7</td>
<td>Suitability (long-term horizon)</td>
<td>2</td>
</tr>
<tr>
<td>D10</td>
<td>Prior knowledge of the local landscape</td>
<td>2</td>
</tr>
<tr>
<td>D9</td>
<td>Eligibility of infrastructure debentures (regulatory change)</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: the authors

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44 These steps are loosely inspired by the procedures and tools applied in situational analysis, such as the TOWS matrix (see, for instance, Gottfried et al., 2018; Weihrich, 1982, 1999)

45 Although Brazil’s speculative investment grade directly affects the ability of foreign investors to invest in the country, it is a result of broader macroeconomic and political issues and may not be specifically addressed by any single policy focused on capital markets.
Although the overall frequencies may already assist in identifying the most relevant drivers and barriers, understanding how these aspects interact may also be helpful to further prioritize those barriers that are not countered by any drivers and/or those drivers that simultaneously diminish the impacts of several barriers.

In this respect, Table 12 offers a qualitative matrix in which weak or non-existent relationships are left blank, and strong relationships where the driver counters, causes or reinforces the barrier (and vice versa) are marked with an “X.” Each barrier and driver is identified according to the codes provided in the previous tables. To identify the relationships between the drivers and barriers, the research team has discussed each one interaction (10 drivers x nine barriers = 90 interactions) and marked with an “X” when that interaction was mentioned by the interviewees. The exercise, even though subjective, is grounded on the interviews and provides a good starting point for further discussions.
Below, the most relevant interactions are discussed and possible alternatives for enhancing existing drivers and/or minimizing current barriers are explored, as suggested by the interviewees.

## 5.1 Most relevant barriers, drivers and interactions

### 5.1.1 Countering exchange rate volatility

**Related drivers and barriers:** Exchange rate volatility (BS3), green appeal (D1), the convenience of listed equities (D4) and prior knowledge of the local landscape (D10)

Influenced by the country’s overall macroeconomic and political outlook, exchange rate volatility (BS3) and other structural barriers seem to be somehow mitigated by three of the drivers that attract foreign capital market investors.

First, low-carbon infrastructure opportunities in sectors such as renewable energy or railway transport in Brazil seem to be good matches for foreign pension funds or foreign asset managers with investment policies/mandates seeking greater exposure to low-carbon assets. Thus, for foreign investors, the green appeal (D1) may help offset structural challenges to investing in the country or, at least, increase their tolerance of these risks.

### Table 12: Interaction matrix

<table>
<thead>
<tr>
<th>Drivers</th>
<th>BS3</th>
<th>B6</th>
<th>B1</th>
<th>B2</th>
<th>B7</th>
<th>B4</th>
<th>B5</th>
<th>B3</th>
<th>B8</th>
</tr>
</thead>
<tbody>
<tr>
<td>D8</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>D2</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>D4</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D5</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>D4</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D6</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D7</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D10</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D9</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

**Source:** the authors
On this point, the number and amount of sustainable credit operations (green bonds, green infrastructure debentures etc.) have grown considerably in recent years\textsuperscript{46}, issued in R$ (exposed to exchange rate risks), but also in US$, which transfers the exchange rate risk from the institutional investor to the issuers (direct investors). In addition, the Ministry of Infrastructure is working with the Climate Bonds Initiative (CBI) to certify greenfield railways according to the Climate Bonds Standard before auction in order to allow concessionaires to issue green bonds in the future\textsuperscript{47}.

Secondly, especially for foreign private equity investors, exchange rate volatility (BS3) was found to be partially countered by investors’ prior knowledge of the local landscape (D10) because they had a better understanding of currency cycles in Brazil and, as put by one interviewee, “reach a different understanding than the market’s view.” According to the interviewees, this knowledge can be obtained through setting up an in-country team that will develop this expertise and/or partnering with local private equity investors. Other interviewees suggested that events, hubs or platforms could be put in place to provide matching opportunities between foreign investors and local partners, and that provision of these hubs could be supported either by national (or regional) governments within the scope of international cooperation projects or by Brazilian sectoral associations, as already happens, for instance, in the sugar and ethanol industry.

Thirdly, for foreign investors in general, a relatively simple way to increase exposure to infrastructure assets is through listed equities (D4) due to the convenience associated with investing through this vehicle. It should be noted though that large swings in the exchange rate could significantly affect returns and prevent the investment altogether.

Solutions to reduce currency risks for direct investors, such as “correcting” the taxation from gains obtained via hedging strategies, were already explored in National Study Year 1. In particular, allowing concessionaires to enter into local contracts denominated in foreign currencies (as stipulated in Draft Bill 2,889/2019), for instance between a commodity trader and a railway company, could “dollarize” the entire supply chain and facilitate the issuance of bonds in US$, as suggested by one interviewee.

