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SNAPFI COUNTRY STUDY

Brazil

*Barriers to attracting
direct and capital market
investments for railway
infrastructure in Brazil*

JULY 2020

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List of acronyms and abbreviations

AAF	All Aboard Florida
Abdib	Association of Infrastructure and Basic Industries
ALL MN	América Latina Logística – Malha Norte S.A.
ALL MO	América Latina Logística – Malha Oeste S.A.
ALL MP	América Latina Logística – Malha Paulista S.A.
ALL MS	América Latina Logística – Malha Sul S.A.
Anac	National Agency of Civil Aviation
Antaq	National Agency of Waterway Transport
ANTT	National Agency of Land Transport
A-S-I	avoid, shift and improve
BNDES	Brazilian Development Bank
BRT	bus rapid transit
CBI	Climate Bonds Initiative
CN	Canada National Railway
CNT	National Transport Confederation
CO₂e	metric tonnes of carbon dioxide equivalent
CONIT	National Board for Transport Policy Integration
DNER	National Department of Highways
EFC	Estrada de Ferro Vitória Minas
EFVM	Estrada de Ferro Vitória Minas
EPL	Planning and Logistics Company
FCA	Ferrovias Centro-Atlântica S.A.
Fepasa	São Paulo Railway Network
Ferroeste	Estrada de Ferro Paraná-Oeste S.A.
FNS	Ferrovias Norte-Sul S.A.
FTC	Ferrovias Tereza Cristina S.A.
GDP	gross domestic product
GHG	greenhouse gas

HSR	high-speed rail
Infraero	Empresa Brasileira de Infraestrutura Aeroportuária
IPO	initial public offering
JNR	Japan National Railways
km²	kilometre squared
LVC	land value capture
MDIC	Ministry of Industry, Foreign Trade and Services
MINFRA	Ministry of Infrastructure
MSF	Management Stabilisation Funds
MtCO^{2e}	million metric tonnes of carbon dioxide equivalent
MTR	mass transit railway
PABs	private activity bonds
PAC	Growth Acceleration Program
p-km	passenger-kilometre
PKP	Polish State Railways
PNL	National Logistics Plan
PPI	Investment Partnership Program
RFFSA	Federal Railway Network
SAC	National Secretary of Civil Aviation
SFPP	Secretaria de Fomento, Planejamento e Parcerias
SNPTA	Secretaria Nacional de Portos e Transportes Aquaviários
SNTT	Secretaria Nacional de Transportes Terrestres
tkm	tonne-kilometre
TNL	Transnordestina Logística S.A.
U.S.	United States of America
UK	United Kingdom
USSR	Soviet Union
USSR	value-added tax



CHAPTER ONE —————>

Introduction

Brazilian freight logistics is heavily reliant on road transport. In 2015, 65% of all cargo transport was on roads, followed by rail (15%), maritime cabotage (11%) and inland waterways (5%) (Ministério dos Transportes, 2018).

The country's overdependence on road transport is detrimental to national competitiveness, in particular because of the importance of hard and soft commodities to national exports. Soy is the country's main exported product, representing 12% of total exports (or EUR 23.25 billion) in 2019, followed by crude oil and iron ore, accounting for 11% (EUR 21.56 billion) and 9% (EUR 17.99 billion), respectively (MDIC, 2020)¹.

Railways are a more suitable means for transporting agricultural and mineral commodities in view of their capacity to transport large volumes of cargo over long distances with significant economies of scale (Transport and ICT, 2017). Although building railway infrastructure is more costly in terms of time and resources than building road infrastructure (Miguel & Reis, 2015), railways yield fuel economy, require lower maintenance, have a lower risk of accidents and are less vulnerable to extreme weather events (Scharf, 2014). On the other hand, road transport is more suitable for transporting products shorter distances as roads allow higher network capillarity (Leite, Pereira, Marinho, & Bittencourt, 2016).

Another advantage of railways over roads is the smaller environmental footprint. Estimates show that railways transporting cargo emit 23.3 gCO₂ per tonne-km (tkm), while road transport emits approximately 101.2 gCO₂/tkm (CNT, 2019a). Thus, not only would the development of railway infrastructure improve Brazil's competitiveness, but it would also contribute to meeting the country's greenhouse gas (GHG) emissions reduction targets.

Historically, the Brazilian Development Bank (BNDES) and the state-controlled Caixa Econômica Federal bank have been the main investors in transport infrastructure projects, accounting for 47% of total investments in 2014 (Frischtak & Noronha, 2016).

¹ Currency exchange rate from 31/12/2017: USD 1.123. All currency rates in the study were obtained from <https://www.xe.com/pt/>.

Nonetheless, given current public fiscal constraints and BNDES's² smaller resource pool, private investments must be attracted in order to close the infrastructure gap (Frischtak, Mourão, & Noronha, 2017).

In 2016, the federal government launched the Investment Partnership Program (PPI, in Portuguese) to expand infrastructure through privatisation and partnership contracts with the private sector (PPI, 2020c). The current administration is also interested in attracting international green capital market investments to fund infrastructure development. This is illustrated by the signing of a Memorandum of Understanding between the federal government and the Climate Bonds Initiative (CBI) in 2019 to certify green public infrastructure projects and attract green bonds investors (Governo do Brasil, 2019).

Given the current context and with the objective of contributing to public policy discussions, this report seeks to identify the barriers that must be overcome in order to unlock private investments for the railway sector. Two types of challenges will be examined:

- a.** Barriers that hamper the attraction of domestic and foreign private companies (also called direct investors) to build and maintain railway infrastructure and/or operate freight transport services in Brazil;
- b.** Barriers that hinder the attraction of domestic and foreign investors to invest in railway projects and companies through the bond market in Brazil.

This study makes academic and practical contributions. Academically, this study helps to fill a gap in the literature on the main challenges related to increasing climate finance in developing nations. In practical terms, the report is particularly relevant in a context in which private investors are seeking investment opportunities with higher rates of return (in view of low global interest rates) and in which the State does not have resources to devote to infrastructure. Additionally, this is an opportunity for Brazil to develop infrastructure that is sustainable and aligned with the nation's Paris Agreement commitments (by 2025, Brazil plans to reduce GHG emissions by 37% compared to 2005 levels, and by 43% by 2030).

² The current administration, under President Jair Bolsonaro, plans to reduce the volume of financing offered by BNDES (Vasconcelos, 2019).

This report is structured as follows. The first section reviews the literature and develops a number of research propositions on the barriers to private investments in the railway sector in Brazil. The second section describes the research methodology. Next, the interview findings are presented and discussed. The final section concludes and suggests areas for future research.



CHAPTER TWO —————>

Literature review

2.1

Definition of sustainable infrastructure

According to the Inter-American Development Bank (2018, p. 3), sustainable infrastructure refers to “infrastructure projects that are planned, designed, constructed, operated, and decommissioned in a manner to ensure economic and financial, social, environmental (including climate resilience), and institutional sustainability over the entire life cycle of the project.”

Similarly, the UNEP Inquiry (2016, p. 22) defines sustainable and resilient infrastructure as infrastructure that “integrates environmental, social and governance aspects into a project’s planning, building and operating phases while ensuring resilience in the face of climate change or other shocks such as rapid migration, natural disasters or economic downturns”. Thus, a common definition of sustainable infrastructure incorporates social and environmental (including climate-related) considerations over the project’s life cycle.

With regard to sustainable transport infrastructure, the literature (e.g. Germanwatch & NewClimate Institute, 2018; OECD et al., 2018; UN, 2016) often describes the strategy for sustainable transport as the avoid-shift-improve (A-S-I) approach:

- › Avoid inefficient or unnecessary travel or transport;
- › Shift modes to the least energy-intensive modes available;
- › Improve the energy efficiency of all modes or reduce the emissions intensity of fuel.

Ang & Marchal (2013) and UN (2016) add that sustainable transport infrastructure depends on national circumstances and, as such, A-S-I strategies need to be tailored to each country's context.

Additionally, the authors observe that climate-resilient strategies must be incorporated into A-S-I approaches to adapt to a changing climate. Examples include improved drainage systems to increase the resilience of roads to heavier rainfall and higher standards for rails to help prevent track buckling due to increased temperature.

The Germanwatch & NewClimate Institute (2018, p. ii) considers the following transport infrastructure investment areas and technologies to be aligned with the Paris Agreement 2oC target:

- › Zero-carbon transport fuelling infrastructure (electricity, hydrogen, alternative fuels);
- › Non-motorised transport infrastructure (sidewalks and dedicated bike-lanes, bike sharing infrastructure);
- › Integration of transport and urban-development planning;
- › Electric rail and rolling stock (passenger and freight);
- › Electric public transport systems;
- › Inland waterways;
- › Transport and travel management measures.

Likewise, the Climate Bonds Standard automatically deems projects related to urban trams, subway systems, bike transport systems and vehicles propelled by fully electric engines or hydrogen fuel cells to be Paris-aligned assets (Climate Bonds Initiative, 2019b). In addition, the areas below are considered Paris-aligned depending on specific thresholds based on per passenger-km values for passenger transport, or per tonne-km values for freight (as shown in Table 1):

- › Vehicle technologies:
 - a.** Technologies that significantly increase emissions efficiency (including fuel efficiency, fuel type and other vehicle improvements);
 - b.** New technologies and hybridisation.

- › Transport infrastructure:
 - a. All modes of collective/mass transport and their infrastructures, especially urban rail and Bus Rapid Transit (BRT);
 - b. New developments in public transit such as ropeways and cable cars;
 - c. Alternative (low carbon) energy refuelling distribution infrastructure;
 - d. National transport infrastructure to reduce transport emissions and fulfil national climate change commitments.
- › System improvements and technologies that encourage overall efficiency (high load, occupancy and flow):
 - a. Technologies that encourage new behaviour (such as qualifying vehicle carpool clubs, bike sharing);
 - b. Better integration of all types of transport (Climate Bonds Initiative, 2017).

TABLE 1

Emission thresholds for green bond certification, according to the Climate Bonds Standard for Low-Carbon Land Transport

	2000	2010	2015	2020	2030	2050
International Energy Agency 2-degree scenario - passenger activity (gCO₂ per p-km)	107	94	87	75	56	33
International Energy Agency 2-degree scenario - freight activity (gCO₂ per tkm)	35	30	27	25	21	18

Source: (Climate Bonds Initiative, 2017)

TABLE 2

Paris-aligned transport infrastructure

	Germanwatch & NewClimate Institute (2018)	(Climate Bonds Initiative, 2019b) – automatically aligned	(Climate Bonds Initiative, 2019b) – dependent on other criteria
Motorised transport infrastructure	Zero-carbon transport fuelling infrastructure (electricity, hydrogen, alternative fuels)	Vehicles propelled by fully electric engines or hydrogen fuel cells	Alternative (low carbon) energy refuelling distribution infrastructure
Non-motorised transport infrastructure	Non-motorised transport infrastructure (sidewalks and dedicated bike-lanes, bike-sharing infrastructure)	Bike transport systems	
Integration	Integration of transport and urban development planning		Better integration of all types of transport
Electric transport	<ul style="list-style-type: none"> › Electric rail and rolling stock (passenger and freight) › Electric public transport 	Vehicles propelled by fully electric engines	
Waterway transport	Inland waterways		
Travel management	Transport and travel management measures		
Urban transport		<ul style="list-style-type: none"> › Urban trams › Metro systems 	<ul style="list-style-type: none"> › All modes of collective/ mass transport and related infrastructure, especially urban rail and Bus Rapid Transit (BRT) › New developments in public transit such as ropeways and cable cars
Technology			<ul style="list-style-type: none"> › Vehicle technologies that significantly increase emissions efficiency (including fuel efficiency, fuel type and other vehicle improvements) › New technologies and hybridisation › Technologies that allow new behaviour (such as qualifying vehicle carpool clubs, bike sharing)

Source: Germanwatch & NewClimate Institute (2018); Climate Bonds Initiative (2019); Climate Bonds Initiative (2019)

With regard to rail transport, the Climate Bonds Standard classifies asset categories based on its "traffic light" colour-coding (Climate Bonds Initiative, 2016, 2017):

- › **Green light** (types of asset that are considered to satisfy the threshold under all circumstances): all infrastructure, infrastructure upgrades, rolling stock and vehicles for electrified public transport and electrified freight rail, including electrified rail, trams, trolleybuses and cable cars.
- › **Amber** (types of assets that need to be considered on a case-by-case basis): assets must meet the universal performance criteria for CO₂e direct emissions for passenger (per p-km) or freight (tkm) transport.
- › **Red** (types of assets that can be deemed to never qualify): infrastructure and rolling stock for railway lines that are built with the overriding objective of transporting fossil fuels (>50% of tkm).

2.2

Contribution of infrastructure investment to economic development

Investments in infrastructure contribute to development as they have a multiplier effect on the economy. A study from Standard & Poor's (2015) estimated the benefits to the real GDP of various countries of an increase in infrastructure spending. The results show that an increase in spending equivalent to 1% of the GDP in the first year can have a multiplier effect of between 1 and 2.5 for G20 countries in a three-year period, whilst the multiplier effect for the GDPs of China, India and Brazil would at least 2 times the increase in infrastructure investment (Table 3).

Other studies have also found a positive relationship between infrastructure capital, productivity and economic development. For example, Roller & Waverman (2001) found evidence of a significant positive causal link between telecommunications infrastructure and economic growth. Aschauer (1989) noted that the core infrastructure of streets, highways, airports, mass transit, sewers, water systems, etc. has strong explanatory power for an increase in productivity.

In relation to Brazil, Raiser et al. (2017) indicate that a permanent increment in infrastructure spending corresponding to 1% of GDP would expand Brazil's economy by a total of 1.5%–3% within a decade and by a total of 4%–8% within 30 years. Examining the sub-national level, Amann, Baer, Trebat, & Villa (2014) found that if states increased their infrastructure spending by 1%, the regional GDP growth rate would rise 0.11% per year, while the GDP per capita growth rate would climb 0.072% per year.

TABLE 3

The effects of an increase in infrastructure spending of 1% of GDP

Country	Multiplier effect (2015-2017)	GDP per capita (USD, 2018)
UK	2.5	42,943.9
Brazil	2.5	8,920.8
China	2.2	9,770.8
India	2.0	2,010.0
Argentina	1.8	11,683.9
U.S.	1.7	62,794.6
Japan	1.5	39,290.0
Canada	1.4	46,233.0
Italy	1.4	34,483.2
France	1.3	41,463.6
Mexico	1.3	9,673.4
South Korea	1.3	31,362.8
Germany	1.2	47,603.0
Indonesia	1.0	3,893.6
Australia	1.0	57,373.7
Eurozone	1.4	36,569.7 ⁽ⁱ⁾

Source: The authors, from Standard & Poor's (2015) and World Bank (2018a)

⁽ⁱ⁾ GDP per capita of the entire European Union

Currently, according to the World Economic Forum, Brazil ranks 78 out of 141 countries in infrastructure according to the Global Competitiveness Index, whilst also lacking trade openness (125th) and having excessive red tape³ (141st) (World Economic Forum, 2019).

3 Burden of government regulation.

In terms of transport infrastructure investments, Moreira (2014) observed that, even if transportation investments were equally distributed throughout the country, the Northern and Central-West regions would benefit more, proportionally, from investments in railways and inland waterways because: (i) infrastructure in these regions is of worse quality and less dense and (ii) these regions produce heavy primary goods and are farther from the main ports. In sum, evidence from previous studies shows that spending on infrastructure has a positive effect on productivity and economic growth.

Brazil has a per capita GDP equivalent to 79% of the world average, with very limited growth in the past 10 years (1% total growth between 2008 and 2018), and a slightly below-average ability to deliver infrastructure to its more than 209 million residents over its 8,515,770 km² area (The World Bank, 2018b; World Economic Forum, 2019)⁴. Hence, Brazil's strong need to enhance economic development is closely related, if not dependent, on the country's ability to improve its infrastructure.

⁴ Although 87% of Brazil's population lives in urban areas, commodities are produced in rural areas.

2.3

Transport infrastructure in Brazil

Brazil is estimated to have invested EUR 28.7 billion in infrastructure in 2018, or the equivalent of 1.87% of the GDP. As shown in Table 4, the sectors that received the largest investments were transportation, electric power and telecommunications, with EUR 9.9 billion, EUR 9.18 billion and EUR 6.59 billion, respectively (Pereira, 2019).

