Country Development Challenges: Route toward Sustainable and Inclusive Growth

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Executive Summary

Brazil was already facing a sluggish economic recovery prior to the COVID-19 pandemic. Between 2014 and 2016, the country experienced a deep recession marked by substantial drop in economic activity combined with a reversal of recent gains in social indicators. From 2017 to 2019, GDP growth was unable to fully recoup the losses incurred during the recession. In recent decades, Brazil has repeatedly experienced this pattern, with a sharp decline in economic activity followed by an anemic recovery.

On the supply side, the accumulation of capital and labor has been largely responsible for GDP growth in recent decades, while productivity growth has been sluggish since the 1980s. Weak productivity growth makes expansions difficult to sustain. Together with demographic changes and insufficient levels of savings and investment, growth driven by factor accumulation tends to be both slow and volatile. With the exception of some sectors; as agriculture and mining, the Brazilian economy is not able to compete abroad. Brazil is ranked 59th out of 62 countries in the World Competitiveness Ranking 2022, three positions below the 56th place it held in 2020. Aggregate labor productivity has increased only 0.9% per year between 1995 and 2021[1]. Business environment pose challenges for companies to expand. According to the WEF Global Competitiveness Index published in 2019, Brazil ranked last out of 141 countries in terms of the burden of government regulation. It also ranked near the bottom of the index (124th) in terms of product market efficiency, due to poor internal competition and distortive subsidies.

1 FGV-IBRE (2022)

In addition, serious fiscal imbalances continue to threaten macroeconomic stability and growth in Brazil. From the late 1990s through the mid-2010s, Brazil ran sizeable primary surpluses. However, these surpluses were obtained through repeated increases in the tax burden and cuts to public investment without a comprehensive program for limiting the growth of expenditure or improving the quality of public spending. This approach resulted in a large debt burden, with a significant share of debt maturing in the short term, as well as interest rates that are higher than in many comparable emerging market economies. Since 2016, several initiatives have attempted to limit the erosion of the fiscal balances, including a constitutional amendment to curb the real growth of primary spending and reforms to the pension system. However, these measures proved insufficient to contain the growth of expenditure. Unsustainable fiscal dynamics are not limited to the federal government, and subnational authorities have also faced deteriorating fiscal balances over the last decade. The rigidity of the budget and the high level of public debt impede the public sector to act counter-cyclically to offset negative activity shocks.

Poverty and inequality impose binding constraints on growth and development. Brazil is one of the world's most unequal countries. Despite modest improvements in recent decades, slow economic growth and ineffective public policies have kept poverty and inequality indicators stubbornly high. Administrative inefficiency, inadequate public accountability, and the opacity of the policy process

contribute to weak productivity growth, high poverty rates, and entrenched social inequality.

The pandemic exerted a significant impact in the country in different dimensions, exacerbating its structural challenges. Human, economic, social and political questions suffered the impact of the pandemic. The pandemic highlighted several shortcomings in Brazilian public policies. The weak advance in productivity has been producing a slow recovery with a labor market that does not have the capacity to create high-quality jobs. Although the government has built a comprehensive package of measures to contain the impacts of the pandemic, it resulted in a weakening of the fiscal situation. In addition, the country has seen an increase in poverty and inequalities given the heterogeneous nature of the impact of the pandemic and lack of adequate social protection system. FMI (2022) finds that Brazilian students who faced total or partial school closures will experience some of the greatest lifetime income losses in the G-20 at an estimated 9.10% loss in lifetime income. The pandemic also brought back the inflationary issue and rising interest rates, creating more macroeconomic instability in the country. Finally, the pandemic has made the country more dependent on commodity trade and increased the country's trade ties with China, its main trading partner.

Growth is necessary but not sufficient to reduce poverty and inequalities. Persistently high levels of poverty and inequality show that growth in isolation cannot resolve Brazil's social problems. A structural improvement of social outcomes involves efficient and focused public policies, and a more agile, effective, and fiscally sustainable public sector. Efficiency gains in the public sector requires that relevant public policies are designed, implemented, monitored, assessed, and adjusted according to international best practices. Targeting public polices in the most vulnerable groups generates more advances in reducing poverty and inequalities and accelerates the growth of productivity.

In a post-pandemic world, policies that facilitate digital transformation and a balanced use of Brazil's abundant natural capital will be vital to achieving inclusive and sustainable growth. Globally, the COVID-19 pandemic accelerated the digital transformation and a push toward a greener society. New technologies create both challenges and opportunities for development: they can help countries accelerate economic growth, improve competitiveness, manage resources more efficiently, and extend essential services to the poorest and most-vulnerable households; at the same time, they threaten to disrupt labor markets and displace certain workers. Managing such complex trade-offs will require forward-looking policies. In addition, Brazil's natural assets—already an important source of income for many households—offer critical opportunities for economic and social development, especially in less-developed regions of the country. Policies that facilitate digital transformation, and promote a sustainable exploitation of natural capital, can mitigate the social costs of necessary reforms to the business and fiscal environments, while raising living standards across the country.

The actionable recommendations presented in this document are organized under four strategic pillars. These are:

- **I.** Promoting a resilient recovery;
- **II.** Adopting a new social agenda for an inclusive growth;
- **III.** Fostering the digital transformation for development; and
- **IV.** Incorporating green growth into country's development model. These strategic pillars and their corresponding policy actions are highly interdependent and should not be pursued in isolation.

Table 1 summarizes some of the critical policy actions, which are discussed in greater detail in chapter 3. The policy recommendations are designed to enhance growth and social indicators and contribute to the achievement of Brazil's development goals.

PILLAR 1. Promoting a Resilient Recovery

SUPPORT INTEGRATION WITH REGIONAL AND INTERNATIONAL MARKETS	1. Make progress on trade-policy agenda 2. Accelerate Regional Integration 3. Improve trade facilitation and logistics for export 4. Strengthen investment- and export-promotion activities
BOOST INVESTMENT IN INFRASTRUCTURE	1. Build a National Public Investment System 2. Improve the regulatory and institutional framework for public investment 3. Mobilize private capital for long-term financing
DEVELOP PUBLIC-PRIVATE PARTNERSHIPS (PPPS)	1. Maintain a centralized PPP program 2. Streamline the PPP process and enhance its transparency 3. Build institutional capacity, especially among subnational governments 4. Improve the fiscal management of PPPs
REMOVE BARRIERS TO BUSINESS GROWTH	1. Improve the regulatory framework 2. Create the conditions to reduce banking spreads 3. Support strengthening of Development Financial Institutions (DFIs) 4. Promote credit, develop capital markets, and crowd in private sources of finance to encourage investment and expand financial access
STRENGTHEN THE FISCAL FRAMEWORK	1. Strengthen the program evaluation process 2. Reinforce the link between planning, budget and performance at the institutional level 3. Adopt a medium-term budget framework 4. Revise the tax system 5. Embrace a more cooperative federalism 6. Strengthen accountability and transparency in the public sector

PILLAR 2. Adopting a new social agenda for an inclusive growth	
FOCUS PUBLIC POLICES FOR REDUCING POVERTY AND INEQUALITIES	1. Formulate public policies that promote equity and target the most vulnerable 2. Improve representation and remove stereotypes 3. Reinforce cognitive and socio-emotional skills of students and workers 4. Develop training programs
PREPARE THE YOUTH FOR THE FUTURE	1. Expand the coverage and improve the quality of childcare 2. Enhance the design of cash transfer programs to maximize their benefits for children 3. Use technology to expand and improve access to quality education 4. Implement curricular and high-school reforms 5. Mitigate the impact of the pandemic on students
BUILD STRONG SOCIAL PROTECTION AND LABOR MARKET	1. Expand and improve the existing structure of social protection 2. Improve data quality to identify all vulnerable citizens 3. Review and consolidate the *Auxilio Brasil* program 4. Develop a comprehensive policy for long-term care 5. Consider policy options for reducing informality 6. Strengthen the public employment system 7. Develop qualification and requalification programs
IMPROVE THE ACCESSIBILITY, QUALITY, EFFICIENCY, AND EQUITY OF HEALTH SERVICES	1. Increase public financing in health 2. Improve the efficiency and quality of services 3. Enhance coordination among different levels of government 4. Adopt a healthcare-service delivery model founded on primary care 5. Use innovative health services modalities
MAKE CITIES SAFE AND INCLUSIVE	1. Prioritize violence prevention 2. Improve the effectiveness of existing policies 3. Restructure the penitentiary system 4. Support integrated programs of neighborhood upgrading 5. Incentivize private investment in housing development 6. Implement land titling and home improvement programs 7. Support innovative models of housing production 8. Develop an integrated urban-renewal program 9. Assess alternatives to traditional housing programs

PILLAR 3. Fostering the Digital Transformation for Development	
PROMOTE INNOVATION TO BOOST GROWTH	1. Enhance the efficiency of public investment in innovation 2. Create new financial instruments for innovation 3. Utilize public procurement to increase investment in innovation 4. Support innovation in value chains or clusters 5. Develop capacity for innovation within private firms
BUILD THE CAPACITY OF WORKERS TO UTILIZE NEW TECHNOLOGIES	1. Organize scholarship programs for digital training 2. Develop mentorship opportunities, support networks, and role models for underrepresented groups in STEM fields 3. Digitally transform education pedagogical practices and management systems 4. Create new academic models to align student skills with market demand 5. Incentivize the development of online platforms that match workers with jobs
DEVELOP INFRASTRUCTURE FOR NEW TECHNOLOGIES	1. Promote investment in telecommunications and improve sectoral regulation 2. Enhance the digital ecosystem 3. Incentivize to the banking sector to finance digital infrastructure 4. Promote PPP and concession schemes in rural and underserved areas
FACILITATE ENTREPRENEURSHIP FOR A DYNAMIC ECONOMY	1. Leverage new sources of funding for early-stage start-ups 2. Reduce bias in investment 3. Promote the incubation and acceleration of startups 4. Support the pipeline of founders from underrepresented groups 5. Create open innovation financing instruments 6. Increase international cooperation
LEVERAGE NEW TECHNOLOGIES TO BOOST PRODUCTIVITY	1. Enact structural reforms to encourage competition and global integration 2. Reduce the fiscal burden that limits technological uptake 3. Encourage the adoption and utilization of innovative technologies 4. Strengthen industrial segments in which Brazil has comparative advantages 5. Promote the development of sustainable agricultural technologies
IMPROVE THE QUALITY OF LIFE AND INCLUSION USING NEW TECHNOLOGIES	1. Support the development of smart cities 2. Encourage the expansion of municipal broadband connectivity 3. Assist municipal authorities in developing and implementing data management policies 4. Support capacity-building programs related to smart cities 5. Boost fintech companies to improve access to financial services 6. Reduce bias in the financial system 7. Enable credit expansion to facilitate inclusion
USE THE TECHNOLOGY TO IMPROVE THE EFFICIENCY AND TRANSPARENCY OF THE PUBLIC SECTOR	1. Adopt digital technologies to support fiscal policymaking and fiscal management 2. Use digital technologies to strengthen expenditure management 3. Utilize digital technologies to improve social programs 4. Support the digital transformation of the public sector at subnational level

PILLAR 4. Incorporating Green growth into the country's development model

FOSTER ADAPTATION AND CLIMATE RESILIENCE	1. Curb deforestation 2. Mitigate transition risks 3. Develop a carbon market 4. Propose a green fiscal policy 5. Reduce fossil-fuel subsidies 6. Streamline socioemotional and education skills for climate change in the new curriculum
BUILD A SUSTAINABLE, RESILIENT AND INCLUSIVE INFRASTRUCTURE	**Energy** 1. Diversify the electricity matrix 2. Rethink electricity pricing and tariff structures 3. Position the country as a provider of low-carbon energy solutions 4. Follow and support shifts in the power sector **Water, sanitation, drainage and waste management** 1. Address institutional and regulatory bottlenecks 2. Accelerate innovation and digital transformation in service delivery 3. Improve quality of drainage projects **Transport** 1. Invest in the transportation sector 2. Adopt a green growth strategy 3. Support logistics corridors and multimodal transport 4. Enhance resilience in the transport sector 5. Advance the electrification of public and private transport **Green Cities** 1. Reduce GHG emissions through sustainable integration of urban planning and green mobility systems 2. Develop low-carbon cities, setting out goals for urban decarbonization 3. Enhance resiliency in urban environments 4. Reduce atmospheric, water, acoustic, and soil contamination
PROMOTE SUSTAINABLE ECONOMY: BIOECONOMY, AGRICULTURE, MINING AND TOURISM	**Bioeconomy** 1. Tailor policies to support the bioeconomy 2. Accelerate the productive transformation of the bioeconomy 3. Promote innovation and research to create sustainable business opportunities 4. Incentivize sustainable production methods **Agriculture** 1. Strengthen and promote climate goals and reduce deforestation 2. Reform the ATER system 3. Expand the capacities of producer organizations 4. Invest in training in rural areas 5. Strengthen the agricultural health system **Tourism** 1. Build institutional capacity to develop and manage sustainable tourism 2. Improve logistics, sanitation, and telecommunications infrastructure 3. Adopt a tourism model based on high service quality and sustainability 4. Improve the use of technology in the tourism sector 5. Reorient tourism to strengthen communities and local businesses 6. Invest in nature-based solutions
CHANNEL FINANCIAL RESOURCES FOR THE GREEN ECONOMY	1. Develop technical assistance programs and appropriate regulations for green finance 2. Build a global climate-information architecture 3. Analyze the impact of fiscal incentives 4. Establish a pipeline of sustainable projects 5. Use credit-enhancement instruments, such as partial guarantees, to develop a multi-tranche sovereign green bond

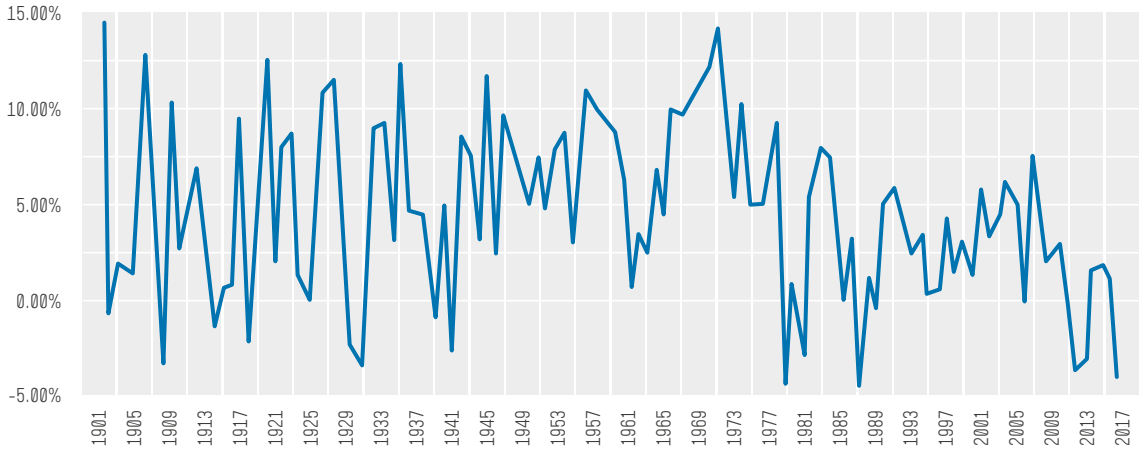
1 Economic Context

Economic Trends Prior to the Covid-19 Pandemic

1.1. Brazil was already facing a sluggish economic recovery before the onset of the pandemic. Between 2014 and 2016, the Brazilian economy experienced one of the deepest recessions in its history. This recession marked the end of a decade of robust economic growth fueled by credit and consumption. From 2017 to 2019, growth was anemic at an average annual rate of about 1%. While economic activity was expected to accelerate in 2020, the pandemic swiftly rendered previous forecasts obsolete.

1.2. Brazil's GDP growth has generally been volatile, and over the last decade it reached its lowest historical average. The growth of the Brazilian economy has been volatile, especially in recent decades. After experiencing rapid growth from the late 1960s through much of the 1970s, a period known as the "economic miracle," Brazil proved unable to sustain this robust expansion. In the 1980s, an external debt crisis caused growth rates to plunge, resulting in a "lost decade." Growth modestly accelerated in the 1990s and 2010s, but in the 2010s the country experienced its weakest expansion in over a century, as a deep pandemic-induced contraction in 2020 pushed the average growth rate to just 0.28%, far below the level of the "lost decade." Even in the absence of the pandemic, economic activity would have reached a record low during the 2010s, as the annual GDP growth rate averaged just 0.76% between 2010 and 2019.

FIGURE 1.1. GDP real growth (%) 1901-2020



Source: Ipeadata

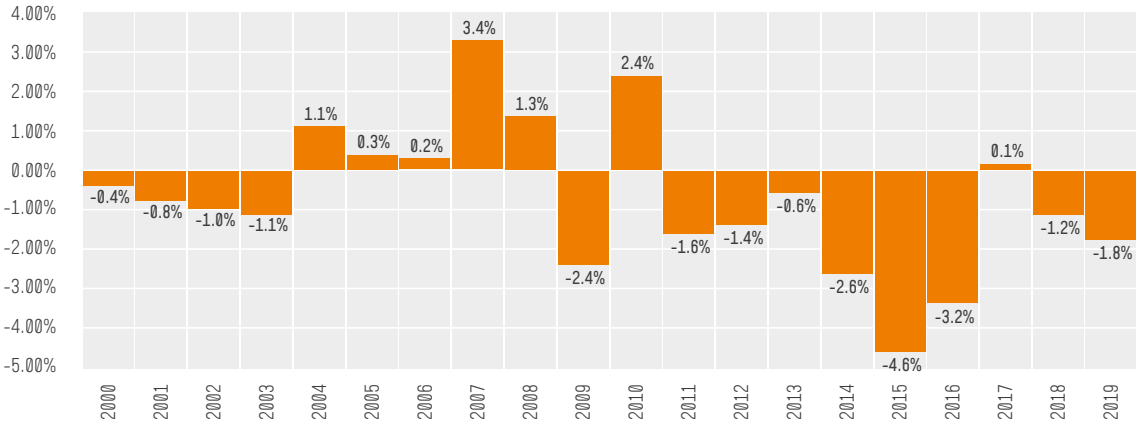
Period	Average Growth
1901 - 1910	4.38%
1911 - 1920	4.34%
1921 - 1930	4.62%
1931 - 1940	4.48%
1941 - 1950	5.97%
1951 - 1960	7.41%
1961 - 1970	6.22%
1971 - 1980	8.67%
1981 - 1990	1.67%
1991 - 2000	2.63%
2001 - 2010	3.71%
2011 - 2020	0.28%

Source: Ipeadata

1.3. Indicators of aggregate productivity have performed poorly over the last few decades, suggesting that the causes of Brazil's sluggish growth are deep-seated and persistent.[1] Total factor productivity (TFP) fell significantly in the 1980s,[2] dropping at an annual average rate of 0.6% between 1981 and 1990. In the 1990s, TFP growth turned positive but remained modest, expanding at an average rate of 0.1% percent per year. Several studies have credited trade liberalization with boosting productivity during the decade. In the early 2000s, TFP remained below its 1980 level; however, the TFP growth rate accelerated to an average of 1.5% per year over the decade. In the 2010s, TFP growth again turned negative, contracting at average annual rate of 0.1%. This decline in productivity was particularly acute during the 2014-2016 recession, when the TFP growth rate plunged by almost 1.0% per year. In 2019, Brazil's TFP was only 15% higher than it was at the beginning of the 1980s, and the TFP growth rate remained modest at just 0.3%. Despite several government initiatives in the last decade, productivity growth continues to be modest in Brazil. [3]

1 There are different methodologies to calculate the evolution of the Total Factor Productivity (TFP). Here it is shown the results available at https://ibre.fgv.br/observatorio-produtividade
2 According to Menezes-Filho, Campos and Komatsu (2014) since the 1980s, agriculture began to show greater productivity growth and productivity of the manufacturing sector has declined. According to Silva, Menezes-Filho and Komatsu (2016) the fall in productivity in the 1980s was only not larger because of the increase in structural change in the country.
3 FGV-IBRE (2022)

FIGURE 1.2. The Evolution of Total Factor Productivity in Brazil



Source: FGV and Penn World Table

1.4. Gains in productivity have never been the main engine of economic growth in Brazil. GDP can be decomposed into three components: TFP, the capital stock, and the labor force. Table 1.1 shows that the evolution of the capital stock has accounted for the largest share of growth in Brazil in all periods since 1948, except for 2000-2010. In no period was productivity growth the primary contributor to growth. Moreover, declining productivity slowed economic growth during the 1980s and 2010s.

1.5. Brazil's growth drivers are approaching exhaustion. The country's demographic dividend ended in 2018, when the working-age population's share in the total population began to decline (Velloso et. al., 2020). This trend is expected to continue over the coming years, increasing the demographic burden. Meanwhile, the investment-to-GDP and savings-to-GDP ratios are also diminishing. Sustaining an annual economic growth rate of 5.1% would require investing an estimated 22% of GDP each year, and each percentage-point increase in the investment rate would boost the GDP growth rate by an estimated 0.4% (Bonelli and Bacha, 2011). However, Brazil's already low savings and investment rates are likely to decline further over the coming decades. Low productivity growth together with a higher global interest rates and financial costs may inhibit long-term investment, particularly in key sectors such as infrastructure. In this context, the only way to generate robust economic growth will be to implement reforms that spur a substantial and sustained increase in productivity growth.

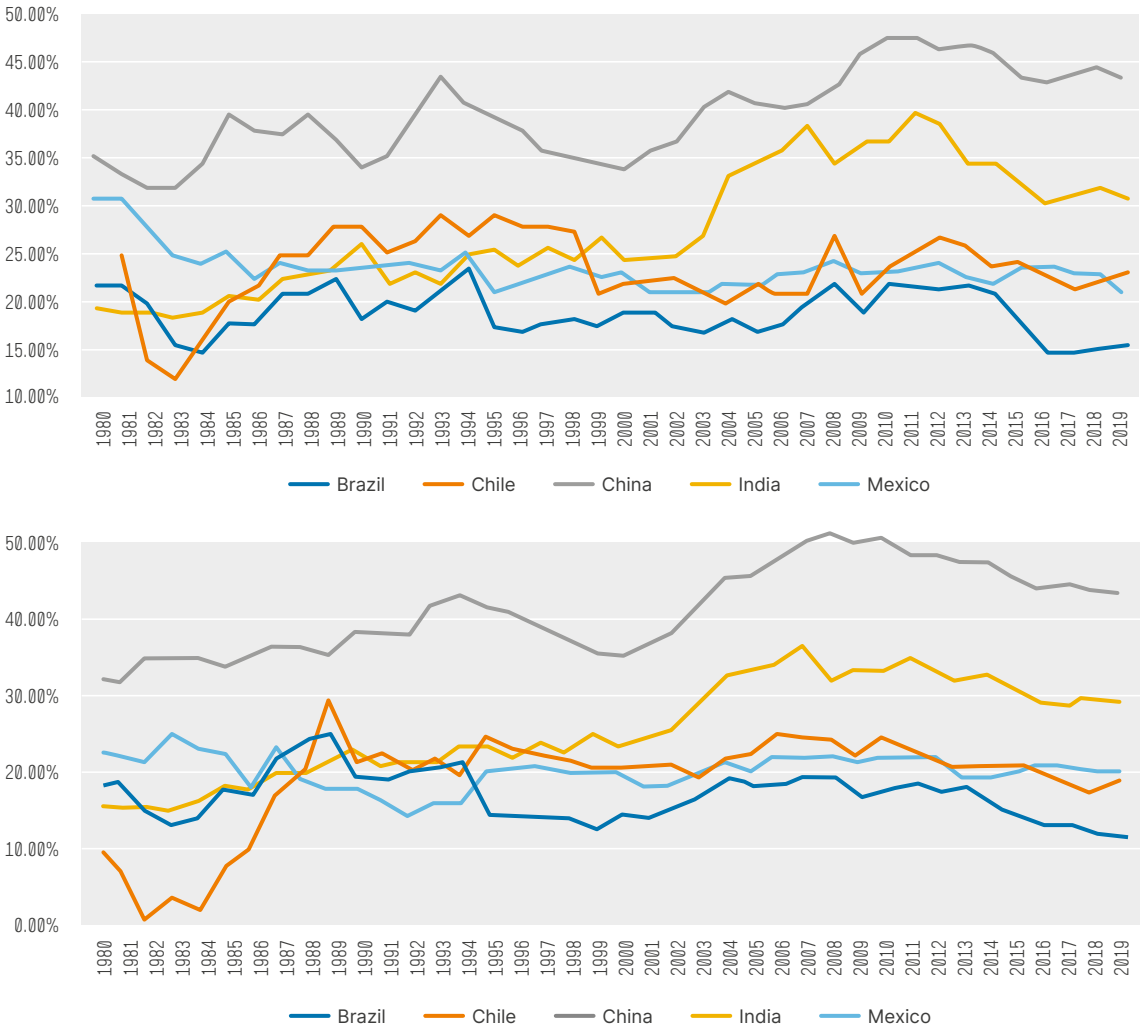
TABLE 1.1. Growth Accounting – 1948 – 2019

	Contribution to Growth		
	TFP	Capital	Labor
1948-1962	27%	51%	22%
1963-1967	16%	67%	17%
1968-1973	33%	42%	25%
1974-1980	13%	61%	26%
1981-1992	-71%	89%	82%
1993-1999	9%	49%	42%
2000-2010	31%	34%	35%
2010-2019	-14%	85%	29%

Source: Bonelli and Bacha (2011) and Velloso et. al. (2020)

1.6. Low levels of productivity are observed across all sectors of the Brazilian economy. The aggregate productivity of the United States is about six times higher than that of Brazil, underscoring the country's considerable distance from the technological frontier (Ferreira et. al., 2017). Although Brazil's agricultural sector has experienced the

↓ **FIGURE 1.3.** The Evolution of the Investment-to-GDP Ratio and the Savings-to-GDP Ratio



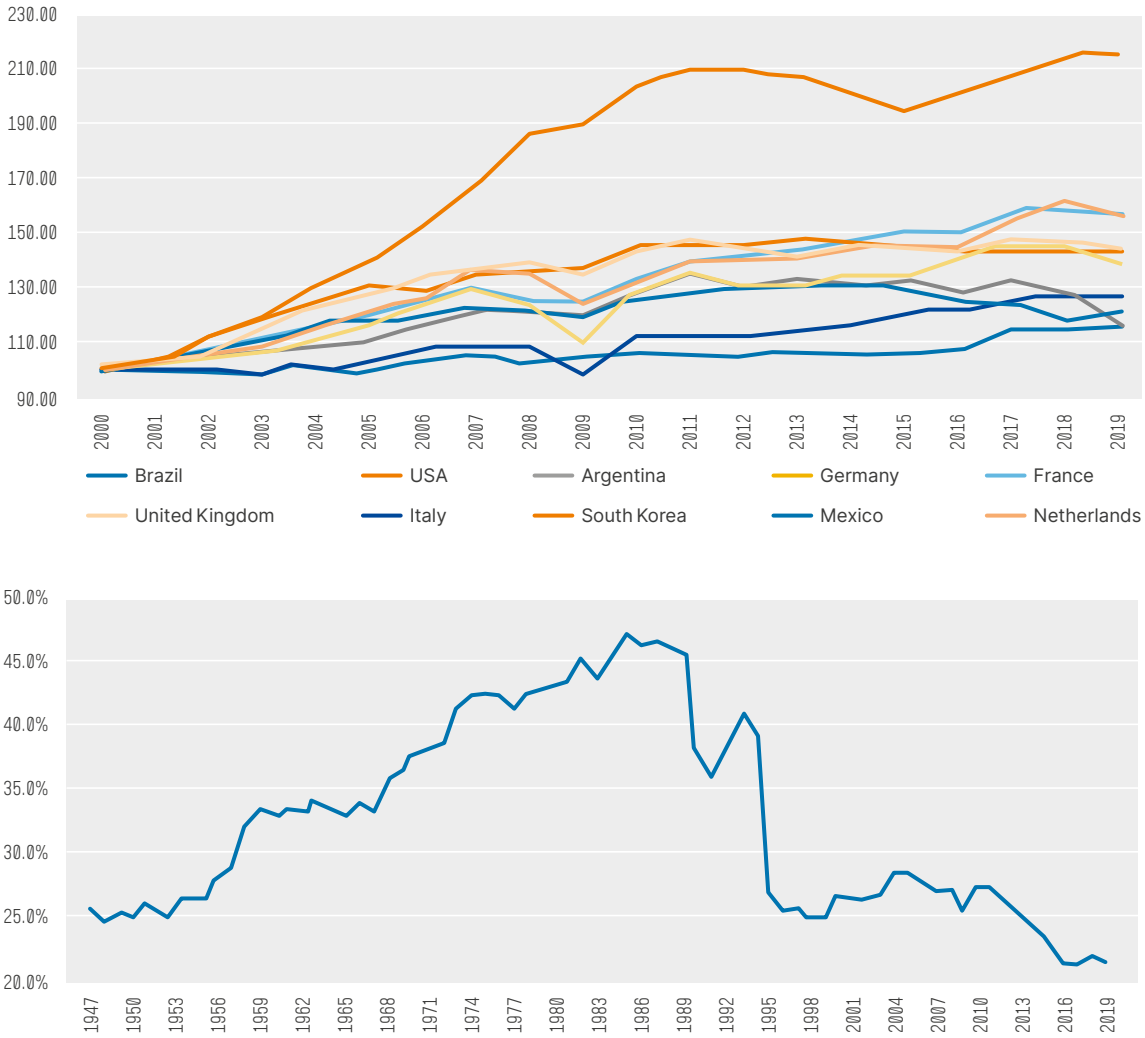
Source: IMF-WEO

fastest productivity growth rate of any sector over the last two decades, the U.S. agricultural sector is still about 14 times more productive. The U.S. manufacturing sector is 5.7 times more productive than its Brazilian counterpart, while the U.S. service sector is 5.4 times more productive.