5.1.2 Investments in incentivized infrastructure debentures

Related drivers and barriers: Lower than expected returns from infrastructure debentures (B6), tax incentives for retail investors (D8), and eligibility of infrastructure debentures (D9)

\textsuperscript{46} Over 60% of all of these issuances from Brazilian companies have occurred from 2020 onwards. A comprehensive and updated list can be found at https://docs.google.com/spreadsheets/u/1/d/e/2PACX-1vRDp7Z82Qovr9VuupGGQGSIk66hQpRfL5ucb6kZ80Hyt0Vfuij7Qe8h99_DVx2Frg-8ADHE05ASP/pubhtml

\textsuperscript{47} As discussed in National Study Year 1.
The tax incentive granted to retail investors by Statute No. 12,431/2011 when investing in infrastructure debentures (D8) has generated great demand from these investors. On the supply side, the regulatory change that simplified the issuance process of incentivized debentures from energy companies (as stipulated by MME Decree 245/2017) (D9) allowed for the emergence of “corporate debentures,” increasing the supply of debentures and decreasing the risk of these vehicles, since they are backed by the companies’ balance sheets.

While regulations have created favorable conditions for retail investments, institutional investors were not benefitted, given that the great demand from retail investors for infrastructure debentures reduced the spread paid by debenture issuers (B6), causing institutional investors to not be attracted by these bonds.

On this point, as mentioned earlier, five interviewees brought up the proposal from Draft Bill 2,646/20 that seeks to create a new series of debentures and grant the tax incentive to the issuing company rather than to retail investors. This would then allow the issuer to offer a higher spread, contributing to attracting institutional investors.

5.1.3 Improved data availability

**Related drivers and barriers:** Limited data on companies and projects (B1), portfolio diversification (D1), the convenience of investing in listed infrastructure equities (D4), and prior knowledge of the local landscape (D10)

Improved data availability and disclosure practices (B1) from infrastructure companies allow investors to better assess the risks and returns associated with infrastructure companies and projects. In this sense, more and higher-quality data could further encourage investors to diversify their portfolios towards infrastructure assets (D1), including via listed equities, due to a better understanding of their correlation with other sectors.

Prior knowledge of the local landscape (D10) can occasionally minimize this barrier for foreign investors. As mentioned earlier, one interviewee linked the success of a foreign infrastructure asset manager to their close relationships with local regulators and other local actors in Brazil, which are themselves important sources of information.

In addition, as previously explored, a database could be developed in order to unify relevant information for investors to properly conduct due diligence of infrastructure projects, particularly with regard to public concessions. Although this database could be helpful, one interviewee mentioned that engaging with the appropriate players on the ground locally tends to be more important, as she summarized: “there is a need for understanding Brazil (as a country) that will not be written in any database.”
5.1.4 Pension fund risk appetite

**Related drivers and barriers:** Low liquidity of infrastructure “project debentures” (B4), portfolio diversification (D1), a need to attain high actuarial targets (D5), a higher ratio of active participants (D6), suitability (D7) and the lower than expected returns of infrastructure debentures (B6).

A reduced SELIC interest rate, coupled with the need of pension funds with defined benefit plans to attain their actuarial targets (D5), could increase fund managers’ appetite for riskier investments in order to achieve higher returns, contributing to greater portfolio diversification, away from government bonds and with more investments in other asset classes such as infrastructure (D1).

However, for defined benefit plans, the need to achieve their actuarial targets (D5) is accompanied by a need for liquidity, given the higher share of retired participants in these plans (D6), rendering illiquid “project debentures” undesirable (B4), even for portfolio diversification purposes (D1). As mentioned by one interviewee, in order to sell these debentures on the secondary market, an investor may have to wait “some time” and even sell below the market price.

On the other hand, some defined contribution funds that have a higher ratio of active participants (D6) can afford to hold more illiquid assets in their portfolios over longer periods, including long-term investments such as infrastructure assets (D7). Still, in the case of incentivized debentures, they do not enjoy the tax incentive given to retail investors and, therefore, would need to be compensated by attractive return rates (in comparison to other illiquid and/or riskier assets) (B6). Again, extending the tax exemption to the issuer could render this type of instrument more desirable for institutional investors.

5.2 Tackling barriers to capital market investments

Measures suggested by the interviewees to tackle barriers to capital market investments in infrastructure have already been discussed in previous topics and sections, and are summarized below:

- Creating a shared database for due diligence of infrastructure projects (in B1);
- Outsourcing infrastructure investments to specialized infrastructure fund managers (in B2);
- Bundling smaller pension funds (B2);
- Creating a new series of incentivized debentures, as stipulated by Draft Bill 2,646/2020 (in B6);
- Issuing bonds in US$ (in BS3);
Allowing non-qualified investors (those with investments lower than R$ 1 million) to invest in FIP-IEs (in Box 5);

Creating platforms, hubs or events to match foreign investors with local partners (see the previous section);

Having the government certify infrastructure projects so that they will be eligible for green bond issuance after auction (see the previous section).