TABLE 4

Investment in infrastructure, per sector (EUR billion)

Sector	2017 [†]	2018 [§]	% Change
Electric power	8.93	9.18	+ 2.80
Telecommunications	6.19	6.59	+ 6.46
Sanitation	2.99	3.01	+ 0.67
Transportation	9.74	9.90	+1.64
- Road	5.13	5.22	+ 1.75
- Railways	1.48	1.19	- 19.59
- Mobility	1.99	1.75	- 12.06
- Airports	0.25	0.52	+ 108.00
- Ports	0.68	0.92	+ 35.29
- Waterways	0.23	0.29	+ 26.09
Total	27.86	28.7	+ 3.02
% GDP	1.69%	1.87%	+10.65

Source: Pereira (2019). [†] Currency exchange rate from 31/12/2017: BRL 3.974, [§] Currency exchange rate from 31/12/2018: BRL 4.445

According to the Brazilian Association of Infrastructure and Basic Industries (Abdib, 2019), current investments in infrastructure are insufficient to remove development bottlenecks: investment needs are estimated to be 4.3% of the GDP per year for the next ten years while investments in infrastructure from 2015 to 2017 represented, on average, only 1.7% of the GDP. Specifically, the transport sector requires investments equivalent to 2.26% of the GDP per year, whilst current investments amount to only 0.49% (Abdib, 2019). This percentage is much lower than countries like China, which invested an average annual rate of 4.5% of the GDP between 1992 and 2011 (Moreira, 2014)⁵.

Current investments in infrastructure are also insufficient to compensate the rate of deterioration of the Brazilian infrastructure, which is estimated to be 2.03% of the GDP per year (Raiser et al., 2017), demonstrating that investments largely serve to maintain infrastructure rather than expand it.

2.3.1 Characteristics of transport infrastructure in Brazil

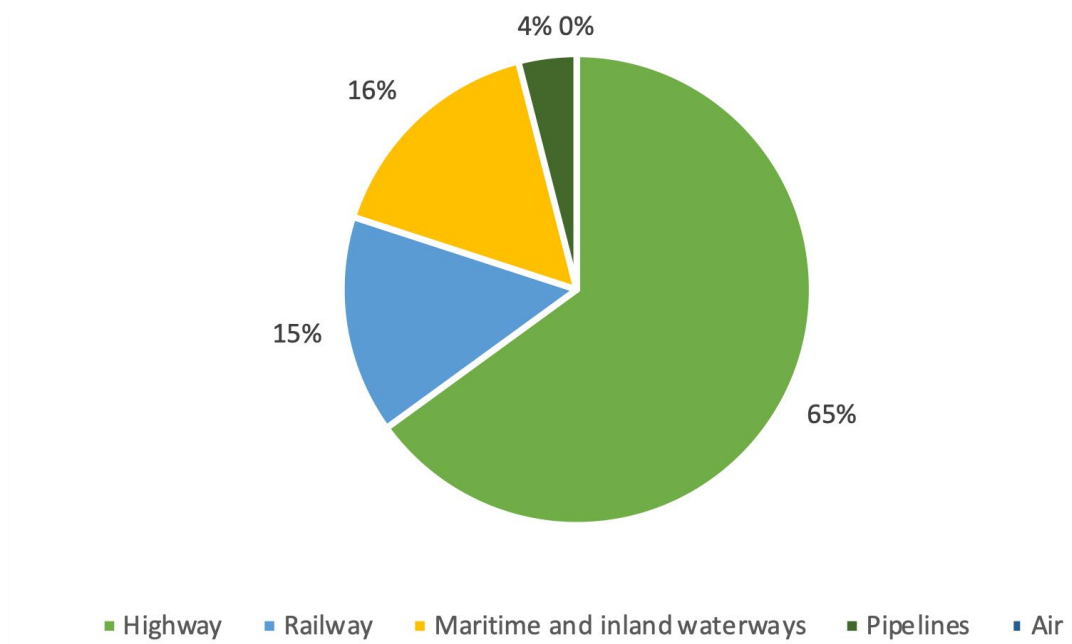
The country has 1.72 million kilometres of highways (12.4% of which are paved), 29,074 km of railways, 19,500 km of economically navigable inland waterways, 8,500 km of navigable coastline and 112 public airports with regular flights (CNT, 2018b, 2019c).

The predominance of the road-based transport mode in Brazil is a result of the expansion of the automotive industry starting in the second half of 1950s, when the country's road infrastructure was transformed into the main means of transportation for passengers and cargo (*Box 1*). Conversely, the size of the railway network has changed little since the beginning of the 20th century. Road transport accounts for 65% of all freight transport (*Graph 1*), followed by rail (15%) and maritime cabotage (11%) (Ministério dos Transportes, 2018).

⁵ Here, however, it is worth highlighting that Brazil also has significantly lower gross savings (close to 14% of GDP) in comparison to China (46% of GDP) (The World Bank, 2018b).

GRAPH 1

Freight transport in Brazil (in tkm), in 2015

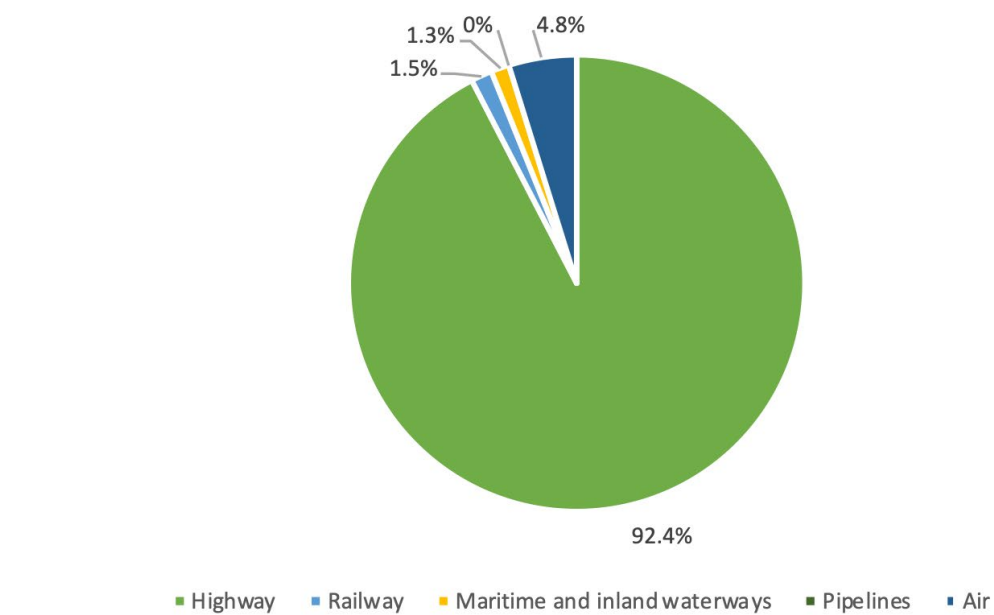


Source: The authors based on Ministério dos Transportes (2018a)

Obs.: Maritime cabotage - 11%; Inland waterways - 5%; Waterways in general – 16%.

GRAPH 2

GHG emissions per transport mode (MtCO₂e), in 2017[†]



Source: The authors based on (Secretaria de Política e Integração, 2018)

[†] The calculation includes emissions from both passenger and cargo transportation.

The effects of the country's large dependence on road transport include losses to the economy as well as high logistical and transport costs (Ministério dos Transportes, 2018). Comparing freight transport prices between Brasília and the Port of Angra dos Reis, Leite, Pereira, Marinho, & Bittencourt (2016) found that transporting cargo by railway would cost EUR 29.87⁶ (BRL 105.91) per tonne versus EUR 48.81 (BRL 173.10) per tonne by truck.

The dependence on road transport also has high environmental impacts. In 2017, 92.4% of the 203.7 MtCO₂e emitted by the transport sector originated from road transport (Graph 2) (Secretaria de Política e Integração, 2018). Therefore, for Brazil to reach its emissions targets, more effort must be put into transitioning to lower-carbon-intensive transport modes. As discussed below, waterway transport and railway transport would be important elements of this transition.

BOX 1

Brazil's mid-20th century preference for road-based transport in perspective

Brazil's overreliance on road-based transport can be traced back to the 1930s, when the first political decisions were made determining that this mode would be quicker and cheaper to implement in order to integrate the economies of the different regions of the country.

The period most often identified as the pinnacle of road-based transport in Brazil was from 1945 through the 1970s, in particular due to three main factors:

- › Complementarity with the development of a national automobile industry, with a strong relationship between the availability of roads and the growth of the fleet of cars and trucks;
- › The division of labour between the federal government and national heavy construction companies (contractors), with the former being responsible for mobilising funds and planning the sector and the latter for executing the works and projects;

6 Currency exchange rate from 30/06/2016: BRL 3.20

- › The constitution of a political subsystem for road infrastructure, with autonomous and flexible bureaucracies insulated from the political process and supported by financial resources, mostly funds, safeguarded from budget disputes. For instance, taxes on fuel were directly funnelled to the National Department of Highways (DNER) rather than being transferred to the National Treasury.

After 1967, Brazil's military government expanded investments in the sector further by creating two additional taxes to fund DNER programs. From 1955 to 1975, more than 35,000 kilometres of paved roadways were built, representing a 700% increase in the network in just 20 years.

After the oil crisis in 1973, however, concerns about energy efficiency and new energy sources resulted in a gradual uncoupling of resources. Funds previously earmarked exclusively for roads were redirected towards more general development funds. Investments in roads declined from 0.6% to 0.2% of GDP between 1976 and 1984.

Source: (Correia, 2011)

BOX 2

Socio-political risks

Brazil's large dependence on road transport, in particular for freight, also has social and political risks stemming from the high level of influence and political power of truck drivers. For instance, in May 2018 truck drivers decided to go on strike and park their vehicles along the country's roadways as a form of protest against rising diesel prices (Alves, Assis, Beatryz, & Tavares, 2018; Búrigo, 2019). During the strike, the supply of food was affected. For example, with the transportation of milk from farms interrupted for five days, more than 280 million litres of milk had to be discarded. Similarly, 64 million adult birds and chicks died due to lack of feed (Kreter, Souza Junior, Staduto, & Oliveira, 2018).

Overall, the supply crises negatively affected economic growth, with Brazil's GDP growth 1.2% lower than expected that year (Laguna, 2018).

Hence, the development of rail infrastructure in Brazil is not only associated with lower GHG emissions, but also helps to alleviate the country's exposure to largely unpredictable socio-political phenomena such as strikes from a single category of workers.

2.3.1.1 Waterway transport infrastructure

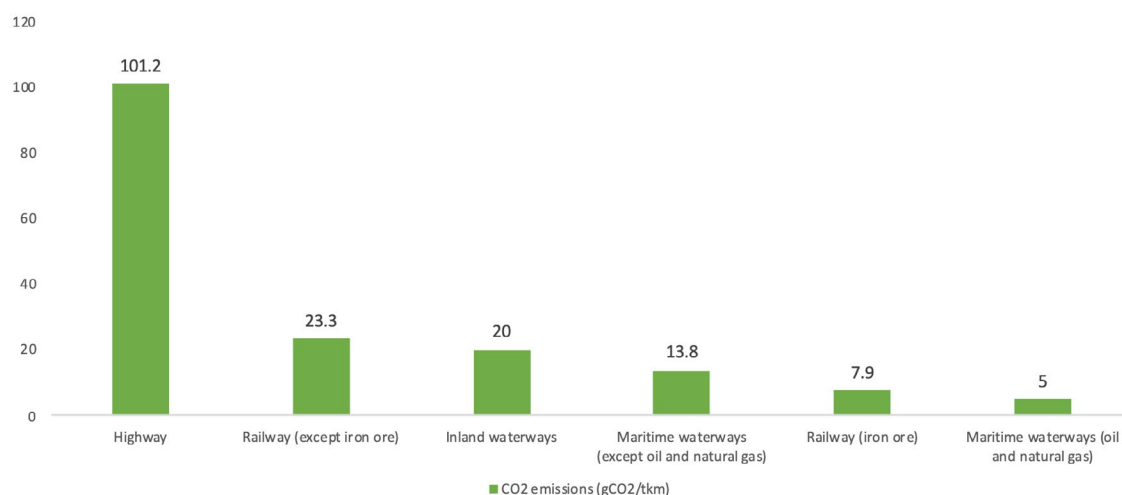
According to the National Transport Confederation (CNT, 2019b), the waterway transport mode is when cargo and/or passengers are carried by vessels (e.g. ships and barges) via bodies of water. Waterway transport can be classified into inland waterway transport (when transport takes place on rivers, lakes, lagoons, channels, bays, coves and sheltered maritime areas) and maritime transport (when transport takes place on seas and oceans).

Waterway transport favours the transport of large volumes of cargo over long distances due to its shipping capacity and the lower operational cost per cargo unit (CNT, 2018b). When maximum capacity is reached, waterway transport can cost approximately 40% of the cost of road transport and 70% that of railway transport (CNT, 2019a). Other advantages of this transport mode include lower fuel consumption per tonne-kilometre, lower accident rates, lower environmental impacts and reduced emissions (CNT, 2018b). As shown in Graph 3, waterway transport pollutes considerably less than road transport and, in some cases, less than railway transport.

Waterway transport has some disadvantages: it is slower, less frequent and less flexible compared to other means. As a result, the type of cargo transported is often homogenous, non-perishable, heavy and with lower added value (CNT, 2018b, 2019b; Miguel & Reis, 2019). In 2017, solid bulk accounted for 64% of the volume transported through Brazilian ports (CNT, 2019b).

GRAPH 3

CO₂ emissions per transport mode (2010)[†]



Source: The authors, based on CNT (2019a)

*tkm = tonne-km (tonnes transported * distance travelled)

[†] The calculation of the emissions factor for the transport of iron ore by rail took into account the weighted average of emissions from the following concessionaires: Estrada de Ferro Carajás (EFC), Estrada de Ferro Vitória Minas (EFVM) and MRS Logística S.A. The calculation of the emissions factor for transport by rail of other products included the weighted average of emissions of the following concessionaires: Ferrovia Norte-Sul S.A. (FNS), Ferrovia Centro-Atlântica S.A. (FCA), Ferrovia Tereza Cristina S.A. (FTC), América Latina Logística – Malha Sul S.A. (ALL MS), Estrada de Ferro Paraná-Oeste S.A. (Ferroeste), Transnordestina Logística S.A. (TNL), América Latina Logística – Malha Paulista S.A. (ALL MP), América Latina Logística – Malha Oeste S.A. (ALL MO) and América Latina Logística – Malha Norte S.A. (ALL MN).

The emissions factors for maritime cabotage were retrieved from secondary sources (Ministério dos Transportes & Ministério das Cidades, 2013)

Internationally, maritime transport is responsible for 95% of freight transport of exports (Miguel & Reis, 2019). Domestically, only 47% of the 42,000 km of navigable waterways are used for transporting cargo. This is equivalent to 2.3 km per 1,000 km², a low figure compared to China and the United States, which have, respectively, 11.5 km² and 4.2 km² of economically navigable waterways per 1,000 km². Moreover, there was freight transport in only 6 of the 12 Brazilian river-basin regions between 2010 and 2018. Deficiencies in waterways and port infrastructure, lack of modal integration, low levels of investment and low priority given to the sector by public policies are some of the barriers to develop waterway transport in Brazil (CNT, 2019d, 2019b, 2019a).

2.3.1.2 Railway transport infrastructure

Railways are highly suitable for transporting cargo over long distances — with lower costs, lower greenhouse gas emissions and more reliable service — as they are not impacted by vehicle traffic (CNT, 2019b; Miguel & Reis, 2019). Their disadvantages are that they are less flexible in terms of services and timetable, requiring more complex planning for loading and unloading. In addition, rail transport is dependent on pre-existing infrastructure, which is time and resource-intensive, and on road transport, as railways do not allow door-to-door transport (Miguel & Reis, 2019).

In 2017, railways transported 538.78 million tonnes of cargo and 375.24 billion tonnes-km (tkm) of cargo. With regard to type of transported product, 79% of the cargo transported in 2016 corresponded to iron ore, 4% soy, 3% sugar and 2% corn (EPL, 2018).

Concentrated in the Southeast and South (Miguel & Reis, 2015) (Figure 1), the Brazilian railway system occupies 3.6 km per 1,000 km², a low density when compared to countries of similar dimensions like the United States and China with, respectively, 29.9 and 12.9 km per 1,000 km² (CNT, 2018b). Brazil's railroad density ranks 78th out of 141 countries according to The Global Competitiveness Report 2019 of the World Economic Forum (Schwab, 2019). Moreover, although the extent of the Brazilian railway network is approximately 29,000 km, only 7,000 km are in full operation, 13,500 km have low traffic density and 8,500 km are underutilised or do not have commercial operations (EPL, 2018).