1.7. Slow productivity growth has reduced the manufacturing sector's share in GDP. Productivity growth rates in Brazil's three major sectors have been highly uneven (Veloso et al., 2022). The service sector accounts for about 70% of total hours worked and 73% of all added value, yet its average productivity growth rate has been anemic at 0.4% per year between 1995 and 2021. Agricultural productivity grew rapidly over the period, rising by an average of 5.6% per year, but productivity in the manufacturing sector declined by an average of 0.2% per year, and the sector's recent performance has been poor by the standards of comparable countries (Menezes-Filho et al., 2016). Between 2007 and 2018, the productivity of the manufacturing sector plunged by 14.3%, with declines observed across most subsectors, and government subsidies and incentives were unable to reverse this trend (Mendonça et al., 2020). Persistently negative productivity growth reduced the manufacturing sector's share in GDP from 48.0% in 1985 to 21.4% in 2019.

1.8. As the economy recovered, employment indicators improved slightly in the years prior to the pandemic. Reflecting its rigid labor market and

FIGURE 1.4. The Evolution of the Manufacturing Sector's Productivity across Countries (2000-2019) and the Sector's Share in Brazil's GDP (1947-2019)



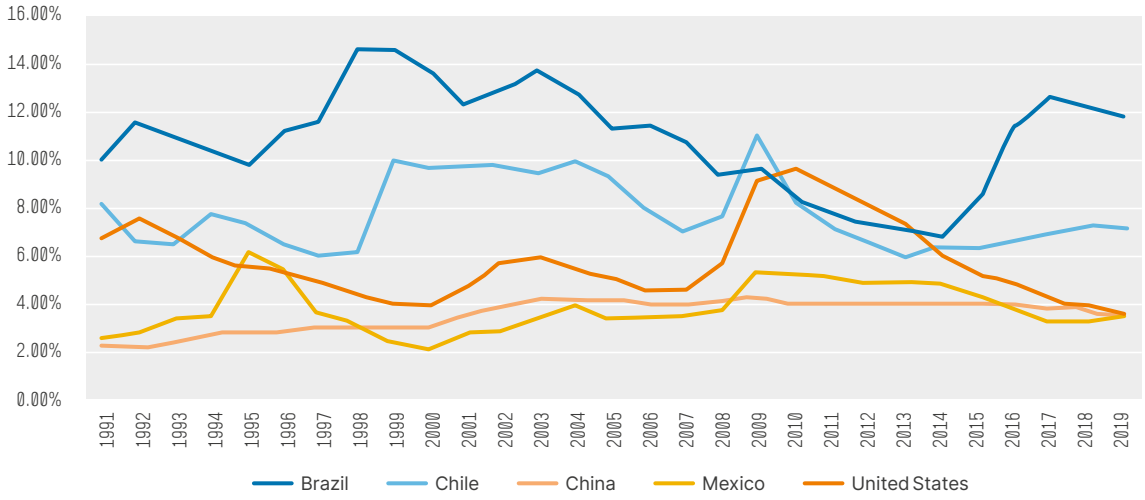
Source: CNI

slow productivity growth, Brazil has higher levels of unemployment than many comparable countries. The unemployment rate fell steadily from the late 1990s until the recession of 2014-16, which severely weakened the labor market. Unemployment started to increase in 2014 and peaked at 13.7% in the first quarter of 2017 before falling from through 2019. Between 2017 and 2019, the employment growth was concentrated in occupations normally associated with the informal sector. Nominal employment growth remained sluggish, the quality of newly created jobs was low, and the unemployment rate fell only slightly during the period.

1.9. Brazil has long been among the world's most unequal countries. Since well before the COVID-19 pandemic, Brazil has exhibited high levels of social and economic inequality. In recent decades, periods of robust growth have yielded improvements in poverty and inequality, but these gains have been limited, uneven, and in some cases temporary. In 2020, the World Inequality Database[4] found that households in the top 10% of the income distribution received 58.6% of all pretax income, while those in the bottom 50% received just 10%. Income inequality in Brazil is both extremely high and broadly persistent over time.

4 https://wid.world/country/brazil/

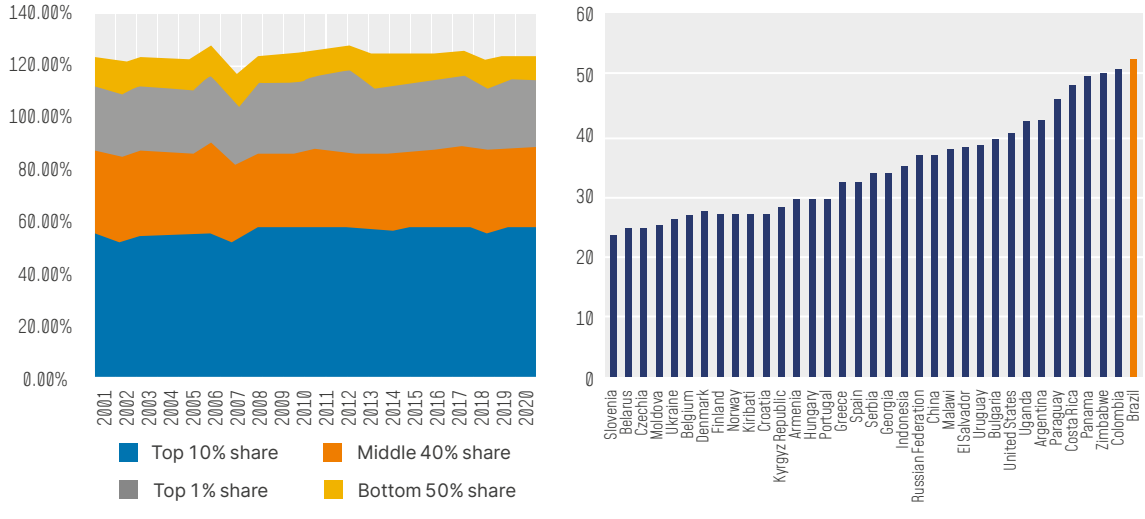
FIGURE 1.5. The Evolution of the Unemployment Rate, Brazil and Comparators (1991-2019)



Source: IMF

1.10. The 2014-2016 recession disrupted an improving trend in social indicators, and the pandemic derailed a subsequent recovery. The Gini coefficient fell from 0.545 in 2018 to 0.543 in 2019, approaching but not reaching its historical low of 0.524 in 2015. According to the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística, IBGE), the poverty rate was 24.7% in 2019, indicating that 51.7 million Brazilians were living on less than R$436 (US$ 80.00) per month just prior to the pandemic. Moreover, the extreme poverty rate was 6.5%, implying that 13.69 million people were living on less than R$151 per month.[5] By contrast, the poverty rate in 2014 was 22.8% (45.8 million people), while the extreme poverty rate was 4.5% (9.0 million people), reflecting a broad deterioration in poverty indicators over the period. Between 2015 and 2019, an additional 5.9 million people fell below the poverty line, a 12.9% increase in the poor population, while an additional

FIGURE 1.6. Distribution of Income in Brazil (2001-2020) and the Gini Coefficient in Brazil and Comparators (2019)



Source: World Inequality and World Bank

5 Poverty status is determined by dividing total household income by the number of household members.

4.7 million people fell below the extreme poverty line, a 51.5% increase in the population living in extreme poverty. The middle class expanded by 35 million people from 2002 to 2012, when it comprised 53% of the Brazilian population.[6] However, this trend appears to have stalled and reversed in the years since. According to the IADB's Labor Markets and Social Security Information System (Sistema de Información de Mercados Laborales y Seguridad Social), 8.7 million Brazilians fell from the middle class into poverty between 2014 and 2018.

1.11. Salient gender and racial disparities are evident across several dimensions of poverty and inequality. The economic activities most common among lower-income households, including domestic services, agriculture, and construction, employ the largest shares of Afro-Brazilians (pretos)

TABLE 1.2. Distribution of Household Income per Capita by Demographic Characteristics, Brazil (2019)

			HOUSEHOLD INCOME PER CAPITA					
			Below US$1.90 in 2011 PPP terms			Below US$5.50 in 2011 PPP terms		
	Population	Share (%)	Population	Share (%)	Distribution (%)	Population	Share (%)	Distribution (%)
Total	209,415,000	100.0	13,689,000	6.5	100.0	51,742,000	24.7	100.0
GENDER								
Men	101,054,000	48.3	6,525,000	6.5	47.7	24,883,000	24.6	48.1
Women	108,361,000	51.7	7,163,000	6.6	52.3	26,859,000	24.8	51.9
COLOR OR RACE								
Branco (White)	89,373,000	42.7	3,055,000	3.4	22.3	13,168,000	14.7	25.4
Preto (Afro-Brazilian) or Pardo (Mixed Race)	117,855,000	56.3	10,499,000	8.9	76.7	38,072,000	32.3	73.6
SEX AND COLOR OR RACE								
Branco Men	42,222,000	20.2	1,420,000	3.4	10.4	6,298,000	14.9	12.2
Preto and Pardo Men	57,790,000	27.6	5,049,000	8.7	36.9	18,358,000	31.8	35.5
Branco Women	47,151,000	22.5	1,635,000	3.5	11.9	6,870,000	14.6	13.3
Preto and Pardo Women	60,065	28.7	5,450	9.1	39.8	19,714	32.8	38.1

Source: IBGE (2020)

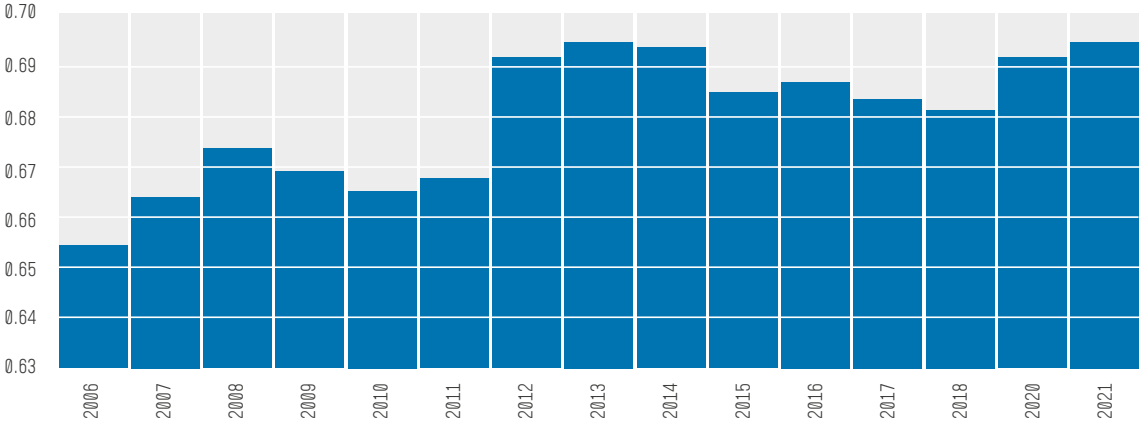
6 SAE (2012). Please note that this study exclusively relies on an income criterion to identify the middle class, which it defines as households with per capita monthly income levels between R$ 291 and R$1,019.

and mixed-race Brazilians (pardos). In 2019, the average wage among employed Brazilians of European descent (brancos) was 73.4% higher than the average for pretos and pardos,[7] while men of all ethnicities earned 29.6% more than women. In 2019, the employed branco population received a higher hourly wage rate than the preto or pardo population across all education levels, with the largest disparity observed among those who had completed a superior degree. The average wage rate for brancos with a completed superior degree was R$33.90, while the average for pretos and pardos with the same degree was R$23.50, indicating a wage gap of 44.3%. In addition, informality was far more common among preto and pardo workers than their branco counterparts. Similar shares of men and women were employed informally, but their occupation types differed. Men were more likely to be unlicensed employees or self-employed workers, while women were more likely to be engaged in household labor or informal care work, especially caring for dependent family members. Between 2012 and 2019, the average income of preto and pardo households was about half the average for branco households. The IBGE defines 42.7% of the population as brancos and 56.3% as pretos or pardos, but in 2019 pretos and pardos accounted for 77% of all households in the bottom income decile, while brancos accounted for 70.6% of households in the top decile.

1.12. Women's social and economic inclusion is increasing, but numerous challenges remain. Brazil's 1988 Constitution established formal legal equality between men and women, and subsequent laws and public policies, such as the 2012-2015 National Plan for Women, have aimed to promote gender equality in practice. Nevertheless, gender disparities persist across Brazilian society, and additional targeted policies will be needed to accelerate progress toward full equality. Brazil ranked 93 among 156 countries in the World Economic Forum's 2021 global gender report. The report found that Brazilian women were underrepresented in politics, received lower pay, suffered more harassment, and were more vulnerable to unemployment than men.

1.13. Despite sustained efforts to reduce racial inequality in Brazil, significant disparities persist. The Secretary of State for Human Rights introduced affirmative action in 2002, and a new Secretary of Policy for the Promotion of Racial Equality was established in 2003. The government also incorporated racial equity perspectives into sectoral policies to advance the basic rights of the preto and pardo populations, but these efforts have achieved limited success. In 1950, the average life expectancy at birth was 47.5 years for brancos and 40.1 years for pretos, a gap of 7.4 years. By

↓ FIGURE 1.7. World Gender Gap Index, Brazil (2006-2021)



Source: World Economic Forum (1=total parity; 0 = total disparity)

7 These terms are used by the IBGE, which disaggregates economic data across five racial categories: pretos, pardos, brancos, amarelos (people of East Asian descent), and indígenas (people of Amerindian descent). The term "pardo" primarily refers to people of mixed ethnic heritage, but it may also encompass certain Asian and Amerindian communities.

TABLE 1.3. Life Expectancy at Birth (1950–2017) and Average Years of Schooling (1976–2008) by Race

	Life expectancy at birth (years)						Average years of schooling					
	1950	1960	1980	1991	2008	2017	1976	1986	1998	2008	2012	2020
Branco (White)	47.5	54.7	66.1	70.8	73.1	75.3	4.5	5.4	6.8	8.3	10.6	12.4
Preto (Afro-Brazilian)	40.1	44.7	59.4	64.0	67.0	73.0	2.7	3.9	4.7	6.5	9.0	11.3
Difference	7.4	10.0	6.7	6.8	6.1	2.3	1.8	1.5	2.1	1.8	1.6	1.1

Source: Data from the 1950 and 1980 censuses, as presented in Wood et al. (1988), and Lovell (1999), who adds the 1960 figures; data for 2008 are from LAESER (2010; p. 197/9) and IBGE. PNAD household surveys; the 1976 and 1986 figures are published in Silva and Hasenbalg (2000), and 1988–1998–2008 overlapping series in LAESER (2010)

2017, this gap had narrowed to 2.3 years, as average life expectancies reached 75.3 years for brancos and 73.0 for pretos. The gap in average years of schooling fluctuated at around 1.5-1.8 between 1976 and 2008, then narrowed to 1.1 in 2020, when the branco population averaged 12.4 and the preto population averaged 11.3. Education indicators have improved across all racial groups, and racial disparities are lowest at the primary level, while secondary and tertiary completion rates are higher among the branco population.

1.14. Brazil also exhibits vast regional differences in economic and social outcomes. In 2019, the Northeast accounted for 27.2% of the total population, yet it was home to 56.8% of Brazilians living in extreme poverty.[8] Meanwhile, the Southeast was the country's most populous region, but it accounted for just 20% percent of the extremely poor and 27% of the total poor population. At the state level, Maranhão had the highest poverty rate at about 20%, followed by Acre (16.1%), Alagoas (15.0%), Amazonas (14.4%), and Piaui (14.0%). In the state of Maranhão about half of the total population is poor, while 12 other states, especially in the North and Northeast, the poor account for more than 40% of the population. Income inequality is also significantly higher in the North and Northeast regions. In 2018, the Gini coefficients for the North and Northeast were 0.551 and 0.545,

TABLE 1.4. Regional Distribution of People below the Moderate Poverty Line (US$ 5.50 per day)

North	36.80%
Northeast	40.50%
Southeast	16.40%
South	12.30%
Midwest	16.50%
Brazil	**24.10%**

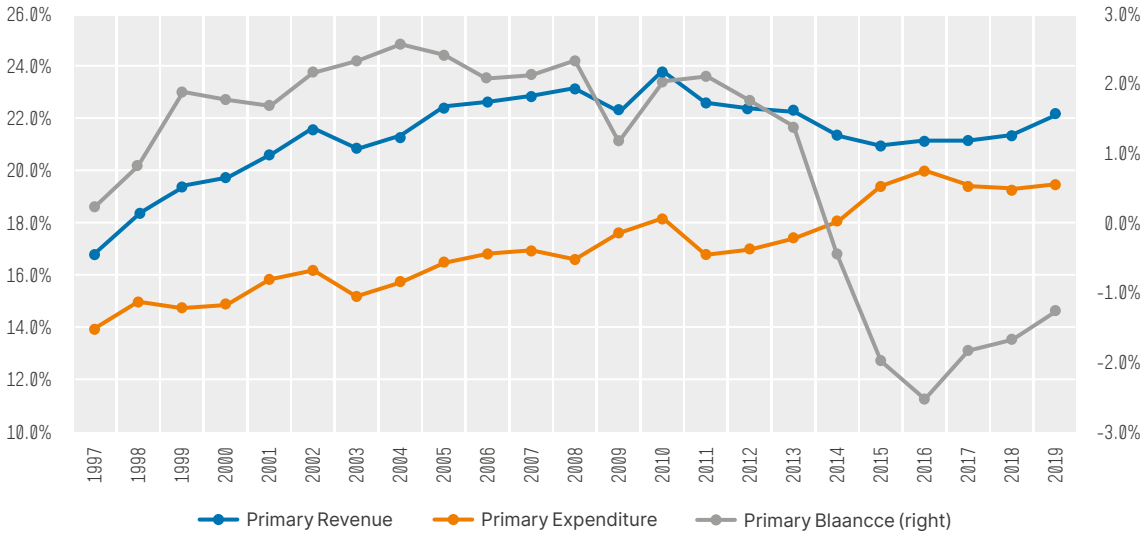
Source: PNADC/IBGE (2020)

respectively, compared to just 0.473 in the South. In terms of education, in the Northern Region, only 4.9% of the municipal networks reached highest level of evaluation compared to 73.9% in the Southeast (IDEB, 2020). In health, according to the Index of social inequalities in health (FIOCRUZ, 2022) 98% of the municipal in the north region are in the worst levels of health conditions compared to 35% in the southeast and only 7% in the south.

1.15. In addition to the complex challenges around productivity growth, poverty, and social inequality described above, Brazil's chronic fiscal imbalances have long undermined its macroeconomic stability. After a monetary stabilization plan was implemented in 1994, the government was able to run a significant primary surplus by steadily increasing the tax burden. After the 2008 global financial crisis, falling public revenue and rising

8 As above, the moderate and extreme poverty rates are based on per capita household incomes of US$5.50 and US$1.50 per day, respectively, in 2011 PPP terms.

FIGURE 1.8. Central Government Primary Expenditures, Revenues, and Balances, Brazil (1997-2019 - % of GDP)



Source: National Treasury

expenditures undermined the fiscal balances, and the government has run sizeable primary deficits since 2013. Although cyclical forces played an important role on the revenue side, structural factors on the expenditure side—which had previously been masked by large nonrecurring revenues—drove the deterioration of the fiscal balances. A rapid demographic transition, combined with generous pension rules, has put persistent upward pressure on social security spending. In addition, the growth of the public sector wage bill and other mandatory expenditures related to education, healthcare, and social services, exacerbated by the expenditure rigidity established by the 1988 Constitution, further boosted total government spending.

1.16. In 2016, the government approved a Constitutional amendment limiting expenditure growth. The Temer administration adopted a gradual approach anchored by a long-term strategy to stabilize the debt. The plan centered on capping the growth of real primary public spending.[9] Demographic pressures, institutional rules, and revenue earmarks drive the trajectory of public spending and profoundly influence Brazil's fiscal performance. Demographic aging continues to put upward pressure on pension and welfare benefits, while public sector compensation and professional advance policies affect the wage bill, and revenue earmarks intensify budgetary rigidity. At the federal level, mandatory expenditures now represent close to 94% of all primary spending, up from 86% in 1997. As the fiscal rule limits increases in primary spending, rising mandatory expenditures have been accommodated at the expense of discretionary expenditures, especially the public investment budget.

1.17. In 2019, Congress approved a Constitutional amendment that reformed the pension system to safeguard compliance with the fiscal rule. Social security spending represents about 40% of total federal spending. Without the reform, increased social security spending would have caused mandatory expenditures to breach the fiscal rule. The Constitutional amendment established a minimum retirement age of 62 years for women and 65 years for men and a minimum contribution time of 20 years. At the time of its approval, official projections indicated that the reform would generate R$800.3 billion in fiscal savings over 10 years.[10] In 2020, the Treasury announced that the actual savings were higher than anticipated. Whereas the government expected the

9 According to the Constitutional amendment, the growth of total primary spending across all branches of government cannot exceed the official inflation rate for the previous year. Some transfers are excluded from the rule, but accruals from previous years are not.

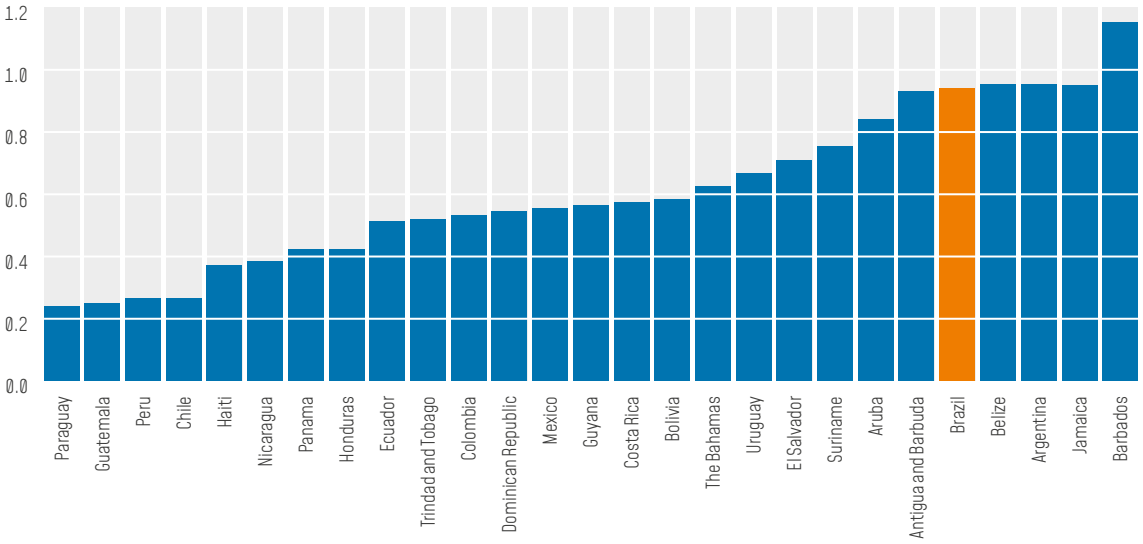
10 This calculation already includes the changes performed by the Congress. The original proposal foresaw fiscal savings of R$ 1.2 trillion. The Independent Fiscal Institution foresees total savings of R$ 700 billion in 10 years.

reform to yield R$3.5 billion in savings in 2020, actual savings were more than twice as high at R$8.5 billion.