Below are other alternatives that were also mentioned during the interviews:

**Government backing**

**Barriers to be tackled:** structural barriers (BS1-4)

Four suggestions/examples were provided by the interviewees regarding how government action can support attraction of capital market investments to infrastructure.

One interviewee recalled a successful case from Denmark. A Danish pension fund established an agreement with the country’s Ministry of Trade to invest in infrastructure in countries that were not regular recipients of investments, and the Ministry would support the deal by agreeing to embargo the country in case any rules related to investor protection (e.g. expropriation rules) changed.

Another interviewee mentioned the experience of Export Development Canada (EDC)\(^{48}\), a public corporation\(^{49}\) which provides a variety of services, including insurance, for Canadian companies willing to export goods and services and invest internationally. Although the interviewee noted that these services are mostly focused on direct investors, she thinks the model could be adapted for the financial industry.

In Brazil, a third interviewee cited the example of railway project Ferrogrão, for which the government will provide a R$ 2.2 billion guarantee deposit to cover non-manageable risks over the lifetime of its 69-year contract.

In addition, another interviewee suggested that the government could create a collateral fund or restructure existing funds (such as the Infrastructure Collateral Fund – FGIE, the Merchant Marine Fund – FMM, and the Civil Aviation National Fund – FNAC, through BNDES) to back and leverage private investments in infrastructure.

\(^{48}\) [https://www.edc.ca/](https://www.edc.ca/).

\(^{49}\) Crown corporation according to Canadian terms.
New investment vehicles

Barriers to be tackled: pension fund risk aversion (B8), aversion to greenfield investments (B5).

One interviewee suggested that new investment vehicles could also be created, such as hybrid securities that have fixed and variable income components. This vehicle could be more appealing to certain institutional investors, such as pension funds, that are more risk averse and often do not allocate substantial portions of their portfolios to pure equity instruments. Examples of these instruments are subordinated bonds, convertible bonds and preferred stock (OECD, 2015).

BOX 6

Measures suggested by the interviewees to tackle barriers to capital market investments in infrastructure

› Creating a shared database for due diligence of infrastructure projects;
› Outsourcing infrastructure investments to specialized infrastructure fund managers;
› Bundling smaller pension funds;
› Creating a new series of incentivized debentures, as stipulated by Draft Bill 2,646/2020;
› Issuing bonds in US$;
› Allowing non-qualified investors (those with investments lower than R$ 1 million) to invest in FIP-IEs;
› Creating platforms, hubs or events to match foreign investors with local partners;
› Having the government certify infrastructure projects so that they will be eligible for green bond issuance after auction;
› Government supporting attraction of capital market investments to infrastructure;
› Creating new investment vehicles, such as hybrid securities that have fixed and variable income components.

Source: the authors based on the interviews.

Appendix 3 lists six additional measures suggested by OECD (2020) that could be employed in order to increase institutional investments in green infrastructure.
CHAPTER SIX

Conclusions
Institutional investors represent a promising source of capital for infrastructure investments. In theory, the long-term horizons of these investors’ liabilities match the long time horizon of infrastructure assets that, in turn, have low correlation with other asset classes, contributing to portfolio diversification. Internationally, some institutional investors have increased their exposure to infrastructure, but general uptake has been slow (Inderst, 2016).

The global gap for new investments in infrastructure is concentrated in middle-income countries. However, these nations often lack the conditions to attract institutional investors, such as sound policies, effective institutions, reliable contract enforcement and clear capital market regulations. Hence, local governments need to adopt policies and pursue actions that foster a conducive environment for attracting private investments in infrastructure (Bielenberg et al., 2020; Yamahaki et al., 2020).

In view of this context, this report set out to identify the barriers and drivers that explain current patterns of capital market investment in infrastructure in Brazil, with a special focus on low-carbon infrastructure. Furthermore, the report explored possible actions that could assist in maximizing existing drivers or create new ones, as well as remove or mitigate current barriers, thus contributing to narrowing the infrastructure gap in the country.

Drawing on 14 interviews with stakeholders from Brazilian capital markets, the results from this study suggest that structural factors appear to be the most relevant (i.e. most frequently mentioned by interviewees). Improving these structural aspects is key for emerging markets, given the weaker legal, macroeconomic and political conditions, in concert with less developed capital markets (Yamahaki et al., 2020). Overcoming these challenges requires a host of broader reforms, which was not the focus of this study and thus not discussed.