The lack of investments in the railway system is one of the main barriers to freight transport in Brazil. A train with 20 freight cars could replace approximately 40 trucks, reducing risks related to theft and loss of cargo and consuming less energy per transported tonne (CNT, 2018a).

FIGURE 1

Map of the Brazilian railway network



Source: (ANTF, 2020)

Barriers to the increased use of railway transport include the presence of different gauges in the system (the network is composed of 76% metric gauge, 22.2% broad gauge, and 1.8% mixed gauge⁷), making connectivity more difficult, including with the rail networks of neighbouring countries; low geographic coverage, particularly from the main grain-belt areas to the ports; the sharing of railways for passenger and cargo transportation (e.g., part of the railway network in the city of São Paulo is used to transport both passengers and cargo), and the lack of intermodal terminals connecting rail transport to other forms of transport (CNT, 2018b, 2019b; World Bank, 2012).

7 (CNT, 2019b).

Finally, the development of the railway sector can generate social and economic benefits. According to Law 13,448/2017, concessionaires may be required to make additional investments in the rail network if the government brings forward contract renewal of railway concessionaires (i.e. if the government renews concession contracts years before the expiration date). Drawing on the Input-Output Table from the Brazilian Institute of Geography and Statistics, (Oliveira, Marcato, Curi, & Sousa, 2018) estimated that, if five concession contracts were renewed in advance (Vitória-Minas, Carajás, FCA, Malha Paulista and Malha Sudeste railways), they would generate approximately BRL 12.4 billion in investments between 2017 and 2027. These have the potential to generate nearly 700,000 new jobs, BRL 7.1 billion in extra remuneration, BRL 3.1 billion in additional tax collection and a BRL 42.6 billion increase in the national product.

BOX 3

Transport integration in Brazil

The integration of different transport modes is critical to good logistics performance. However, the institutional structure for transport planning and regulation in Brazil is highly fragmented, lacking an integrated perspective of the country, its regions, production areas and priorities (Miguel & Reis, 2019).

Until 2016, policy planning was distributed among three separate organisations: the Ministry of Transport, the National Secretary of Civil Aviation (SAC) and the Special Secretary of Ports, the latter two with ministerial-level status. As a result, issues pertaining to ports and civil aviation were decided separately from land transport (Sampaio & Aguiar, 2019).

The regulatory process is also fragmented, with three distinct and independent regulating agencies: the National Agency of Land Transport (ANTT), responsible for regulating rail and road transport; the National Agency of Waterway Transport (Antaq), regulating waterway transport and ports; and the National Agency of Civil Aviation (Anac), regulating civil aviation. The division of responsibilities into different regulating agencies was a result of political and business interests.

For example, the creation of Antaq was largely motivated by pressure from the lobby of shipbuilders from the state of Rio de Janeiro (De Paula & Avellar, 2008).

In 2016, the Ministry of Transport, the National Secretary of Civil Aviation and the Special Secretary of Ports were joined to form the Ministry of Transport, Ports and Civil Aviation (today, Ministry of Infrastructure), but the regulating agencies were kept separate (Sampaio & Aguiar, 2019).

In terms of integrated planning, the National Board for Transport Policy Integration (CONIT) was responsible for proposing national policies to integrate the different transport modes. However, from its establishment in 2001 until its extinction, CONIT held only one meeting. In 2016, CONIT's responsibilities were transferred to the Investment Partnership Program Management Council. This transfer is worrisome because the new body is not specifically tasked with developing national logistics, and this may result in a lack of effort towards this goal (Sampaio & Aguiar, 2019). In sum, historically, the fragmented structure of transport planning and regulation increased the challenge of developing a more integrated transport infrastructure. More recently, however, certain efforts have attempted to change this outlook. For example, in 2018, the Planning and Logistics Company (EPL, see more below) published a National Logistics Plan (PNL) outlining the investments and projects needed to enhance Brazil's infrastructure through 2025.

This plan seeks to improve the circulation of cargo throughout the country through all means of transportation. If implemented, the projects listed in the plan should reduce total transportation costs by 16% and CO2 emissions by 14.3%, in comparison with the 2018 baseline (EPL, 2018)⁸. In 2020, the National Logistics Plan was being updated to extend its timeframe until 2035 (MINFRA & EPL, 2020).

⁸ In its most ambitious scenario ("Cenário PNL 2025"), which includes three greenfield railway projects (totalling 3,223 km of new tracks) and adjustments in the overall capacity of five existing railways (EPL, 2018).

2.4

The history of the railway sector in Brazil

The history of the railway sector in Brazil can be divided into four cycles.

The first cycle started in the middle of the 19th century when the State granted concessions to private companies who implemented and financed railroad projects. Legislation guaranteed cession of public land to these companies and tax exemptions when importing railway equipment and mineral coal. Between 1854 and 1889, over 9,000 km of railways were built and, by 1915, the railway network reached 26,646 km. Its primary purpose was to transport coffee for export (Felix & Filho, 2016; Pinheiro, 2014; Sampaio & Daychoum, 2017).

The second cycle started in the beginning of the 20th century and ended in the 1980s. With rail fees dropping (in real terms) due to inflation and the consequent need to increase public subsidies, the government decided it would be more advantageous to nationalise the railway system and compensate shareholders. By 1917, over half of the network had been nationalised.

One of the landmarks of this period was the creation of the Federal Railway Network (RFFSA) in 1957, controlling 37,000 km of railways. Despite the government's efforts, a number of factors contributed to reducing the importance of the railway sector, such as the rapid expansion of road infrastructure and the successive economic crises in the 70s and 80s.

These factors caused a drop in investments in the railway network, a deterioration in the quality of infrastructure and an increase in the number of accidents (Pinheiro, 2014; Sampaio & Daychoum, 2017).

In the third cycle, the sector was privatised by the federal government to stimulate investments in infrastructure. A total of 25,900 km of railroads were auctioned between 1996 and 1999 through 30-year concession contracts. The system was divided into six networks and the government auctioned RFFSA in 1996. Two years later, the São Paulo Railway Network (Fepasa) was auctioned. Then, the railways controlled by mining company Vale were transferred to the investors who acquired the company in 1997 (Felix, 2018; Pinheiro, 2014; Sampaio & Daychoum, 2017).

These concessions succeeded in improving rail infrastructure and transport quality, as investments made by the concessionaires helped to increase productivity and to reduce the number of accidents. Between 1997 and 2012, railway activity (measured in tkm) increased at an average rate of 5.3% per year, and the number of accidents decreased by 84.7% in this period. On the other hand, there was little network expansion (Felix, 2018; Pinheiro, 2014; Sampaio & Daychoum, 2017).

After the privatisation process, the sector became concentrated in the hands of a restricted number of freight transport operators. Today, Rumo, Vale, VLI Logística (previously Valor Multimodal S/A), Transnordestina Logística S/A and MRS Logística control the exploitation of 95% of the railway network in the country (Felix, 2018).

The fourth cycle started in 2012 when the federal government launched the Logistics Investment Program, proposing the unbundling of infrastructure operation and maintenance from service provision. Not one railway was auctioned under the 2012 unbundled regime, which was unsuccessful and eventually abandoned in 2015 (Pinheiro, 2014; Sampaio & Daychoum, 2017).

In 2016, the government launched the Investment Partnership Program (PPI) and the PPI Management Council, centralising decisions related to Public-Private Partnerships for infrastructure (Sampaio & Daychoum, 2017).

Today, the PPI Management Council is under the auspices of the Ministry of the Economy, and the PPI has four greenfield rail projects:

- › Railway EF-354 (East-West Integration), connecting Mara Rosa (state of Goiás) and Água Boa (state of Mato Grosso) – 383 km: under study;
- › São Paulo Ferroanel, connecting Perus station (in the city of São Paulo) and Manoel Feio station (in the city of Itaquaquecetuba) – 53 km: under study;
- › Railway EF-170 (Ferrogrão), connecting Sinop (state of Mato Grosso) and Lucas do Rio Verde (state of Mato Grosso) - 177 km: under public consultation;
- › Railway EF-334 (East-West Integration), connecting Caetité and Ilhéus (state of Bahia) – 537 km: case filed with the Federal Court of Accounts;

To further encourage private sector investments in the rail sector, there is a draft Senate bill under consideration in Congress that proposes updating the law governing railway development and use in Brazil. Draft Senate Bill 261/2018 perceives that the limited, outdated rail infrastructure is largely explained by an overreliance on public investment, and attempts to “incorporate the best (railway regulation) practices available in the international landscape and introduce them, with the necessary adaptations, into the Brazilian legal framework” (Senado Federal, 2018). If the bill passes, private entities will be able to propose new railway projects, subject to the State’s approval, unlike today, when new railway projects depend on government concession. This bill was highlighted by the Ministry of the Economy as a priority in order to improve Brazil’s economic outlook (Ribeiro, 2020).

2.4.1 Institutional framework for transport infrastructure in Brazil

A thorough discussion about the evolution of the institutional framework for transport infrastructure in Brazil lies beyond the scope of this report. However, a brief description of the current state of affairs may assist in expressing both the barriers and possible pathways forward for developing railways in the country.

In this sense, at the federal level Brazil has its Ministry of Infrastructure, whose origins date back to the 1860s when the State Secretariat for Agriculture, Commerce and Public Works⁹ was created. Since then, the attributions and names of the ministry have changed, but the country has a dedicated ministry responsible for developing Brazil's transport infrastructure since 1891 (Infraestrutura, 2016).

The most recent changes happened in 2016, when the Civil Aviation and Ports Secretariats were attached to the structure of the Ministry of Transport (Infraestrutura, 2016), and in 2019, when the new administration published Decree 9,676 and Law 13,844, extinguishing the existing Ministry of Transport and creating the new Ministry of Infrastructure, now also responsible for the country's national transport policy (Brasil, 2019b). The Ministry of Infrastructure has the mission to "provide integrated and reliable transport infrastructure for safe, efficient mobility of people and goods, aiming to increase national competitiveness" (Ministério da Infraestrutura, 2020a). Among its competencies, the Ministry is responsible for:

- › The "national policy for rail, road, waterway, airport and air transport";
- › Participating "in strategic planning, establishing implementation guidelines and setting priorities for transport investment programs"; and
- › The "preparation or approval of grants and concessions plans" (Brasil, 2019b).

The Ministry is composed of four Secretariats (Civil Aviation; Ports and Water Transport; Land Transport; and Promotion, Planning and Partnerships)¹⁰. Each Secretariat is responsible for assisting the Minister and his Executive Secretary to coordinate and supervise related entities in their respective sectors, as well as to propose, implement and monitor national transport policy, among other tasks (Brasil, 2019a).

⁹ Secretaria de Estado dos Negócios da Agricultura, Comércio e Obras Públicas.

¹⁰ Respectively, Secretaria Nacional de Aviação Civil (SAC); Secretaria Nacional de Portos e Transportes Aquaviários (SNPTA); Secretaria Nacional de Transportes Terrestres (SNTT); Secretaria de Fomento, Planejamento e Parcerias (SFPP).

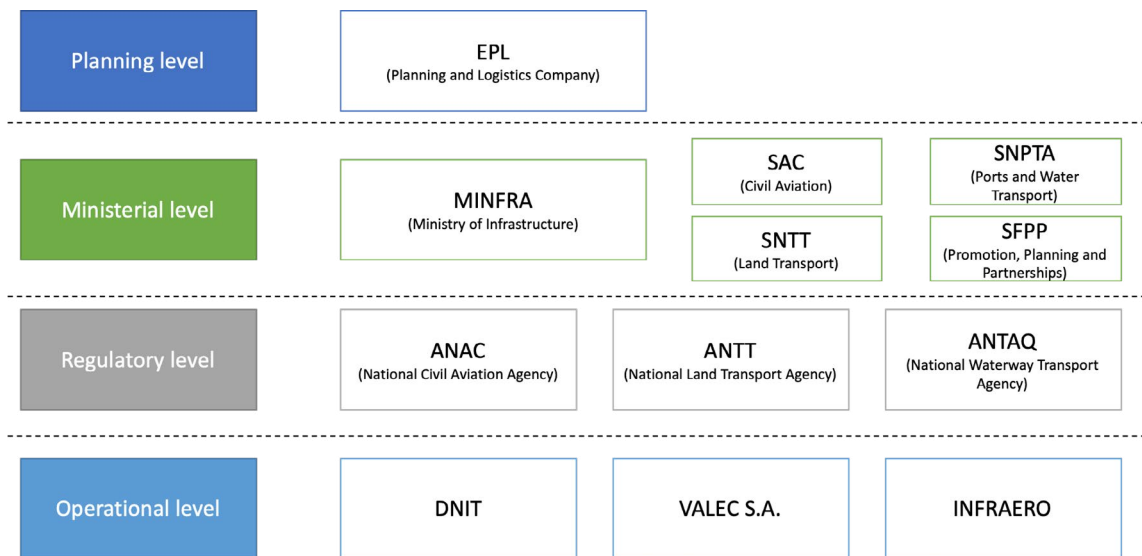
The Ministry of Infrastructure also oversees and controls four autarchies¹¹ responsible for regulating, overseeing, and inspecting “the activities of service provision and use of transport infrastructure, performed by third parties” (ANTT, 2020); and three state-owned companies:

- › Infraero¹²: responsible for the operation of commercial airports (Infraero, 2018);
- › Planning and Logistics Company (EPL)¹³: responsible for the development of studies and reports to support infrastructure planning (EPL, 2020); and
- › Valec S.A.¹⁴: responsible for the construction, operation and use of railways (Valec, 2020).

Figure 2 provides a simplified structural map of transport-related agencies at the federal level in Brazil. Those of greater relevance and interest to the railway sector within the Ministry of Infrastructure are briefly presented in Box 4.

FIGURE 2

Structural map of transport-related bodies at the federal level



Source: (ANTF, 2020)

11 National Department of Transport Infrastructure (Departamento Nacional de Infraestrutura de Transportes – DNIT); National Land Transport Agency (Agência Nacional de Transportes Terrestres – ANTT); National Waterway Transport Agency (Agência Nacional de Transportes Aquaviários – ANTAQ); and National Civil Aviation Agency (Agência Nacional de Aviação Civil – ANAC).

12 Empresa Brasileira de Infraestrutura Aeroportuária.

13 Empresa de Planejamento e Logísticas.

14 VALEC Engenharia, Construções e Ferrovias S/A.

BOX 4

National entities related to the railway sector

Planning and Logistics Company (EPL): Public company whose purpose is to develop studies and research for infrastructure, logistics and transport planning in Brazil (EPL, 2020).

National Land Transport Agency (ANTT): Federal agency created in 2001 with the objectives of: “i) implementing the policies formulated by the Ministry of Infrastructure and its related entities; ii) regulating or supervising the activities of service provision and use of transport infrastructure, ensuring the movement of passengers and goods [...], harmonising the interests of users, concessionaires [...] and delegated entities [...] and preventing the emergence of imperfect competition or the violation of the economic order” (Brasil, 2001).

Therefore, ANTT is responsible for granting concessions for railway transport related to the use of existing infrastructure; for granting permission for regular passenger rail services (not related to the use of infrastructure); and for authorising multimode transportation services (ANTT, 2020). Therefore, ANTT is the regulatory body for the use of rail infrastructure in Brazil (Ministério da Infraestrutura, 2019).

National Department of Transport Infrastructure (DNIT): Federal autarchy created in 2001 as part of Law 10,233, which restructured the road, rail and waterway transport systems in Brazil. DNIT is responsible for implementing the national policy for land and water transport infrastructure. Hence, DNIT is both the managing and executing body for federal roads, railways and waterways. It is also responsible for the transshipment and intermodal interface facilities and river and lake port facilities. DNIT is financed by the federal government (DNIT, 2020).

Valec S.A.: Joint-stock company controlled by the government, restructured in 2008, tasked with building and operating rail infrastructure, including studies and projects related to the development of rail networks and the construction, operation and use of systems to store cargo as well as connect railways with other modes of transportation (Valec, 2020).

As a result of its restructuring, in 2008 Valec was awarded the concession for the construction of four greenfield projects, totalling 9,437 km of new rails. However, by 2016, only 764 km were operational and nearly 5,100 km were still under study (Felix, 2018).