1.18. The public debt poses risks to macroeconomic stability. After reaching a low of 51.8% of GDP in 2014, Brazil's gross public debt stock rose steadily to reach 74% in December of 2019, a high level by the standards of comparable countries.[11] Using the IMF definition of public debt, Brazil's debt-to-GDP ratio in 2019 was among the highest in Latin America and the Caribbean. Brazil's debt burden is not only large, but its composition and average maturity pose challenges for debt management. At the end of 2019, most public debt was linked to the basic interest rate (Selic) of 38.9%, the average maturity was less than four years, and the amortization schedule implied that 19.2 percent of the debt would need to be rolled over within one year. These factors represent significant risks in the event of a confidence crisis. However, most government debt remains held by domestic financial institutions, investment funds, and pension funds, mitigating risks related to international capital flows.

1.19. Brazil's subnational public finances are in an increasingly tenuous position. The fiscal situation among Brazilian states and municipalities has deteriorated since 2008, leaving subnational governments poorly positioned to cope with the economic and fiscal impact of the pandemic. Despite the renegotiations of intergovernmental debts under Complementary Law No. 156/2016, expenditure growth remained unchanged, particularly current spending, which is driven by public sector wages, pensions, and other benefits.[12] State revenues have declined in recent years, with total revenue from taxes, contributions, and transfers falling from 12.7% of GDP in 2006 to 11.7% in 2019. Taxes and transfers both remained broadly unchanged as a share of GDP. The Tax on the Circulation of Goods and Services (Imposto sobre Circulação de Mercadorias e Serviços, ICMS) is Brazil's most important state tax, but it performed poorly due to a combination of structural and circumstantial factors. Across the Brazilian economy, services have gained ground, while manufacturing—the main baseof the ICMS—has declined.[13][14]

↓ **FIGURE 1.9.** Debt-to-GDP Ratios, Brazil and Regional Comparators (2019)



Source: WEO-IMF

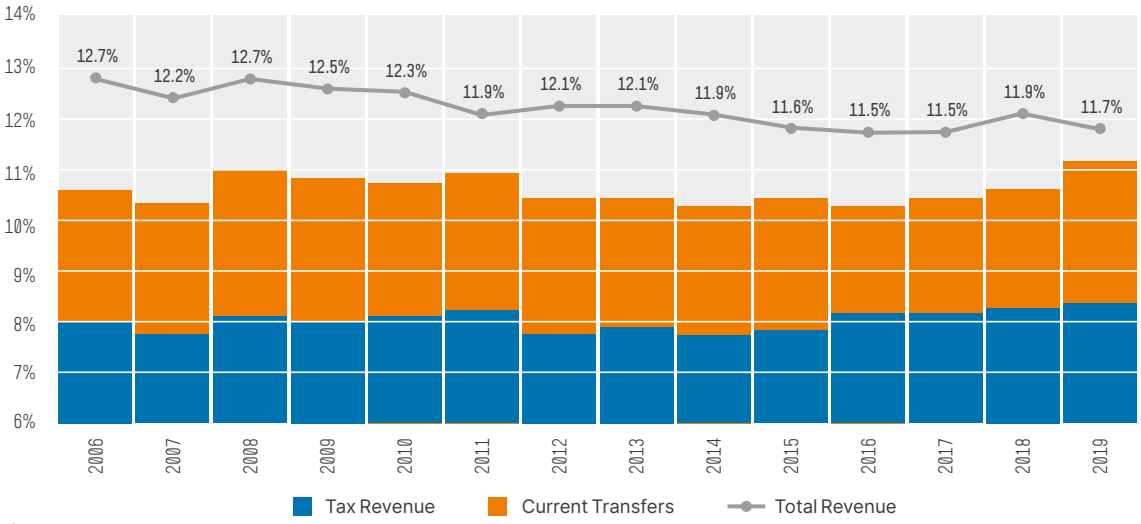
11 This debt-to-GDP ratio is the definition of used typically by the Ministry of Finance. The IMF publishes a slightly different definition of debt which includes the "*compromissadas*" – public bonds used in monetary policy operations.

12 In the previous decade, fiscal behavior improved the state balance sheet and debt had a downward trajectory. This was subsequent to the renegotiation of the public debt of the states of the nineties, the fiscal adjustment program and the implementation of the Fiscal Responsibility Law (LRF). See Piancastelli and Boueri (2008).

13 Afonso e Pinto (2019), The crisis of subnational governments in Brazil: challenges and propositions, Economic-fiscal position document made for the IDB; and Rossi Júnior, José Luiz; Aguiar, Fernando (2018) : *Understanding the evolution of the fiscal situation of the Brazilian states; 2006–2015*, Economics, Elsevier, Amsterdam, Vol. 19, Iss. 1, pp. 105-131;

14 According to Afonso and Pinto (2019), the share of the added value of the manufacturing industry lost around 4 points of GDP between 1996 and 2018.

FIGURE 1.10. State Revenues as a Share of GDP, Brazil (2006-2019)

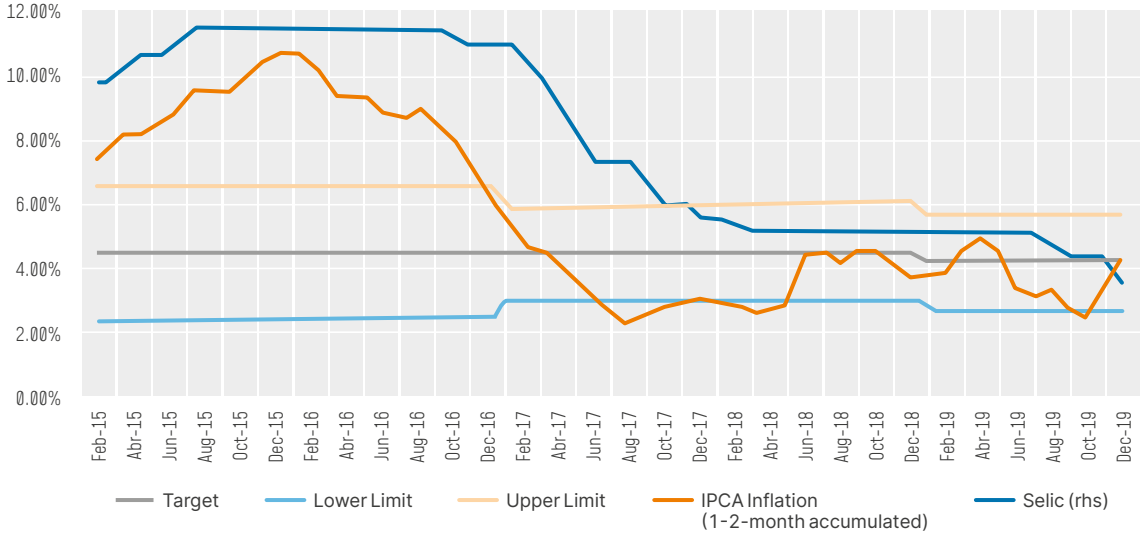


Source: National Treasury

1.20. On the positive side, inflationary risks were successfully controlled, monetary policy credibility was restored, and interest rates fell significantly in the years before the pandemic. The enhanced credibility of the central bank, combined with a sound fiscal framework and weak economic activity, helped reduce inflation. After peaking in 2016, the headline inflation rate fell below the target band in 2017, then remained within the band in 2018 and 2019. Between 2016 and 2019, inflationary expectations remained anchored within the target band, and moderate and stable inflation allowed the National Monetary Council (CMN) to lower the band during the period. The central bank reduced the policy rate from an annualized average of 14.25% in 2016 to 4.5% in 2019.

1.21. Brazil is developing a credit market. Brazil's credit-to-GDP ratio grew from 30% in 2007 to 46.94% at the end of 2019, but it was still well below the OECD average of over 100% (World Bank, 2021). From 2007 until the 2014-2016 recession, the credit-to-GDP ratio increased significantly and continuously. From the beginning of the 2000s until the

FIGURE 1.11. Inflation Targets, the Policy Rate (Selic), and the Consumer Price Index, Brazil (2015-2019)

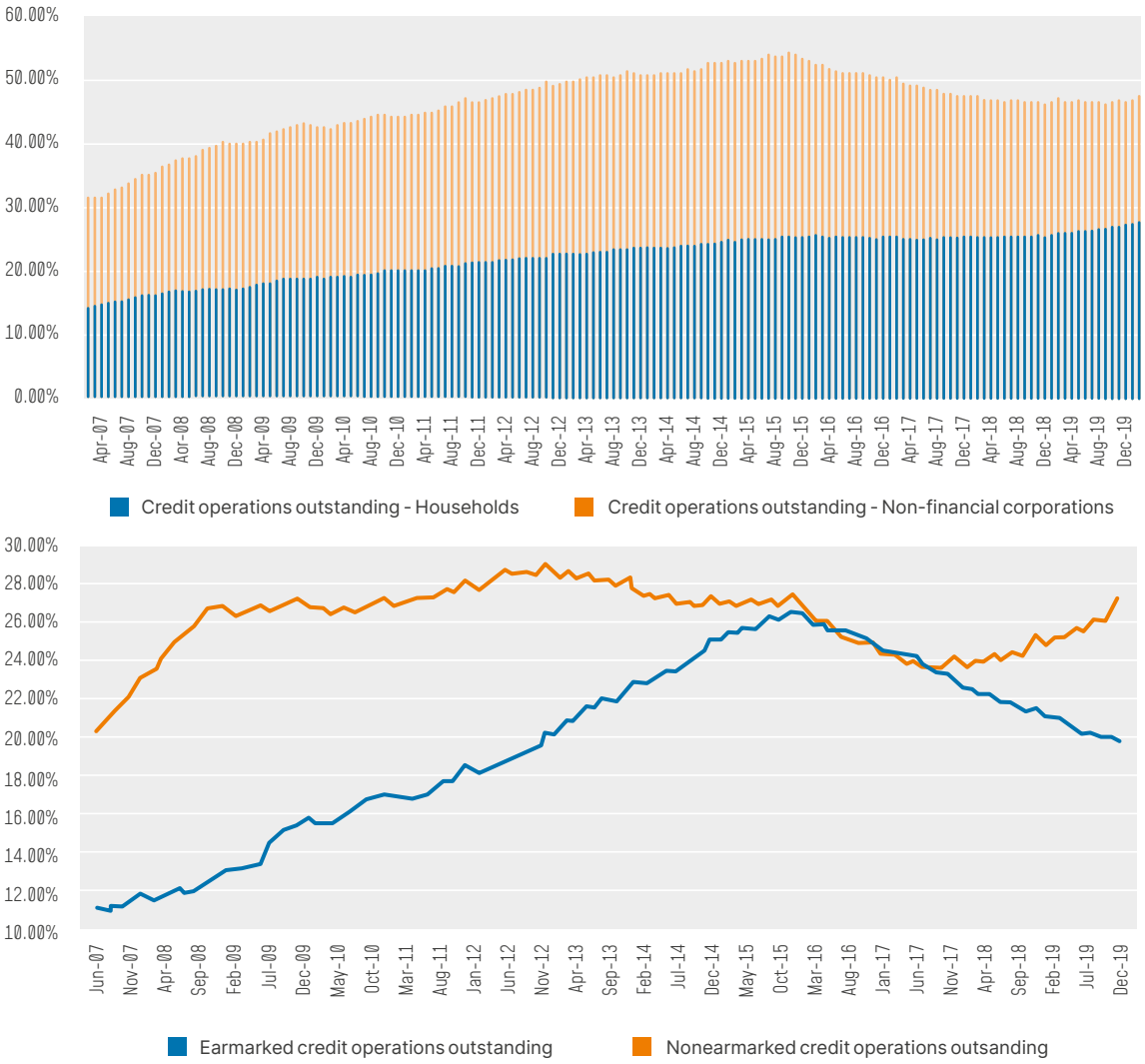


Source: Central Bank

2008 financial crisis, a favorable macroeconomic context, changes in credit regulation (especially for personal credit), and financial innovations in the private sector supported an increase both in earmarked and nonearmarked credit. After 2008, earmarked credit drove the continued expansion of total credit, as the government increased the use of public funding to boost the credit supply. Between the end of 2015 and 2018 the credit-to-GDP ratio fell, but after 2018 the economic recovery reversed this trend, driven by an increase in nonearmarked credit. In 2019, 37.4% of the credit was directed to small and medium enterprises (SMEs), while 62.6% was directed to large companies.

1.22. In recent years, rising trade surpluses and strong reserve accumulation improved Brazil's external position. Unlike in previous periods, the external accounts were among the Brazilian economy's main strengths prior to the pandemic. Since 2001, Brazil has run trade surpluses in every year except 2014, and in 2017 the trade surplus reached a historic high of US$56.0 billion. Between 2017 and 2019, the trade surplus deteriorated slightly, but Brazil's external position remained solid. In December 2019, foreign reserves reached US$356.8 billion, while the external debt stock totaled US$322.9 billion, of which US$123.8 billion was public external debt.

FIGURE 1.12. Evolution of the Credit-to-GDP Ratio by Creditor and Credit Type, Brazil (2007-2019)



Source: Central Bank of Brazil

Consequently, foreign reserves provide substantial liquidity cover in the near term.

1.23. Rising exports to China and a broad increase in commodity exports drove the growth of the trade surplus. In 2000, China accounted for just 1.40% of Brazil's total exports, but by 2019 its share had risen to 22.25%. China's increasing prominence accompanied a major shift in the sectoral composition of Brazilian exports. The manufacturing sector's share in total exports fell from 83.0% in 2000 to 57.1% in 2019, while the contribution of agriculture grew from 8.1% to 19.5% and extractive industries rose from 6.7% to 22.9%. Soybeans, iron ore, and oil are Brazil's largest exports.

The Pandemic's Impact on the Brazilian Economy[15]

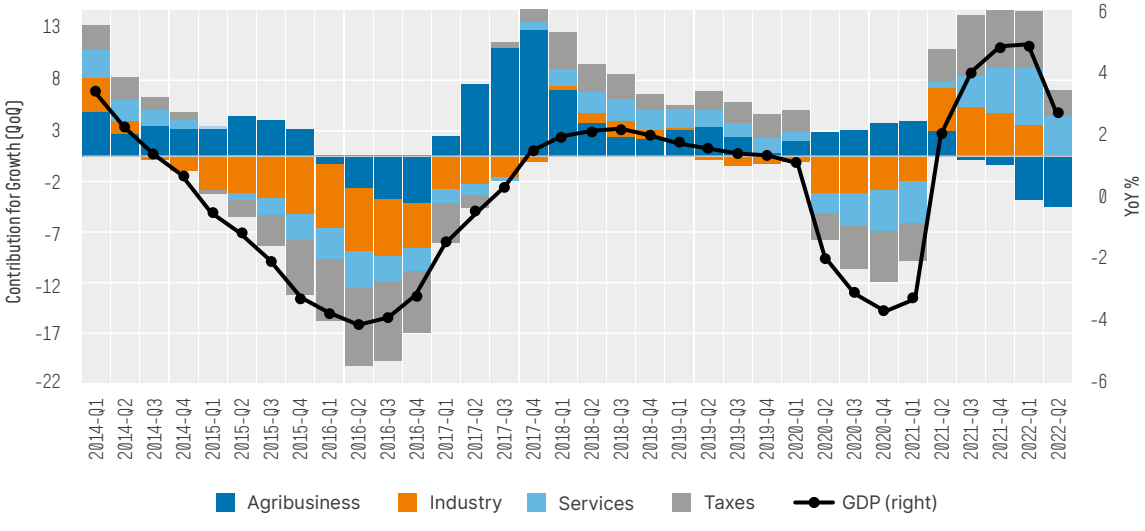
The pandemic, growth and fiscal situation

1.24. The pandemic posed massive humanitarian, economic, social, and political challenges. The first case was detected in February 2020, and by September 2022[16] Brazil had over 34 million confirmed cases and more than 685,000 deaths. Sao Paulo has been the most affected state, with more than 6.0 million confirmed cases and 174,000 deaths. The vaccine rollout started slowly in early 2021 but accelerated during the year. Cases and deaths both peaked in April 2021 and have since fallen continuously.

1.25. The pandemic caused a steep decline in economic activity in 2020 followed by a recovery in 2021 and 2022. The pandemic interrupted Brazil's expansion, causing an unprecedented drop in economic output in the second quarter of 2020. Brazil's GDP contracted by 3.9% in 2020, albeit less severe than the 9% drop forecast in the beginning of the pandemic (IMF, 2020). The Brazilian economy endured subsequent waves of the pandemic during 2021, but economic activity remained resilient, and growth accelerated as the vaccination effort advanced, and restrictions were eased. The GDP growth rate rebounded reached 4.6% in 2021.

1.26. The pandemic raised important questions regarding the distribution of power within Brazil's federal system. Since the beginning of the pandemic, the federal government has been engaged in a series of disputes with the state governors regarding the power to restrict personal mobility, impose new rules on business operations,

↓ **FIGURE 1.13.** GDP Growth Decomposition, Brazil (2014-2022)

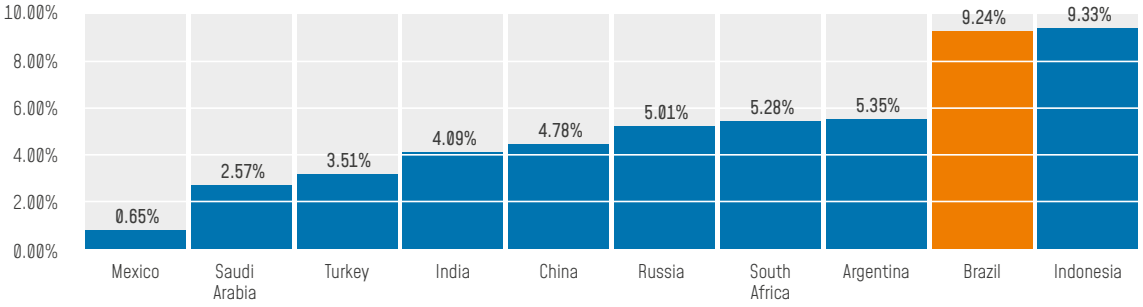


Source: IBGE

15 The sub-chapter discusses the developments in 2020, 2021 and 2022 up to this moment.
16 September 20th, 2022.

and manage the vaccination process. Almost all of Brazil's 27 governors initially imposed restrictions on mobility and gatherings, including lockdowns in some states, but the president favored a less stringent approach, citing concerns about the economic impact of these measures. The Supreme Court resolved this dispute in favor of subnational governments, determining that mayors and governors can impose social distancing, quarantines, and similar measures to combat the pandemic and can even decide which services are essential or nonessential. The vaccination rollout gave rise to additional disputes between the federal and subnational authorities regarding the use of specific vaccines and the implementation of vaccination plans.

FIGURE 1.14. COVID-19 Fiscal Response Packages, G-20 Emerging Markets (2020-2021)



Source: IMF

TABLE 1.4. Pandemic Response Measures, Brazil (2020 and 2021)[17]

	2020		2021	
Measure	**Planned (R$ billions)**	**Amount Paid (R$ billions)**	**Planned (R$ billions)**	**Amount Paid (R$ billions)**
Emergency aid to vulnerable households ("Auxilio emergencial")	322.00	293.11	68.05	60.58
Financial assistance to subnational governments	79.19	78.25	-	-
Emergency employment security and income support programs	51.55	33.50	10.67	7.71
Additional spending by the Ministry of Health and other ministries	46.33	42.70	32.60	25.77
Credit operations guarantee funds	58.09	58.09	5.0	5.0
Payroll financing	6.81	6.81	-	-
Expanded cash-transfer program ("Bolsa Família")	0.37	0.37	-	-
Vaccine procurement and distribution	-	-	32.58	21.79
Other programs	40.41	11.19	1.32	0.59
Total	**604.75**	**524.02**	**150.21**	**121.44**

Source: National Treasury

17 Up to December 31st, 2021.

1.27. The government mounted a sizeable fiscal response designed to counter the impact of the pandemic. Policy measures that directly affected the Treasury accounts included:

I. employment security and income support for formal workers and workers in vulnerable situations;
II. tax relief, subsidized credit, and official guarantees to the private sector; and
III. fiscal assistance to subnational governments provided via debt renegotiation and extraordinary transfers.

Brazil's pandemic response package was among the largest in emerging markets. The fiscal response in 2020 totaled R$524.0 billion, or approximately 8.30% of Brazil's GDP. In 2021, the government provided another R$109.3 billion direct fiscal support, bringing the total cost of the response to approximately 9.3% of GDP (Table 1.4). When measures with indirect fiscal effects—such as tax deferrals and debt renegotiation—are included, the cost of the government's response effort reaches R$906.2 billion, or about 12.9% of GDP.

1.28. The COVID-19 pandemic prompted the government to temporarily ease the fiscal rules. In response to the pandemic-induced economic shock, the government invoked the escape clause to allow for exceptional economic policy measures. The application of the escape clause was authorized by Congress, which declared a state of public emergency until the end of 2020. The state of emergency suspended various procedural and numerical fiscal rules, relieving the government of its obligation to follow budgetary procedures consistent with

Emergency Aid

The pandemic has put enormous pressure on the social protection system. Brazil's flagship cash-transfer program (Bolsa Família) benefits over 40 million people, yet its scope was insufficient to shield households from the effects of the pandemic. The government responded by approving an assistance program for vulnerable households (the "Corona Voucher"), which covered three times as many beneficiaries and delivered 5.5 times as much in benefits as Bolsa Família. The Emergency aid was the government's most expensive pandemic response program, costing R$45 billion per month.

The Emergency aid guaranteed a minimum income for workers facing heightened economic vulnerability. The original version of the program provided an income transfer of R$600 per month for a period of three months, which was then extended for another two months. On September 1st, 2020, the benefit was extended through December, but the payment amount was reduced to R$300. The program was subsequently extended through the first four months of 2021.

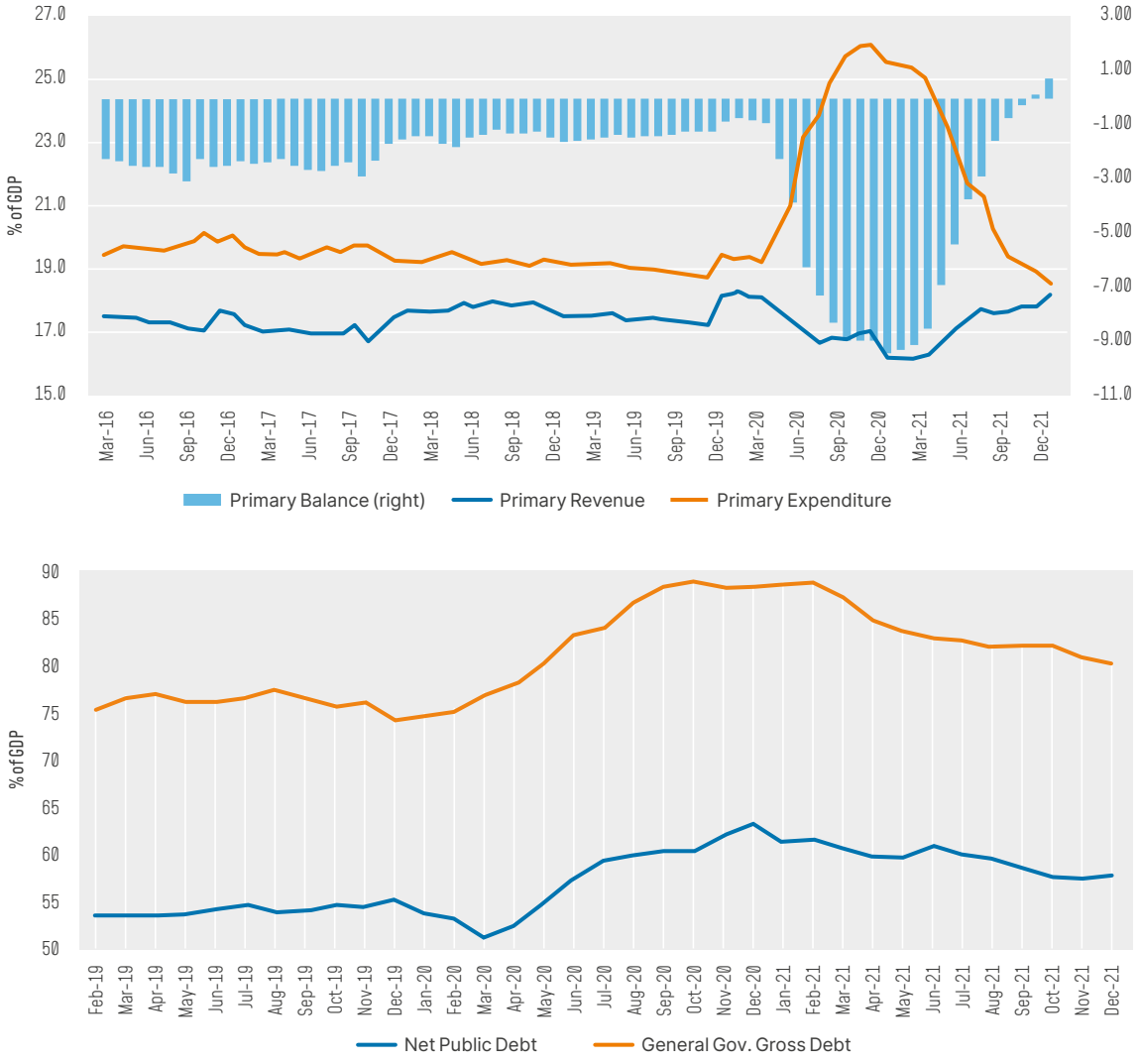
ECONOMIC IMPACT

- Close to 67 million people received the Emergency aid.
- According the Fundação Getulio Vargas (FGV), a leading Brazilian thinktank, the program boosted the average worker's income by 24%. Among informal workers, the program increased monthly income by 50%, from R$1,344 to R$2,016.
- A large share of program benefits accrues to workers in northeastern and northern states and to less-educated workers nationwide. Women have benefited the most from the increase in income.
- According to estimates from the World Bank, seven million people would have fallen into poverty without the emergency aid. In the absence of the voucher, the number of Brazilians living below the poverty line could have risen from 41.8 million in 2019 to 48.8 million in 2020.

achieving its annual fiscal targets. The limits and conditions related to credit operations (including compliance with the "golden rule") were waived, and the government was empowered to grant guarantees and engage in voluntary tax-transfer operations related to the national emergency.

1.29. In 2021, the fiscal rules were altered so that pandemic-related expenses would not count toward the expenditure cap. In 2021, Congress approved an emergency bill that extended the payment of a monthly stipend ("*Auxilio emergencial*") of R$250 for four months (March-June). Congress also created fiscal triggers to limit spending at the federal, state, and municipal levels; when mandatory expenditures subject to the cap reach 95% of total primary spending, salary increases for the civil service are automatically suspended. Congress also proposed, but did not mandate, the elimination of public funds and a progressive reduction in tax expenditures. All other fiscal rules that had applied before the crisis were re-imposed in 2021, albeit with an exemption for pandemic-related spending. Such spending was generally excluded from the expenditure cap, though it continued to be recorded in the primary balance. The only exception was the monthly stipend, which was excluded both from the expenditure cap and from the primary balance.