Second, retail investors are one of the most important classes of capital market investors in infrastructure in Brazil due to a tax exemption available to them. To the best of our knowledge, such a prominent role is a unique feature of Brazil’s outlook. Even though these investors fill an important infrastructure gap, their shorter-term preferences and need for higher liquidity also influence and shape the infrastructure bond market, with a lack of a proper match between investment vehicles and asset time horizons.

With regard to pension funds, the industry’s culture is notably one of risk aversion, with most assets allocated to fixed income, especially domestic sovereign bonds, which were sufficient to achieve actuarial targets in the past. More recently, declining interest rates (among other factors) may be motivating managers to seek riskier investments, although most pension funds still have room to diversify into other asset classes, such as listed equity, and into other sectors besides infrastructure.

Moreover, the largest pension funds in Brazil tend to have a higher share of retired participants, thus requiring high levels of liquidity in order to pay beneficiaries.
Newer funds with higher ratios of active participants could match their long-term liabilities with higher-yield, less-liquid assets, but tend to lack the financial and human resources and expertise to make investments in infrastructure.

Lastly, local structural barriers represent substantial challenges for foreign investors that might be interested in investing in Brazil, particularly since they could find more favorable conditions (e.g. investment grade countries with less volatile currencies) in other emerging markets. Still, the appeal of low-carbon, “green-labelled” infrastructure assets and bonds in Brazil, as well as the prior knowledge of the local landscape held by some investors, may help mitigate these barriers, especially for private equity investors.

Overall, the research findings corroborate the literature, suggesting that some of the barriers faced by investors in Brazil are similar to those found in other developed and developing countries. Hence, there seems to be room for some form of policy learning (transfer) from the international experience.

In addition, the report offers valuable contributions to the academic literature by providing a higher level of granularity in the analysis, with an in-depth evaluation of a specific emerging market, as well as a greater degree of differentiation among barriers and drivers (those pertaining to the institutional environment, those related to direct investments and those linked to capital markets) by investor type.

The results may also help local policymakers identify priorities for action, as well as offer better insights into the decision-making processes of different investors, their needs and conditions in order to invest in the pipeline of infrastructure projects available in the country. More generally, the report also showcases the importance of ensuring that the topics of low-carbon infrastructure and ESG investing are on the agenda of capital market investors.

Concerning the limitations of the study, sampling did not aspire to offer statistical representativeness, and the opinion of the interviewees should not be generalized to the whole Brazilian capital market, nor should interview findings be generalized to other emerging markets. Nonetheless, it provides valuable insights into the academic literature, and its analytical framework could be used (and adapted) to investigate other countries, as well as other asset classes (e.g. alternative investments) and other low-carbon sectors in Brazil.

Finally, as the Brazilian market matures, other methods could be employed, such as surveys with a larger sample of capital market investors and content analysis of pension fund annual reports. Future studies could also explore in more detail the barriers and drivers affecting direct investments in other infrastructure sectors in Brazil, like that conducted in National Study Year 1 on the railway sector.
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Capital market investments in low-carbon infrastructure in Brazil


OECD. (2019). *Annual Survey of Large Pension Funds and Public Pension Reserve Funds.*


*Capital market investments in low-carbon infrastructure in Brazil*
APPENDIX 1: Deforestation and transport infrastructure

This short literature review was a request from the external reviewers of National Study Year 1, who were interested in learning about the relationship between transport infrastructure and deforestation patterns.

A number of academic studies have analyzed the impact of transport network expansion (particularly road expansion) on deforestation, indicating that improved access to remote areas increases the likelihood of vegetation cover loss.

Geist & Lambin (2001) conducted a meta-analysis of 152 cases from 95 articles to identify the proximate\textsuperscript{50} causes (agricultural expansion, wood extraction and expansion of infrastructure) and underlying forces (demographic, economic, technological, policy and cultural factors) of deforestation. With regard to transport infrastructure, the authors found that the extension of roads was a cause of deforestation in 61\% of the cases studied (93 out of 152 cases), rail expansion was a cause in 11\% (17 cases) and rivers in 9\% (11 cases). Losos, Pfaff, Olander, Mason, & Morgan (2019) explain that the impacts from rail are less severe than those from roads because rail provides access to freight and passengers only at stations, thus at fewer points than roads.

Focusing on the Brazilian context, Barber, Cochrane, Souza, & Laurance (2014) found that nearly 95\% of all deforestation in the Amazon region occurred within 5.5 km of (official and unofficial) roads or within 1 km of navigable rivers. The authors also found that protected areas near roads and rivers experienced less forest loss than did unprotected lands, concluding that conservation measures have a strong mitigating effect on deforestation risk.