In 2020, Brazil's federal budget provides approximately EUR 1.0 billion¹⁵ to the Ministry of Infrastructure (and its affiliated entities), an 8.6% increase over 2019. Construction and restoration of railways by Valec S.A. will cost EUR 52 million, with an additional EUR 132 million to be spent from 2021 to 2023. DNIT will spend EUR 2.8 million on activities related to the railway sector (equivalent to 0.26% of its total budget). Lastly, ANTT is expected to spend EUR 2.3 million on inspection of rail networks and assets (equivalent to 9.2% of its total budget) (Brasil, 2019c)¹⁶.

As mentioned earlier, in addition to these entities and efforts, Brazil established the Investment Partnership Program (PPI) in 2016. Currently under the Ministry of the Economy, its objective is to increase private sector participation in the provision of (public) services in several areas, including through the concession of railways (PPI, 2020d). This will be further explored in the next section.

The Ministry of Infrastructure is responsible for forwarding propositions and projects to be included in the PPI, developing studies related to these projects and the bidding processes for their concession to the private sector. Regulatory agencies, such as ANTT, must supervise performance of the agreements, as well as review contracts and assess claims of contractual adjustments within their fields (PPI, 2020d).

¹⁵ Currency exchange rate from 14/05/2020: BRL 6,39 (approximately BRL 6.836 billion).

¹⁶ All currency rates from 14/05/2020: BRL 6,39. In order: VALEC (BRL 337 million in 2020, BRL 840 million between 2021 and 2023); DNIT (BRL 17.9 million); ANTT (BRL 14.4 million).

2.5

International railway finance and development practices

Policymakers often seek inspiration and knowledge from international experiences, especially when facing problems that are common to several jurisdictions. Therefore understanding the circumstances and contexts in which a solution previously adopted elsewhere may be successfully transferred to a new location is relevant (Rose, 1991; Stone, 2001).

TABLE 5

Length of the largest rail networks (total route-km)

Country	Most recent year	Most recent value
United States	2018	150,462
Russian Federation	2018	85,626
India	2018	68,443
China	2018	67,515
Canada	2018	47,687
Germany	2018	33,440
Brazil	2007	32,622
France	2018	28,241
Ukraine	2017	21,626
South Africa	2017	20,953
Poland	2018	18,536
Argentina	2017	17,609
Japan	2018	16,852
Italy	2016	16,788
Kazakhstan	2018	16,061

Source: (International Union of Railways apud The World Bank, 2018c)

With regards to the railway sector, countries with large networks are a reasonable starting point from which to derive valuable lessons. Here, although lessons could be learned in terms of regulations, governance, and other institutional aspects, the main focus will be on the financing of railway development (and maintenance).

Although characteristics vary between countries, presently, a first trend to be highlighted is that a high degree of private ownership and operation is the exception among the largest rail systems in the world, with only Canada, Chile, the United States of America (U.S.), and Japan having more than half of their railways under private provision (Laurino, Ramella, & Beria, 2015).

2.5.1 Railway systems in the Americas

In North America, both Canada and the U.S. have large, freight-dominated networks with private provision of railway services (Laurino et al., 2015). In addition, they have unusual competition between rail companies, with the existence of separate infrastructure options that can be used interchangeably for certain destinations (Boardman, Laurin, Moore, & Vining, 2013).

The U.S. has the world's largest railway system, with a network of more than 200,000 km (Laurino et al., 2015). There, the development of railways started in the late 1800s and early 1900s, mostly with private finance, although local, state and federal governments provided strong support by providing investors with rights-of-way¹⁷ and large portions of properties adjacent to the tracks (Müller & Aragonés, 2013).

Although the private sector provided the necessary capital for the construction and operation of American railroads, the industry was heavily regulated, for instance with little flexibility for private entities to set access and service rates, in order to prevent monopolistic behaviour in the sector, and the obligation of provision of passenger services (Müller & Aragonés, 2013). With the increasing competition from highways and road transport in the 1960s and 1970s, the financial situation of the

¹⁷ In transportation, right-of-way usually refers to a nonpossessory right to build a railway, a highway, a bike trail, or other transportation systems over a portion of land (Merriam-Webster, 2020).

railroads deteriorated, including cases of bankruptcy. As a result, the U.S. Congress adopted a series of measures to increase flexibility in the sector¹⁸, adopting several market-oriented procedures, for example allowing companies to abandon and sell unprofitable lines and, thus, increase efficiency (Müller & Aragonés, 2013).

More recently, the same public-private partnership pattern is used for the development of new railway systems in the U.S., where revenues from selling or renting properties in station-oriented developments around railway stations are expected to cover the financing costs of new tracks and rollingstock (Kenton & Gifford, 2015).

Indeed, so-called development-based land value capture (LVC) instruments, such as the sale or lease of land, development rights, and air rights, allow governments, private sector developers and investors, as well as landowners, to share the increase in land values around transit stations, hence generating funds for “transit investment, operation and maintenance, but also to promote sustainable urban development” (Suzuki, Hiroaki; Murakami, Jin; Hong, Yu-Hung; Tamayose, 2015).

BOX 5

Examples of station-oriented developments

One recent case where property revenues helped finance new railway systems was the All Aboard Florida (AAF) project¹⁹, a privately proposed, owned and maintained passenger service that will be fully operational by 2022 and link Orlando and Miami (Holsman, 2019), although most of its initial funds (48% of the total) will come from the sale of tax-exempt Private Activity Bonds (PABs) issued through the US Department of Transportation²⁰ (Holsman, 2019; Kenton & Gifford, 2015).

18 The Staggers Rail Act of 1980 is the landmark piece of legislation for these reforms and is explicitly mentioned as a positive inspiration in Brazil's Draft Senate Bill No. 261, 2018 (Senado Federal, 2018).

19 More information is available at: <https://www.transportation.gov/briefing-room/dot9717>.

20 Financing instrument designed to “increase private sector investments in U.S. transportation infrastructure”. More than USD 12 billion in PABs have been issued as of February 7, 2020 (United States Department of Transportation, 2020).

Examples of such an approach outside of the U.S. are still rare, but can be found in Hong Kong, China and Tokyo, Japan. In the first case, the government confers public-land development rights to the state-owned corporation that manages the Mass Transit Railway (MTR) network, which then partners with private players to develop, manage and sell the properties around stations. As a result, 38% of MTR revenues between 2000 and 2012 came from property development, an additional 28% came from leases and other related services and only 34% from transit operations (Suzuki, Hiroaki; Murakami, Jin; Hong, Yu-Hung; Tamayose, 2015).

Similarly, in Tokyo, with the advent of the Housing-Railway Integration Law, landowners in specifically designated areas (alongside future railways) can cede portions of their properties for the construction of railway facilities or to be sold by the government in order to raise funds for investments. Even though landowners are left with smaller properties, they can reap the benefits of increased land-value due to the new transport infrastructure, in leases or future sales (Suzuki, Hiroaki; Murakami, Jin; Hong, Yu-Hung; Tamayose, 2015).

Initially, Canada's rail system was composed of several private railroads, nationalised between 1917 and 1923 due to their poor financial situations, thus giving rise to the state-owned Canadian National Railway (CN). From then until 1995, CN required direct subsidy payments to operate, particularly to maintain its passenger services, mostly through recapitalisations by the national government²¹. In 1995, CN was privatised through a share-issue privatisation, which guaranteed that CN was going to be a listed company with multiple shareholders. Following privatization, CN's capital expenditures increased significantly (33% increase in the first five years), with a decrease of the company's debt-to-assets ratio, given that it was now able to raise funds via capital markets (Boardman et al., 2013).

21 "The Canadian government swapped CN's debt for equity or recapitalized it in 1937, 1952 and 1978" (Boardman et al., 2013).

In South America, Chile's Northern Railroad was privatised in the 1990s, while, in the rest of the railway system, freight services were awarded to a concessionaire, and passenger services and essential facilities remain under the national government's control (Laurino et al., 2015).

In Argentina, the railway system was developed in the late 1800's and early 1900's, mostly by private foreign operators, such as five English and three French companies, and was geared at promoting exports. The entire system was nationalised in 1948 due to the increasing competition of road transport and the difficult financial conditions of British companies after World War II (Müller & Aragonés, 2013). The public railway company gradually became a liability for the government, which needed to provide constant financial support for it. With the state virtually bankrupt in the 1980's, railways were privatised, with the vast majority of the network leased to private freight concessionaires²² (Müller & Aragonés, 2013).

2.5.2 Railway systems in Europe

Nearly all networks in European countries were initially built and operated by private companies and were only nationalised in the first half of the 20th century, usually as a result of increased competition from other modes of transportation (Laurino et al., 2015). Recent trends indicate that most countries in Europe have decreased the length of their networks, even though investments have increased (Alexandersson & Rigas, 2013).

A notable exception to the initial pattern of private provision of rail services within the continent was the Soviet Union (USSR), where, naturally, the entirety of the All-Union Soviet Railway was funded and operated from its inception by the state and state-owned companies. After the collapse of the USSR, national governments still retained a high degree of control over the sector, reforms were limited, and the few occurrences or attempts at concessions or privatisation, such as the only one attempted in Russia, have been surrounded by allegations of corruption and a lack of transparency (Pittman, 2013).

²² The concessions last 30 years, although large investments in rail infrastructure probably require longer periods, since rail equipment and structures have life cycles that extend beyond this timeframe (Müller & Aragonés, 2013).

In Sweden, the state is fully responsible for making investments in track infrastructure and maintenance since the 1988 Transport Policy Act. While the main train operating company is a national publicly-owned company, State Railways, many of its divisions (cleaning services, computer information services, vehicle maintenance, hotel operation) were privatised, and local and regional lines were decentralized to regional authorities (Alexandersson & Rigas, 2013). Both national and regional governments still allocate funds to maintain unprofitable passenger services (Kurosaki & Alexandersson, 2018).

In the United Kingdom (U.K.), the rail industry was privatised in 1996, initially to a for-profit corporation (Railtrack) whose financial sustainability depended on access charges²³ and subsidies. After the company became insolvent in 2001, the system was handed over to Network Rail, a debt-financed, not-for-profit private company limited by guarantee, and accountable to members²⁴ rather than to shareholders (Jupe, 2009).

Since privatisation, however, maintenance of and improvements to the network are funded through debt, which has grown steadily even under Network Rail's administration, or through governmental grants and payments for access charges. Indeed, close to 85% of the company's net revenue requirements come from direct or indirect public funding (Jupe, 2009).

In Poland, the Polish State Railways (PKP) managed all activities related to railways after the collapse of the Soviet Union. In 1995, however, the country started to reform its rail sector through a series of laws that culminated in the creation of separate lines of business within the sector, preparing PKP to be a joint stock company, the introduction of private sector participation in the industry and the opening of the network to third-party operators. In 2013, PKP privatised four subsidiaries, receiving EUR 1.11 billion in revenues²⁵, in particular through the initial public offering (IPO) of its freight carrier. Privatisation continued in 2015 and the funds obtained are the main source of resources for PKP's investment program (Transport and ICT, 2017).

23 Fees to access or use the rail network.

24 Public members, drawn from a cross-section of the public, form the majority of the company's 110 to 120 total members (Jupe, 2009).

25 USD 1.2 billion. Currency exchange rate from 14/05/2020: 1 EUR = 1.08 USD.

2.5.3 Railway systems in Oceania

Although rail was considered a core New Zealand governmental competency throughout most of the 20th century, in 1993 New Zealand Rail Ltd was privatised, with a lease from the government granting the right of occupation of portions of land for railway activities and purposes (Laird, 2013). In 1996, the now-private company was listed in New Zealand and the U.S. in order to raise funds and retire existing debts.

Throughout the following years, competition from road transport²⁶ led the company, now rebranded as Toll NZ, to request significant subsidisation in a process that ultimately led to its reacquisition by the national government in 2008 with the promise of an additional EUR 106 million²⁷ of public funds to be spent in track restoration and subsequent plans for additional governmental outlays to grow the use of railways for freight in the country (Laird, 2013).

In Australia, public and private railways have coexisted since the beginning of the 20th century. The vast majority (over 90%) of the network is currently used for freight services (Laurino et al., 2015), especially profitable iron ore railways (Laird, 2013). In effect, Australia offers a rare case in which governmental railway systems were profitable by the time they were privatised (Laird, 2013). Among major rail networks, Australia is also unique in the coexistence in nearly equal proportions of national state companies, local state companies, private concessions and private provision (Laurino et al., 2015).

2.5.4 Railway systems in Asia

In Japan, Japanese National Railways (JNR) was broken into six vertically integrated passenger railway companies, separated by regions, and one national freight company after major reforms to the sector took place in 1987.

²⁶ Even though heavy trucks are required to pay road use charges in New Zealand, these are often low if not frozen to “control inflation” (Laird, 2013).

²⁷ USD 115 million. Currency exchange rate from 14/05/2020: 1 EUR = 1.08 USD.

The passenger transport companies on the main island of Honshu serve dense metropolitan areas, have been entirely privatised and are profitable even accounting for the cost of infrastructure, partially financed by the revenues from affiliated businesses, which account to nearly a third of operational revenues (Kurosaki & Alexandersson, 2018).

Unprofitable services are assisted by the Management Stabilisation Funds (MSF), allocated to each company, after the separation, to be invested and accrue interest to subsidise rail operations (Kurosaki & Alexandersson, 2018)²⁸. Freight service is still operated by the state-owned Japan Freight Railway Company, although it accounts for only 5% of total freight in the country, with the remainder being transported by trucks and ships (Statista, 2019).

In Southeast Asia, Bray & Sayeg (2013) analyse experiences with private sector provision of urban rail systems and look at nine projects implemented in Bangkok (Thailand); Kuala Lumpur (Malaysia); Manila (Philippines); and Singapore (Singapore). The most frequent capital contribution by governments was the provision of rights-of-way (in six of the nine projects); land was given in two projects; fixed infrastructure was provided in three projects; and rollingstock was provided by the government in two of the nine projects (Bray & Sayeg, 2013).

The role of the private sector includes financing infrastructure (in five projects) and rollingstock (six projects) and the mere operation of services on short-term bases (one project). Private operation and maintenance of the existing assets is the more common arrangement (seven projects) (Bray & Sayeg, 2013).

In Singapore and in one project in Bangkok, 100% of financing came from the government; another project in Bangkok received 80% of funding from the government; in all other projects, private debt is the main vehicle for financing delivery and operation of the systems (accounting for more than 67% of funds in five projects, up to 80%)²⁹ and, thus, private equity provided at most only one third of financing needs (Bray & Sayeg, 2013).

28 Low interest rates in Japan, however, resulted in lower than expected investment returns, exposing the companies to financial distress (Kurosaki & Alexandersson, 2018).

29 However, some of this debt includes government soft loans or export credits (Bray & Sayeg, 2013).

The experience in China is one of overwhelming governmental control of the sector. Since 1949, all tasks related to design, construction, operation and management were centralised in Beijing, at the Ministry of Railways (Mu, de Jong, Ma, & Xi, 2015). Poor service quality and competition with aviation and road transport led to a decreasing importance of the sector in the country's logistics, reaching a low market-share of 6% in 2007. However, in 2008 the Chinese Economic Stimulus Program was enacted, to counter the financial crisis, with more than EUR 185 billion³⁰ allocated to the Ministry of Railways, leading to the construction of the world's largest high-speed rail (HSR) network in just a few years (Mu et al., 2015).

This fast roll-out of the Chinese HSR, without any private funds, is not without concerns: the rising debt of the railway sector reached 63% of its revenues in 2013 (Mu et al., 2015). Additionally, at that time, the ratio of logistics costs to GDP in China was twice that of the U.S. (Hooi Lean, Huang, & Hong, 2014). These factors led to a series of reforms, with the Ministry of Railways being split into two corporations, one of which invests in and operates the system, the China Railway Corporation, whilst being allowed to raise funds in the capital market; however, the main source of transport finance remains the central state budget (Mu et al., 2015).

Elsewhere in Asian developing economies, in India the rail sector is strictly overseen by the government and the country has yet to carry out any major reforms to it, although some concessions have been granted to public or mixed companies (Laurino et al., 2015). In Iran, railway projects are mainly financed through the state budget, based on socioeconomic development programs (Noorzai, Jafari, Golabchi, & Hamed, 2016).

³⁰ USD 200 billion. Currency exchange rate from 14/05/2020: 1 EUR = 1.08 USD.