FIGURE 1.15. The Evolution of the Primary Balance and the Debt Stock, Brazil



Source: National Treasury

1.30. The COVID-19 pandemic impacted the fiscal accounts in 2020. The cumulative 12-month consolidated public sector primary deficit widened from R$61.9 billion (0.84% of GDP) in 2019 to R$702.9 billion (9.49% of GDP) in 2020. Given the economic slowdown and the deferral of certain tax payments, tax revenue dropped by 6.91% in real terms between 2019 and 2020, its sharpest contraction since 2009. The gross public debt stock jumped from 74.3% of GDP in December 2019 to 88.8% in December 2020, while the net public debt stock increased from 54.6% of GDP to 63.0% during the same period.

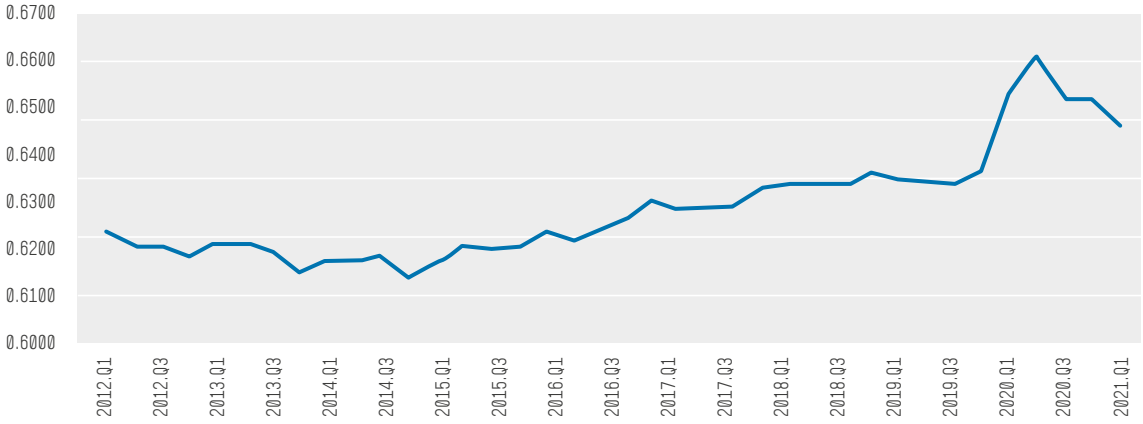
1.31. The fiscal accounts improved in 2021 and 2022. As revenue growth accelerated and spending declined, the cumulative 12-month consolidated public sector primary deficit turned to a surplus of R$64.7 billion (0.75% of GDP). Growth and inflation have strongly influenced federal tax collection. The gross public debt stock dropped to 80.3% in December 2021, while the net public debt stock fell to 57.3% of GDP.[18] According to the Central Bank of Brazil, the reduction in the debt-to-GDP ratio in 2021 reflected net debt redemptions during the year by the Treasury, combined with a higher nominal GDP growth rate (reflecting a combination of faster real growth and elevated inflation).

1.32. Brazil's debt profile deteriorated during the pandemic. The extraordinary pandemic-related expenditures implemented during 2020 and 2021 were financed primarily via the issuance of Treasury bonds.[19] Although the federal government has been able to fully finance its extraordinary expenditures by issuing debt, Treasury data indicate that the average maturity of the debt shortened during the pandemic. In January 2020, 19.2% of the debt matured in the next 12 months, but by the end of the year this share had risen to 28.0%. In 2021, the Treasury tried to shift the debt-maturity structure by reducing the high concentration of short-term instruments that would be maturing in 2022, a presidential election year. By the end of 2021, the share of debt maturing in the next 12 months had fallen to 21.0%.

The Pandemic and the Labor Market, Poverty, and Inequality

1.33. The 2015-16 recession and the COVID-19 pandemic exposed critical vulnerabilities in Brazil's social development model and threatened to reverse recent gains. Since 2015, multiple social indicators have either plateaued or deteriorated, while Brazil's Human Development Index score has stagnated following a decade of improvement.

↓ **FIGURE 1.16.** Gini Coefficient, Brazil (2012-2021)



Source: FGV Social – PNAD Continuous

18 The IMF's World Economic Outlook estimates the gross debt stock at 98.4% of GDP, as the IMF methodology includes bonds on the central bank balance sheet that are not included in the figures quoted here.

19 Alternatively, the authorities could have used the financial surplus calculated in the Balance Sheet of the Union for 2019 or reallocated resources by cancelling federal budget appropriations for 2020.

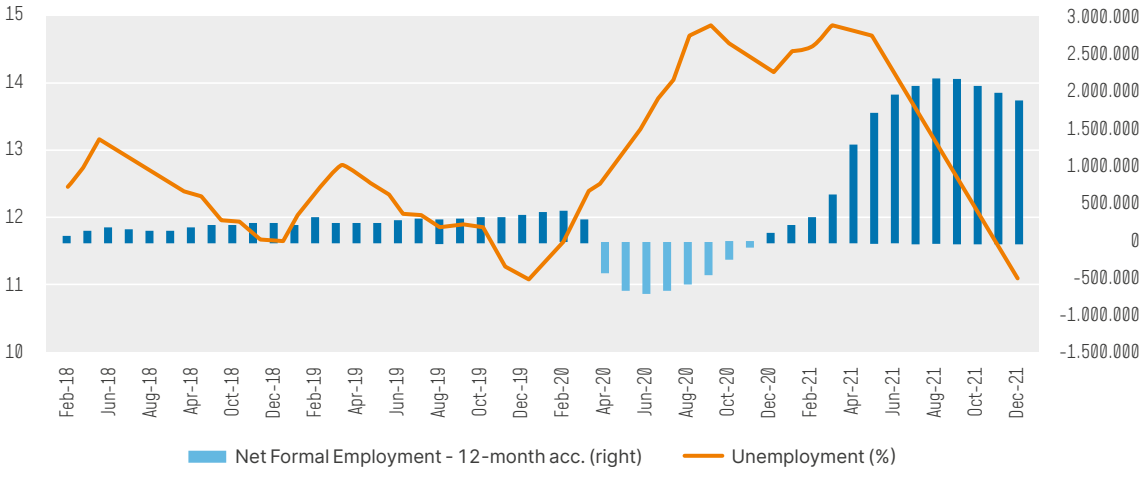
According to FGV Social,[20] the Gini coefficient rose from 0.6003 in 2014 to 0.6279 in 2019, spiked to 0.667 during the height of the pandemic, then fell slightly to 0.640 in the second quarter of 2021 but remained well above pre-pandemic levels.

1.34. **The government adopted two major policies to directly attenuate the pandemic's impact on employment: The Emergency Employment Support Program (*Programa Emergencial de Suporte a Empregos*, PESE) and the Employment and Income Benefit (*Benefício Emprego e Renda*, BEm).** The PESE is a special credit line for small and medium-sized enterprises to finance their payroll during the pandemic emergency. The credit lines granted under the program cover an eligible firm's entire payroll for a period of two months, though the amount of support is capped at twice the minimum wage per employee (or R$2,090). The support provided through the PESE totaled R$7.9 billion, and the program benefited 2.64 million employees at 313,695 firms. The BEm is an emergency benefit paid by the federal government to formally employed workers who face reduced working hours, pay cuts, or the temporary suspension of their employment contracts. The BEm was extended until July 2021, and while active it compensated more than 22 million workers for income losses incurred during the pandemic. The suspension of employment contract was responsible for 46.88% of BEm claims, while salary reductions of 25%, 50%, and 70%, were responsible for 6.37%, 17.25%, and 29.51% of claims, respectively.

1.35. **Despite the considerable support provided under the PESE and BEm, the pandemic had a deeply negative impact on Brazil's labor market.** Following the second wave of the pandemic, the unemployment rate peaked at 14.7% in March 2021, up from 11.2% in January 2020. The General Registry of the Employed and Unemployed (Cadastro Geral de Empregados e Desempregados, CAGED) indicates that the first two months of the pandemic witnessed the net destruction of over one million formal jobs. However, net job creation resumed in the second half of 2020, and 2021 saw the net creation of more than 2.7 million formal jobs. While 13.9 million people were unemployed in 2021, the unemployment rate fell to 11.1%, below its pre-pandemic average.

1.36. **The pandemic increased inequalities in the labor market.** The income of the average Brazilian worker—including informal, unemployed, and retired or otherwise inactive workers—fell

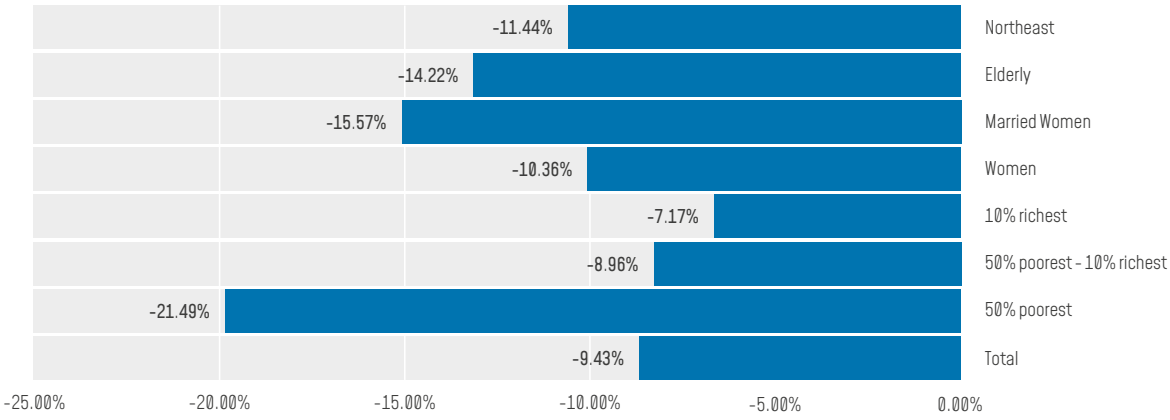
FIGURE 1.17. The Evolution of the Labor Market



Source: IBGE and Minister of Labor

20 FGV Social (2021). Desigualdade de Impactos Trabalhistas na Pandemia. https://cps.fgv.br/DesigualdadePandemia

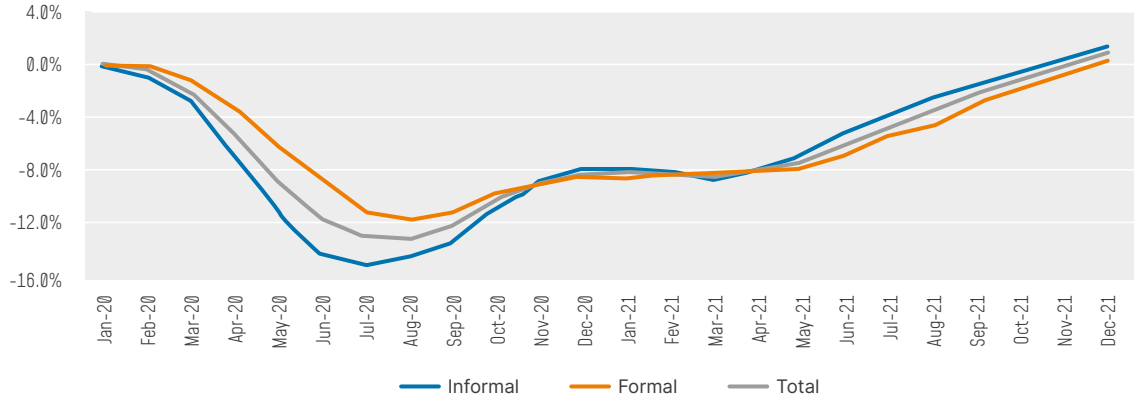
↓ FIGURE 1.18. Change in Average Worker Income, Brazil (2019.Q4 – 2021.Q2)



Source: FGV Social (2021)

by 9.4% between the end of 2019 and the second quarter of 2021.[21] However, this decline was not consistent across groups: workers in the bottom half of the income distribution experienced an average income loss of 21.5%, while those in the top 10% saw their incomes decline by just 7.16%. Middle-class workers, defined as those between the 50th and 10th percentiles of the income distribution, experienced an average income loss of 8.96%. Income declines were steepest among residents of the northeast region (-11.4%); women (-10.35%), especially married women (- 15.57%), who were forced to devote more time to domestic work; and the elderly (-14.22%), who were especially likely to withdraw from the labor market altogether. Income losses were most severe among those who possessed more than one of these characteristics. For example, women in the bottom 50% of the income distribution experienced an average 26.2% drop in income, compared to an average of just 18.4% for men. Costa et al. (2021)[22] show that inequalities in labor-force participation, unemployment rates, occupation types, and informality rates all widened during the pandemic. Even when controlling for other personal or workplace characteristics, women, pretos and pardos, and young people were especially likely to lose their jobs or to be unable to find jobs.

↓ FIGURE 1.19. Evolution of Total Employment (2020-2021)



Source: Observatorio Laboral COVID-19

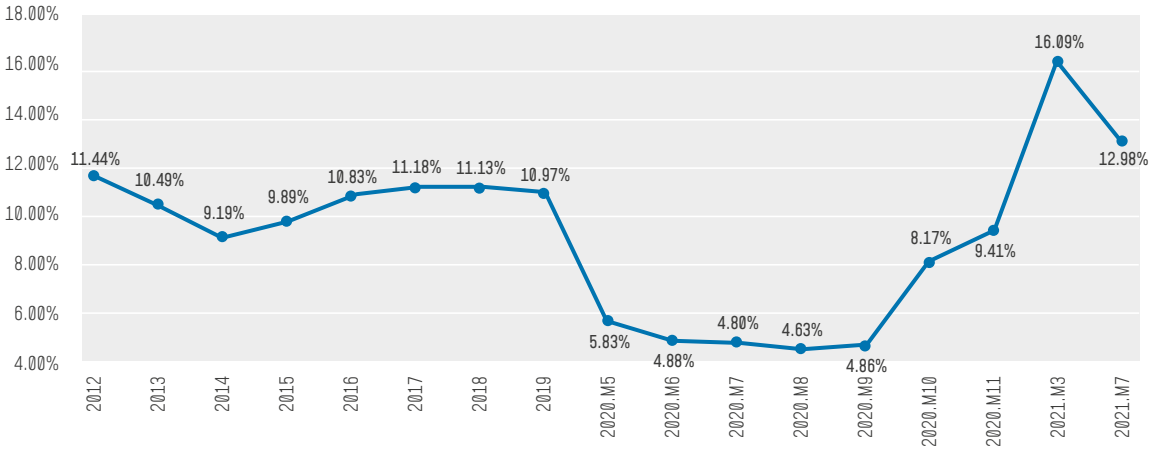
21 Source: FGV Social (2021).
22 Costa, J., Barbosa, A. and Hecksher. M. (2021). Desiguldades no mercado de trabalho e pandemia da Covid-19. IPEA Discussion Paper 2684.

1.37. Indicators of job quality deteriorated during the pandemic. According to IBGE, while employment rates have rebounded, job quality has declined in the wake of the pandemic. Average income is below pre-pandemic levels, and employment growth has been driven by informal jobs and low-paying jobs. The share of informal employment has increased by 10.2% since the start of the pandemic, and 11.7 million workers are informally employed. Meanwhile, the number of domestic workers has risen by 9.2% to 5.4 million people, the highest level recorded in the ten years that the survey has been administered. Data from ECLAC (2021) confirm the deterioration of job quality during the pandemic. The share of formal employment declined, many workers resorted to self-employment in the informal sector, and a large segment of the workforce moved from larger firms to smaller firms with lower average productivity levels. These trends were more pronounced for women, older workers, and those with lower education levels. In addition, real earnings fell by more than 10% from pre-pandemic levels, and the reallocation of labor across sectors will have unpredictable consequences.

1.38. Women and afro-descendants were disproportionally affected by the pandemic. The unemployment rate among women reached 17%, versus just 12% among men, and unemployment was most prevalent among women with low levels of education. Pretos experienced a steep decline in employment during the pandemic: the number of employed pretos dropped by 10.5% between 2019 and 2020, while the number of employed brancos fell by 6.1%. Branco workers were also more likely to switch to remote work than were their preto counterparts. In 2020, about 14% of employed brancos worked remotely, compared to just 7% of pretos. A recent study[23] found that in the second quarter of 2020 the number of female entrepreneurs fell by 15%, while the number of male entrepreneurs declined by 10%. Overall, the groups most affected by rising unemployment were pretos, women, workers under 34 years old, those with little education, and those employed in the informal sector. Moreover, 48% of female-owned businesses suspended operations in 2020, compared to 44% of male-owned businesses. Differences in savings among women and men also increased during the pandemic: in 2019, women saved 17.2% less than men, but by 2021 this gap had widened to 47.6%.

1.39. The poverty rate fluctuated significantly during the pandemic. According FGV (2021), The poverty rate averaged 10.97% in 2019, reflecting roughly 23.1 million people living below the

↓ **FIGURE 1.20.** Evolution of the poverty rate



Source: FGV Social (2021)

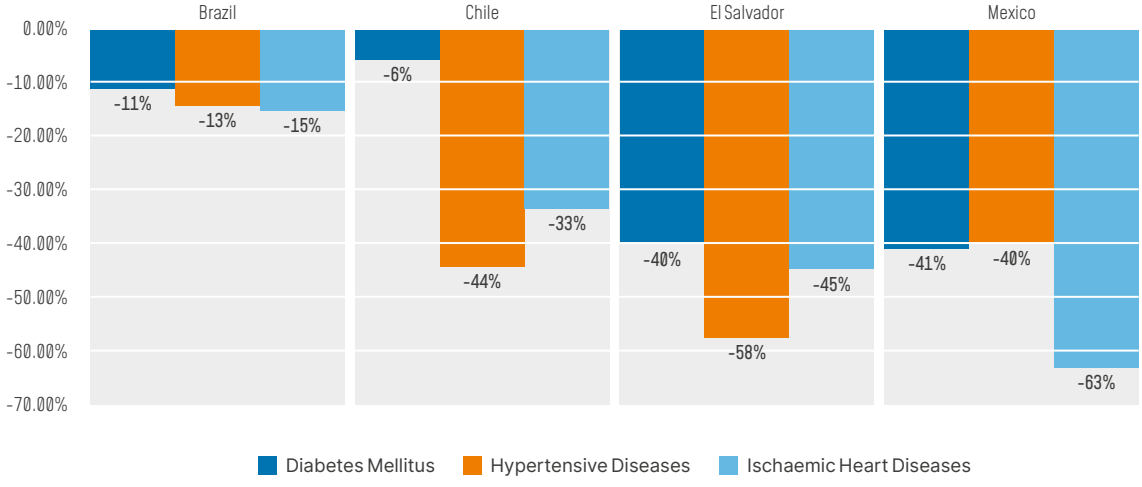
23 IDB, Nubank, and SEBRAE (2021). Available at https://blog.nubank.com.br/data-nubank-empreendedorismo-feminino-contexto/

poverty line. In 2020, the emergency support delivered in response to the pandemic reduced the poverty rate to 4.63%, or 9.8 million people. In the first quarter of 2021, as emergency aid was suspended, the poverty rate shot up to 16.1%, or 34.3 million people. When emergency aid was restored in mid-2021, the poverty rate fell to 12.98%, or 27.7 million people, still well above pre-pandemic levels. ECLAC (2021) estimates that the extreme poverty rate rose from 5.5% in 2019 to 8.0% in 2020, while the moderate poverty rate increased from 19.2% to 24.1%.

1.40. The impact of the pandemic and housing precarity showed a high correlation. The pandemic has exacerbated socio/economic/territorial disparities in Brazilian cities affecting disproportionately more vulnerable communities. It particularly affected low-income families domiciled in subnormal clusters. The population living in precarious conditions constituted the main social group impacted by the pandemic. Afro-Brazilian and pardos without schooling had 80.35% death rates, against 19.65% of whites with higher education.[24]

1.41. School closures during the pandemic caused major learning losses, which will incur long-term economic costs. As schools closed during the pandemic, children and young people faced reduced educational opportunities, especially those from the most vulnerable households. According to IPEA (2021),[25] about 14% of students from public educational institutions from preschool to graduate school, or 5.8 million children and young people, lacked home access to broadband internet or 3G/4G, which prevented them from effectively participating in educational activities during the pandemic. Portela et. al. (2021)[26] present three scenarios for post-pandemic education; in the most pessimistic scenario, where remote learning proves wholly ineffective, education indicators would revert to their 2016 levels. The study also reveals that the population groups most affected by the pandemic were young men and boys; members of the preto, pardo, or indígena (indigenous) communities; individuals whose mothers who did not finish elementary school; and residents of the North and Northeast regions. The least affected were women and girls; members of the branco community; and individuals whose mothers had at least completed high school. IDB (2021)

FIGURE 1.21. Changes in Hospitalization Rates for Selected Conditions, Brazil and Comparators (2020)



Source: Bernal et al. (2022)

24 PUC Rio de Janeiro 2020. Análise socioeconômica da taxa de letalidade da COVID-19 no Brasil.
25 IPEA (2021). Políticas Sociais: acompanhamento e análise. Nr.28, 2021.
26 Portela, A, Soares, C., Santos, G., Costa,G., Ramos, L., Lima, L. , Ferreira, P. Pandemia de covid-19: o que sabemos sobre os efeitos da interrupção das aulas sobre os resultados educacionais? FGV EESP CLEAR.

shows that the closure of public schools in Sao Paulo in 2020 reduced expected learning by 72.5% and more than tripled the dropout rate. FMI (2022) finds Brazilian students who faced total or partial school closures will experience some of the greatest lifetime income losses in the G-20 at an estimated -9.10% loss in lifetime income.

1.42. The health consequences of the pandemic extend far beyond COVID-19-related deaths. Many people discontinued or delayed the treatment of other diseases, and deferred care will have negative long-term health implications. In addition, a share of COVID survivors have experienced so-called "long COVID," involving protracted motor function and respiratory challenges (some permanent), and rehabilitation needs will continue to put pressure on health services. In addition, mental health issues increased across all groups, especially among the most vulnerable.

1.43. Food insecurity and undernourishment also increased during the pandemic. According to FAO (2021), the prevalence both of moderate and severe food insecurity increased significantly in Brazil between 2014–16 and 2018–20.[27] The overall rate of food insecurity increased by close to 5 percentage points over the period, as the food-insecure population rose from 37.5 million in 2014-16 to 49.6 million in 2018-20. A study by the PENSSAN network[28] (2022) shows that 58.7% of households faced some level of food insecurity in the beginning of 2022, up from 54% in 2018, implying that 125.2 million Brazilians lacked consistent access to adequate food. Of these, 30.7% of the population were either moderately or severely food insecure, while 15.5% of the population were severely food insecure.

The pandemic, liquidity, credit, inflation and monetary policy

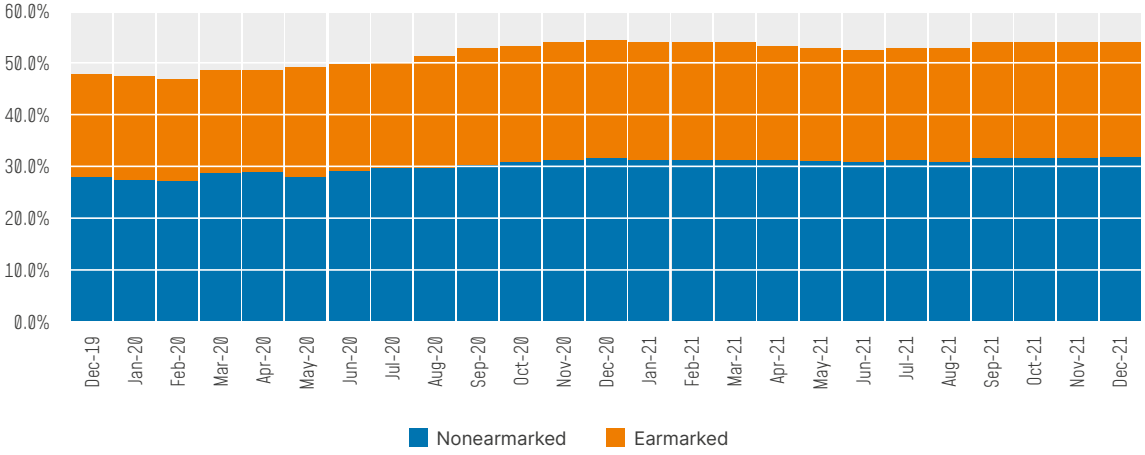
1.44. The Central Bank of Brazil (BCB), the National Treasury, and public banks[29] have adopted measures to mitigate the effect of the pandemic on the financial system and the credit supply. To attenuate the economic impact of the pandemic, the central bank has made efforts to promote the proper functioning of the market without compromising the soundness and stability of the national financial system. The central bank eased rules for deposits and lending to maintain an adequate level of liquidity and credit, ensuring that Brazilian banks have the necessary resources to lend and refinance debts for the households and firms most affected by the crisis. Altogether, the announced measures increased the liquidity of the financial system by R$1,216 billion, equivalent to 16.7% of GDP.

1.45. The Treasury implemented three major programs to increase the credit supply, the PESE (Emergency Program to support jobs), the National Program to Support Microenterprises and Small Businesses (PRONAMPE) and PEAC (Emergency Program to access Credit). The PESE has reached 2.6 million workers at 131,695 companies, but when it was launched it had the potential to reach up to 12.2 million workers at 1.4 million firms. Several factors undermined the PESE's effectiveness. First, the program was only available to firms that process their payrolls through a bank, effectively excluding many SMEs, particularly those in smaller cities. Second, the requirement that a worker's job be retained for two months was excessively rigid, as firms were unwilling to sacrifice the flexibility to lay off workers given the pandemic's uncertain duration. Third, firms often take out loans to cover a portion of the payroll, but the program required that the firm finance the entire payroll, further constraining its ability to alter its workforce. Finally, the PESE overlapped with other government programs designed to assist SMEs, and its approach may have been more appropriate for larger firms.

1.46. PEAC and PRONAMPE programs effectively boosted the credit supply. PRONAMPE was a credit line with special conditions and government

27 FAO (2021). Latin America and the Caribbean Regional Overview of Food Security and Nutrition.
28 Rede Brasileira de Pesquisa em Soberania e Segurança Alimentar – Rede PENSSAN (2021). Second National survey of food insecurity in the context of the Covid-19 pandemic in Brazil.
29 Public banks include BNDES, Banco do Brasil, Caica Economica Federal and development banks.

