Scenario analysis

transition risks

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bradesco

Transportation sector

Brazil has particular conditions in terms of its transportation structure and dynamics. As an emerging economy with a continental geographic size, Brazil will face great challenges and opportunities in a transition towards a low carbon economy. To properly analyze the impacts of climate scenarios on the transportation sector in the country, a range of current elements and trends have to be discussed to understand their effects on bank portfolios.

Transportation in Brazil

In Brazil, the energy sector accounted for 21% of total greenhouse gas (GHG) emissions in 2018. Within it, the transport sector was the most carbon intensive and responded for 49% of the total GHG emissions (200.2 $MtCO_2e$), followed by energy consumption in the industrial (15%), fuel production (13%) and electricity generation (12%) sectors[1]. This paper brings a discussion on the effects at a segment level of transition scenarios on the transportation sector, which supported the assessment of Bradesco's credit portfolio exposure to transition risks, also described herein.

Air transport

Brazil, the fifth largest country in the world, is largely dependent on air transport, which generates approximately 0.5% of the national GHG emissions, a proportion that is likely to rise as emissions from aviation have increased at a faster pace than other sectors of the Brazilian economy. Between 2005 and 2015, for example, GHG emissions from international flights operated from/to Brazil have grown at a 4.5% annual rate[2]. As the segment is operated within international dynamics and regulations (even in the domestic activities), air transport is highly exposed to climate-related transition factors, such as new technologies and carbon pricing and offsetting demands[3]. Such elements can impose new significant operational expenses and investments according to the climate scenario employed in the analysis.

Maritime transport

Brazil plays a major role in global exports of key commodities, such as iron and farming products, which are essentially dependent on maritime transport. Domestically, there has been a recent development of the coast-to-coast shipping mode after a massive national strike by truck drivers in 2018, leading to an increase in the utilization of shipping for domestic freight transportation[4]. Although more efficient in terms of carbon emissions per load, if compared to road transportation, maritime transport is still a carbon intensive segment. As in air transport, international shipping is exposed to a range of changing market conditions and regulations, which may impose negative impacts on the segment. Thus, considering the combination of high emissions per dollar exported and the growing domestic share, the maritime transport segment is expected to be considerably exposed to transition risks.

Rail freight transport

Brazil is highly dependent on road transportation for freight, with only 15% of its freight transported by rail. A recent renewal of contracts with operators in the existing rail infrastructure provides for the modernization of these assets and can materialize in a greater amount of cargo transported by rail, contributing to a higher energy efficiency per load. Besides, it is expected to trigger the operationalization of new railway projects[5].

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[1] Análise das emissões brasileiras de gases de efeito estufa e suas implicações para as metas do Brasil 1970-2018 (SEEG, 2019)

[2] scielo.br/scielo.php?script=sci_arttext&pid=S0034-73292019000200203

[3] scielo.br/scielo.php?script=sci_arttext&pid=S0034-73292019000200203

[4] opetroleo.com.br/cabotagem-movimenta-608-milhoes-de-toneladas-entre-janeiro-e-abril/

[5] epocanegocios.globo.com/Economia/noticia/2020/02/governo-preve-investimento-de-r-30-bi-em-ferrovias-nos-proximos-5-anos.html

Road Transport

Brazil has a network of 1,720,700 kilometres of national roads and highways, standing as the fourth largest in the world. Here, we analyse the impacts of developments on both passenger and road freight transportation.

Electric and hybrid electric vehicles

In 2018, there were only around 11 thousand electric and hybrid cars running throughout the country, which represented only 0.025% of the total Brazilian fleet[6]. In 2019, a series of electric and hybrid vehicles were launched in Brazil, accompanied by the installation of energy charging stations, a move seen as a warning by manufacturers that the country will not be left out of the global efforts towards the adoption of Evs[7]. However, high prices at the national market are limiting to the consistent penetration of EVs and hybrid electric modes, which should therefore remain restricted to a small niche market, as there is no forecast of reaching a sales scale that justifies local production. Despite the small share in the national market, there are ongoing discussions and programs to stimulate the production of EVs. An example is a national program, the Rota 2030 program, sanctioned by the Brazilian government in 2019, which offers a set of federal government guidelines for the auto industry in the next decade. The program, with a particular influence on the individual transport segment, includes energy efficiency targets for vehicles powered by fossil fuels and incentives for automakers of hybrid and electric vehicles. In the city of São Paulo, electric and hybrid vehicles have a 50% discount on the Motor Vehicle Property Tax (IPVA) and are exempted from a vehicle municipal rotation, which prohibits the circulation of cars in the expanded city centre once a week, at certain times, based on license plate ends[8]. Although evolving at a slower pace than other countries, e.g. the U.S. and China, Brazil has been promoting electro-mobility and has the potential to further expand the segment if more ambitious target setting and supporting mechanisms are applied to incentivize it[9].