BOX 6

Railway systems in Africa: the case of the East African network

In Kenya and Uganda, railway lines are mostly state-owned, with the first multinational rail infrastructure concession to a private provider in Africa in 2006; then, the World Bank Group managed to mobilise private finance³¹ to take over the 25-year concession to refurbish and operate the East African network between Mombasa (Kenya) and Kampala (Uganda) (Mutambatsere, Nalikka, Pal, & Vencatachellum, 2013).

2.5.5 General lessons and the role of the private sector

Overall, a few general lessons can be extracted from the brief examples provided above. In particular, passenger services are less likely to be profitable and more often are directly provided or subsidised by the government. Freight services tend to be more profitable, particularly when moving bulk cargo for export, and, thus, more often privately financed or privatised after construction. Both services, though, have to compete with other modes of transportation, especially road transport, and profitability seems to be highly dependent on density³².

The private sector has a role to play in the railway sector, particularly during and after reform efforts. For instance, capital is more abundant in the private sector, although usually more costly than public funds. Private investors also tend to be better at recognising the opportunities for good returns offered by railway projects (Transport and ICT, 2017).

31 80% of the concessionaire initial CAPEX budget was lent by the International Finance Corporation (IFC) and by the German development bank KfW (Mutambatsere et al., 2013).

32 Kurosaki & Alexandersson (2018) make this case explicitly for passenger services.

Typical forms of private sector participation in the railway sector are:

- › Contracting and outsourcing: many activities, such as maintenance, cleaning and ticket collection services, can be outsourced to the private sector, even in state-owned railways. Costs tend to be lower when services and materials are purchased through competitive bidding;
- › Service management contracts: governments can outsource the entire management of the railway system to a private sector operator;
- › Concessions and franchises: contracts, for infrastructure and/or operations, between governments and private actors in order to provide rail services. A concession is usually a longer contract and requires more investments from the private sector compared to franchises;
- › Private railways: either through privatisation of a national rail system, such as the Canadian National Railways, or through the proposal and development of railways directly by the private sector, as observed in Australia, Canada and the United States;
- › Other forms of participation: equipment ownership and leasing (when third-parties own, maintain and lease equipment to railways); infrastructure construction and maintenance (for instance for track renewal); and private operation of trains (including on state-owned networks) (Transport and ICT, 2017).

Nonetheless, the railway sector has historically relied on substantial governmental subsidies, in part to take advantage of the positive externalities associated with rail transport, such as decreased air pollution and traffic congestion, and increased overall productivity. Indeed, in most countries, public funds have been and remain the main source of investment for the deployment of infrastructure. Revenues from access or use charges are then able to cover operational and maintenance costs. Notable exceptions can be found in the U.S., Canada, Japan and Australia (Laurino et al., 2015).

2.6

Barriers to the development of rail infrastructure in Brazil

Considering Brazil's transport infrastructure needs and current macroeconomic conditions, assessed as unfavourable for an increase in public investments, Brazil must attract private investments to close the transport infrastructure gap.

Two types of barriers limiting an increase in private investments in the railway sector in Brazil were identified in the literature review:

- a.** Barriers that hamper the attraction of domestic and foreign private companies (also called direct private investors) to build and maintain railway infrastructure, and/or to operate freight transport services in Brazil;
- b.** Barriers that hinder the attraction of domestic and foreign investors to invest in railway projects and companies through the bond market in Brazil.



Barriers to the attraction of private direct investors to the railway sector

- › Impediments to allowing the private sector to propose new rail projects (Felix, 2018)
- › Regulatory insecurity for concessionaires (Martins & Valente, 2019; Felix, 2018; Felix & Filho, 2016)
- › Judicial insecurity for concessionaires (Martins & Valente, 2019)
- › High risk-return ratio of rail projects (Felix, 2018; Felix & Filho, 2016; Motta & Ouverney, 2014; Sampaio & Daychoum, 2017)
- › Concessionaires' inability to generate additional revenue (Felix, 2018)
- › Poor technical qualifications, lack of financial independence and political interference from regulating agencies (Sampaio & Aguiar, 2019; Moreira, 2014)
- › Foreign currency risks (Martins & Valente, 2019; Gonçalves & Costa, 2019)
- › Obtaining environmental licenses (Amann, Baer, Treblat, & Lora, 2016; Mourogane & Pisu, 2011; Gonçalves & Costa, 2019)



Barriers to the attraction of bond investors to railway projects and companies

- › Low supply of green bonds in the Brazilian market (CBI, 2019; Yamahaki et al., 2020)
- › Lower than expected risk-adjusted returns of green bonds and infrastructure debentures (Banga, 2019; Cochu et al., 2016; Yamahaki et al., 2020)

Source: The Authors

2.6.1 Barriers to the attraction of private direct investors to the railway sector

2.6.1.1. Impediments to allowing the private sector to propose new rail projects

According to article 21 of the Federal Constitution³³, railway transportation could be either developed as a market activity, conferred by the public administration through authorisation³⁴, or as a public service, conferred through concession³⁵ or permission³⁶. However, the decree that regulates article 21 (Decree 1832/1996) has limited rail exploitation to concession only.

As a result, even when a private company identifies a business opportunity to build rail infrastructure in a particular region, it cannot explore the opportunity because new rail projects are dependent on the interest of the State. This is unlike countries like Japan and the United States, where the private sector is free to propose new projects. In the United States, for example, any firm that is willing to build a railway can ask the Surface Transportation Board for authorisation. If the project is economically feasible and it follows the regulatory rules, the regulating authority may grant the company a license to operate (Felix, 2018).

As mentioned earlier, the development of rail infrastructure as a market activity is what Draft Senate Bill 261/2018 proposes. If this bill passes, private entities will be able to propose new railway projects, subject to the State's approval, unlike today when new railway projects depend on government concessions.

Research proposition A1: The legal impediment preventing the private sector from proposing new railway projects hinders the attraction of private direct investments to the railway sector in Brazil.

33 Art. 21(XII)(d) – “It is the responsibility of the State to explore, directly or through authorisation, concession or permission, railway and waterway transport services between Brazilian ports and national borders, or that traverse State or the country's borders.”

34 The public administration allows a private party to perform an activity or to use a public good.

35 The public administration and a private company or a group of companies enter into a contract in which the government transfers the provision of a public service to the private party.

36 The public administration temporarily delegates the provision of a public service to a private party.

2.6.1.2 Regulatory insecurity for concessionaires

A trustworthy and predictable regulatory environment, with judicial security and clear rules, is vital to attracting and promoting private investments in infrastructure (Martins & Valente, 2019).

However, companies interested in operating in the rail sector in Brazil face legal insecurity. This is because article 175 of the Federal Constitution states that the enactment of a Law is needed to regulate concession and permission of public services. However, the concession of rail transport is regulated only by a decree (Decree 1832/1996). This creates legal insecurity for companies because the decree could be easily altered by the President. Therefore, a Law must be enacted to properly institutionalise the legal framework for concessionaires and companies under the permission scheme (Felix, 2018; Felix & Filho, 2016).

Research proposition A2: Regulatory insecurity derived from the absence of a law regulating railway concessions hinders the attraction of private direct investments in the railway sector in Brazil.

2.6.1.3 Judicial insecurity for concessionaires

Another barrier to private investments in infrastructure is associated with the long delays involved in resolving disputes between regulating agencies and concessionaires when contracts are financially imbalanced. Because of such conflicts, concessionaires often ask the courts to review decisions. This removes the competence to make a decision from the regulating agencies, transferring it to judges who tend not to possess the technical knowledge to perform a proper technical analysis (Martins & Valente, 2019).

Research proposition A3: Judicial insecurity arising in situations of financial imbalance of contracts hinders the attraction of private direct investments in the rail sector in Brazil.

2.6.1.4 High risk-return ratio of rail projects

Greenfield railway projects require large investments and have a long-term payback timeframe, exposing firms to a number of risks, including the risk of expropriation, unilateral changes in the financial balance of contracts and business obsolescence. In addition, the industry has large sunk costs (i.e., costs that cannot be recovered), which further increases payback time. As the rail sector faces competition with air, waterway and road transport, the risk-return ratio in the sector is deemed to be substantially high (Felix, 2018; Felix & Filho, 2016; Motta & Ouverney, 2014; Sampaio & Daychoum, 2017).

Research proposition A4: The long-term payback timeframe and high level of investments required for greenfield railway projects hinder attraction of private direct investments in the railway sector in Brazil.

2.6.1.5 Concessionaires' inability to generate additional revenue

The ability to generate additional revenues could help concessionaires to improve financial returns. For example, Japan's largest passenger rail company, East Japan Railway, earned 71% of its revenues from transport fees, 15% from real estate exploitation, 8% from renting spaces in passenger stations and 5% from other additional revenues in the 2001-2012 period (Felix, 2018).

Hong Kong rail company MTR Corporation earned 34% of its revenues from transport fees, 38% from real estate projects, 15% from commerce in passenger stations and 13% from rent and business management between 2000 and 2012. Authorising alternative and additional earnings associated with the railway business could mitigate or eliminate the need for public financing in the sector. Nonetheless, in Brazil, the generation of certain additional revenues was forbidden in concession contracts (Felix, 2018).

Research proposition A5: Concessionaires' inability to generate revenues beyond those derived from transport operations hinders the attraction of private direct investments in the railway sector in Brazil.

2.6.1.6 Poor technical qualifications, lack of financial independence and political interference from regulating agencies

Regulating agencies were created in the 90s to regulate the relationship between the State, service providers and users. The agencies' directors are not hierarchically subordinated to the Executive branch of the government, and are nominated according to the following procedure: the president indicates a person that she or he feels is fit for the position; the Senate assesses and approves the person for the position; then the president makes the official nomination (Sampaio & Aguiar, 2019).

The problem with this nomination process is that the elected government may make use of these posts as a bargaining chip with other political parties in exchange for guaranteeing parliamentary support. As the positions in regulating agencies have substantial influential power and fixed mandates, on many occasions the government awaits until the political need arises to nominate new directors (Sampaio & Aguiar, 2019).

As an expected result of the politicisation of nomination processes, directorship positions of a number of regulating agencies have stayed vacant for long periods of time. Because of this situation, two presidential decrees were issued in 2012, allowing the Minister of Transport (now Minister of Infrastructure) to appoint acting directors until formal nomination. However, this created an additional problem. As acting directors do not have stable mandates and may be removed from the post at any moment, there is a higher risk that their decisions are vulnerable to the influence of the Executive branch (Sampaio & Aguiar, 2019).

Financial autonomy is another issue. In practice, regulating agencies do not have their own budget and, until 2019, depended on resources that the Treasury transferred to the Ministry of Infrastructure (as shown below, this has changed with Law 13848/2019). As a consequence, regulating agencies may be subject to budget cuts, as was the case for ANAC in 2014, whose budget was reduced by 20%. Another issue associated with financial independence is the recurring delays in budget disbursement, compromising an agency's ability to perform activities regularly.

Given that the autonomy of a regulating agency is directly related to its financial capacity, there is a risk to agencies' independence (Sampaio & Aguiar, 2019).

Furthermore, regulating agencies are viewed as lacking in technical staff (Moreira, 2014). Valente (2015) analysed three regulating agencies (the Electric Energy Agency - ANEEL, the Telecommunications Agency - ANATEL and the Civil Aviation Agency - ANAC) and found that only the appointed directors of ANEEL all had technical knowledge and previous experience working in the sector.

Approved in 2019, the National Law of Regulating Agencies (Law 13848/2019) seeks to reduce political influence, mismanagement and corruption in regulating agencies. Among other requirements, this legislation requires that regulating agencies perform Regulatory Impact Analyses before making regulatory changes so as to assess the impact of the proposed changes. The Law also creates the position of agency ombudsman, responsible for monitoring grievance procedures associated with the agency's performance. In addition, it transfers the responsibility for budget transfer from sectoral ministries to the Ministry of the Economy. Although it is early to evaluate its impact, implementation of this legislation is expected to promote more political and financial independence for regulating agencies.

Research proposition A6: Poor technical qualifications, lack of financial independence and political interference from regulating agencies hinder the attraction of private direct investments in the railway sector in Brazil.

2.6.1.7 Foreign currency risks

Another issue that limits the attraction of foreign investments in infrastructure are foreign currency risks as they may compromise the fiscal balance of contracts, given that these risks are often transferred to the concessionaires (Martins & Valente, 2019). Foreign currency risks are material to foreign direct investors because, while they employ capital from their shareholders (in dollars) in Brazilian assets, revenues are generated in Brazilian currency.

The volatility of the Brazilian currency exchange rate coupled with the lack of foreign exchange hedging mechanisms in concession contracts (e.g. index service fees to USD dollars) may discourage direct investors from operating in the country (Gonçalves & Costa, 2019).

Research proposition A7: Foreign currency risks hinder the attraction of private direct investments in the railway sector in Brazil.

2.6.1.8 Obtaining environmental licenses

Brazil is one of the few countries whose environmental licensing system employs a three-stage process that involves preliminary, installation and operating licenses, each requiring its own procedures. This generates more uncertainty, delays and disputes to obtain environmental licenses from federal and state-level bodies (Amann, Baer, Treblat, & Lora, 2016; Gonçalves & Costa, 2019; Mourougane & Pisu, 2011). Indeed, Duarte et al. (2017) find, through an extensive literature review, that licensing procedures in Brazil are not necessarily technically driven and often are subject to political pressure.

Moreover, since 2004, a new general law for environmental licensing has been discussed in the legislative branch (Bill 3729/2004). Among its justifications, the proposed bill mentions that “the licenses required and contents of environmental impact assessments are only found in decrees and regulations”, with practices varying between states, and an overall lack of operational structure (for instance, qualified technicians) as well as a high degree of judicial insecurity concerning licensing processes. One of the proposed changes in Bill 3729 is the establishment of fixed deadlines for granting licenses (Câmara dos Deputados, 2004). As of June 2020, this Bill was ready to be voted on in the plenary of the Chamber of Deputies (Freire, 2020).

Research proposition A8: Delays in obtaining environmental licences hinder the attraction of private direct investments in the railway sector in Brazil.

TABLE 6

Summary of research propositions for direct investors

H	Hypothesis	Source
A1	The legal impediment preventing the private sector from proposing new railway projects hinders the attraction of private direct investments to the railway sector in Brazil.	(Felix, 2018)
A2	Regulatory insecurity derived from the absence of a law regulating railway concessions hinders the attraction of private direct investments in the railway sector in Brazil.	(Martins & Valente, 2019; Felix, 2018; Felix & Filho, 2016)
A3	Judicial insecurity arising in situations of financial imbalance of contracts hinders the attraction of private direct investments in the railway sector in Brazil.	(Martins & Valente, 2019)
A4	The long-term payback timeframe and high level of investments required for greenfield railway projects hinder attraction of private direct investments in the railway sector in Brazil.	(Felix, 2018; Felix & Filho, 2016; Motta & Ouverney, 2014; Sampaio & Daychoum, 2017)
A5	Concessionaires' inability to generate revenues beyond those derived from transport operations hinders the attraction of private direct investments in the railway sector in Brazil.	(Felix, 2018)
A6	Poor technical qualifications, lack of financial independence and political interference from regulating agencies hinder the attraction of private direct investments in the railway sector in Brazil.	(Sampaio & Aguiar, 2019; Moreira, 2014)
A7	Foreign currency risks hinder the attraction of private direct investments in the railway sector in Brazil.	(Gonçalves & Costa, 2019; Martins & Valente, 2019)
A8	Delays in obtaining environmental licences hinder the attraction of private direct investments in the railway sector in Brazil.	(Amann, Baer, Treblat, & Lora, 2016; Mourogane & Pisu, 2011; Gonçalves & Costa, 2019)

Source: (International Union of Railways apud The World Bank, 2018c)

2.6.2 Barriers to the attraction of bond investors to railway projects and companies

This section will focus on the barriers to the growth of two main investment assets that could contribute to the financing of rail infrastructure projects: green bonds and infrastructure incentivised debentures.