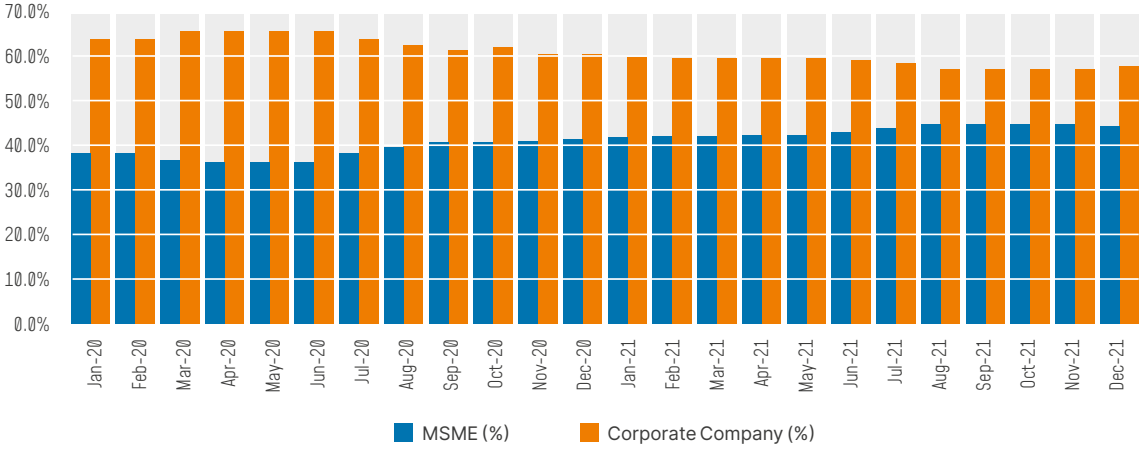
FIGURE 1.22. Credit to the Economy as a Share of GDP, Brazil (2019-2021)



Source: Central Bank

guarantees for Brazilian SMEs that had previously been current on their taxes before the COVID-19 pandemic compromised their ability to pay. The Treasury provided resources through the Operations Guarantee Fund (Fundo de Garantia de Operações, FGO) such that the fund could guarantee up to 85% of commercial lending to SMEs. All loan contracts were required to offer a payment term of up to 36 months and a maximum interest rate equivalent to the basic interest rate (Selic) plus 1.25%, and each loan could be up to 30% of the SME's annual gross revenue for 2019. For firms that had operated for less than one year, the loan limit was either 50% of its share capital or 30% of its average monthly turnover, whichever was higher. The federal government approved a second line of credit, the Emergency Credit Access Program (Programa Emergencial de Acesso ao Crédito, PEAC), to further shield SMEs from the impact of the pandemic. Under the supervision of the Ministry of Economy, the program authorized an infusion of R$20 billion of federal resources into the FGI managed by the Brazilian Development Bank (BNDES). The rules of the PEAC are similar to those of PRONAMPE, with the government guaranteeing up to 85% of the total credit risk. BNDES (2022) shows that the PEAC were effective to reduce the mortality of the firms and to save jobs during the pandemic.

FIGURE 1.23. Share of Total Credit by Firm Size, Brazil (2020-2021)



Source: Central Bank

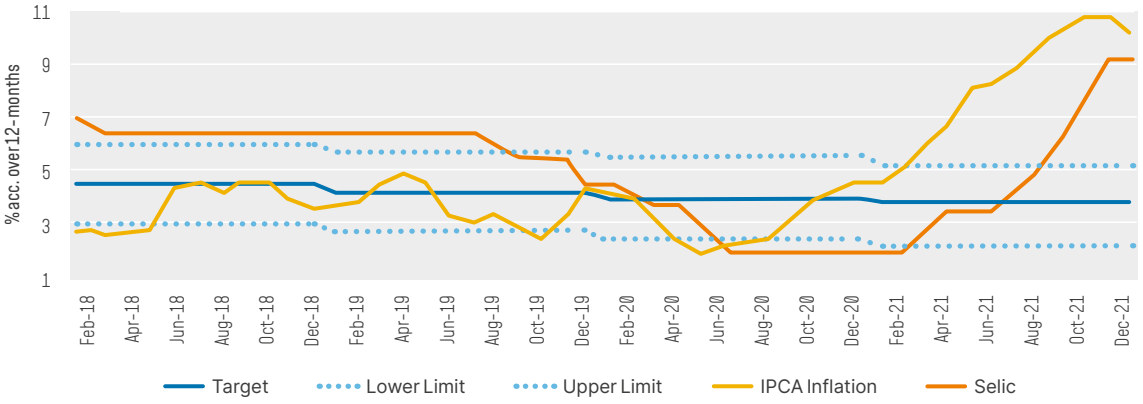
1.47. Credit concessions increased during the crisis. Boosted by the government's emergency credit programs and the deferment of existing loans, total credit increased from 46.9% of GDP in December 2019 to 54.0% at end-2021. Credit to both firms and households increased during the pandemic. According to the central bank, the government's credit programs were responsible for about 80% of the growth of bank lending to the private sector in 2020. Since 2015, earmarked credit had been shrinking, while non-earmarked credit had markedly expanded, but this pattern changed during the crisis. In 2020, the credit programs for SMEs launched during the year caused earmarked credit to expand by 15.9%, its first annual increase since 2015. The growth of earmarked credit slowed in 2021, but by the end of the year it equaled 21.7% of GDP, up from 19.8% in December 2019.

1.48. Notwithstanding the issues with the PESE described above, the government's programs were broadly effective in expanding credit for smaller firms. Due in part to the credit programs launched in response to the pandemic, the total credit balance for SMEs rose by 31.6% in 2020 and by another 17.5% in 2021. By contrast, the SME credit balance had increased by just 6.7% in 2019. Meanwhile, total credit to large companies expanded by 16.0% in 2020 and by 6.7% in 2021 following a 3.7% contraction in 2019. As a result, the share of SMEs in total credit increased from 37.35% in December 2019 to 42.9% in 2021.

1.49. Household debt increased during the pandemic. According to the central bank, falling labor income pushed the debt burden of Brazilian households from 41.4% of the annual wage bill in December 2019 to 52.6% in December 2021. A survey by the National Confederation of Commerce (Confederação Nacional do Comércio, CNC) indicated that about 12 million Brazilian families were in debt—the highest level recorded since the launch of the survey in 2010. The survey also found that 74.6% of households had debts maturing within the next few months. Among indebted households, 25.6% reported having overdue accounts, while 10.1% reported that they would not be able to pay their future debt obligations.

1.50. Inflation poses a burgeoning challenge. Although Brazil had faced high rates of inflation in the past, prices had largely stabilized prior to the pandemic. In 2019, the headline inflation rate was within the target band and medium-term expectations were well anchored. In July 2019, the central bank began lowering interest rates, and by 2020 the Selic reached a historic low at an annual average of 2.00%. In 2020, the central bank adopted a forward guidance framework in which it laid out plans to continue monetary easing indefinitely, as "the nature of the crisis probably implies that the disinflationary pressures from reduced demand may last longer than in previous recessions." The pandemic had the expected initial deflationary impact in 2020, but inflationary concerns mounted

↓ **FIGURE 1.24.** Inflation and Interest-Rate Dynamics, Brazil (2018-2021)



Source: Central Bank

in 2021 and 2022. A combination of supply-chain bottlenecks and elevated energy and food prices drove the sharp increase in inflation.

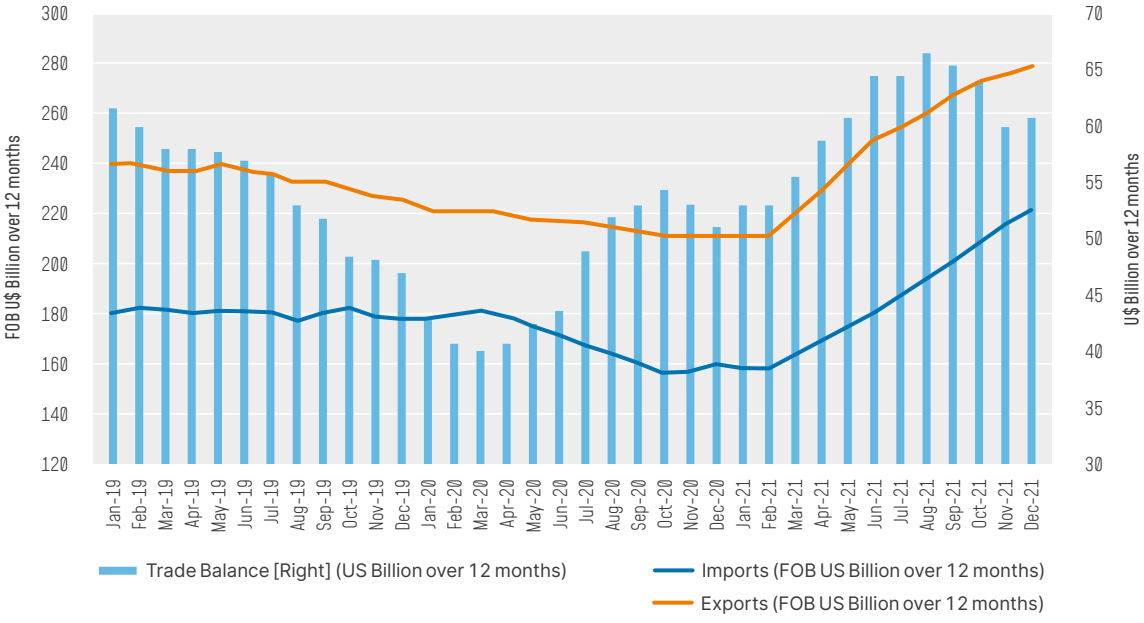
1.51. Monetary policy tightened in 2021 and 2022. Faced with growing inflationary pressures and the drift of expectations above the target band, the central bank initiated a monetary tightening cycle in 2021. Consumer price inflation has persisted, with services and industrial goods experiencing especially sharp price increases. Meanwhile, volatile CPI components such as energy and food prices have spiked, reflecting adverse weather conditions and ongoing geopolitical shocks. Together, these factors have prompted a significant revision of short-term inflation projections.

The Pandemic and the External Accounts

1.52. A record trade surplus drove a substantial improvement in the current account during the pandemic. Between 2014 and 2017, Brazil's current-account deficit narrowed from a record 4.3% of GDP in 2014 to just 0.48% in 2017, but in 2018 it widened dramatically to 2.69%. However, a growing trade surplus during the pandemic narrowed the current-account deficit to 1.75% of GDP in December 2021. The initial shock reduced the trade surplus by weakening exports, but as the pandemic advanced imports fell more sharply than exports, boosting the trade surplus. In 2021, rising commodity prices amid a global economic recovery, coupled with the delayed effects of a currency devaluation in 2020, pushed Brazil's trade balance to record levels.

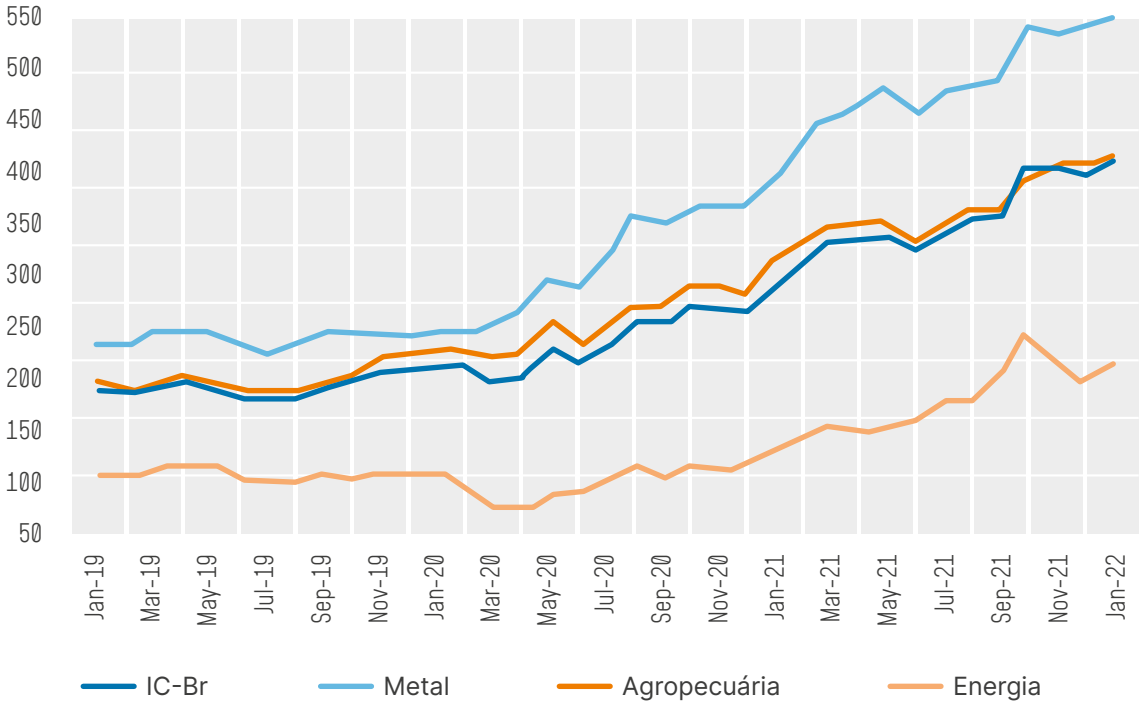
1.53. The record trade surplus highlights Brazil's increasing dependence on commodity exports and the importance of China as a trade partner. Export growth was driven by the extractive industries, especially iron ore and related products, and by agricultural goods, especially oil and soybeans. In 1997, agriculture and the extractive industries accounted for a combined 18% of Brazilian exports, but by 2019 this share had risen to 42.50%. The pandemic accelerated this trend, and agricultural and extractive-industry exports reached 49.7% of total exports in 2021. Meanwhile, manufactured goods fell from 80% of total exports in 1997 to 49.79% in 2021. In parallel to the rising importance of commodities, China

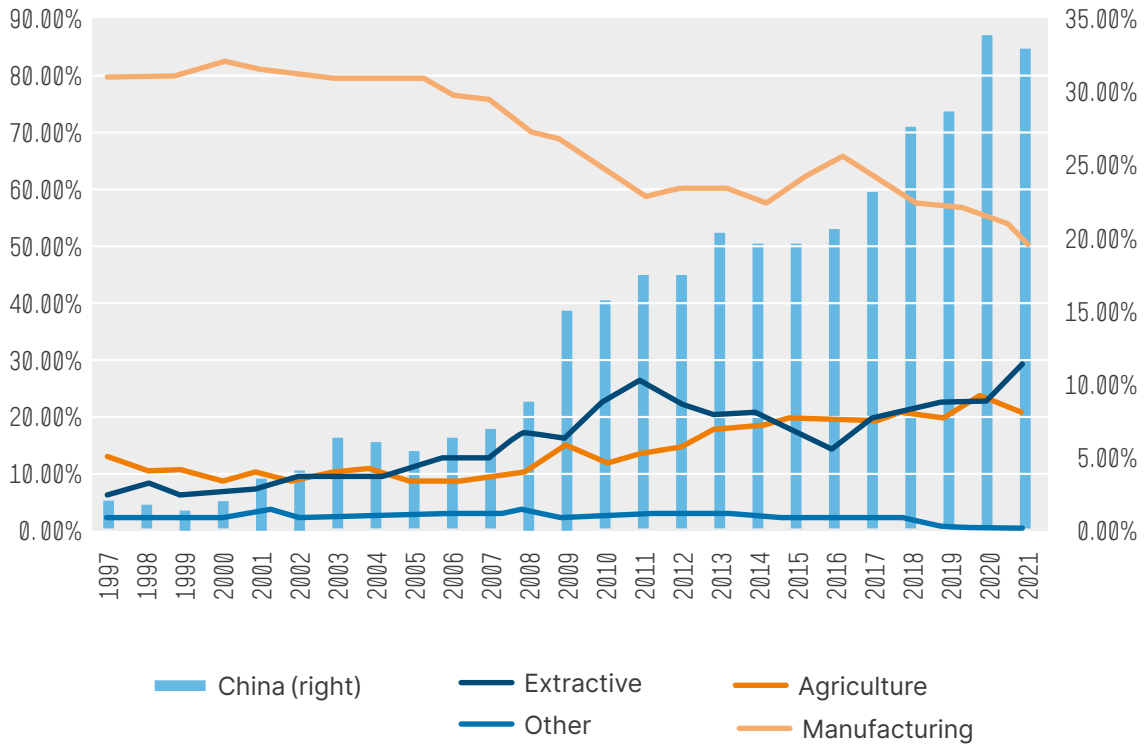
↓ **FIGURE 1.25.** Evolution of Trade balance (2018 – 2021)



Source: Central Bank and SECEX

FIGURE 1.26. Global Commodity Prices (2019-2022) and Brazilian Exports to China (1997-2021)





Source: Central Bank (dec 2005 = 100) – commodities Index. SECEX – exports' destination.

became Brazil's main export destination of Brazilian exports. The share of Brazilian exports going to China rose from 2.2% in 1997 to 28.4% in 2019 and reached 32.8% in 2021.

The Economic Outlook for 2022-2026

1.54. Economic growth will be vital to address the social and fiscal challenges facing Brazil in the short and medium term, but downside risks to the growth outlook are significant. To avoid permanent scarring from the pandemic, Brazil needs robust and equitable growth. External risks to the growth outlook include new waves of the pandemic, global monetary tightening, the mounting fallout from Russia's invasion of Ukraine, and slowing economic activity in developed countries. On the domestic front, key risks include reform slippages, and weakening fiscal discipline. Long-term projections suggest that it will be years before the Brazilian economy fully recovers from the pandemic. Moderating global growth and tightening monetary policy around the world will slow Brazil's recovery, and over the medium term the GDP growth rate is expected to average no more than 2% per year.

1.55. Macro-fiscal vulnerabilities could threaten Brazil's recovery. Delays in articulating a credible vision for debt sustainability could fuel uncertainty in domestic markets and heighten sensitivity to external shocks. The shortening of the average maturity of the public debt and the behavior of the yield curve during 2022 partly reflected rising macro-fiscal risk. The sharp rise in inflationary pressures over the year may further complicate macroeconomic management, and monetary tightening could increase the cost of debt service. Mounting fiscal and inflationary risks combined with a challenging external environment, unresolved constraints on structural productivity, and persistently high levels of poverty and inequality could result in a protracted period of anemic growth.

1.56. Despite recent improvements in the fiscal balances, a significant fiscal adjustment is still necessary to stabilize the debt ratio and ultimately lower debt levels. Given the growth of economic activity and inflation rates expected in 2022, adjusting Brazil's fiscal stance to reflect the output cycle will be crucial to shore up fiscal sustainability. Several favorable but temporary conditions are currently obscuring the government's underlying fiscal position, and projections for the short and medium term should correct for these transitory factors. Fiscal reforms will be crucial to lower the debt trajectory avoid compromising key parameters of sustainability. Mandatory expenditures and earmarked revenues create considerable downward rigidity in the public budget, leaving little scope for fiscal adjustment. Structural reforms will be necessary to address this issue and avoid a low-quality fiscal adjustment that penalizes investment and harms the welfare of vulnerable groups.

1.57. Notwithstanding the challenging outlook and significant downside risks, near-term growth could pick up if the government possess sufficient political will and implementation capacity to advance much-needed reforms. A credible effort to address fiscal vulnerabilities could boost confidence in the Brazilian economy, supporting increased investment in high-return sectors such as infrastructure, technology, and natural resources. In turn, greater investment could promote the efficient mobilization of human capital among workers with diverse levels of education and skills, generating opportunities for productive engagement across Brazilian society. Exploiting emerging opportunities in the digital economy while leveraging Brazil's comparative advantages in traditional sectors will be vital to accelerate growth. Moving forward, the government must combine efforts to address urgent macro-fiscal vulnerabilities and structural deficiencies with measures to maximize the potential of Brazil's productive factors. Chapter 2 assesses priority policy challenges in each of these areas.

TABLE 1.6. Selected Social Indicators

Indicator	Period I	Period II	Period III	Period IV
	2004–08	2009–13	2014–16	2017-2020
National level				
GDP per capita (constant 2015 US$)	7662.95	8828.27	8828.10	8486.94
Poverty (% of population below $5.50 a day - 2011 PPP)	34.52	22.88	18.73	19.87
Extreme poverty (% of population below $3.20 a day - 2011 PPP)	17.40	9.88	7.83	9.10
Gini coefficient	0.55	0.53	0.52	0.54
Years of education (individuals of 25+ years)	7.2	7.7	7.9	8.55
Years of education: men (individuals of 25+ years)	7	7.5	7.7	8.35
Years of education: women (individuals of 25+ years)	7.3	7.9	8.1	8.73
Life expectancy at birth (years)	72.3	73.9	75.0	75.7
Life expectancy at birth: men (years)	68.5	70.2	71.3	72.0
Life expectancy at birth: women (years)	76.1	77.6	78.7	79.4
Unemployment rate (%)	8.60	7.40	8.90	12.69
Unemployment rate: men (%)	6.49	5.71	7.65	11.06
Unemployment rate: women (%)	11.40	9.85	10.54	14.36
Access to improved sanitation (% households)	38.2	40.6	43.9	47.3
Access to improved water (% homes)	78.1	79.5	82.0	84.7
Access to electricity (% of population)	97.6	99.3	99.7	99.8
Educational attainment - High School (Individuals 25+ years)	32.8	39.0	43.8	46.8
Educational attainment - High School (Female 25+ years)	34.0	40.6	45.7	48.9
Educational attainment - High School (Male 25+ years)	31.4	37.2	41.7	44.5

2 Route toward Sustainable and Inclusive Growth

Chapter 1 *identified several structural bottlenecks that constrain the Brazilian economy, including low productivity growth and high levels of poverty and inequality. The COVID-19 pandemic exacerbated these problems, creating further obstacles to Brazil's development. The pandemic has shown that Brazil would benefit from pursuing a new growth model based on efficiency, resilience, inclusion, and sustainability. This chapter analyzes the challenges involved in constructing such a model.*

The new growth model should strive to increase the competitiveness of all economic sectors without generating macroeconomic imbalances and while improving the distribution of income and opportunities, providing adequate social services, and supporting equal treatment of different social groups. In addition, the new model should use new technologies and innovative practices as a growth engine. Finally, the model should promote the rational use of natural resources and biodiversity as a comparative advantage to foster growth.

All objectives need to be pursued simultaneously. Growth alone cannot permanently reduce inequalities and improve inclusion. The digital transformation brings opportunities, but it can lead to an increase in inequality if not accompanied by appropriate policies. At the same time, new technologies allow for more sustainable methods of production that, if adopted, can attract investments that will strengthen economic growth. The narrative articulated in this chapter is structured around four overarching, multi-faceted pillars, as shown in the figure below.[1]

↓ **FIGURE 2.1.** Pillars for Development

1 Zooming in into the specific development bottlenecks through a prioritization exercise is critical to reach an integrated diagnostic and build a narrative for policy action. Chapter 2 builds upon extensive and rich diagnostics work on Brazil's development problems that is available in the literature. A key goal is to systematize existing external knowledge in an integrated way that supports the presentation of policy solutions in chapter 3. As a starting point, a set of methodologies discussed in the annex are performed.

1º PILLAR

Promoting a Resilient Recovery

PILLAR RATIONALE

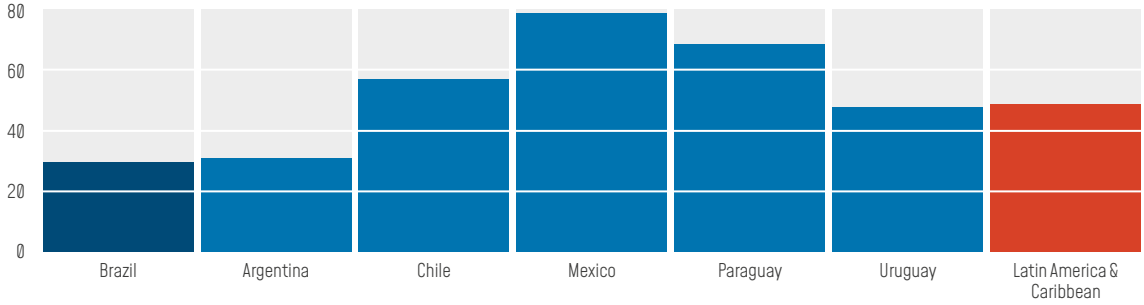
The emergency induced by the COVID-19 pandemic has worsened the structural bottlenecks of the Brazilian economy. Gaining momentum for medium-term growth is vital to minimizing the negative impact of the pandemic (IMF, 2021). Pillar 1 considers options to accelerate short-term growth by tackling structural bottlenecks. An economy more closely integrated with international markets, featuring better infrastructure and a stronger private sector, will boost growth and productivity and help reduce poverty and inequalities. Fiscal reforms will also be key to alleviating the impact of the pandemic on fiscal accounts and offering better social protection while maintaining macro and socio-economic stability—a necessary condition for more buoyant growth.

Key Diagnostics and Prioritization

2.1. International trade could drive Brazil's recovery. Evidence inside and outside the region suggest that the external sector can contribute to productive development.[2] Productivity gains can occur, for example, when import competition stimulates a reorientation towards more productive firms,[3] or through the availability of imported inputs of higher quality or at lower cost, [4] or through the transfer of technology through imports.[5] FDI can also contribute to productivity, through the availability of greater resources to invest in more efficient production methods, as well as through spillover effects such as the acquisition of new technologies and management models and the encouragement of input production by local suppliers.[6] Trade liberalization is estimated to account for between 32% and 39% of LAC's cumulative GDP per capita growth between 1990 and 2010.[7]

2 See IDB (2019) and Mesquita Moreira (2019) for a detailed literature review on this matter.
3 Pavcnik (2002), Melitz (2003).
4 Ethier (1982).
5 Keller (2004).
6 A sectoral analysis performed by Tondl and Fornero (2010) focused on Latin America found that FDI in the manufacturing sector has a positive effect on the productivity of that sector, but of a smaller magnitude than the direct effect of FDI in most other sectors. However, FDI in manufacturing has indirect effects on the productivity of other sectors such as agriculture, mining, electricity, and gas and water.
7 Mesquita Moreira, Li and Merchán (2019).