In addition to analyzing actual deforestation, academics have employed spatial analysis to estimate future deforestation resulting from road expansion. For instance, Vilela et al. (2020) examined 75 proposed road projects\textsuperscript{51} to be implemented in the Amazon region in Brazil, Bolivia, Colombia, Ecuador and Peru. They estimated that the implementation of these projects would cause deforestation equivalent to 2.4 million hectares over the next 20 years\textsuperscript{52}, with the paving of the trans-Amazonian highway causing 23\% of all predicted losses.

\textsuperscript{50} Human activities that directly affect the environment and thus constitute proximate sources of change.
\textsuperscript{51} Totaling 12,000 kilometers
\textsuperscript{52} To predict deforestation in the vicinity of each project, the authors used Dinamica EGO, which simulates future land cover change based on a probabilistic model of past deforestation, as explained by biophysical and socioeconomic variables.
Barni (2009) estimated the impact on deforestation of rebuilding and paving BR-319 by simulating four different scenarios. As shown in the graph below, he found that the BAU2 scenario (rebuilding of BR-291) would have the highest accumulated deforestation rate by 2030 (858.6 ha), followed by CONSERV2 (rebuilding of BR-319 with the creation of Conservation Units) with 775.9 ha of deforestation, BAU1 (no rebuilding of BR-319) with 715.2 ha, and CONSERV1 (no rebuilding of BR-319 and the creation of Conservation Units) with 654.5 ha (Figure 13) of deforestation. Similar to Barber et al. (2014), Barni (2009) noted that both road infrastructure and (formal recognition of) area protection affect forest cover loss.

### FIGURE 12

**Accumulated deforestation in the south of Roraima under four scenarios**

There are fewer studies investigating the relationship between rail expansion and deforestation patterns. Recently, Araújo, Assunção, & Bragança (2020) published a report estimating the environmental impact caused by the construction of Ferrogrão (EF-170 rail), a 930 km-greenfield project connecting the state of Mato Grosso to the Mirituba port, in the state of Pará. By improving market access, the authors predict that the new railway will encourage agricultural producers and cattle ranchers to increase land use and production, eventually causing an area of 2,043 km² of native vegetation to be deforested.

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53 The author also used the Dinamica EGO simulation software.
### APPENDIX 2:

**Characteristics of the largest pension funds in Brazil**

<table>
<thead>
<tr>
<th>Fund name</th>
<th>Plan Name</th>
<th>Type</th>
<th>Year of foundation</th>
<th>AUM</th>
<th>Active participants</th>
<th>Assisted participants</th>
<th>Actuarial target (2018)</th>
<th>Actuarial target (2019)</th>
<th>Actuarial target (2020)</th>
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<tbody>
<tr>
<td>PREVI</td>
<td>Plano de Benefícios 1</td>
<td>DB</td>
<td>1967</td>
<td>R$ 182,627,912.00</td>
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<td>82,129</td>
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<td>9.71%</td>
<td>N/A</td>
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<td>FUNCEF</td>
<td>REG/REPLAN</td>
<td>DB</td>
<td>1977</td>
<td>R$ 52,752,618.00</td>
<td>84,451</td>
<td>51,685</td>
<td>INPC + 4.5%</td>
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<tr>
<td>PETROS</td>
<td>PPSP-R</td>
<td>DB</td>
<td>1970</td>
<td>R$ 43,226,022.00</td>
<td>70,100</td>
<td>73,200</td>
<td>9.66%</td>
<td>9.80%</td>
<td>9.15%</td>
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<tr>
<td>REAL GRANDEZA</td>
<td>Plano de Benefício Definido</td>
<td>DB</td>
<td>1972</td>
<td>R$ 15,379,548.00</td>
<td>776</td>
<td>6,932</td>
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<td>INPC + 5%</td>
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<td>FAPES</td>
<td>Plano Básico de Benefícios</td>
<td>DB</td>
<td>1975</td>
<td>R$ 13,287,220.00</td>
<td>2,681</td>
<td>2,227</td>
<td>9.70%</td>
<td>11.30%</td>
<td>10%</td>
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<tr>
<td>BANESPREV</td>
<td>Plano V</td>
<td>DB</td>
<td>2007</td>
<td>R$ 13,266,889.00</td>
<td>2</td>
<td>11,877</td>
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<td>INCPC + 10.16%</td>
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<td>SISTEL</td>
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<td>DB</td>
<td>1977</td>
<td>R$ 12,102,705.00</td>
<td>1,745</td>
<td>22,690</td>
<td>INPC + 4.19%</td>
<td>INPC + 4.09%</td>
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<tr>
<td>PETROS</td>
<td>PPSP-NR</td>
<td>DB</td>
<td>1970</td>
<td>R$ 11,393,352.00</td>
<td>70,100</td>
<td>73,200</td>
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<td>9.80%</td>
<td>9.08%</td>
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<td>VALIA</td>
<td>Plano de Benefício Definido</td>
<td>DB</td>
<td>1973</td>
<td>R$ 10,605,632.00</td>
<td>7</td>
<td>15,151</td>
<td>INPC + 5%</td>
<td>INPC + 5%</td>
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<tr>
<td>VIVEST</td>
<td>PSAP/Eletropaulo</td>
<td>DB</td>
<td>1979</td>
<td>R$ 10,447,049.00</td>
<td>4,890</td>
<td>9,229</td>
<td>IGP-DI + 6.2%</td>
<td>IGP-DI + 5.64%</td>
<td>IGP-DI + 4.81%</td>
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<tr>
<td>FUNDACAO ITAU</td>
<td>Plano Itaubanco CD</td>
<td>DC</td>
<td>2010</td>
<td>R$ 10,424,773.00</td>
<td>12,940</td>
<td>8,044</td>
<td>INPC + 4%</td>
<td>INPC + 4.19%</td>
<td>INPC + 4.09%</td>
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<tr>
<td>UNIBANCO</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VISAO PREV</td>
<td>Plano Visão Telefônica</td>
<td>DC</td>
<td>2011</td>
<td>R$ 5,599,539.00</td>
<td>4,681</td>
<td>4,840</td>
<td>12.04%</td>
<td>18.16%</td>
<td>6.27%</td>
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<tr>
<td>Fund name</td>
<td>Plan Name</td>
<td>Type</td>
<td>Year of foundation</td>
<td>AUM</td>
<td>Active participants</td>
<td>Assisted participants</td>
<td>Actuarial target (2018)</td>
<td>Actuarial target (2019)</td>
<td>Actuarial target (2020)</td>
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</tr>
<tr>
<td>FUNDACAO IBM</td>
<td>Plano CD da IBM Brasil</td>
<td>DC</td>
<td>1996</td>
<td>R$ 4,587,250.00</td>
<td>8,728</td>
<td>1,324</td>
<td>IGP-DI + 4.63%</td>
<td>IGP-DI + 4.63%</td>
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<tr>
<td>PETROS</td>
<td>PP-2</td>
<td>VC</td>
<td>2007</td>
<td>R$ 27,149,055.00</td>
<td>70,100</td>
<td>73,200</td>
<td>9.35%</td>
<td>9.89%</td>
<td>10.05%</td>
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<tr>
<td>FUNCEF</td>
<td>Novo Plano</td>
<td>VC</td>
<td>2006</td>
<td>R$ 19,407,129.00</td>
<td>76,287</td>
<td>8,481</td>
<td>INPC + 4.5%</td>
<td>INPC + 4.5%</td>
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<tr>
<td>PREVI</td>
<td>Previ Futuro</td>
<td>VC</td>
<td>1998</td>
<td>R$ 19,293,302.00</td>
<td>81,914</td>
<td>2,512</td>
<td>8.61%</td>
<td>9.71%</td>
<td>10.32%</td>
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<tr>
<td>FORLUZ</td>
<td>Plano B</td>
<td>VC</td>
<td>1997</td>
<td>R$ 10,238,295.00</td>
<td>5,980</td>
<td>13,061</td>
<td>9.24%</td>
<td>9.83%</td>
<td>IPCA + 5.3%</td>
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<tr>
<td>VALIA</td>
<td>Plano de Benefícios Vale Mais</td>
<td>VC</td>
<td>2001</td>
<td>R$ 10,172,907.00</td>
<td>73,849</td>
<td>6,647</td>
<td>9.4%</td>
<td>7.6%</td>
<td>N/A</td>
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</tbody>
</table>

DB = Defined Benefit; DC = Defined contribution; VC = Variable contribution

Inflation indices: INPC (Índice Nacional de Preços ao Consumidor); IGP-DI (Índice Geral de Preços - Disponibilidade Interna)

i: Year of foundation of the company; ii: Split from other plans in 2018; iii: Numbers for 2018; iv: Investment policy and benchmarks for the Moderate profile; v: Consolidated targets for all Valia plans.