- › A green bond is “a financial debt instrument that is almost entirely linked to green and climate-friendly assets or projects” (Climate Bonds Initiative, 2020). To date, 21 bonds labelled as green bonds have been issued in Brazil, totalling EUR 4.76 billion³⁷, by the energy (40%), land use (36%) and industry (7%) sectors. Transport and buildings had low allocations, responding for 5% combined (Climate Bonds Initiative, 2019a).
- › Infrastructure incentivised debentures are corporate debt financial instruments that enable companies to raise money from capital markets for infrastructure projects which are considered priority projects by the federal government. Infrastructure incentivised debentures are regulated by Law 12.431/2011 and by Decree 8,874/2016, offering tax benefits for investments in projects in the following sectors: logistics and transport, urban mobility, energy, telecommunications, broadcasting, sanitation and irrigation. Retail and foreign investors are exempt from income tax levied on debenture earnings, and companies are taxed 15%. The tax exemption is also applied to shareholders who invest in investment funds made up of at least 85% of incentivised debentures (Ministério dos Transportes, 2012).

37 USD 5.13 billion. Currency exchange rate from 14/05/2020: 1 EUR = 1.08 USD.

According to a report from the Ministry of the Economy (Ministério da Economia, 2020), the volume of infrastructure incentivised debentures grew from EUR 110 million³⁸ in 2012 (four projects) to EUR 5.33 billion³⁹ in 2019 (98 projects), whilst the transport sector received nearly EUR 0.95 billion⁴⁰ in investments in 2019 (16 projects, four in the railway sector, responsible for 37.7% of the total amount received by the transport sector).

2.6.2.1 Low supply of green bonds

There is a low supply of green bonds in the Brazilian market, with only 21 bonds labelled as green bonds issued to date in the country (Climate Bonds Initiative, 2019a). According to Yamahaki et al. (2020), this can be explained by two factors. The first is that potential bond issuers are wary of whether there might be a regulatory penalty if the issuer fails to prove the environmental additionality of the green bond. The second factor is that there are a restricted number of companies in Brazil that have the financial capacity to issue a bond equivalent to 200 to 250 dollars or euros, which is the minimum ticket required to issue a green bond abroad. As noted by Banga (2019) and Cochu et al. (2016), the bond must be large enough to be appealing to green bond purchasers, for whom size, maturity and liquidity are key elements for portfolio decisions.

Research proposition B1: The low supply of green bonds in the Brazilian market hinders the attraction of investors to low-carbon (including railway) sectors in Brazil.

2.6.2.2 Lower than expected risk-adjusted returns

Another barrier to the increase of capital market flows to the railway sector is investor perception that returns from investing in infrastructure debentures are low in relation to the risk inherent to entrepreneurial activities. Comparing infrastructure debentures to sovereign bond investments, pension funds often find that the return from investing in debentures is lower than expected considering their exposure to corporate risk (Yamahaki et al., 2020).

38 BRL 700 million. Currency exchange rate from 14/05/2020: 1 EUR = 6.34 BRL.

39 BRL 33.8 billion. Currency exchange rate from 14/05/2020: 1 EUR = 6.34 BRL.

40 BRL 6.0 billion. Currency exchange rate from 14/05/2020: 1 EUR = 6.34 BRL.

Lower than expected returns is also a barrier for green bond investments as investors do not perceive that there is a premium for acquiring a green bond in comparison to a conventional bond other than the reputational gain. There is also an added risk for investors as they must check that the financed projects have environmental additionality (Yamahaki et al., 2020).

Research proposition B2: The lower than expected risk-adjusted returns of green bonds and infrastructure debentures hinders the attraction of investors to low-carbon (including railway) sectors in Brazil.

TABLE 7

Methods employed and purposes

H	Hypothesis	Source
B1	The low supply of green bonds in the Brazilian market hinders the attraction of investors to low-carbon (including railway) sectors in Brazil.	(Banga, 2019; Cochu et al., 2016; Yamahaki et al., 2020)
B2	The lower than expected risk-adjusted returns of green bonds and infrastructure debentures hinders the attraction of investors to low-carbon (including railway) sectors in Brazil.	(Yamahaki et al., 2020)



CHAPTER THREE 

Methods

A qualitative approach was taken for this study, with a probing literature review and semi-structured interviews for data collection and content analysis for data analysis, as further described below.

TABLE 8

Summary of research propositions for bond investors

#	Method	Method employed	Purpose
1	Data collection	Literature review	Provide a general context for the research and identify a list of barriers hindering private investments in the railway sector
2	Data collection	Semi-structured interviews	Exploration of the research propositions related to the barriers to an increase in private investment in the railway sector, as identified in the literature review.
3	Data analysis	Content analysis	Coding and interpretation of the textual data (transcribed interviews).

Source: The Authors

3.1 Literature review

An initial literature review facilitates the development of new hypotheses and theories, recognises areas in which a large amount of research has already been conducted and those in which additional research is needed (Webster & Watson, 2002). The literature consulted includes academic papers, doctoral theses, technical reports and other sources from grey literature, including government web pages. Given the focus on existing barriers to investments, the identification of relevant literature was constrained to more recent publications. This review allows us to identify and propose an initial clustering of the relevant barriers for private sector investors in rail infrastructure.

3.2 Semi-structured interviews

Semi-structured interviews are also chosen as a method for data collection because they allow investigation of a fairly clear list of topics, but also provide the flexibility to accommodate other issues that arise in the course of the interview (Bryman & Bell, 2007). Semi-structured interviews can “provide detail, depth and an insider’s perspective” and allow for further testing and analysis of the responses (Leech, 2002). In this study, the list of issues to be explored refers to the barriers that hinder the increase of private investment in the railway sector in Brazil, as shown in Figure 3. The interviews employed open-ended questions (Hsieh & Shannon, 2005), but also provided leeway for both the interviewer to ask questions that are not included in the interview guide and for the interviewee to pursue particular issues of interest (Bryman & Bell, 2007).

The research sample is comprised of 11 individuals who represent stakeholders from the railway sector, as shown in Table 9. Interviewees were selected based on their close relationship with the research topic. Consequently, sampling procedures did not aspire to offer statistical representativeness and interview findings should not be generalised to larger populations.

Indeed, interviews offer the possibility of data triangulation with the findings from the literature review, thus increasing the researchers' ability to contextualise and interpret the results (Thurmond, 2001). In this sense, and taking into consideration the research goals, greater emphasis is placed on players that actually invest in railway infrastructure (sector representatives), the largest group in the sample. Government representatives, academics and representatives of users provide additional context and ensure that differing perspectives are taken into account.

Moreover, it is necessary to note that data collection was greatly affected by the Covid-19 pandemic, which precluded the realisation of in-person interviews and compromised the availability of possible interviewees. In total, 29 invitations to participate in the study were sent via e-mail (38% response rate).

Interviews were conducted between the 23rd of April and the 18th of June, 2020. Durations varied from 36 minutes (shortest) to 120 minutes (longest).

TABLE 9

List of interviewees

Interviewee code	Type of interviewee
G1	Government representative
G2	Government representative
A1	Academic
A2	Academic
S1	Sector representative
S2	Sector representative
S3	Sector representative
S4	Sector representative
S5	Sector representative
U1	Representative railway user
U2	Representative railway user

Source: The Authors

3.3 Content analysis

The data collected from the interviews were transcribed and analysed using the content analysis method, which is “a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use” (Krippendorff, 2004. p. 18). The usual steps of a content analysis were followed:

- › Development of a coding scheme;
- › Codification of transcribed responses;
- › Counting of frequencies of appearance of each coded unit.

Answers were coded using thematic units: conceptual static units appearing within the texts (interviews) that require interpretation, intuition and judgement by the analysts for proper coding (Lacity & Janson, 1994).

Thematic units were initially defined by the barriers identified from previous studies, as listed in Figure 3, serving as a starting point to analyse the interviews. Subsequently, further coding and categorization, with the possible identification of new barriers or combinations of existing ones, was performed as a continuous, iterative process (Erlingsson & Brysiewicz, 2017). Accordingly, the main findings stemming from the interviews are presented in the next section.

4

CHAPTER FOUR 

Interview findings

4.1

Barriers to direct investments

Before we analyse the barriers to the increase of private direct investments in rail infrastructure in Brazil, it is worth noting that the construction or expansion of railway infrastructure can be undertaken by either the public or the private sector.

For greenfield projects, Interviewee G2 observed that the public company Valec is often responsible for building rail infrastructure. After construction, the State grants railway operation rights to a concessionaire through a public auction. For example, in July 2019 the operation rights for the North-South railway (central and south sections), built by Valec, were granted to Rumo S.A..⁴¹ In the third semester of 2020, the first section of the West-East Integration Railway (FIOL) is to be auctioned, while the second section is under construction⁴².

The public sector can also transfer the responsibility to expand rail infrastructure to the private sector, according to Law 13,448/2017⁴³. As Interviewee G1 explained, when the government brings forward a contract renewal (i.e. renews the concessionaire's contract a few years before the expiration date), the concessionaire could be required, in exchange, (i) to make investments in the railway network where it operates or, (ii) if

41 (PPI, 2020a)

42 (PPI, 2020b)

FIOL's first section: from Ilhéus to Caetité

FIOL's second section: from Caetité to Barreiras

43 Article 9: Extending partnership contracts in the railway sector will also be guided:

I – by requiring, when applicable, investments to increase existing capacity in order to reduce the overload on the railway branch, ensuring the contract's financial balance.

the network does not require additional investments, to make investments in another railway network. The contract renewal of Malha Paulista, which took place in June 2020, is an example of the first option. Concessionaire Rumo must invest BRL 6 billion in the next five years in the rail network to increase transport capacity⁴⁴. As Interviewee S3 highlighted, the Malha Paulista contract renewal was a milestone in railway history as it was the first of its kind in Brazil and will likely speed up advance renewals of other concession contracts.

Interviewee G1 noted that the second compensation option (i.e. investing in another rail network) is called cross investments. Interviewee S1 mentioned that cross investments represent an appropriate solution as compensation for renewing the concession contracts of Carajás and Vitória-Minas railways, operated by Vale, because, as they are entirely or almost entirely duplicated, they do not require further investments. In this case, the compensation options for contract renewal would be either paying a concession fee to the State or making investments in another railway network. Interviewee S1 defended the latter as being the most suitable option because he believes that the private sector is more efficient at building railway infrastructure than Valec, while concession fees would be transferred to the National Treasury with no specific earmarking. Interviewees A2 and S2 also agreed that this mechanism expedites infrastructure expansion. Among the drawbacks to cross investments, Interviewee G2 cited the concessionaire's exposure to engineering and environmental risks in a region where it will not operate.

The interview findings are discussed below, organised by research proposition and type of stakeholder interviewed.

44 (Alerigi, 2020)

RP A1:

The legal impediment preventing the private sector from proposing new railway projects hinders the attraction of private direct investments to the railway sector in Brazil

There is already a proposed policy to address this barrier (Draft Bill 261/2018). Therefore, the evaluations provided by the interviewees tend to reflect their support for this bill rather than focusing on a broader discussion regarding the proposal of new projects by the private sector per se. In this respect, conflicting views emerge from the responses.

Government: Government representatives are in favour of Draft Bill 261/2018, which authorises the private sector to propose and build new railroads, or to operate unutilised railway branches. According to Interviewee G1, if the draft bill passes, a company or a corporate group will be able to build a railway branch connecting its farm (or factory) to a port or to a larger railroad. Hence, the company will be less dependent on government planning and public tenders to operate railways and transport cargo by rail. Interviewee G2 observed that what Draft Bill 261 proposes is similar to port regulations, which encompass specific rules for public and private ports. Interviewee G2 highlighted, though, that the draft bill is not needed from a legal point of view because there are no constitutional or legal provisions that prevent the private sector from building a railway. Interviewee G2 added that the main advantage of this draft bill is to permit land expropriation for private businesses.

Academia: Interviewee A2 agreed that authorising the private sector to build new railroads would promote an increase in private sector participation in the railway sector⁴⁵. Additionally, he noted that this draft bill would help solve another problem in the industry, which are rail branches that are not commercially utilised. As Interviewee A2 explained, in concession rail networks, there are branches which are not used or that are underutilised by the concessionaires. Interviewee A2 then suggested that these branches be returned to the State so that interested private companies, such as prospective users, can invest in and operate them.

⁴⁵ Interviewee A2 also mentioned that Draft Bill 7,063/17, concerning the legal framework for concessions in general, could achieve the same outcome.

Interviewee A1 warned that authorising construction of small railway branches by the private sector could potentially discourage the development of large logistics projects owing to financial disincentives. As Interviewee A1 purported, a railway concessionaire operating a large railway network is able to operate a less profitable branch because it operates another one in the same network that is more lucrative. Therefore, the interviewee stressed that a robust National Logistics Plan is needed so that authorising private railway projects does not compromise the larger railway projects that the country needs.

Sector: Sector representatives have differing views of Draft Bill 261.

Interviewee S3 defended that approval of the draft bill would be beneficial to concessionaires, explaining that, in concession contracts, concessionaires are only able to explore service demand and prospect clients after they are granted the concession. This generates a degree of uncertainty on the concessionaires' part about estimated revenues. Conversely, Interviewee S3 believes that the authorisation modality would allow concessionaires to better design railway networks based on previous studies of client demand.

Similar to Interviewee A2's argument, Interviewee S2 agreed that approval of the draft bill would help unlock railway projects. If the government allows concessionaires to return rail branches that are not used, the State can then authorise private companies to exploit these "abandoned" branches. Interviewee S2 cited two benefits from operating existing branches: they already have strips of land along the railways, thus avoiding the need for land expropriation, and the environmental licensing process would likely be simpler in comparison to a greenfield project.

Two sector representatives are against the draft bill. Interviewee S1 claimed that Draft Bill 261 would create regulatory asymmetry between concessionaires and authorised companies, because concessionaires would be subject to a harsher set of regulations than those under the authorisation regime. Additionally, greenfield projects would still require large initial investments in land acquisition.

Interviewee S4 argued that Draft Bill 261 is unconstitutional because it is illegal to transfer public property to the private sector without a public auction⁴⁶. However, Interviewee S4 also mentioned that, if smaller underutilised branches were returned to the State during contract renewals for existing concessions and reaucted as shortlines (via authorisation), then foreign operators that specialise in this segment (for instance from the U.S.) could possibly be attracted to invest in Brazil.

Interviewee S5 highlighted that any company that does not currently operate in the railway sector would find it hard to enter it due to the high level of specialisation required to maintain and operate a rail network. He claimed that having capital to build infrastructure is not sufficient because there is a need to develop specialised know-how as well.

Users: The two companies representing users of rail transport services do not trust that the private sector will be interested in building new railways or operating unused rail branches if the draft bill passes. Interviewee U1 argued that it would be too costly for a private company to make railway investments alone, unless the volume of transported materials is large enough to offset the required investments. Likewise, Interviewee U2 was not certain that this would be the best alternative for corporations because that would imply substantial financial investments and devoting efforts to activities that are outside the company's core business.

In sum, government representatives and some sector representatives agree that allowing the private sector to propose new rail branches would increase private sector participation in railway operations and/or stimulate the use of "abandoned" branches. On the other hand, users of rail transport services are sceptical that private sector companies would be interested in making such substantial investments and operating in an industry that is not part of their business. In Year 2, the research team plans to interview representatives from other sectors, such as agricultural commodity traders, to investigate their interest in the authorisation modality. The team also intends to interview U.S. shortline companies to better understand the benefits of this modality.

⁴⁶ However, according to article 21 of the Federal Constitution, railway transportation could be either developed as a market activity, conferred by the public administration through authorisation, or as a public service, conferred through concession or permission.

In contrary, it is perceived that current RE development in Indonesia will not achieve the target in 2025⁴⁷. A study published in 2019 supports the claim that the current share of renewables in the energy mix and in power generation are only 12.5% and 13%, respectively, both of which need to double in five years (Suharsono et al., 2019).

RP A2:

Regulatory insecurity derived from the absence of a law regulating railway concessions hinders the attraction of private direct investments in the railway sector in Brazil

Government: The government representatives do not agree that concessionaires suffer from limited regulatory security. Interviewee G1 noted that the railway regulatory framework has had significant improvements in recent years and today offers more security to the concessionaires than in the past. He cited as an example the establishment of regulations for rights-of-way, operations in which a concessionaire allows another company to use its rail network in exchange for remuneration or financial compensation. Additionally, Interviewee G1 argued that the possibility of renewing contracts before the expiry date, as provided for in Law 13,448/2017, has improved the legal environment for concessionaires because they are better able to plan future investments. Interviewee G2 added that concessionaires might complain that there is no guarantee that their contract will be renewed, but he does not attribute that to legal insecurity as the concession rules clearly establish that the contract has an expiry date.