FIGURE 2.1: Trade as a share of GDP (%)



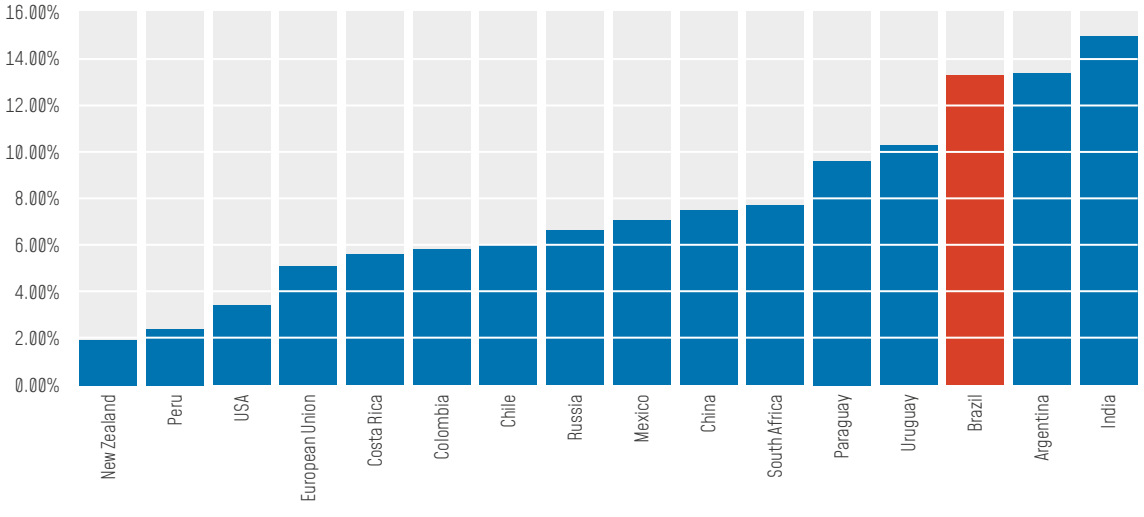
Source: IMF

2.2. Brazil is not as integrated internationally as other economies in the Region. Exports and imports of goods and services represent 30% of GDP, which is lower than comparator countries and well below the average for Latin America and the Caribbean (LAC). Although this can partly be explained by Brazil having the largest economy in the region, this indicator is 79% for Mexico, LAC's second-largest economy. Brazil lacks the extensive network of free trade agreements (FTAs) that many other economies in the region possess and does not have FTAs in place with its three largest export partners: China (which accounts for 30% of merchandise exports); the EU (14%); and the United States (12%).

2.3. Traditional trade barriers are high. Brazil has an average applied most-favored nation (MFN) tariff rate of 13.3%, the third-highest in Latin America.[8] Although there is a common external tariff (CET) as a part of the Mercosur customs union, exceptions are permitted, and Paraguay applies an average MFN tariff of 9.6% and Uruguay an average rate of 10.3%.[9]

2.4. Nontariff barriers and bureaucracy also limit international trade. Brazil is among the world's most frequent users of nontariff measures, such as sanitary and technical regulations, national component policies, and technical

FIGURE 2.2. Tariffs – Simple Average (MFN applied)



Source: UNCTAD (2021)

8 WTO, ITC, and UNCTAD (2021).
9 USITA (2020); WTO, ITC, and UNCTAD (2021).

import barriers. According to the World Bank,[10] Brazilian imports have a coverage ratio of 86.42% and a frequency ratio of 75.62% for nontariff measures—compared to international averages of 71.98% and 43.04%, respectively—even though Brazil's exports have a coverage ratio of 50.04% and a frequency ratio of 38.71%. The Brazilian manufacturing sector in particular is protected by nontariff barriers at higher levels than the world average (SAE, 2018).

2.5. Productive complementarity among Latin-American countries has a role to play in the recovery, but intraregional trade has declined over the past few decades. Faria (2020)[11] shows significant potential for integration among Latin American countries. The study indicates that the main sectorial links between Brazil and Latin American countries occur via the service sector, and several other sectors hold potential for integration. Nevertheless, the share of Brazilian exports to and imports from Latin America has fallen since 1997. That year, Latin America (including Mercosur) was Brazil's main export market, accounting for 28% of all its exports. As of 2021,[12] this share had dropped to 13.1%.

2.6. Several obstacles hinder regional and international integration. High transport costs for exports and imports, weak logistical integration among countries, high tariffs on capital and intermediate goods in the region's largest economies, sub-regional trade agreements that do not address critical issues for the formation of intra-regional chains—such as nontariff barriers, disparate rules of origin, and restrictive trade regulations. These factors inhibit Brazil's ability to access international value chains while slowing the growth of intra-regional trade and investment.[13]

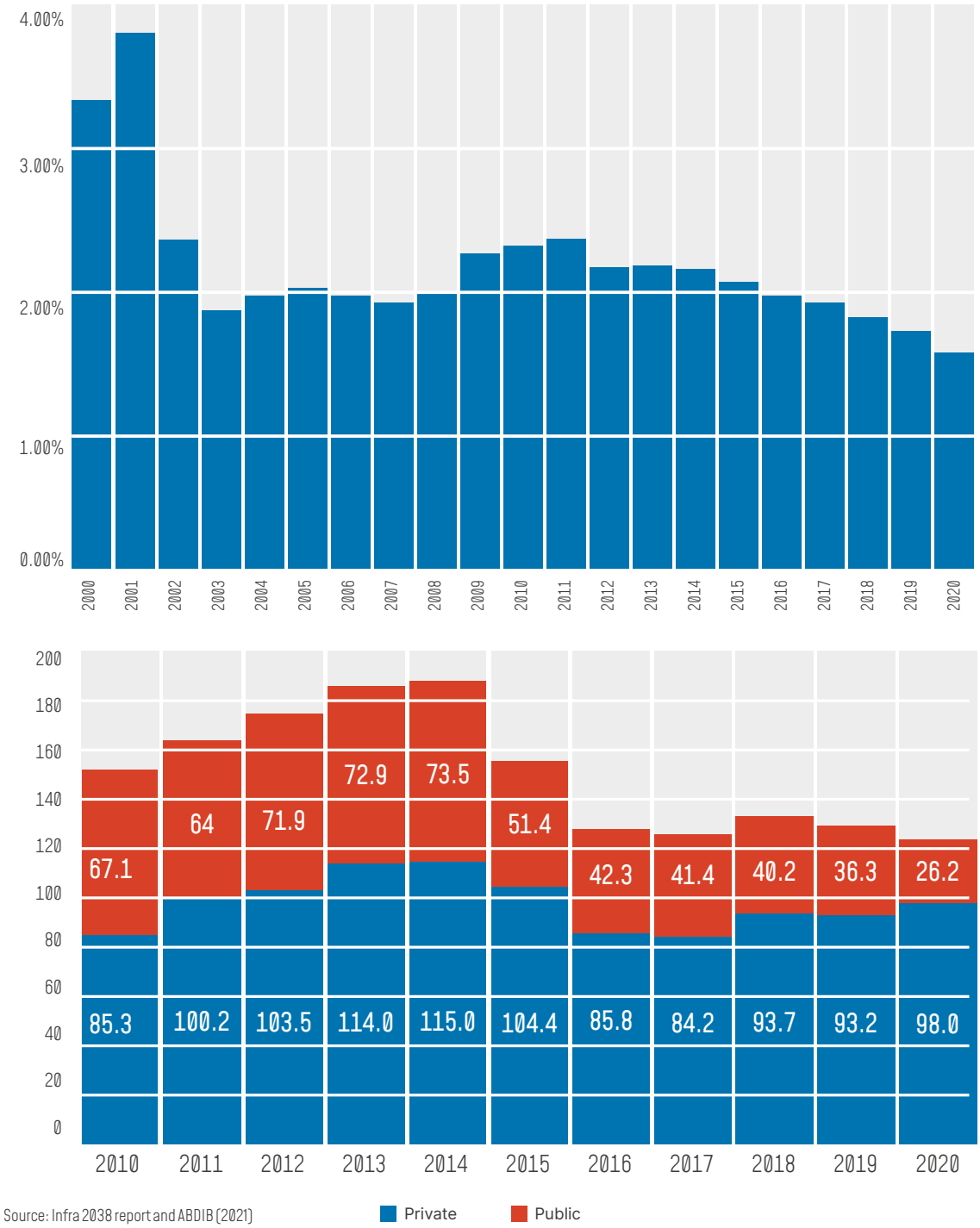
2.7. Brazil's participation in global value chains is limited, but the pandemic has created new opportunities.[14] Hollweg and Rocha (2018)[15] show that although Brazil has witnessed high growth in total domestic value added embodied in gross exports since 1995, it exhibits less international engagement in global value chains. Similarly, a 2021 report by the National Confederation of Industry (*Confederação Nacional da Industria*, CNI)[16] found that Brazil's position in global value chains is very fragile, but that the COVID-19 pandemic has created new opportunities for the country. Moreover, in a recent paper on the resilience of value chains, McKinsey (2021) estimates that between 16% and 26% of global exports (worth between US$2.9 and US$4.6 trillion) could shift away from existing trade partners either to domestic production or to new trade partners, reflecting the influence both of economic and noneconomic considerations.

2.8. An integrated economy needs to boost logistics, so Investments in infrastructure can make a crucial contribution to the recovery. Extensive literature indicates that infrastructure investments and improvements in infrastructure services are powerful tools for boosting productivity and growth. IMF (2020) points out that a synchronized infrastructure investment push could invigorate growth, limit scarring, and address climate goals. Munhoz et. al. (2021) show that by investing 2% of GDP in transportation infrastructure, Brazil can increase its GDP by 27%. Brichetti et al. (2020) indicate that besides enhancing productivity, improvements in infrastructure services can reduce poverty and inequality.

2.9. Infrastructure gaps impose major constraints on economic growth. The low quality of Brazilian infrastructure poses a challenge to productivity and economic growth. Brazil ranked 59th out of 163 countries in the World Bank's 2018 Logistics Per-

10 https://wits.worldbank.org/tariff/non-tariff-measures/en/country/BRA
11 Faria, Weslem (2020). Productive complementarity in Latin America? An assessment for 2005 and 2011.
12 Up until September.
13 Moreira et al (2008); Cadestin, C. et al (2016). Another contributing factor is the rise in political and institutional instability in the region's largest countries in recent years.
14 Urata and Baek (2022) show that participation in global value chains is an important driver of productivity growth. They find that Japanese firms that participate in global value chains are more productive than non-participants, and a longer participation strengthens the productivity-enhancing effects.
15 Hollweg, Claire H.; Rocha, Nadia. 2018. GVC Participation and Deep Integration in Brazil. Policy Research Working Paper; No. 8646. World Bank, Washington, DC. © World Bank.
16 CNI (2021). Reorganização das cadeias globais de valor. Riscos e oportunidades para o Brasil, resultantes da pandemia de COVID-19.

FIGURE 2.3. Investment in infrastructure in Brazil, % of GDP and R$ billion



Source: Infra 2038 report and ABDIB (2021)

formance Index and did not record any substantial improvements over the last decade. In addition, the country ranks 78th out of 141 countries on quality of overall infrastructure, 116th on road quality, 78th on railroad density, 104th on efficiency of seaport services, and 85th on efficiency of air transportation services (WEF, 2019). The inadequate availability and low quality of transportation infrastructure is also among the key obstacles to doing business domestically.[17] Furthermore, infrastructure invest-

17 EMIS, 2018.

ment in Brazil is low and declining. In the 1970s, Brazil invested on average 5.42% of its GDP in infrastructure, but in 2020 this share had dropped to a historical low of 1.55%. Infrastructure investment has decreased since 2014, with a more noticeable reduction in public investment.

2.10. Several factors stand in the way of boosting infrastructure investment. Ineffective long-term planning that lacks an integrated strategic vision reduces the efficiency of infrastructure investment. Project guidance and screening are inadequate, the use of cost-benefit analysis is inconsistent, there are no clear criteria for project selection, and links between long-term plans and the annual budget are weak.[18] Regulatory uncertainty hinders investment in all sectors,[19] and long-term infrastructure financing options are very limited. A study by the Interamerican Development Bank (2020) found that large infrastructure projects take, on average, 20% longer than scheduled and costs are generally 80% over budget. Such deficiencies in project execution compromise the search for new investments and for a reduction of the infrastructure gap.

2.11. Enhancing infrastructure investment will require more efficient governance.[20] Efficiency of public investment is key for growth,[21] but Brazil's public investment management systems face challenges. According to the latest Public Investment Management Assessment (2018), the efficiency gap between Brazil and the most efficient countries with comparable levels of public capital stock per capita is 39 percent. The gap is wider than the average of 27 percent for countries in the Europe and the Middle East and 29 percent for countries in Latin America and the Caribbean (LAC). According to the 2018 Public Investment Management Assessment, Brazil's areas of strength include national planning, budget comprehensiveness, company regulations, and monitoring of assets; on the other hand, the key weaknesses are in the allocation and implementation phases, especially around project appraisal and selection, protection of investments, funding availability, and project management. Most institutions with investment responsibility were assessed as medium or low on metrics of implementation and effectiveness. There is a lack of high-level guidance about priorities, poor coordination across levels of government, and no central guidelines on project

↓ **TABLE 2.1.** Investment in Infrastructure by sector – 2020

Sector	Actual Investment in 2020 (R$ billions)	% of GDP	Minimum Necessary Investment (R$ billions)	% of GDP
Transport/Logistics	23.0	0.31%	149.0	2.26%
Energy	56.4	0.76%	55.4	0.84%
Telecommunications	31.2	0.42%	50.0	0.76%
Water and Sewage	13.6	0.18%	30.0	0.45%
Total	124.2	1.67%	284.4	4.31%

Source: ABDIB (2021)

18 See World Bank (2018) and SAE (2018), inter alia.
19 Amann & Baer, 2006; Cunha & Rodrigo, 2012; De Paula & Avellar, 2008; and Amann et al., 2016.
20 Infrastructure has a positive effect on economic growth and on the reduction of income inequality. Public investment does not seem to pose equity--efficiency tradeoffs, but instead tends to improve both macroeconomic and distributional outcomes (Furceri and Grace Li, 2017). Yet, the economic and social impact of public investment depends on the efficiency of investment spending (Gupta et al., 2014; IMF, 2014). The growth dividends from closing the efficiency gap are considerable: an increase of 1% of GDP in public investment raises output by just 0.3% for countries in the bottom quartile of the efficiency distribution, compared to as much as 0.6% for countries in the top quartile (Abiad et al., 2015).
21 IDB (2018).

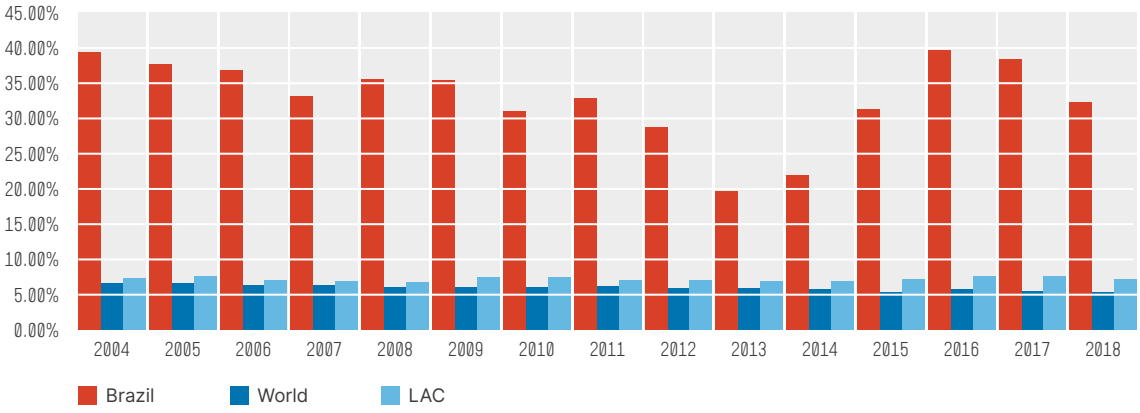
appraisal and selection. Combined with poor capacity at the subnational level and among certain spending ministries, poor project management, and uncertain funding, these weaknesses contribute to suboptimal project execution, cost overruns, delays, and poor-quality infrastructure.

2.12. Brazil needs to create a business climate more favorable to private sector development. Improving Brazil's business environment is necessary to boost the country's long-term productivity. The costs stemming from unnecessary bureaucracy strongly discourage companies from expanding in Brazil. The country suffers from relatively burdensome regulation, relative to both OECD countries and other large emerging economies. According to the WEF Global Competitiveness Index published in 2019, Brazil ranked last out of 141 countries in terms of the burden of government regulation. It also ranked near the bottom of the index (124th) in terms of product market efficiency, due to poor internal competition and distortive subsidies.

2.13. High financing costs are a major constraint to private sector development, and the financial system does not play a strong intermediation role. The Brazilian financial system is among the largest and most sophisticated in Latin America, but the financing available to Brazilian firms tends to be scarce and expensive. Balassiano and Vidal (2019) show that Brazil has the second-highest banking spread in the world, due to a variety of factors. For example, the recovery of credit through judicial means in Brazil is among the worst in the world: only US$0.11 for every US$1 borrowed is recovered. In Japan, which has the lowest banking spread in the world, US$0.92 is recovered for every US$1 borrowed, and the global average is US$0.34 per US$1 borrowed. Other studies cite additional factors: costs associated with provisioning, the high level of non-performing loans, taxation, the high operational costs of banks (including labor costs), and high concentration and poor competition among banks. The relative importance of each factor depends on the type of credit (SMEs, large companies, household, or working capital). As a result, neither banks nor the capital markets meet the long-term financing needs of Brazil's private sector. The banking system offers credit mainly for short-term financing of households and businesses. SMEs face especially low liquidity and high costs for long-term financing, and capital markets are at the early stages in terms of issuance of long-term bonds.

2.14. Access to finance remains one of the most significant constraints to the survival, growth, and productivity of SMEs. In addition to gaps in digitalization and infrastructure, SMEs are affected by a shortage of credit, despite advances during the pandemic thanks to government credit programs. Notably, the credit supply to SMEs dropped significantly between 2015 and 2019, falling just under its 2015 level at the start of the pandemic. This decline was connected to the economic reces-

FIGURE 2.4. Interest rate spread (lending rate minus deposit rate)



Source: World Bank, World Development Indicators

sion that hit the country during the same period, but the drop was more significant for smaller companies: total credit to SMEs dropped by 31%, while credit to large companies fell by just 9%.[22] According to the SME Finance Forum, Brazil's SMEs face a finance gap equivalent to 24.7% of GDP, one of the highest in the world, although BNDES (2021) shows that the supply of credit to SMEs has a positive impact on employment.

2.15. Shortcomings in public sector governance, combined with a burdensome State administration, undermine fiscal sustainability, efficiency, and effectiveness, thus deterring growth and development. Public sector governance in Brazil—understood as the structures, rules, and systems shaping government operations and accountability—can be improved. Shortcomings in the strategic and operational planning, in the definition of responsibilities, monitoring, and assessment of compliance with goals and standards, pose problems given the size of the Brazilian State.

2.16. Policymaking needs to center on hard evidence and results to foster public sector productivity. In the coming years, the public sector will need to revisit public expenditure more thoroughly, including the mandatory budget lines. In this context, efficiency in the public sector has become a key additional ingredient in this discussion – the World Bank shows that measures to improve the efficiency of public expenditure can lead to savings amounting to 8.36% of the GDP.[23] In this context, beyond reforms and a push for efficiency in selected areas, Brazil is in need of a more fundamental overhaul in its public policymaking mindset to mainstream evidence-based public policymaking. Greater focus on service delivery, widespread adoption of modern principles for the design, implementation and monitoring of State action, and mechanisms that ensure accountability and transparency are all part of a needed package to support growth and equity.

2.17. Responding to the country's social needs post-pandemic, without leaving the fiscal consolidation agenda to the side, will rely on improving the quality of public spending. Federal entities at the three levels of government suffer from high personnel expenditure and low savings and investment. Governments need to rationalize expenses and enhance the efficiency of public resources, in order to increase the economic and social impact of public spending.

2.18. Enhancing fiscal transparency is vital to increase the effectiveness of the public sector. Greater fiscal transparency is necessary to promote sound policy decisions and strengthen accountability for implementation and results. Improved fiscal transparency—which includes appropriate financial and fiscal reporting requirements, the regular publication of forecasts and budgets, and effective fiscal risk management—allows for a more open and informed debate, both within government and with the public. Transparency is fundamental to the credibility of fiscal policies and a prerequisite for building trust in financial markets.[24]

2.19. Corruption is also a challenge for growth and the reduction of poverty and inequalities. Regarding transparency and integrity, corruption is perceived as one of the most important problems in Brazil. According to Transparency International's Global Corruption Barometer, while in Latin America (2019), 85% of the region's citizens reported corruption as the most serious problem in their governments and 77% of the population had little or no trust in their governments, in Brazil, these figures corresponded to 90% and 72%, respectively. On the other hand, the Corruption Control Indicator of the World Governance Indicators (World Bank), in the 2016-2020 period, the average score of the countries of Latin America and the Caribbean has remained at -0.27 compared to 1.08 for OECD countries. Brazil underperformed the regional average, scoring -0.33 in 2019 compared to -0.40 in 2015 (i.e. showing improvement).

22 ABDE-Bid. Support for SMEs in the COVID-19 crisis: financing challenges for resilience and recovery. 2021. p.25. <https://publications.iadb.org/publications/portuguese/document/Apoio-as-MPMEs-na-crise-da-COVID-19-desafios-do-financiamento-para-resiliencia-e-recuperacao.pdf>
23 World Bank (2017).
24 IMF, 2014.

2º PILLAR

Adopting a new social agenda for inclusive growth

PILLAR RATIONALE

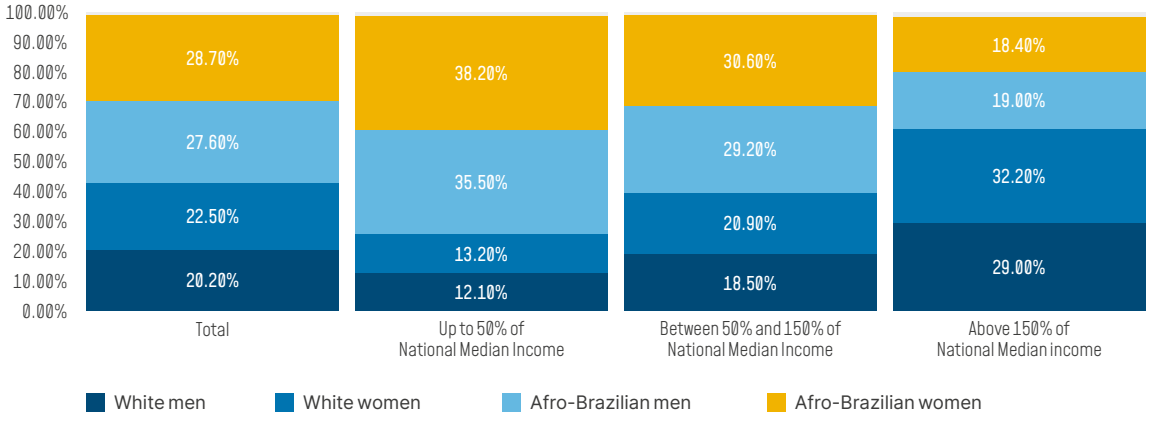
The pandemic widened deep-rooted inequities in the Brazilian economy. The most vulnerable sections of the population suffered more from the pandemic (Chapter 1). If not addressed, these social outcomes will have adverse consequences on the country's long-term growth and social cohesion. Pillar 1 discussed policies to boost growth and help the economy recover, and therefore reduce poverty and inequality; yet the historical persistence of poverty and social inequalities indicates that growth alone cannot reduce them permanently. In addition, poverty and inequalities make productivity bottlenecks more difficult to tackle. Brazil has not yet created efficient policies to help people achieve a good standard of living. Therefore, reformulating the social agenda must be a core aspect of the recovery from the pandemic, with a view to achieving better and long-lasting social outcomes.

Key Diagnostics and Prioritization

2.20. Inequality of opportunities cuts across regions, gender, and race in Brazil, and persists over time. Chapter 1 shows that breakdowns by race, gender, and geographical location are fundamental to the diagnosis of poverty and inequality in the country. The results indicate that inequalities are structural, given that key differentials, apart for small fluctuations, remain stable over time (IBGE, 2020). Women make up half of the Brazilian population, and 56.3% of the total population self-identifies as Afro-Brazilian (*preto* or *pardo*), but gender and racial disparities in income, education, and access to labor markets, public services, and violence prevention services remain stark. Considering the income distribution by deciles, Afro-descendants are over-represented at the bottom. 76.7% of those living below the poverty line (less than US$1.90 per day) are Afro-descendants.[1] Inequalities by race and gender in the labor market are also high. Moreover, the intersection of data on gender and race reveals that women Afro-descendants stand out among the poor: they make up 28.7% of the population, but 39.8% of the extremely poor and 38.1% of the poor. Households led by Afro-descendant women, without a spouse and with children under the age of 14, are those with the highest incidence of poverty: 24% of them have a per-capita household income of less than US$1.90 per day, and 62.4% of less than US$5.50 per day.

1 IBGE (2020).

↓ **FIGURE 2.5.** Distribution of population across gender and race, according to household income per capita



Source: IBGE (2020)

2.21. Inequality and poverty go hand in hand in Brazil. The World Social Report (2020) finds that highly unequal societies are less effective at reducing poverty than those with low levels of inequality. Unequal societies also grow more slowly and are less successful at sustaining economic growth. In Brazil, Barros et. al. (2007) show that the fall in inequality in the 1990s and 2000s had a major effect on the income of the poorest, thereby reducing poverty in the country. Much like the Gini coefficient, poverty has instead increased since the 2014–2015 recession. According to the IBGE, 10.3% of the population lived on less than US$3.20 per day in 2011, falling to 7.1% in 2014 but increasing again to 9.2% in 2018. Using other datasets, FGV Social (2021) shows that in 2019 10.97% of Brazilians, or 23.1 million people, were living below the poverty line. This ratio increased to 16.09% in the first quarter of 2021, then fell to 12.98% in the second quarter of the year.

2.22. Social spending in Brazil is high compared to the rest of the region. Spending on health and education accounts for 28% of the central government's primary expenditure. Moreover, it has been rising rapidly over the last two decades, partly reflecting constitutional minimum spending requirements in both sectors. In addition, Brazilian expenditures in these sectors are higher than in other Latin American countries: Brazil spends 6.1% of GDP in education, while other Latin American countries and OECD countries spend on average 4.0% and 4.9%, respectively; in the health sector, Brazilian government spends 3.9% of GDP, compared to the LAC average of 3.4%.[2] However, despite advances in social indicators in recent decades, Brazil has ample room to improve the quality of social spending.

Effective policies focusing on more vulnerable population would have a significant effect on poverty and inequality. Different social policies during the whole life cycle of a Brazilian citizen are ineffective to reduce the poverty and inequalities and exerted an acute impact on the social mobility of different groups especially women, afro-descendants and other vulnerable groups.