Source: the authors based on the references below.
<table>
<thead>
<tr>
<th>Fund name</th>
<th>Asset type</th>
<th>Investment limits</th>
<th>Actuarial target</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREVI (2020)</td>
<td>Fixed income</td>
<td>37.36% to 54.94%</td>
<td>Actuarial target + 0.25% p.a.</td>
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<tr>
<td></td>
<td>Variable income</td>
<td>37.21% to 50.35%</td>
<td>Surpass IBrX Index</td>
</tr>
<tr>
<td></td>
<td>Structured</td>
<td>0.33% to 2.99%</td>
<td>INPC + 7% p.a.</td>
</tr>
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<td></td>
<td>Real estate</td>
<td>3.79% to 8.85%</td>
<td>INPC + 7% p.a.</td>
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<tr>
<td></td>
<td>Foreign markets</td>
<td>0% to 4%</td>
<td>MSCI World Index + Currency variation</td>
</tr>
<tr>
<td></td>
<td>Operations with participants</td>
<td>0.57% to 5.15%</td>
<td>Surpass actuarial target</td>
</tr>
<tr>
<td>FUNCEF (2019) - REG/REPLAN</td>
<td>Fixed income</td>
<td>46% to 65.8%</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Variable income</td>
<td>17.1% to 35.1%</td>
<td>IBrX -100</td>
</tr>
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<td></td>
<td>Structured</td>
<td>0% to 5.1%</td>
<td>N/A</td>
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<tr>
<td></td>
<td>Real estate</td>
<td>7.7% to 15.9%</td>
<td>N/A</td>
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<td></td>
<td>Foreign markets</td>
<td>0% to 1.7%</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Loans</td>
<td>1.2% to 5.5%</td>
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<td>PETROS (2019)</td>
<td>Fixed income</td>
<td>20% to 100%</td>
<td>N/A</td>
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<td></td>
<td>Variable income</td>
<td>0% to 45%</td>
<td>N/A</td>
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<td>Structured</td>
<td>0% to 20%</td>
<td>N/A</td>
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<tr>
<td></td>
<td>Real estate</td>
<td>0% to 10%</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Foreign markets</td>
<td>0% to 10%</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Operations with participants</td>
<td>0% to 15%</td>
<td>N/A</td>
</tr>
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<td>Fund name</td>
<td>Asset type</td>
<td>Investment limits</td>
<td>Actuarial target</td>
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<tr>
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<td>REAL GRANDEZA (2019)</td>
<td>Fixed income</td>
<td>44% to 100%</td>
<td>Surpass actuarial target</td>
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<td>0% to 30%</td>
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<td>Structured</td>
<td>0% to 12%</td>
<td>Surpass actuarial target</td>
</tr>
<tr>
<td></td>
<td>Real estate</td>
<td>0% to 6%</td>
<td>Surpass actuarial target</td>
</tr>
<tr>
<td></td>
<td>Foreign markets</td>
<td>0% to 4%</td>
<td>Surpass actuarial target</td>
</tr>
<tr>
<td></td>
<td>Operations with participants</td>
<td>0% to 4%</td>
<td>Surpass actuarial target</td>
</tr>
<tr>
<td>FAPES (2019)</td>
<td>Fixed income</td>
<td>100%</td>
<td>Cash, Short-term and long-term fixed income</td>
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<td></td>
<td>Variable income</td>
<td>70%</td>
<td>Ibovespa</td>
</tr>
<tr>
<td></td>
<td>Structured</td>
<td>20%</td>
<td>Ibovespa e CDI</td>
</tr>
<tr>
<td></td>
<td>Real estate</td>
<td>20%</td>
<td>IMA-B5+</td>
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<td></td>
<td>Foreign markets</td>
<td>10%</td>
<td>MSCI World (em R$)</td>
</tr>
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<td>Operations with participants</td>
<td>10%</td>
<td>Actuarial target</td>
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<tr>
<td>BANESPREV (2020)</td>
<td>Fixed income</td>
<td>85% to 100%</td>
<td>INPC + 4.17% p.a.</td>
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<td></td>
<td>Variable income</td>
<td>0%</td>
<td>-</td>
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<tr>
<td></td>
<td>Structured</td>
<td>0%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Real estate</td>
<td>0% to 5%</td>
<td>INPC + 8% p.a.</td>
</tr>
<tr>
<td></td>
<td>Foreign markets</td>
<td>0%</td>
<td>-</td>
</tr>
<tr>
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<td>Operations with participants</td>
<td>0% to 15%</td>
<td>INPC + 4.17% p.a.</td>
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<td>Fund name</td>
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<td><strong>VALIA (2020) - Defined Benefit</strong></td>
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<td>67% to 93%</td>
<td>INPC + 5% p.a. (8.7%)</td>
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<td>Variable income</td>
<td>0% to 8%</td>
<td>Ibovespa (11.4%)</td>
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<tr>
<td></td>
<td>Structured</td>
<td>0% to 7%</td>
<td>INPC + 5% p.a. (8.7%)</td>
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<td></td>
<td>Real estate</td>
<td>6% to 12%</td>
<td>INPC + 5% p.a. (8.7%)</td>
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<tr>
<td></td>
<td>Foreign markets</td>
<td>-</td>
<td>INPC + 5% p.a. (8.7%)</td>
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<td>Operations with participants</td>
<td>1% to 6%</td>
<td>INPC + 5% p.a. (8.7%)</td>
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<td><strong>VIVEST (2021)</strong></td>
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<td>2% to 40%</td>
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<td>0% to 10%</td>
<td>4.20%</td>
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<td>Real estate</td>
<td>0% to 10%</td>
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<td>6.1% (Fixed income) and 4.5% (Variable income)</td>
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<td>0% to 20%</td>
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<td>Real estate</td>
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<td>Foreign markets</td>
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<td><strong>FUNDACAO IBM (2019)</strong></td>
<td>Fixed income</td>
<td>50% to 100% CDI + 0.6%</td>
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<td>Structured</td>
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<td>Real estate</td>
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<td>Foreign markets</td>
<td>0% to 100% IBOVESPA</td>
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<td><strong>FORLUZ (2019)</strong></td>
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<td>0% to 15% IBOVESPA + 0.68% p.a. (32.48%)</td>
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<td>0% to 15% IPCA(IBGE) + 5.6% p.a. (10.15%)</td>
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<td>Real estate</td>
<td>0% to 10% IPCA(IBGE) + 6% p.a. (10.57%)</td>
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<td>Foreign markets</td>
<td>0% to 5% 112% CDI (6.69%)</td>
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<td>22% to 98% 41% CDI + 59% (IPC-BR + 4.75%) - 6.8%</td>
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<td>Variable income</td>
<td>1% to 42% Ibovespa (11.4%)</td>
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<tr>
<td></td>
<td>Structured</td>
<td>0% to 15% 90% IMA-B5 + 10% (IPC-BR + 4.75%) - 6.8%</td>
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<td></td>
<td>Real estate</td>
<td>1% to 4% IPC-BR + 4.75% p.a. (8.5%)</td>
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<tr>
<td></td>
<td>Foreign markets</td>
<td>0% to 8% MSCI World NR (8.8%)</td>
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<tr>
<td></td>
<td>Operations with participants</td>
<td>0% to 9% IPC-BR + 4.75% p.a. (8.5%)</td>
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</table>
### FUNCEF (2019) - Novo Plano