Academia: The representatives from academia have differing views. Interviewee A1 argued that the absence of a law governing railway concessions is not the primary legal constraint for concessionaires operating railway projects. Rather, a secure legal environment is more a question of the extent to which the public sector abides by the concession contracts (discussed below, in RP A3) and on the extent to which the regulating agencies effectively regulate the sector (discussed in RP A6).

47 Interview with Respondent Q, Respondent R, and Respondent S

In contrast, Interviewee A2 noted that there is a need for additional rules to regulate some aspects of railway activity. For example, he mentioned that there are no clear regulations for situations when the concessionaire wishes to transfer the concession contract to a foreign company. He also mentioned that rights-of-way are not properly regulated by ANTT. Moreover, he noted that there are no procedures in place that allow concessionaires to propose side business projects to generate extra income (as discussed in RP A5).

Sector: Sector representatives agree that there is a lack of regulatory security in the concessionaires' business environment.

Interviewee S1 cited two examples of regulatory insecurity. The first relates to Law 13,448/2017, which allows concessionaires to renew concession contracts in advance. After its enactment, Interviewee S1 noted that the law was contested by the Public Prosecution Service and then directed to the Federal Supreme Court under a Direct Unconstitutionality Lawsuit (ADIN, in Portuguese). Interviewee S1 explained that, after assessing the injunction from the Public Prosecution Service, the Supreme Court judged that the law was constitutional. However, the Supreme Court has not yet assessed the merit of the lawsuit. As Interviewee S1 highlighted, there is a risk that the Supreme Court might decide to evaluate this lawsuit's merit in a year's time and conclude that renewing contracts in advance of when they are to expire is unconstitutional. Interviewee S1 observed that this results in added legal insecurity for concessionaires, who might view the situation as uncomfortably inconsistent. Another example of regulatory insecurity that Interviewee S1 cited was the lack of clear rules for concessionaires to return unused rail branches. Although concessionaires have the legal right to return railway sections which are not lucrative, Interviewee S1 claimed that the process has not been properly regulated by ANTT.

With regard to regulatory complexity, Interviewee S3 observed that, because the rail network passes through or near several municipalities, the concessionaire is subject to both federal and local laws, making legal compliance more challenging. As an example, Interviewee S3 mentioned that the local laws of certain municipalities require that, during some hours of the day, only a particular type and sequence of train horn be used, even though these specific requirements are not consistent with federal standards.

Interviewee S4 added that there is a need to better regulate the role of independent railway operators, claiming that denying rights-of-way means curtailing the free market, and that the solution for this problem lies in a change of attitude by the regulator (ANTT) rather than requiring a new regulatory framework.

Users: Corroborating Interviewee S4's response, Interviewee U1 agreed that there needs to be proper regulation concerning independent railway operators. Interviewee U1 noted that, although there are companies with the right to act as independent railway operators, these operators are often involved in the management of railway yards and he has never seen independent railway operators operating long distance transport services. Interviewee U1 believed that, if the role of long-distance operators was properly regulated, companies that utilize railway transport would be able to transport their own cargo instead of using third-party services by negotiating rights-of-way with concessionaires to use their railway network.

In short, while government representatives did not agree that there is regulatory insecurity, representatives from academia, the rail sector and rail users offered a few examples in which regulations are incomplete, conflict with other regulations or have the potential to be overturned. In Year 2, the research team plans to continue examining the need to further regulate rights-of-way and the role of independent railway operators, the ability of concessionaires to return unused rail branches and the status of the lawsuit against Law 13,448/2017 at the Federal Supreme Court.

RP A3:

Judicial insecurity arising in situations of financial imbalance of contracts hinders the attraction of private direct investments in the rail sector in Brazil.

Government: The government representatives did not state their views on this topic.

Academia: Interviewee A1 stated that, since railway projects are long-term projects, the private investor needs legal assurance that a contract signed in 2020 will be valid in five, 10 or 20 years. Moreover, as these contracts are oftentimes incomplete (as they deal with long-term projects), the direct investor must be assured that there will be robust processes in place for revising contracts and for filling eventual contractual gaps as the need arises. Interviewee A1 added that, if investors do not believe that there are strong rules and agencies supporting these processes, they will either decide not to operate in Brazil or they will only operate in the country in exchange for very high rates of return. Although Interviewee A1 commented on the importance of judicial security for concessionaires, he did not make specific remarks about the status quo.

Interviewee A2 stated that there is a somewhat conflicting relationship between concessionaires and ANTT. Interviewee A2 recalled that ANTT was created only after existing concessions were granted in the 1990s and that it now seeks to legitimise its role by attempting to make changes in the terms of the concession contracts, generating legal insecurity in relation to the validity of existing contracts.

Sector: Interviewee S1 observed that the oversight bodies in Brazil, such as the Federal Court of Accounts and the Public Prosecution Service, have been interfering excessively in regulations, public auctions and contract negotiations. As an example, he cited that the Federal Court of Accounts has been insisting that ANTT revise the concessionaires' internal rate of return, currently 11.04% p.a., deeming that it is excessively high. Interviewee S1 also mentioned that the Federal Court of Accounts's technical team has positioned itself against the contract renewal of Carajás Railway by Vale. Interviewee S1 contended that this is an unreasonable position, since not renewing the railway's contract has the potential to seriously compromise the logistics of a company that is paramount to the country's GDP.

With regard to returning existing branches, Interviewee S1 also mentioned that concessionaires are often fined for not using these branches. Current players have learned to cope with these challenges, but they still represent an additional source of insecurity and confusion for potential new entrants.

Interviewee S3 noted that concessionaires must observe both federal and local laws, as well as manage relationships with different government levels. As Interviewee S3 exemplified, when an individual invades a section of the railway's land strip and starts building a house, the concessionaire must contact the municipality to report the invasion and request removal of the invaders. Interviewee S3 then stressed that the likelihood and speed at which municipalities will solve urban conflicts like invasions depend on the quality of the concessionaires' relationship with the local governments, which is why the concessionaire must strive to maintain good relationships with the local governments as well. In addition to contacting the municipalities, the concessionaire must also demonstrate to ANTT that all available measures were taken to deal with the invasion. Therefore, the railway is required to manage relationships with different government levels to ensure that the law is enforced.

In sum, a few interviewees claimed that the interference of different government entities like ANTT, the Federal Court of Accounts, the Public Prosecution Service and local governments contributes to the uncertainty in the concessionaires' legal environment. In Year 2, the research team will interview other stakeholders to test the validity of these assertions.

RP A4:

The long-term payback timeframe and high level of investments required for greenfield railway projects hinder attraction of private direct investments in the railway sector in Brazil.

Government: Interviewee G1 observed that the level of financial risk varies according to whether the project is greenfield or not, and according to the level of demand for cargo transport. For example, if the project involves the development of new rail infrastructure, the risk is higher because there is a need to generate customer demand. On the other hand, if the project consists of operating existing infrastructure in locations where there is already demand for cargo transport (e.g. in São Paulo), the risks of demand and price fluctuations are lower.

Likewise, Interviewee G2 noted that for greenfield projects like the Ferrogrão railway, whose construction is expected to be granted to a concessionaire, the project risk is high given that there will be no financial returns during the years in which the railway is being built, and given that the railway will compete for cargo transport with highway BR-163. On the other hand, Interviewee G2 mentioned that the risk is lower for existing rail projects.

Interviewee G2 also talked about the role that so-called returnable assets⁴⁸ could play as collateral in credit operations. These guarantees could help to reduce financing costs but, despite a positive opinion from the Legal Consultancy of the Ministry of Infrastructure, there is a lack of uniformity between practices for different infrastructure sectors. Indeed, oftentimes concession contracts even fail to specify which assets are deemed as returnable, generating yet another source of uncertainty for concessionaires. In this sense, Interviewee G2 mentioned Draft Bill 7,063/17, currently being debated in Congress, that seeks to establish a new regulatory framework for concessions in Brazil, including provisions on the use of returnable assets.

Academia: Similar to what Interviewees G1 and G2 stated, Interviewee A1 argued that the financial risk is high for concessionaires involved in building greenfield projects, noting that initial investments for railway projects are substantial, whilst revenues are generated in the medium term when the concessionaire begins to earn income from the infrastructure. Interviewee A2 noted that concessionaires' weighted average cost of capital (WACC) in concession contracts, which is calculated by ANTT, is at approximately at 11% p.a., which he considers to be an adequate financial return for the sector. In Interviewee A2's opinion, the main problem for concessionaires is the uncertainty regarding the validity of existing contracts (as mentioned in RP A3). In agreement with Interviewee G2, Interviewee A2 points to the uncertainty surrounding which assets concessionaires may offer as collateral for their creditors in order to finance their long-term investments.

⁴⁸ Assets temporarily granted to the concessionaires but that must be returned to the State once the contract expires.

Sector: Interviewee S1 agreed that greenfield railway projects are one of the most capital-intensive⁴⁹ to build compared to other transport infrastructure projects, which explains why there are very few cases in Brazil or abroad in which a railway is built with no government subsidies or financial support. Likewise, Interviewee S4 agreed that railway projects are only feasible when there is financial support from the public sector. At the same time, Interviewee S1 mentioned that public investments in the sector in Brazil are often accompanied by delays, lack of resources and cost overruns.

Interviewee S3 also sees the risk-return ratio of railways as the biggest barrier hindering the attraction of private investors. However, Interviewee S3 argued that, since the public sector will not be operating the railways, when the sector develops greenfield projects it may be less concerned with the quality of the infrastructure and possible impacts of path design on future opportunities to attract new cargo, due to a lack of studies on potential clients. In this respect, Interviewee S3 contended that the diversification of cargo, for instance transporting general cargo in containers, could improve this risk-return ratio.

Interviewee S2 stated that, although initial investments in railway projects are higher in comparison to other transport modes, these are balanced by the lower maintenance costs and by the long lifespan of the rolling stock and the rail tracks, lasting nearly 30 years.

Agreeing with Interviewee G2, Interviewee S3 added that renewing contracts before they expire, as defined in Law 13,448/2017, helps to improve concessionaires' long-term planning because, once they know that they can exploit the infrastructure for a longer period, they are better able to plan future investments.

With regard to returnable assets, Interviewee S1 mentioned a particular issue which also affects concessionaires' return on investments. He referred to the disagreements between the State and concessionaires concerning the value of the assets, with ANTT often recognising only 40 or 60% of the total amount invested by the private operators.

⁴⁹ Interviewee U1 stated that a locomotive costs approximately BRL 10 million and that each 500 metres of rail tracks costs nearly BRL 5 million.

Given that concessionaires are mandated to make certain investments under their contracts, disputes over the value of these assets creates uncertainty and may result in fines on the concessionaires.

In short, the construction of railway infrastructure requires substantial investments, hindering the attraction of private investors. As a result, the State is often responsible for its construction before granting the operations to a concessionaire. Subsequent financial risks for concessionaires to operate existing tracks are deemed manageable. In Year 2, the research team will further explore whether uncertainty related to the rate of depreciation is an issue for concessionaires and to examine if/how public assets under concessions could be used as collateral in financing operations.

RP A5:

Concessionaires' inability to generate revenues beyond those derived from transport operations hinders the attraction of private direct investments in the railway sector in Brazil

Government: Interviewee G1 observed that today concessionaires are not strongly encouraged by the concession contracts to generate extra income.

Academia: The representatives from academia have differing views. Interviewee A1 does not view the inability to generate additional revenues as a barrier to attract private investments. He noted that the possibility of generating extra income depends on whether the contract authorises it or not. Hence, it is an issue with an easy solution in new concession contracts, and that could be employed to help reduce prices for end users.

Interviewee A2 views as nonsensical the fact that ANTT prohibits or does not properly regulate concessionaires' ability to generate extra income. For Interviewee A2, concessionaires would be encouraged to search for extra revenues if they knew how revenues would be distributed, i.e., what percentage would be kept by the concessionaires' and what percentage would have to be earmarked for reducing transport fees for end users.

Interviewee A2 suggested that the most suitable procedure to regulate concessionaires' side business projects would be to create a sector within the Ministry of Infrastructure or ANTT with responsibility for assessing concessionaires' projects on a case-by-case basis, as opposed to including a provision in concession contracts.

Sector: Interviewee S1 commented that ANTT forbids concessionaires to exploit the railway's land strips to build commercial businesses like a shopping mall, arguing that these are outside the scope of concession contracts. In agreement with Interviewee A2, Interviewee S1 is contrary to ANTT's position, claiming that there are several benefits to allowing businesses to be located on the railway's land strips. First, he contended that occupying land strips commercially would help prevent invasions and illegal residential occupation, thus also decreasing the risk of accidents. Second, allowing concessionaires to explore other business opportunities would generate additional income for the State, since concessionaires would be required to transfer 8% of the income to the National Treasury. Currently, however, Interviewee S1 sees ANTT as having a restrictive interpretation of which opportunities can be pursued by concessionaires within their existing contracts.

Interviewee S3 claimed that additional income from secondary business opportunities is of little importance for concessionaires, compared to the revenues from their core activities. Interviewee S5 argued that it does not make sense for concessionaires to be involved in businesses outside their core business.

Interviewee S4 disagreed that it is difficult for concessionaires to implement projects to obtain extra income, arguing that they would only be required to pay the government a commission, which varies from 3 up to 10% of the additional revenues.

In sum, there are differing views about the impediments for concessionaires who might want to generate extra income from side businesses and on the existence of clear procedures. In Year 2, the research team will explore whether exploiting side businesses would be of interest to the concessionaires and whether or not there is already regulation concerning the distribution of such revenues.

RP A6:

Poor technical qualifications, lack of financial independence and political interference from regulating agencies hinder the attraction of private direct investments in the railway sector in Brazil

Government: The government representatives reject the suggestion that ANTT suffers from a lack of personnel with technical qualifications. Interviewee G1 claimed that ANTT staff is highly qualified. Interviewee G2 contended that the level technical qualifications of the regulating agency is not a barrier to the attraction of private investments, even though improving ANTT's qualifications is always welcome.

In terms of political and financial independence, Interviewee G1 agreed that there is political interference in regulating agencies, which he attributed to the agencies' lack of financial independence. Interviewee G1 explained that, as regulating agencies are financially dependent on the National Treasury, the sectoral ministry responsible for the agency's budget could potentially use it as a tool to control the agency. Additionally, he noted that the National Law on Regulating Agencies (Law 13,848/2019) is insufficient to confer full financial independence on the regulating agencies because, even though the Ministry of the Economy now transfers resources, the agencies continue to be dependent on the Treasury for budget allocation.

Academia: In terms of technical qualifications, Interviewee A1 claimed that it is unfair to generalise about the level of ANTT's staff. This is at variance with Interviewee A2, who believes that the level of qualifications of ANTT's staff is lower than that of other regulating agencies like the Brazilian Electricity Regulatory Agency (Aneel), although it is improving.

As for political independence, Interviewee A1 argued that regulating agencies are not fully independent, citing two cases in which the Executive branch tried to reduce agencies' independence. First, Interviewee A1 mentioned a 2003 draft bill from the Executive branch which attempted to reduce the autonomy of regulating agencies.

Second, he also noted that changes to the railway regulatory framework in 2012 (which unbundled infrastructure building and maintenance from transport services operations in concession contracts, and that was never implemented) did not undergo public consultation or consultation with the regulating agency. Nonetheless, Interviewee A1 asserted that Law 13,848/2019 is expected to improve agency management. Similarly to what Interviewee G1 stated, Interviewee A1 claimed that the new law does not correct the lack of financial independence of regulating agencies, but it does reduce the risk that a sectoral ministry will put pressure on the agency by controlling its budget. Interviewee A2 agreed that controlling the budget is a strategy employed by the government to politically interfere in the activities of regulating agencies.

Sector: Interviewee S1 agreed that the level of qualifications at ANTT is low, which he partially attributed to the quality of the recruiting process in public services. Interviewee S1 explained that the State refrains from specifying too many criteria in selection processes for public positions because it fears that doing so will cause them to be judicially contested. As a result, the process for hiring quality staff is undermined. Interviewee S4 did not agree that ANTT's staff is unqualified, although he noted that the nature of their qualifications is more academic than associated with work experience in regulation, given that the average staff member is relatively young.

From the interviews, there was insufficient evidence to corroborate whether/how the level of technical qualifications and degree of political independence negatively impact the attraction of private investments to the railway sector. Therefore, this topic will be further examined in Year 2.