Biofuels

In Brazil, 65% of the cargo passes through roads on trucks[10]. While representing only around 1.5 % of the Brazilian GDP, the road cargo transportation sector's impact on the economy can reach nearly 30%, once this modal allows for interconnections between producer and consumer markets, making the economy flow. In 2018, emissions coming from trucks amounted to 82.6 MtCO2e, more than total emissions from all operating thermoelectric plants in Brazil[11]. Within this segment, biodiesel blends have been important players in terms of carbon footprint reduction. Brazil's sugarcane ethanol is also an important player in the national transport sector emissions reductions trajectory, particularly for cars. For instance, a peak in emissions from the transport sector in 2009 was highly associated with a decrease in ethanol consumption, given a competitive disadvantage against gasoline. Likewise, a decrease in emissions from the sector in 2015 resulted from the recovery of the ethanol industry. Fossil fuel replacement has been a key driver on emissions reductions in recent years. Between 2017 and 2018, a 5% reduction in GHG emissions from the transport sector derived mainly from fossil fuel substitution, i.e. gasoline by ethanol and the use of diesel with a minimum 10% blending percentage of biodiesel, a mandatory percentage regulated by law. The Biofuel was first tested in Brazil in the early 1940s, with patents being released in the late 1970s. It was only in 2004, though, that the first policy to promote the production and consumption of biofuel was created, as listed in the table below.

[6] epocanegocios.globo.com/Tecnologia/noticia/2019/09/carro-eletrico-no-brasil-do-zero-aos-bilhoes-em-10-anos.html

[7] epocanegocios.globo.com/Tecnologia/noticia/2019

[8] Governo zera imposto de importação para carro elétrico e a hidrogênio (CPFL, 2015)

[9] Na direção da eletromobilidade: uma transição possível? (FGV ENERGIA, 2019)

[10] O transporte rodoviário no Brasil e suas deficiências (Moreira et al., 2018)

[11] Análise das emissões brasileiras de gases de efeito estufa e suas implicações para as metas do Brasil 1970-2018 (SEEG, 2019)

Table 1: *Policies that helped to promote biodiesel in Brazil. Source: Oliveira & Coelho (2019)*

Year	Mechanism	Program name and acronym (in Portuguese)
2004	Decree No. 5297	Social Fuel Stamp (SCS)
2005	Law No. 11097	National Program of Production and Use of Biodiesel (PNPB)
2009	Law No. 12187	National Policy on Climate Change (PNMC)
2014	Law No. 13033	Mandatory blend on diesel: increase to 6% and 7%
2016	Law No. 13263	Mandatory blend on diesel: increase to 8%, 9% and 10%
2017	Law No. 13576	National Biofuels Policy (RenovaBio)

RenovaBio

The National Policy on Biofuels or Política Nacional de Biocombustíveis (RenovaBio) integrates the national energy policy and brings a nationwide scope aimed at radically expanding the production and use of biofuel, outlining rules for marketing biofuels in the country and fostering credibility and predictability of national fuel supply. In March 2018, the National Energy Policy Council (CNPE) defined annual compulsory targets to reduce emissions of GHGs, with individual goals assigned to fuel distributors by the Brazilian Petroleum Agency (ANP), which established fines to distributors that do not comply with their individual goals. A new feature of RenovaBio policy is the creation of important market mechanisms: The Certificate of Efficient Production of Biofuels (CPEB), to biofuels producers, and the Decarbonization Credits (CBios), to fuel distributors. The latter are instruments registered in the form of scripture to attest individual targets of distributors, whose achievement shall be assessed through the amount of credits held on the date defined by the policy. Each CBio corresponds to 1-ton tCO_2e and the calculation considers the difference between GHG emissions in the lifecycle of biofuel and its fossil substitute. The calculation includes energy efficiency and environmental impact. CBios first 100 units were traded in June, 2020 at a cost of US$10/Cbio[12].