2.23. Disparities in early childhood development have lifelong effects. Portela (2022) identifies key inequalities in early childhood development in Brazil. 85% of the most educated women have access to the broadest range of prenatal care, but this share plunges to 38% among women with no formal education. At the other end, 10% of uneducated mothers do not have access to any prenatal follow-up, compared with only 1% among women with the highest educational attainments. The author also finds an education chasm between the extremes of the income distribution, with 75.7% of children

2 Source: OECD data (2019). OECD countries spend on average 6.6% on health.

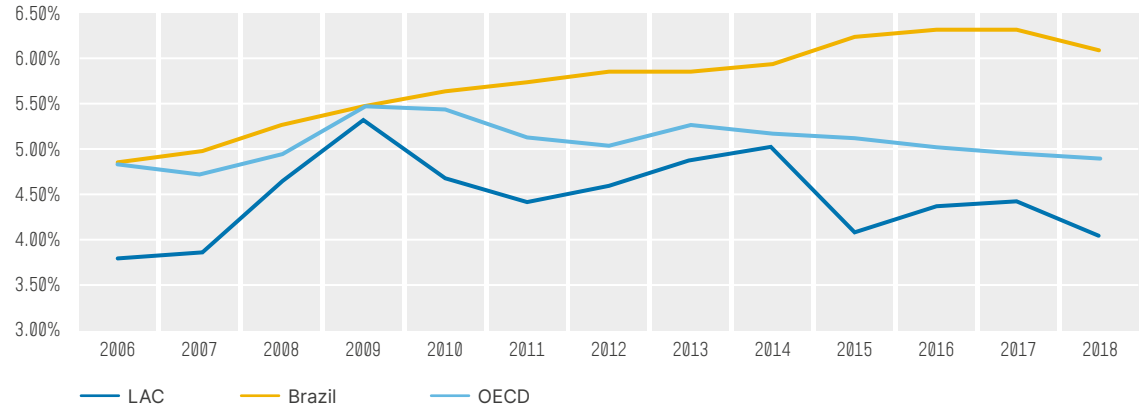
on the lowest income level not attending early childhood education, compared with 44% of those on the highest income level. There are also differences among Brazilian children linked to racial inequality. The share of children outside the early education system is 60.6% among *branco* children (the lowest average), versus 68.4% among *pretos* and *pardos,* and 71.8% among *indígenas*. Finally, only 29.8% of *preto* and *pardo* children under the age of four attend daycare, versus 36.2% of *branco* children. Lack of vacancies near the family residence is the main reported reason for not attending daycare.

2.24. Education: Despite a high level of spending, educational outcomes in Brazil are poor and unequal. The OECD's 2018 Programme for International Student Assessment (PISA) shows that Brazil is among the countries with the worst educational performance. On a scale of one to ten, approximately 43% of Brazilian students were below level two (considered the level of minimum proficiency) in all fields surveyed—reading, mathematics, and sciences—compared with an average of 13.4% in OECD countries. On reading, Brazil ranked 57th among the 77 countries and regions for which data was available. In mathematics and sciences, the country was ranked 70th and 64th (along with Peru and Argentina), respectively, out of 78 nations. Educational outcomes tend to vary significantly depending on the socio-economic backgrounds of students. In Brazil, there were only about five socio-economically disadvantaged students who scored above PISA level two in reading for every ten advantaged students who scored above this level. The participation of the private sector is low in education, with the exception for daycares (children with 0-3 years old), yet private sector can increase the supply capacity faster and in a more flexible way than expanding with direct public supply. Civil Society plays a key role in Brazilian education not only as a strong advocator for quality education but also as promotor of sound strategic policies and programs, leveraging state and municipalities to implement learning recovery and other programs.

2.25. Social Protection: Focus on formal employment and the existence of "invisibles". In recent decades, Brazil has created a social protection net to protect workers from economic fluctuations, alleviate poverty, and mitigate inequalities. However, several challenges remain. Importantly, most existing programs focus on formal workers. Souza et al. (2020) using the 2019 Continuous PNAD data estimate the "invisible" population, that is, individuals who are not included in any government registry and who were in a vulnerable situation. According to the authors, more than 6 million people belong to this group, including informal, unemployed, dismayed and self-employed.

2.26. Labor market: Several challenges affect the dynamic of employment. The Brazilian labor

FIGURE 2.6. Total Expenditure on Education



Source: World Bank

market is characterized by

I. high labor informality, that surpassed 47% by 2019;
II. stagnant labor productivity;
III. high turnover and low average duration of jobs; and
IV. unequal employment opportunities, with unemployment rates higher for afro-descendants and women.

These characteristics could be explained by:

I. workers not having sufficient technical and socio-emotional skills to perform well in the job market;
II. workers have access to inefficient methods of searching for jobs; and
III. labor legislation and the regulatory environment still represent obstacles to creating quality jobs and the growth of productive companies.

2.27. Informality is a significant source of inequality. IDB (2020)[3] discusses the importance of the labor market in the evolution of inequality in Latin America. The study shows that the decline in inequality in the early 2000s was driven by two factors:

I. the expansion of education, and the consequent decrease in the marginal return of skills; and
II. an increase in domestic demand fueled by the region's commodity boom, which favored less-skilled workers (Messina and Silva, 2018).

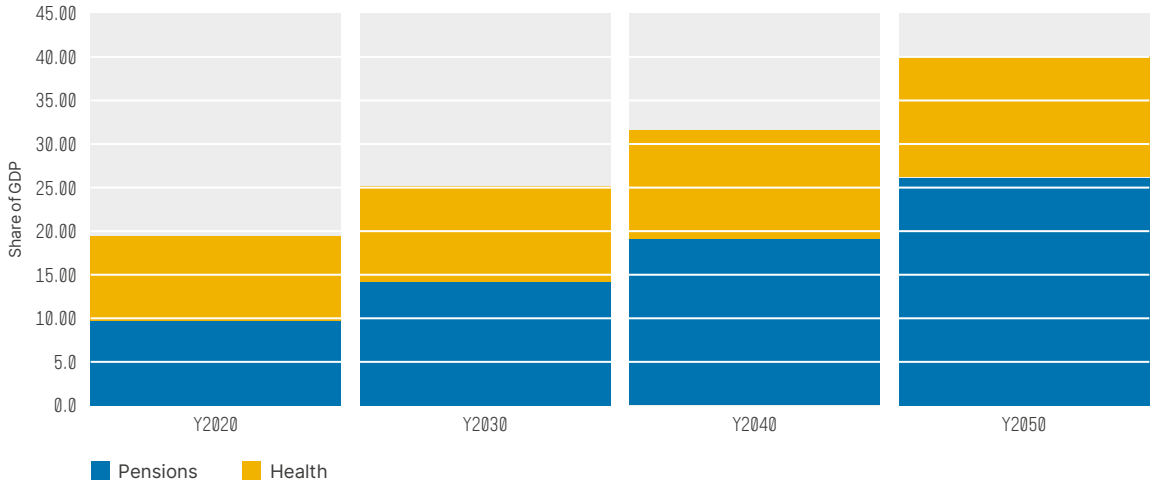
Other labor market forces contribute to explain the evolution of inequality, such as the evolution of the minimum wage and the degree of informality in the economy. Notably, informality is an important component of labor inequality. Workers in the informal economy in LAC do not have access to contributory retirement, health insurance, or a safety net against income losses in the event of unemployment. In Brazil, the rate of informality is close to 40%. The rate is similar for women and men, but higher for *preto* and *pardo* workers than it is for their *branco* counterparts.

2.28. Health: Universalization and concerns about quality, efficiency, and equity. Brazil has made significant advances in health indicators since the creation of the national health system (Sistema Único de Saúde – SUS) in 1988. Brazil spends 9.6% of its GDP on health, slightly more than the OECD average (8.9%), but the share of public spending (40.6%) is lower than the OECD average (73.4%). There have been substantial reductions in child mortality (11.5 deaths per 1,000 children born alive in 2020, versus 24.7 in 2003) and maternal mortality (59 deaths per 100,000 live births in 2018, versus 143 in 1990), and the country has achieved 100% coverage on childhood immunization. However, there are acute concerns about the efficiency and quality of health services. Recent studies based on data envelopment analysis (DEA) and stochastic frontiers reveal that the Brazilian health system has a wide margin of improvement in terms of efficiency, both relative to other countries and internally (i.e., in terms of performance at the state and municipality levels).[4] IDB (2018)[5] shows that significant inequities remain in access to primary care, and users of private insurance have a better experience of primary care than public users. The study also indicates the need to Improve the service management model, including better communication with patients, better scheduling systems for appointments and consultations, and better coordination between levels of care.

2.29. Brazil faces looming demographic trends that will exacerbate social challenges, especially in health. The share of Brazilians aged 65 or older will rise from 10% to 20% of the total population in 24 years, while the same shift will take 60 years in Europe. This exceptionally fast transition will boost spending on health and pensions from 19% of GDP in 2020 to 40% in 2050. Health expenditure, which is projected to rise to 14% of GDP by 2050, will also be driven by economic growth and technology inflation (Rao et al., 2021).

3 IDB (2020). A crise da Desigualdade. América Latina e Caribe na encruzilhada. Edited by Matias Busso and Julián Messina.
4 IDB (2018).
5 Guanais, Frederico, Ferdinando Regalia, Ricardo Perez-Cuevas, Milagros Anaya. 2018. Desde el paciente. Experiencias de la Atención Primaria de Salud en América Latina y Caribe. Washington, DC: BID.

FIGURE 2.7. Projected Spending on Public Health and Pensions, Brazil (% of GDP)



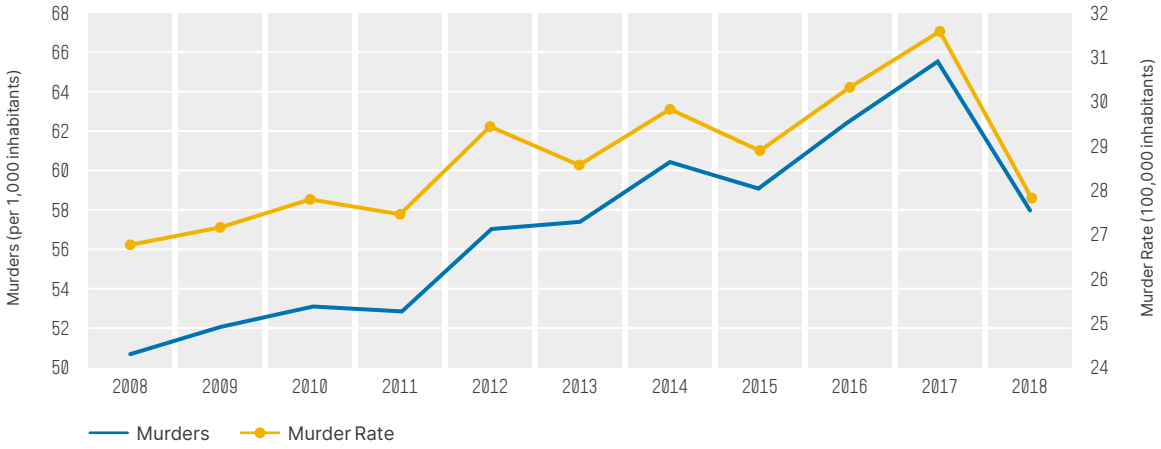
Source: calculations based on IADB, Labor Markets and Social Security Information System (SIMS); International Monetary Fund and Rao et al. 2021.

2.30. Citizens' security has been one of Brazil's greatest challenges over recent decades. With almost 40,000 homicides, and a rate of 18.8 per 100,000 inhabitants,[6] Brazil ranked second for homicide rate in South America in 2019.[7] If robberies and assaults that cause death are added to the above, intentional lethal violent crimes (ILVC) affect almost 42,000 people per year, mainly young people (52%), men (91%), and Afro-descendants (74%)[8] from the urban peripheries.[9] However, Brazil's homicide rates in 2018 and 2019 (27.8 and 18.8 deaths per 100,000 inhabitants, respectively) were the lowest in four years, following a consistent rise in the number of homicides up until 2017. Finally, despite an investment of almost 5.9% of GDP to tackle the direct and indirect costs of crime, Brazil has significant room to enhance the efficiency and effectiveness of public spending in this area.[10]

2.31. Violence in Brazil is disproportionately concentrated among certain demographic groups. Despite the decline in the homicide rate, the femicide rate has not followed the same trajectory and constitutes a major challenge. The number of femicides per 100,000 women in Brazil did fall from 1.6 to 1.5 between 2016 and 2017, but then went up to 1.7 in 2018 and 1.8 in 2019.[11] According to the World Health Organization (WHO), Brazil is the country with the fifth-highest number of femicides in the world. In addition, homicide is the leading cause of death for young people between the ages of 15 and 29. In 2018, 30,873 young people were victims of homicide, representing a rate of 60.4 homicides per 100,000 young people, and 53.3% of the country's total homicides. Among young people, most victims are men: they represent 55.6% of victims aged between 15 and 19, 52.3% of those aged between 20 and 24, and 43.7% of those aged between 25 and 29. In turn, violence is highly concentrated among the Afro-descendant population. Young *preto* men are the most frequent victims of homicide in the country, and homicide rates for this category have been rising over the years.[12] In 2018, 75.7% of all homicide victims were Afro-descendants,[13] and Afro-descendant women accounted for 68% of all women murdered in Brazil.[14] Finally,

6 Brazilian Forum on Public Security (FBSP), 2020.
7 United Nations Office on Drugs and Crime (2019).
8 The proportion of Afro-descendants among homicide victims increased from 59% to 72% between 2001 and 2011 (Marques-Garcia Ozemela et al., 2019).
9 FBSP (2020).
10 Institute of Applied Economic Research (IPEA) and FBSP (2019).
11 https://oig.cepal.org/es/paises/7/profile
12 IPEA (2020), "Atlas of Violence".
13 Ibid.
14 Ibid.

↓ **FIGURE 2.8.** Trends in the Evolution of Violence, Brazil



Source: Atlas da violência 2020 IPEA - Foro Brasileiro de Segurança Pública

violence against LGBT people has increased by an average of 7.7% in the 11 states that keep records of anti-LGBT crimes.[15]

2.32. Brazilian cities suffer from several structural problems. The deficiency in the application of the existing legal framework associated with economic crises that the country has experienced in recent decades were the main driver for the structural problems in Brazilian cities:

I. urban sprawl – with the degradation of central and heritage areas that have a wide supply of installed urban infrastructure;
II. social inequities – with the growth of informal settlements with low habitability patterns affecting mainly certain most vulnerable strata of the population (women and/or blacks/browns); and
III. deficiency in urban infrastructure – the poor conditions of urban infrastructure supply, whether in urban mobility services, or in those of environmental sanitation and energy.

More recently, other challenges related to urban conditions have been:

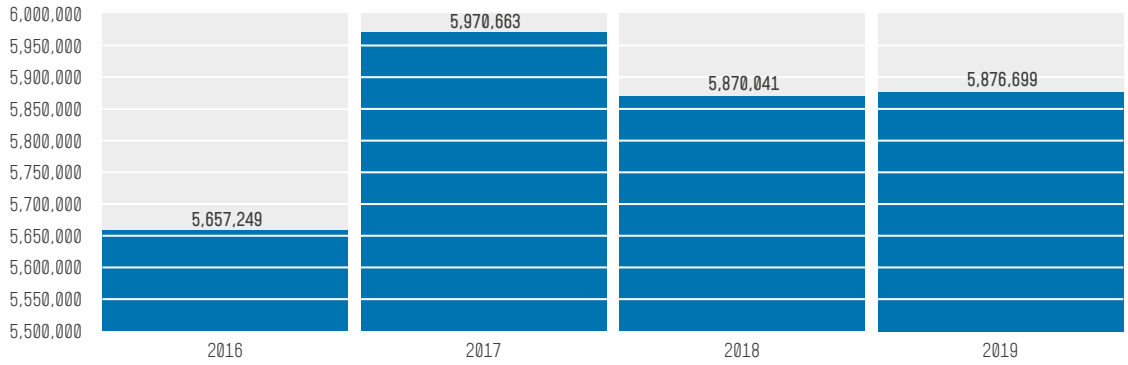
I. low urban resilience in the face of climate change; and
II. economic and sanitary crisis intensified by COVID-19.

2.33. There are major inequalities in housing, especially in cities. In 2019, over 5 million private households were estimated to be part of informal settlements (i.e., slums),[16] equivalent to 7.8% of all households, and 60% above the level recorded in 2010. According to 2019 data from the Joao Pinheiro Foundation (FJP),[17] more than 24 million urban households were considered qualitatively inadequate.[18] Access to community equipment and social services is also very limited: for example, 36% of households in informal more than 2 km away from health posts with inpatient and observation support (IBGE, 2020). In 2019, Brazil's housing deficit affected an estimated 5.8 million households (FJP 2020), comprising:

I. precarious households (improvised and rustic housing);
II. cohabitating households (two or more families living in the same dwelling); and
III. households facing an excessive rent burden (rent equal to or greater than 30% of household income)

15 FBSP (2020).
16 IBGE 2020. Subnormal clusters 2019: preliminary classification and health information for coping with COVID-19.
17 FJP 2020. New methodology and results of housing deficit and inadequate housing in Brazil.
18 Household inadequacy is also referred to as qualitative housing deficit, i.e., the need for improvements in housing and its surroundings. On the other hand, the quantitative deficit illustrates the need for production of new units.

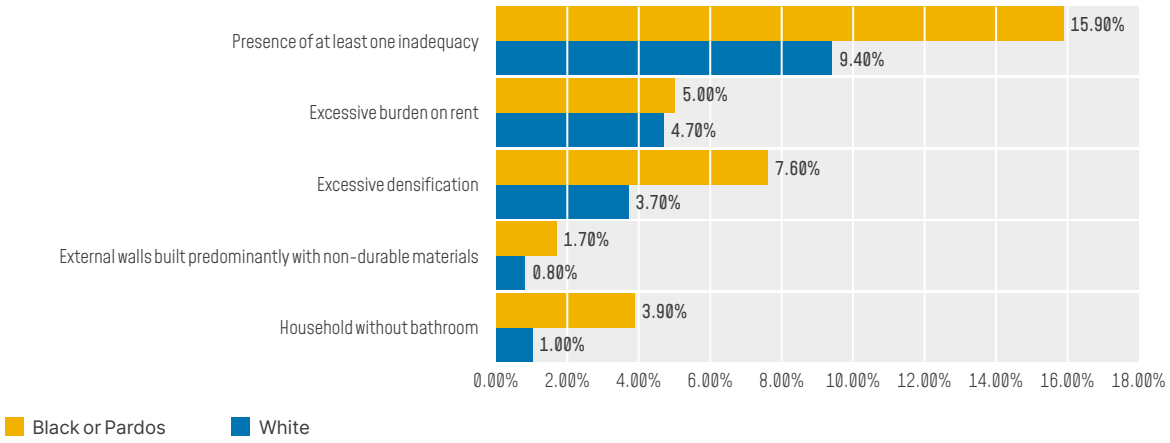
FIGURE 2.9. Housing Deficit, Brazil (number of affected households)



Source: Fundação João Pinheiro – FJP

2.34. Urban and Housing inequality by gender and race are significant. Households headed by women account for a large and growing share of the housing deficit (60% in 2019, versus 54.3% in 2016). The stark racial divide in access to water, sanitation, and solid-waste management infrastructure has important health implications. In 2018, 12.6% of the *preto* and *pardo* population lived in households without garbage collection, versus just 6.1% of *brancos*. Similar racial disparities were observed in households without access to piped water (17.9% versus 11.5%) or improved sanitation (42.8% versus 26.5%). Vulnerability increases even further when racial and gender disparities intersect. For example, excessive household density and absence of a washing machine are twice as prevalent among *preto* or *pardo* households as among *branco* households (7% versus 3.6%, and 44.8% versus 21%, respectively).[19] The divide also has a regional component, with areas in the north and northeast emerging as the most vulnerable: among municipalities with more than 750,000 inhabitants, Belém (55.5%), Manaus (53.4%), and Salvador (41.8%) have the highest proportion of subnormal households; moreover, the highest prevalence of infrastructure inadequacy is found in Acre (80.5%), Amapá (68.2%), and Pernambuco (70.8%) (FJP, 2020).

FIGURE 2.10. Proportion of the population residing in inadequate households, by race



Source: IBGE– 2017

19 Source: IBGE 2019. Social Inequalities by Color or Race in Brazil.

PILLAR 3

Fostering the digital transformation for Development[1]

PILLAR RATIONALE

The digital transformation is driving profound shifts in business, production models, labor markets, and people's lifestyles, and countries well-prepared for it will have a competitive advantage. A resilient growth, as discussed under pillar 1, should be based on a strong technological component, since innovation is at the core of productivity improvements. Yet, digital advances carry the risk of deepening the inequalities discussed under pillar 2, as adjusting to the new environment will depend on the capacity of individuals, firms, and governments. Pillar 3 analyzes Brazil's challenges and opportunities in promoting the digital transformation as a pivotal component of a sustainable, inclusive growth model.

1 The term digital transformation or digital revolution alludes to the effects of massive digitalization in the economy and society. The transformation is based on the use of digitalized information and knowledge as a factor of production, a productivity engine, and an optimization tool for business models (OECD, 2020).

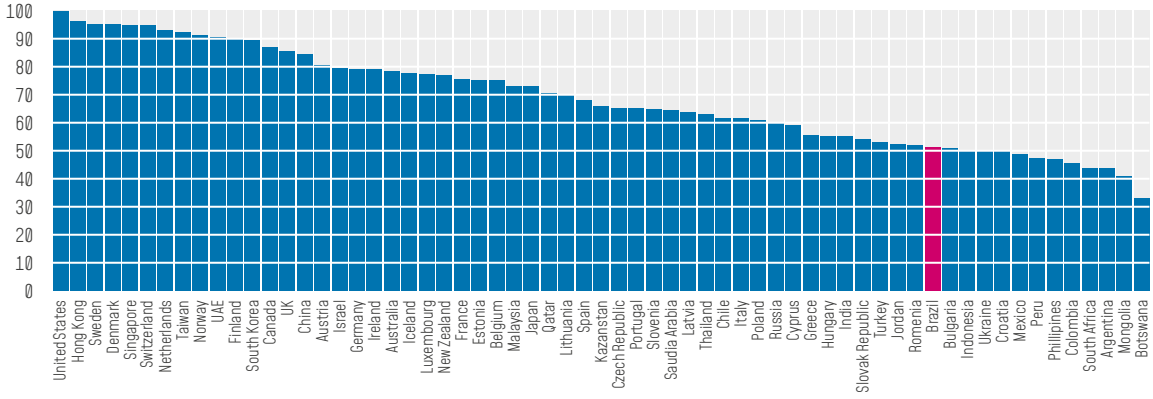
Key Diagnostics and Prioritization

2.35. The digital transformation is key to improving economic, social, and environmental resilience. Digital technologies open new avenues for strengthening climate action, social programs and generating greater transparency and innovation. The use of digital solutions has the potential to improve quality of life and help achieve sustainable development goals. Technologies with exponential growth potential, such as cloud services, big data analytics, blockchain, artificial intelligence, and 5G are increasingly prevalent, and will increase the potential impact of public policies on people's lives. Over the next decades, the economy will be ever more user-centric and data-driven.[2]

2.36. Brasil is not competitive in the digital realm. According to the IMD World Digital Competitiveness ranking, Brazil ranks 52nd out of 64 countries on digital competitiveness (51.48 points out of 100). The ranking analyses countries' ability to adopt and explore digital technologies leading to transformation in government practices, business models, and society overall. Digital competitiveness is assessed based on three major criteria: knowledge, technology, and future readiness.

2 The use of technology will be discussed throughout the text in different subsections. For example, new technologies can make infrastructural sectors grow sustainably, bringing gains in productivity and competitiveness. Key among the benefits from adopting digital technologies is the reduction in the cost of providing infrastructural services. According to IDB (DIA, 2020), digitalization can reduce infrastructural service delivery costs by up to 15%, which would increase the GDP of Latin American and Caribbean countries by 6% on average. Such growth has the potential to contribute to an increase in real incomes, especially among the poorest households. This is also true with respect to several discussions here when the use of new technologies can improve the quality of life of Brazilian population.

↓ FIGURE 2.11. Countries' Digital Competitiveness 2021

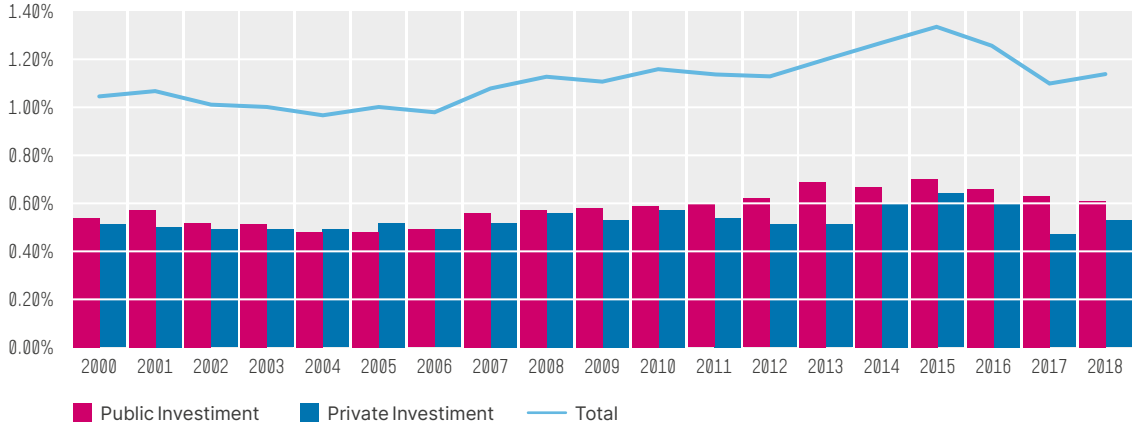


Source: IMD

2.37. Boosting innovation is key for completing the digital transformation. There is robust empirical evidence of a positive relationship between innovation and productivity—see Bell and Forbes (2012). Brazil's R&D investment as a proportion of GDP (1.16%) is very modest compared to other economies, particularly the most dynamic. According to World Bank data, Israel spent 4.95% of its GDP on R&D in 2018, and South Korea spent 4.81%. In addition, the private sector in Brazil only accounts for a small share of the overall investment in innovation. Conversely, the public sector is responsible for about 60% of the total investment in R&D, a level similar to other countries in Latin America, but far larger than in Russia (38%) and South Africa (42%). In Japan and South Korea, the private sector is responsible for about 75% of R&D investments. The gap between public and private investment in R&D in Brazil has remained stable since the early 2000s, while private investment in innovation has been expanding across the world (Chan and de Negri, 2010).

2.38. Education and talent pose a challenge to the digital transformation. Brazil came 57th out of 131 countries in the 2020 Global Innovation Index in relation to education, but its ranking dropped to 85th for tertiary education. Although expenditure on education as a percentage of GDP is a strength for Brazil in the ranking (12th place out of 131), the number of graduates in science and engineering is an important weakness (81st position). In the 2019 WEF Global Competitiveness Index, Brazil ranked 133rd out of 141 countries on digital skills among the active population.