<table>
<thead>
<tr>
<th>Asset type</th>
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<th>Actuarial target</th>
</tr>
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<tbody>
<tr>
<td>Fixed income</td>
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<td>Variable income</td>
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<td>Real estate</td>
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<td>Foreign markets</td>
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<tr>
<td>Loans</td>
<td>4.4% to 8.9%</td>
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</table>

### Visão Previ

<table>
<thead>
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<th>Asset type</th>
<th>Investment limits</th>
<th>Actuarial target</th>
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</thead>
<tbody>
<tr>
<td>Fixed income</td>
<td>51.5% to 100%</td>
<td>15% IMA-B5+ + 55% IMA-B5 + 30% CDI</td>
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<td>110% CDI</td>
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<td>MSCI ACWI</td>
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<td>Loans</td>
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</tr>
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</table>

\(i\): Investment policy and benchmarks for the Moderate profile.

**Source**: prepared by the authors based on the references below.
References

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Capital market investments in low-carbon infrastructure in Brazil
APPENDIX 3:

Measures to accelerate institutional investments in green infrastructure

1. Governments could champion the development of a pipeline of investment-grade projects, partake in investor partnerships as co-investors, and show a commitment to environmental policy goals to attract private investors.

2. Policy-makers could provide clarification on the relationship between fiduciary duty, duty of care and consideration of climate-related and other environment-related risks, explaining whether ESG considerations are permissible from a regulatory point of view in order to encourage willing investors to make green infrastructure investments.

3. General insurers could work with government to develop products that underwrite public assets, thereby lowering perceived risks for these assets and attracting private investments.

4. Asset owners could support green infrastructure investment through their mandates to asset managers, which form the basis for capital allocation decisions of asset managers and investment consultants.

5. The increased availability of more liquid investment vehicles (e.g. YieldCos) would suit the recent trend of shifting from active to passive strategies in the asset management industry and of shifting from defined benefit to defined contribution pension schemes (shifting investment decisions from trustees to beneficiaries, who favor liquidity).

6. Regulatory measures to increase transparency for investors (e.g. recommendations of the Task Force on Climate-related Financial Disclosures - TCFD) and definitions of which investments are green (such as the EU Sustainable Finance Taxonomy) could facilitate decision-making regarding investments and highlight risks related to carbon-intensive, environmentally-harmful investments.

7. Through financial and institutional innovation, the public sector could unlock private investment, for example, by creating a fund that mobilizes private capital towards policy objectives (e.g. renewable energy) and attracts private sector investments through the crowding-in effect (OECD, 2020).