RP 7:

Foreign currency risks hinder the attraction of private direct investments in the railway sector in Brazil

Academia: The representatives from academia have differing views. Interviewee A1 explained that foreign investors are subject to currency risks because, when the Brazilian real depreciates in relation to the American dollar, foreign direct investors are unable under the contract to increase transport fees to offset these losses. In addition, Interviewee A1 noted that changes in currency rates also affect national investors and their ability to pay for equipment and other capital expenditures. For example, if an investor buys a locomotive from the United Kingdom, in British pounds, he will rely on revenues from transport fees that are charged in Brazilian reals and that are often adjusted according to inflation.

Interviewee A2 disagrees that currency risks are an effective barrier, arguing that new concession contracts offer hedging mechanisms by establishing that the concession fee that a foreign concessionaire must pay to the State can vary based on currency fluctuations. For instance, if the Brazilian real devalues in relation to the American dollar, this means that the concessionaire will have lower revenues in dollars. In order to balance lower returns, the contract establishes that, in these situations, the concession fee owed to the State is reduced.

Sector: Interviewee S3 noted that concessionaires are subject to currency risks when purchasing rail tracks and rolling stock. This is because rail tracks and all locomotive components are imported, whilst only assembly is carried out in Brazil. Interviewee S2 agreed that the sector faces currency risks due to its dependence on imported rail equipment.

Interviewee S3 added that currency fluctuations also affect client demand for transport services. He explained that, when the Brazilian real appreciates in relation to the U.S. dollar, clients from the agricultural sector prefer to store commodities until currency conditions are more favourable. In contrast, when the Brazilian real devalues, clients are eager to export all crop yields, increasing the volume of commodities transported.

Interviewee S4 disagrees that currency risks are an issue for concessionaires as they rely on transporting cargo for export.

Government: Interviewee G2 commented that Draft Bill 2,889/2019 seeks to reduce foreign currency risks for concessionaires by allowing exporting companies such as traders to enter into contracts with concessionaires and have the contract provisions based on foreign currency. The advantage for concessionaires is that, once they have receivables in foreign currency, they can more easily obtain financing from abroad. In addition, Interviewee G2 mentioned that, currently, financial operations hedging against currency risks are taxed inappropriately: if a concessionaire manages to obtain financial gains as a result of hedging strategies, they will only offset the increase in their liabilities denominated in foreign currency. They should not be taxed as financial income, but are. In this regard, it is important to analyse the operation as a whole and not as mere financial speculation, something that Draft Bill 7,063 (mentioned previously) also seeks to address.

In sum, concessionaires face a reasonable amount of currency risk when purchasing infrastructure material and rolling stock, which contain imported inputs. However, currency fluctuations do not affect transport fees and are less significant today because all rail concessionaires operating in Brazil are local companies. In Year 2, the research team may explore the relevance of hedging instruments for concessionaires and the developments related to Draft Bills 2,889 and 7,063.

RP 8

Delays in obtaining environmental licences hinder the attraction of private direct investments in the railway sector in Brazil

Government: Interviewee G1 agreed that environmental licensing processes can cause delays in projects. In contrast, Interviewee G2 noted that the government is striving to grant concessions after all licenses have been obtained. He also mentioned that, even when concessionaires need to obtain licenses for specific projects, they do not encounter significant difficulties.

Academia: Interviewee A2 agreed that the environmental licensing process can delay a railway project, but it does not inhibit the investor from operating in the sector. Supporting Interviewee G2's assertions, Interviewee A2 mentioned that, in many cases, the government obtains the environmental license

before granting the concession, reducing this type of risk for concessionaires.

Sector: Interviewee S1 argued that the problem with environmental licensing is that the period during which the concessionaire will have to wait before being granted the license is unpredictable. Moreover, Interviewee S1 observed that the Public Prosecution Service may interfere in the environmental licensing process, citing the case of Carajás Railway. Interviewee S1 recounted that the Brazilian Institute of the Environment and Renewable Natural Resources (Ibama) had granted Vale the environmental license to duplicate the railway, but it was later suspended by the Public Prosecution Service, delaying the start of the project.

Interviewee S3 disagreed that environmental licensing processes are overly bureaucratic. For Interviewee S3, environmental licensing processes reflect the government's concern with protecting the environment. He added that these processes become less complicated when the concessionaire establishes a good relationship with the environmental agencies.

Similarly to Interviewee S3, Interviewee S5 noted that environmental licensing processes are not a barrier to concessionaires that are able to manage these processes adequately. According to Interviewee S5, federal law provides deadlines by which the environmental agencies must make a final decision. As a result, the concessionaires are able to plan when they will obtain the project, implementation and operation licenses. He noted, though, that the culture in the infrastructure sector often views environmental licensing as a nuisance.

Interviewee S4 argued that sometimes concessionaires use the environmental licensing process as an excuse for delaying needed investments by not taking the process seriously and not submitting all required documents correctly.

According to most interviewees, environmental licensing does not seem to be a major issue for concessionaires. In Year 2, the research team will interview environmental agencies to explore the topic further.

4.2

Barriers to capital market investments

Considering that we have not yet interviewed stakeholders from capital markets and that many of the interviewees were unable to comment on the research propositions below, we have opted, in this section, not to discuss the findings by type of stakeholder. In Year 2, the research team will seek to conduct interviews with capital market players.

RP B1

The low supply of green bonds in the Brazilian market hinders the attraction of investors to low-carbon (including railway) sectors in Brazil

Interviewee G1 observed that Brazil has not yet had a case of a green bond issued to finance railway projects. However, he contended that the government is working to make upcoming railway projects eligible for green bond financing. Interviewee G2 explained that the Ministry of Infrastructure is seeking to certify railway projects (according to the Climate Bonds Standards) so that, in future public auctions, candidates are able to bid with prior knowledge that, if they are granted the concession, they will be able to issue green bonds to finance their operations. Additionally, Interviewee G2 remarked that certifying railway projects will not require substantial alterations to the projects.

BOX 7

Latin American program to certify transport infrastructure assets

Shortly after these interviews were held, on 10th June 2020, the Ministry of Infrastructure launched the first Latin American program to certify transport infrastructure assets for green bond issuance. Developed in partnership with the Climate Bonds Initiative (CBI), the program will focus, initially, on certifying railway projects, in particular the West-East Integration Railway (FIOL), Ferrogrão and the Centre-West integration Railway (FICO). Once certified, these projects will have specific criteria for implementation, such as emitting less than 25 grams of CO₂ per tonne-km and having less than 50% of total cargo comprised of fossil fuels. It is expected that these assets will be certified by the time that the public auctions take place.⁵⁰

RP B2

The lower than expected risk-adjusted returns of green bonds and infrastructure debentures hinders the attraction of investors to low-carbon (including railway) sectors in Brazil

Interviewee G2 claimed that infrastructure debentures have lower than expected risk-adjusted returns because of the tax incentives that Law 12,431/2011 grants to retail investors. As explained by Interviewee G2, since retail investors are exempt from income taxes, they calculate this tax exemption as an avoided cost, thereby demanding lower returns than they would in other investments which are not tax exempt. As a result, infrastructure debenture yields fell, curtailing the attraction of institutional investors to these bonds.

50 (Ministério da Infraestrutura, 2020b)

To attract institutional investments to infrastructure debentures, Interviewees A2 and G2 highlighted that Draft Bill 7,063 proposes the creation of a new series of debentures⁵¹. The difference from the existing series is that, instead of granting tax incentives to retail investors, the new series would grant tax incentives to debenture issuers. As such, the draft bill proposes that, to calculate the Social Contribution on Net Profits (CSLL, in Portuguese), the issuer can deduct from the net profits an amount equivalent to 30% of total interest paid to investors⁵². According to Interviewee G2, that would help curb the negative impact of retail investors' tax exemption on debenture returns, thus attracting institutional investors like pension funds. He added that, if the draft bill passes, the company will be able to issue infrastructure debentures in both series.

Interviewee G2 added that, today, when foreign investors invest in an infrastructure debenture issued by a Brazilian company, the issuer is taxed a withholding tax of 15% to remit returns abroad. Draft Bill 7,063 also proposes that this tax be extinguished, enabling issuers to pay higher returns to foreign investors.

Stressing the importance of macroeconomic conditions, Interviewee G1 argued that the issue of lower than expected risk-adjusted returns from infrastructure debentures is no longer relevant in the current scenario in which the country's basic interest rate (Selic) is decreasing. As argued by Interviewee G1, in the past, it was significantly more advantageous to invest in sovereign bonds than in private assets. As a result, the lower returns of corporate bonds were connected to the country's historically high interest rates rather than to the infrastructure sector. This perception was similarly voiced by Interviewees A1 and A2.

In short, there is partial support for the research proposition that the lower-than-expected risk-adjusted returns of infrastructure debentures curb the attraction of institutional investors, but not investments from retail investors.

Finally, Table 10 summarises the interview findings with regard to barriers previously identified in the literature.

51 These provisions were then separated from Draft Bill 7,063/17 and presented as a new Draft Bill (2,646/2020) in order to expedite approval of this instrument (Câmara dos Deputados, 2020).

52 (Machado Meyer, 2020)

TABLE 10

Summary of interview findings

RP	Barrier	Type of stakeholder			
		Government	Academia	Sector	Users
A1	Propose new projects	Strong support	Support	Conflicting views	No support
A2	Regulatory insecurity	No support	Conflicting views	Strong support	Strong support
A3	Judicial insecurity	-	Strong support	Strong support	-
A4	Risk-return ratio	Strong support	Support	Strong support	-
A5	Extra revenues	Low support	Conflicting views	Low support	-
A6	Regulating agencies	Insufficient evidence			
A7	Foreign currency risks	-	Conflicting views	Low support	-
A8	Environmental licensing	Conflicting views	Low support	Low support	-
B1	Low supply of green bonds	Support	-	-	-
B2	Lower than expected risk-adjusted returns of green bonds and infrastructure debentures	Support	Support	-	-

Source: The Authors



CHAPTER FIVE 

Final remarks

For Brazil to meet its Paris Agreement emissions targets, more effort must be put into shifting the country's freight transport matrix towards less-carbon-intensive modes, such as railways.

In view of the country's fiscal situation and the unavailability of public resources, an increase in private sector investments will be required to fill the railway infrastructure gap. Research from the Climate Policy Initiative (Buchner et al., 2019) shows that, in 2018, private actors made USD 326 billion available to finance climate mitigation and adaptation initiatives globally.

In order for developing countries like Brazil to tap into climate finance resources, they must offer investors a conducive business environment with legal security, favourable macroeconomic conditions and political stability (Yamahaki et al., 2020). In this context, this study sought to identify and explore the barriers that must be tackled to attract private investments for railway infrastructure in Brazil.

Firstly, the research team conducted an extensive literature review to identify (i) the barriers to the attraction of direct investors for railway projects and (ii) the barriers to the attraction of capital market investors for railway projects and companies. To explore these barriers, the team interviewed 11 stakeholders from the railway sector, including railway concessionaires, members of academia, government representatives and railway transport users.

In the interviews, there was particular support for Research Propositions A2, A3 and A4, contending that legal insecurity and the large amount of investments required for railway projects represent barriers to the attraction of direct investments for the sector. Regarding other research propositions, such as A1 and A5, the interviewees expressed different perceptions.

For instance, in RP A1, interviewees had divergent views. On the one hand, government representatives and some sector representatives claimed that allowing the private sector to propose new rail branches will increase private sector participation in railway operations and/or stimulate the use of "abandoned" branches. On the other hand, rail transport users are sceptical that the private sector will be interested in making such substantial investments and operating in a field that is not part of their core businesses.

This example indicates that there needs to be a stronger effort on the regulator's part to engage different stakeholders throughout the discussion so as to develop regulations that are effective and conducive to a more secure business environment for private investments.

Moreover, as noted throughout the interviews, there are already a number of policy proposals under discussion in Congress that could help to address some of the barriers identified. In this respect, a better understanding of which barriers are deemed most relevant could help to prioritise and direct scarce legislative efforts and resources towards certain policies.

Since data saturation has not yet been reached, the research team will continue investigating the railway sector in Year 2 of the SNAPFI project. Indeed, results from Year 1 offer a thorough description of a highly complex sector and provide the necessary basis to support the exploration and evaluation of specific policy solutions to increase private sector investment in the railway sector in Brazil. As for next steps, the team will organise a workshop with sector stakeholders to present the research results, gather their views and obtain feedback on which avenues they recommend that the research team focuses on in Year 2 (Table 11).

TABLE 11

Avenues for Year 2

RP	Barrier	Avenues for Year 2
RP A1	Propose new projects	To interview representatives from other economic sectors, such as agricultural commodity traders, and investigate their interest in the authorisation modality. To interview U.S. shortline companies to better understand the benefits of this modality.
RP A2	Regulatory insecurity	To examine the need to further regulate rights-of-way and the role of independent railway operators, explore the ability of concessionaires to return unused rail branches and monitor the status of the lawsuit against Law 13,488/2017 at the Federal Supreme Court.
RP A3	Judicial insecurity	To interview other stakeholders to verify the validity of the assertions regarding the uncertainties created by the interference of different government entities like ANTT, the Federal Court of Accounts, and the Public Prosecution Service in the concessionaires' legal environment.
RP A4	Risk-return ratio	To explore whether uncertainty related to the rate of depreciation of railway assets is an issue for concessionaires and to examine if/how these assets could be used as collateral in financing operations.
RP A5	Extra revenues	To investigate whether exploiting side businesses would be of interest to the concessionaires and whether there is already regulation concerning the distribution of income from side businesses.
RP A6	Regulating agencies	To explore whether/how regulating agencies negatively affect the attraction of private investments.
RP A7	Foreign currency risks	To explore the relevance of financial hedging instruments for concessionaires and the development of Draft Bills 2,889 and 7,063.
RP A8	Environmental licensing	To conduct interviews with environmental agencies.
RP B1	Low supply of green bonds	To conduct interviews with stakeholders from capital markets.
RP B2	Lower than expected risk-adjusted returns of green bonds and infrastructure debentures	To conduct interviews with stakeholders from capital markets.

Source: The Authors

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Appendix I:

Complementary issues or opportunities discussed during the interviews

- » Brazil has projects that can offer higher rates of return than international investors would find in their countries of origin.
- » Concessions in Brazil only last 30 years. Internationally, you can find concession contracts of up to 80 years. Longer concessions decrease the risk that concessionaires might refrain from making further investments in tracks that they may not retain in the near future.
- » Increasing railway capacity dedicated to bulk cargo for exports through contract renewals will also require investments in railway-port integration, for instance in new, expanded rail yards.
- » The most recent concession, the North-South railway, attracted only two local players, who already operate other concessions, and no foreign candidates, reflecting the complexity and uncertainties surrounding the sector.
- » Proposal of new projects requires frequent, long-term conversations and good relations with public authorities at all levels of government (municipal, state and federal).
- » Different gauge sizes prevent more integration between existing railways, and the costs to standardize gauge sizes would be too high to be achieved in the short term. Greenfield projects, however, tend to all be planned to employ the broad gauge (which represents 22% of the current national rail network).
- » Fuel costs represent the largest annual expenditure for concessionaires. Currently all locomotives use diesel as fuel.

- » Currently, the political focus is on expansion (and operations) almost exclusively based on cargo for exports, while railways could play a bigger role transporting general cargo (in containers) between different regions within Brazil (thus also reducing overreliance on road transport) and perhaps attract new, foreign players other than the current concessionaires that have specialised in transporting commodities.
- » One interviewee thinks that there is a limited supply of rail cars dedicated to materials other than solid bulk. Another interviewee had a different opinion and explicitly mentions recent innovations by Brazilian manufacturers, such as the double-stack rail car. Regardless, investments are substantial and transport users must make them because concessionaires are more focused on solid bulk cargo.
- » Users also incur large expenses to adapt their operations to use railways. These investments only make sense for large volumes and, perhaps, as part of new industrial projects (anchor investments).
- » Political will is an important factor to ensure clarity, celerity and expediency to new projects.
- » When railways were granted to concessionaires in the 1990s, obsolete rolling stock, found in the railway yards, was never collected by the National Department of Transport Infrastructure (DNIT), the owner of these assets. This is a hindrance for concessionaires as these assets occupy space that is used for locomotive manoeuvres. In addition, unused rail cars may be used for drug trafficking, prostitution and as a habitat for the vectors carrying tropical diseases.
- » There is a concern that the Tax Regime to Encourage the Modernisation and Expansion of Harbour Infrastructure (Regime Tributário para Incentivo à Modernização e à Ampliação da Estrutura Portuária (Reporto)) will not be continued after 2020. The program offers tax incentives for the purchase of railway assets.