Methodology

In the first Pilot-Project with UNEP FI on TCFD (2017/18), Bradesco analyzed the exposure of its transportation portfolio to transition risk pathways considering a 2ºC scenario and applied it to the sector's portfolio of late 2017. The segmentation adopted for sensitivity analysis followed that suggested by UNEP FI, based on the ISIC classification of sectors[13]. A multi-disciplinary squad, including representatives from economics, credit, risk and sustainability teams, conducted an assessment in order to translate the dynamics of the Brazilian transportation sector, the characteristics of Bradesco's portfolio and the most probable impacts of climate scenarios on our local reality.

[12] Brazilian carbon credit first trade at near $10/CBIO (S&P Global, 2020)

[13] Except for "Other transport manufacturing", which EAD demonstrated no significant materiality

Table 2: Sensitivity analysis of the transportation sector at a segment level

Segments	Risk factor pathways			
	Direct Emissions costs	Indirect Emissions costs	Low-Carbon CAPEX	Revenue
Automotive manufacturers	Moderately low	High	Moderately high	Moderate
Automotive component suppliers	High	High	Moderately high	Moderately high
Maritime services and freight	High	Moderately low	Moderately high	Moderately low
Ground transportation and logistics	High	Moderately low	Moderately high	Moderately high
Airline services and freight	High	Moderately low	Moderately high	Moderately high

Calibration

In addition to the overall sensitivity analysis, from each segment, the 5 most relevant borrowers were selected for the bottom-up tool calibration of each portfolio. Their current climate-related practices and performance were assessed based on their CDP Climate Change scores - primarily at the company level or, in its absence, at group or multinational level. Bradesco's case study of the present pilot features a review of Phase I heatmap analysis to adapt it and reflect a 1.5°C transition impact perspective on the selected segments in 2040. The adaptation was made through an overall aggravation of the segments' sensitivities that were applied to the previous 2°C heatmap, which results can be observed in Table 3. The segment sensitivity assessment was then applied to the late 2017 portfolio and to an early 2020 portfolio, to allow for an analysis of the evolution in credit risk exposure over the period. The CDP score was considered a consistent and comparable metric to measure the level of readiness each company presents to properly act to mitigate risks and explore climate-related opportunities. After internal discussions, a methodology was developed to translate the findings into impacts on companies' ratings, as presented below.

Table 3: Impact on rating based on CDP score

CDP score	Rating downgrade
A / A-	None
B / B-	1 level
C / C-	2 levels
D / D-	3 levels
F or no report	4 levels

Selected scenarios

The REMIND0-MAgPIE model was selected for the scenarios analysis for its capacity to integrate the bioenergetic demand with changes in land use, a particularly relevant feature to the present study due to the role that ethanol and biodiesel have in the Brazilian transport sector. Thus, in order to assess the difference between the impacts predicted in Phase I and Phase II 1.5 ° C scenarios, the portfolios were subjected to the treatments described in Table 4.

Table 4: Scenarios used in the analysis of the 2017 and 2020 portfolios

Portfolio	Phase I 1.5ºC	Delayed 1.5ºC (Phase II)
Transportation 2017	x	x
Transportation 2020	x	x

Results and discussion

The scenarios impacted the PDs quite similarly in the two portfolios, demonstrating that there was no significant impact of the delay in taking actions to transition foreseen in the Phase II scenario. These results are partially explained by the alike composition of primary energy consumption predicted for 2040 in both scenarios.

The portfolios of 2017 and 2020 did not differ significantly in terms of exposure by segment and, between 2017 and 2020; there was a notable positive evolution in the credit profile of customers. However, in this same period, there was no greater transparency in climate risk management and disclosure by customers, leading to a higher impact on the 2020 portfolio average PD by 2040.

Conclusion

This study presents some of the factors that can affect the credit quality of banks' portfolios in the transportation sector. While there are evident risks arising from technological, political, legal and market changes in transition pathways to a low carbon economy, Brazil presents important opportunities to use its internal conditions to prosper in this new context.

The study also showed that transition risk analysis tools are important allies to identify subsectors that are most resilient to policies aimed at a low carbon economy, as well as those that are most exposed to these risks.

Banks should interpret the future scenarios of sectoral and sub-sectoral changes not only from the perspective of risk management, but mainly, as a strategic agenda for engaging with clients to encourage climate disclosure and to offer them financial solutions that will support businesses to become more carbon efficient and resilient to the broad effects of climate change in Brazil.

For more banking pilot studies, please visit the UNEP FI website: https://www.unepfi.org/climate-change/tcfd/tcfd-for-banks/