↓ FIGURE 2.12. Investment in R&D in Brazil (percentage of GDP)



Source: MCTI

2.39. Existing policies do not address equity concerns arising from labor market pressures at a time of digital transformation. Transformative technologies are changing the outlook for jobs. Risks stemming from automation and digitalization are expected to affect job opportunities across many occupations and/or tasks. Brazil lacks a robust policy framework for assessing the risks of "computerization" for jobs, and for pursuing mitigating measures to help workers in the medium term.[3] The digital transformation calls for education systems that could prepare youngster for their working lives, and labor markets capable of absorbing and recognizing new ways of organizing work, while addressing questions about social protection and labor rights. There is a need to implement a more ambitious retooling of workers, with emphasis on competencies such as interpersonal skills and problem-solving—in a recent study, 67% of companies indicated that a labor force with low skills is an obstacle to the growth of their productivity. Technical education remains poorly aligned with the demand of firms.[4]

2.40. The digital transformation has the potential to make skills-based inequality more acute. IDB (2020) finds that technical change is a major force behind the increase in wage inequality in developed countries. Due to technical change, the demand for skills-intensive and well-paid occupations is on the rise, to the detriment of jobs in the middle of the skills distribution (see Autor, Katz and Kearney, 2008, for the US; and Goos, Manning and Salomons, 2009, for Europe). Most skills-intensive occupations cannot be easily replaced by machines or computers, as they require creativity and the ability to solve abstract problems. Instead, many typical tasks of traditionally well-paid occupations, such as those in the administrative, metallurgical, machine operation, and assembly fields, can be either mechanized or performed through simple software. As the demand for occupations requiring average qualifications goes down, so do their relative salaries.

2.41. The digital transformation may broaden the gender gap. There is a gender gap in science, technology, and innovation activities, placing women at a disadvantage relative to male peers. The gap tends to result from gender stereotypes that begin at an early age, partly due to biases in assessing the cognitive abilities of boys and girls.[5] The consequence is educational segregation, which frequently excludes women and poor households from the benefits of technological innovation. Notably, only 30% of graduates in science, technology, engineering, and mathematics (STEM) fields in Latin America and the Caribbean are women.[6] Concerns about gender equality are about not only fairness, but also efficiency. Gender diversity sparks new discoveries by broadening viewpoints, questions, and areas addressed by research. The fourth industrial revolution, accelerated by the health and economic crisis associated with COVID-19, has made clear the importance of developing soft skills and promoting women's involvement in digital areas through an active policy agenda.[7] The implementation of policies encouraging women's access to more productive jobs would have a considerable impact on per-capita GDP, estimated in a rise of between 15% and 25%.[8]

2.42. Connectivity is a challenge for Brazil's digital transformation. An OECD report (OECD, 2020) about connectivity in Brazil places the penetration and speed of fixed broadband services at half the OECD average (15.5% and 42 Mbps, respectively, versus 31.4% and 80 Mbps). Mobile data consumption and average transmission speed are only one-quarter of the OECD average (1.25 Gigabytes versus 4.65 Gigabytes per month and 4.84 Mbps vs. 26.9 Mbps). A study by the IDB estimates an infrastructure gap of around US$21.8 billion for Brazil to achieve the average broadband penetration of OECD countries. Approximately 30% of the investment needs identified are in rural areas, making connectivity

3 Longer-term trends are already being established. For instance, McKinsey Global Institute (2017, A future that works: automation, employment and productivity) points out that by 2065, more than half of work activities may be automated. Brazil is among the countries with the most potential for automation—together with China, India, and the US—as 50% of the Brazilian labor force could be directly impacted.
4 O'Connell et al. (2017) show the positive impact of technical education when demand by firms is identified.
5 Bustelo and Vezza, 2020.
6 GDLab, 2020.
7 GDLab, 2020.
8 Bustelo, Flabbi, Piras, Tejada, 2019.

key for the development of a sustainable agriculture. Also, the "Crowdsource for Digital Connectivity in Brazil"" (C2DB) project found that as of 2021, 19.7 million people, 26,800 schools, and 6,300 health facilities in Brazil had no broadband coverage.

2.43. Access to digital technologies is unequal. For a country with continental dimensions such as Brazil, bringing the internet to regions that are difficult to access should be a policy focus. Regional differences, however, are very significant. In July 2021, the National Telecommunications Agency (*Agência Nacional de Telecomunicações*, ANATEL) estimated the density of broadband subscriptions as 55.7 per 100 households, ranging from 81.4 in Santa Catarina to 21.5 in Maranhão, and from 71.2 in the South to 32.0 in the North (ANATEL, 2021). According to ANATEL, Brazil has 101.4 mobile broadband subscriptions per 100 inhabitants, ranging from 116.2 in the Federal District to 82.8 in Maranhão. There are also inequalities across social groups. The 2020 TIC Domiciles survey found that the rate of internet access among households with income levels below four times the minimum wage rose from 14% in 2019 to 64% in 2020 but remains far below the rate for households with incomes above 10 times the minimum wage, which is close to 100%. The survey shows that for households without an internet connection, cost is the biggest challenge (cited by 68% of households), followed by lack of digital skills (50%). In social services for example, 25% of schools do not have internet access at all, and half of those do not use it for pedagogical purposes: low speed seriously compromises pedagogical use.

2.44. The digital transformation brings several opportunities for the country. The startup ecosystem can be a pillar of sustainable growth in a digital economy. The startup market in Brazil has grown significantly in recent years. According to the Brazilian Startup Association, the number of startups in Brazil jumped from 4,151 to 14,044 between 2015 and 2021. A survey from Nielsen showed that 54% of young people under the age of 18 want to start their own businesses in Brazil. Moreover, venture capital financing of startups has grown almost exponentially during the past decade, from US$100 million in 2011 to US$3.5 billion in 2020. During the first half of 2021, another US$5.2 billion was raised;[9] notably, according to KPMG, Brazilian startups raised a record-setting US$2.7 billion in the second quarter of 2021. The main areas of startup growth are fintech, health, artificial intelligence, and gaming. Still, there is ample room for improvement, as Brazil is only the world's 20th-largest market for startups. In terms of barriers for growth, entrepreneurs mention the regulatory environment, excessive concentration in certain regions and cities (25% of Brazilian startups are located in Sao Paulo), and lack of risk capital and market access.

2.45. The digital transformation offers an opportunity to increase productivity in the ailing manufacturing sector. Modern technologies are transforming industrial production, as new trends in automation and data management offer the prospect of efficiency gains. However, the use of digital technologies is not widespread in Brazil. In 2019, only 40% of Brazilian companies reported having an IT department. 54% had their own website, against the OECD average of 78%. The gap is even wider for smaller companies. Only 51% of small and medium-sized enterprises (SMEs) have a website, compared with 89% of large firms; and 36% of SMEs have an IT department, versus 90% of large firms (ICT, 2019).

2.46. There are several challenges to the digital transformation in the Brazilian manufacturing sector. A 2021 CNI survey of industrial firms revealed that high implementation costs were the main internal barrier to the adoption of new technologies (cited by 66% of respondents), followed by the structure and culture of the company (26%), lack of clarity about returns (25%), and lack of knowledge about technology (25%). The survey also found that a lack of skilled workers (37%), difficulty identifying technologies and partners (33%), and a lack of preparedness in the market (29%) were the main external barriers to

9 Distrito, 2021.

the adoption of new technologies. Finally, Brazil has higher import tariffs on ICT equipment than other large emerging economies, and the administration of tariff exceptions results in high transaction costs, bureaucratic delays, and reduced business agility.[10]

2.47. The agricultural sector has a great chance of benefiting from digitalization. ICT is increasingly being applied to improve the management of agricultural production in Brazil, with a focus on: the Internet of things for managing vehicles, equipment, animals, and plants; monitoring sensors for machinery and soil; autonomous vehicles such as tractors, drones, and robots; artificial intelligence; big data for data storage, and cloud computing for data protection. Tools that are widely used include: intelligent irrigation systems, tractors, harvesters, and sprayers for the electronic control of planting, harvesting, and application of pesticides; weather stations for climate monitoring and forecasting of pests and diseases; and drones that capture information about productivity levels, pests, and other factors. These tools allow detailed control and greater efficiency in the use of inputs (such as pesticides and fertilizers), more efficient use of water, cost reduction, and better monitoring of weather conditions, as well as of pests and diseases. The public sector has also made progress, digitizing agricultural product and livestock records, the inspection processes of agricultural products and inputs at borders, the analysis of compliance of properties with the Forest Code, and monitoring of deforestation and forest fires.

2.48. The digitalization of agriculture faces major challenges. The main obstacles flagged by producers to the use of digital technologies are: lack of internet connectivity in rural areas (61.4%); the cost of machinery, equipment, and applications (58.2%); obtaining qualified and specialized external labor (49%); access to training in digital agriculture technologies (47.4%); and the cost of hiring service providers (43%). Studies conducted by the Ministry of Communications and MAPA also suggest that connectivity represents a fundamental obstacle to the progress of digitalization in agriculture, as 72% of rural establishments in Brazil do not have access to the Internet. The share of establishments without internet access is greater in the North (84%) and Northeast (78%), relative to the South (56%), Southeast (63%), and Midwest regions (71%). In addition, 66% of rural areas and 54% of rural establishments in Brazil receive a poor signal or no 3G signal. In the case of 4G technology, the figures increase to 74% of rural areas and 61% of rural establishments. For both technologies, the worst coverage is in the North and Midwest regions.

2.49. Digital transformation is key to improving economic, social and environmental sustainability and resilience of Brazilian cities. Digital technologies open new options to consolidate climate action, generate greater transparency and innovation and could reduce 15% of the emissions needed by 2030.[11] The use of digital solutions in smart cities has the potential to improve the quality of life indicators of the population between 10 and 30%, contributing 70% to the achievement of sustainable development goals related to housing, energy, water, urban mobility and civic commitment.[12] Technologies with exponential growth potential, such as cloud services, Big Data, *Blockchain*, Artificial Intelligence, 5G and others are increasingly present, and will increase the potential impact on urban development and people's lives. Yet, the majority of Brazilian cities do not have broadband networks and lack public policies, skills and data management instruments.

2.50. Fintech solutions can help promote financial inclusion. According to a 2021 survey,[13]

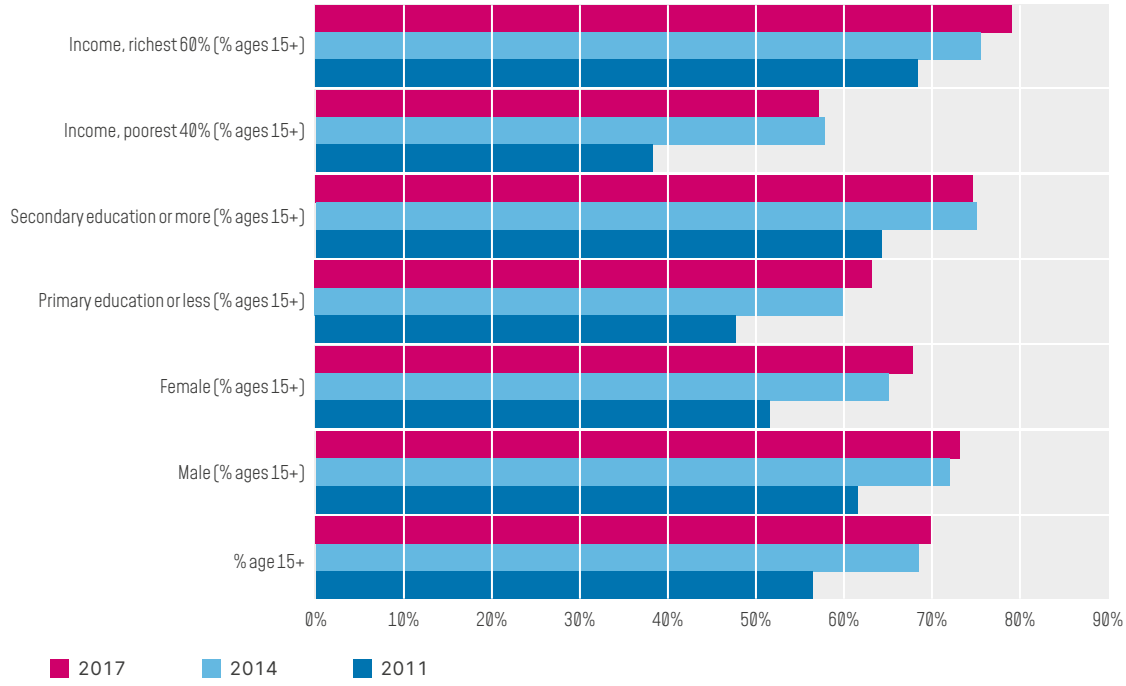
10 See: World Bank (2022) https://wits.worldbank.org/. The relevant policies for ICT-related imports are set forth in the Computer Law and in the rules of the Manaus Free Trade Zone.

11 Hoja de ruta del Exponential Climate Action https://exponentialroadmap.org/

12 If han estimado mejoras de entre el 10-30% en indicadores de sectores como vivienda, energía, agua, movilidad urbana, compromiso civico, entre otros (MGI, 2018).

13 Locomotiva (2021). https://www.ilocomotiva.com.br/single-post/2019/09/24/Um-em-cada-tr%C3%AAs-brasileiros-n%C3%A3o-tem-conta-em-banco-mostra-pesquisa-Locomotiva.

FIGURE 2.13. Financial Inclusion Indicators, Brazil



Source: FINDEX

approximately 45 million people in Brazil have no access to banking services, totaling more than R$800 billion a year (close to 10% of GDP) in resources. Those without access to banking are mostly women (59%), *pretos* and *pardos* (69%), people whose income is less than 10 times the minimum wage (86%), and those who live in the northeast of the country (39%). Among these 45 million people, 58% have primary education or less. In this context, many fintech firms have offered services—from loans to digital payments—that promote financial inclusion.

2.51. Several challenges inhibit the development of Brazil's fintech sector. In 2020, Brazilian fintech firms grew by 34% in terms of total assets. Investment in this sector amounted to US$939 million (*the district*, 2021). According to the Brazilian central bank, social distancing measures pushed about 40 financial institutions to focus on digital banking, and many financial application services became operational in 2020. The central bank and SUPEP have also been working to improve the regulation of the sector. Open banking and open insurance protocols were developed to help customers make the best use of their information and obtain better deals. Although these protocols will accelerate the market entry of new digital financial and insurance firms, and increase competition in the financial sector, certain regulatory issues remain. In surveys, fintech firms point to the scarcity of high-value investors and skilled labor as the main challenges to their development. Connecting with foreign partners that can bring financial-market experience is also difficult for companies operating in a largely closed economy.

2.52. The public sector can also adapt to the digital transformation. The crisis generated by COVID-19 accelerated the digital transformation of the public sector, as restrictions to social mobility led to a greater digitalization of services. In a survey conducted between October and December 2020, 41% of the population reported having adapted without difficulties or few difficulties to the digital world, and 45% reported having adapted since before the crisis. In a research conducted three months after school's closure due to the pandemic, 74% of public school students reported they received pedagogical activities remotely

from to continue studying.[14] Two of the top ten activities carried out online during the second half of 2020 related to public services (applying for social benefits and for documents).[15]

2.53. Despite substantial progress in the digitalization of public services, several challenges persist. At the federal level, Brazil was ranked among the top 20 countries in the world in the United Nations online services sub-index (2020) and reached seventh place out of 198 in the World Bank's digital government maturity index (2021). More than 86% of federal government procedures (equivalent to more than 3,440 procedures) are available in fully digital format, and more than 130 million people have had an account on the gov.br portal as of September 2022. This allows for more timely and effective delivery of services, such as transfers under the emergency aid program (*auxilio emergencial*). In April 2020, the federal government published its Digital Government Strategy, setting out the goal of digitizing 100% of its services by 2022. Moreover, its national cybersecurity strategy, published in February 2020, marked an important regulatory advance, although coordination, operational, and talent challenges remain. At the state level, progress has been limited and uneven. As of 2019, only 4% of state services were digitized, and only 31% of states reported that the service most used by their citizens during the previous year was available in an entirely digital format. As of 2022, some states had surpassed over 60% of digital services while others continued below 10%. In the educational sector, the Connected Education Innovation Policy (Piec), sanctioned in 2021, was an important step towards digital transformation of education. There are still many challenges in terms of coordination and the design of effective strategies for the qualified use of technologies in teaching and learning. Although 75% of public schools report to have internet access, only 5% have the necessary quality for pedagogical purposes (1Mbps per student). It's widely known that Educational Information and Management Systems (Siged) are key to generate strategic information and support effective decision making – nevertheless 15% of urban public schools and 25% of rural ones still manage their students' data 100% analogically[16].

2.54. The digital transformation will have an impact on fiscal arrangements. A reform of the tax system must be designed to move forward with the digital revolution in a way aligned with international standards. Digitalization is eroding the basic rules that governed the taxation of profits of multinational companies in the past century. Large companies can generate significant revenue without paying a proportionate amount of tax in the countries where they operate. The OECD estimates that corporate tax evasion costs between US$100 billion and US$240 billion per year globally, or approximately 4 to 10 percent of global corporate income tax revenues. Overcoming this challenge requires coordinating internationally, as well as among the various levels of government in Brazil.

2.55. Digitalization offers opportunities to enhance the efficiency of the public sector. Tax forecasting and financial management can benefit from the use of larger amounts of data, including for crossing information to create input-output matrices and estimates of economic indicators, better monitoring taxpayers and analyzing risks, and sharing processes among different entities. In addition, the LGPD (Lei Geral de Proteção de Dados - Law 13.709/18) regulated the processing of personal data and paved the way for greater use of data by tax agencies. Digital technologies also bring opportunities to improve the efficiency of public spending, such as: electronic purchasing systems that allow for greater savings and transparency; better assessment of costs for the provision of public goods and services; and better focus on social programs. The digitalization of federal government services has allowed for annual savings of R$3 billion since 2021, and the launch of a national public procurement portal was an important step towards greater efficiency and transparency.[17]

14 Data Folha (2020) Educação não-presencial – Onda 1.
15 BID (2021).
16 Educação Já (2022) Tecnologias na Educação: recomendações para a transformação digital da educação pública brasileira.
17 Ministry of Economy.

4º PILLAR

Incorporating green growth into the country's development model

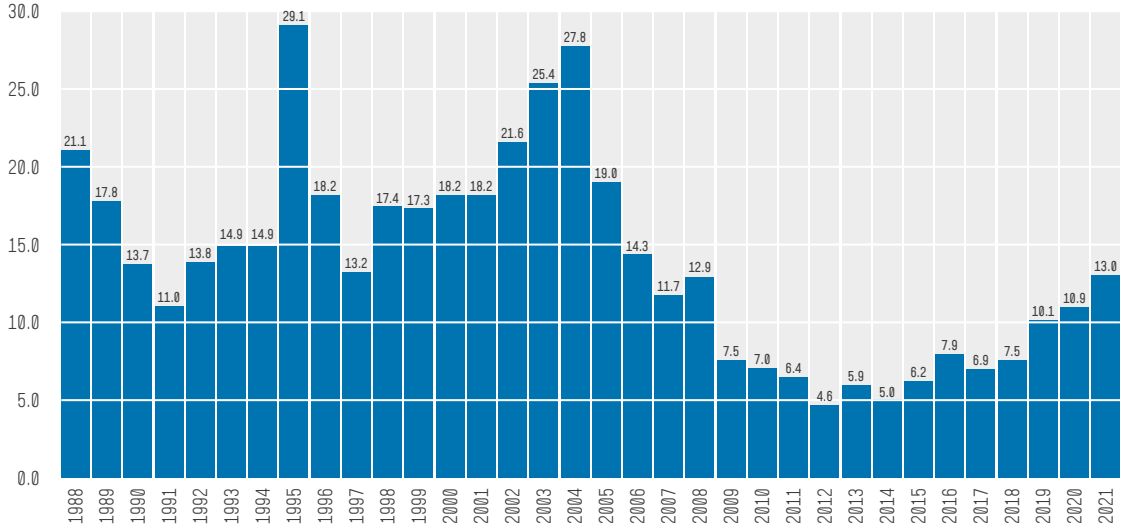
PILLAR RATIONALE

The previous pillars discussed ways of boosting growth and reducing social disparities. Pillar 4 analyzes the challenges and opportunities of building a green economy. Accounting for environmental matters as part of Brazil's development model can help reduce poverty and inequality, contribute to the achievement of economic and sectoral goals, stimulate sustainable economic growth, and make the country more resilient to adverse shocks, such as climate change and ecosystem destruction. The construction of a green agenda should involve different segments of the Brazilian society with a view towards a more efficient, resilient, fair, and sustainable economy.

Key Diagnostics and Prioritization

2.56. Brazil is one of the most biodiverse countries in the world, but it has not properly utilized its natural capital. Brazil has the world's second--largest forested area, accounting for 13% of the global's forests, and the largest area of tropical forest. The biggest Brazilian forest biomes are the Amazon Forest and the Atlantic Forest, which are known for their biodiversity. The ecosystem services not only supply logging and non-logging products, but also regulate natural processes, such as those that determine the quality and quantity of water resources, atmospheric carbon capture, and rainfall systems. In addition, Brazil has one of the world's largest ocean areas (7,491 km2, 16th in in the world by surface). A new economic model that prioritizes the environment is the best option to reconcile socio-economic development with the conservation of Brazil's forests and biodiversity consistent with the Paris agreement.

↓ **FIGURE 2.14.** Amazon Deforestation (thousands of km2)



Source: INPE

2.57. There are substantial gains to be achieved by building a greener economy. WRI (2020)[1] shows that compared to business-as-usual growth, a rapid shift to a low-carbon and resilient economy in Brazil could deliver immediate social and economic benefits. By 2030 this would include a net increase of more than 2 million jobs—four times the number of current jobs in the country's oil and gas sector—and a total GDP gain of US$535 billion (R$2.8 trillion). The adoption of a green development model would yield benefits from the very first year, and lead to a reduction in GHG emissions exceeding Brazil's current commitment for 2025 under the Paris agreement. Other benefits include the restoration of 12 million hectares or more of degraded pasturelands, US$3.7 billion in additional agricultural production, US$144 million in additional tax revenue from the agricultural sector alone, a 42% reduction in greenhouse gas in 2025 (compared to 2005 emissions), and increased access to international financing. These benefits, which would immediately help boost the economic recovery.

2.58. Brazil has experienced increased frequency and severity of extreme weather events. While the country experienced a water crisis in 2021, there were periods of heavy rainfall that caused disruption in several regions in late 2021 and early 2022. Estimates from ANA – National Agency of Water (2019) suggest that by 2035, 73.7 million Brazilians will live in inadequate water safety conditions, because of the high rate of urbanization (increased demand) and water scarcity in areas such as the semi-arid region – Northeast region (reduction of supply). The latter region has the lowest degree of resilience, due to high rainfall variability and absence of reservoirs or underground reserves. This requires prioritized actions to develop integrated water infrastructure.[2] This requires prioritized actions to develop integrated and redundant water infrastructure. This requires prioritized actions to develop integrated and redundant water infrastructure.

2.59. Fiscal policy also plays a role in the green economy. IDB (2021)[3] highlights the value of cutting economic dependence on fossil fuels by reducing subsidies, in order to maintain economic competitiveness and ensure fiscal sustainability. Fiscal policies will have to promote change while

1 Romeiro, V. et al. 2020. "A New Economy for a New Era: Elements for Building a More Efficient and Resilient Economy in Brazil. Working Paper. São Paulo, Brasil: WRI Brasil. Available at https://wribrasil.org.br/pt/publicacoes.
2 Available at https://arquivos.ana.gov.br/pnsh/pnsh.pdf
3 IDB (2021). Fiscal policy and Climate Change: Recent experiences of Finance Ministries in Latin America and the Caribbean.

mitigating risks to public finances from extreme climate events, and from impending structural and technological upheaval.

2.60. Climate-smart infrastructure investments are critical for responsibly increasing productivity and leveraging Brazil's natural capital. Brazil's natural capital remains underexploited as a source of potential growth, and infrastructure investment is key to bridging this gap.[4] Climate change challenges call for concerted efforts to improve planning, adaptation, and mitigation of policies that can impact the environment. Targets to reduce greenhouse gases (GHG) emissions globally, along with goals pertaining to finance, transparency, and other environmental aspects are becoming mainstream in policymaking, and Brazil must step up its efforts in this regard. WRI (2020) finds that countries such as Brazil tend to be more susceptible to risks caused by extreme weather events, as they have less resilient infrastructure and less advanced mechanisms to prevent and cope with natural disasters.

2.61. A sustainable and resilient infrastructure will help the recovery and reduce losses to the economy. Together with the decarbonization of the economy, investment in a sustainable infrastructure will aid the recovery by generating jobs. McKinsey (2020) shows that government spending on renewable energy can create five more jobs per US$1 million invested than spending on fossil fuels. Latin American and Caribbean countries are particularly vulnerable to the impacts of an unpredictable and changing climate, in the form of significant economic damage and human losses. However, there is evidence that climate--resilient investments not only help to avoid or minimize future damages but can also generate benefits that exceed costs by a ratio of as much as 10:1 (Global Commission on Adaptation, 2019). Similarly, returns on investments to protect against disaster risks exceed US$4 of avoided losses for US$1 invested (Kull, Mechler, and Hochrainer-Stigler, 2013; Mechler, 2016; MMC,2015; Moench, Mechler, and Stapleton, 2007; United Nations Office for Disaster Risk Reduction, 2011).

2.62. There are challenges for building a sustainable and resilient infrastructure. Besides the traditional bottlenecks of the infrastructure sector, there is a need for governments to improve the strategic frameworks used to identify green investments and apply technical criteria to achieve better project prioritization (Cavallo, Powell, and Serebrisky, 2020). With respect to the former, it is important that countries develop decarbonization strategies that set out the economic benefits of the transition to low-carbon activities clearly and transparently. As regards the latter, project selection criteria should favor sectors that contribute to decarbonization while generating jobs and improving equity. In this way, resiliency criteria help to not only to have a better prioritization, but also as a selection criterion for public investments. In addition, CAPEX costs that tend to be higher together with high domestic interest rates could also affect the development of project bonds with thematic labels.

2.63. The development of a bioeconomy could be a significant component of a green economy. The bioeconomy—i.e., the use of renewable biological resources from land and sea to produce food, materials, and energy—provides an opportunity to stimulate economic activity in less-developed regions of the country, especially in the Amazon and Caatinga biomes. However, several studies point out the main challenges to the development of the bioeconomy in Brazil: a lack of innovation policies focused on biological products or broader ecological processes; inadequate financial resources targeted to the bioeconomy; a lack of technical assistance; land-tenure challenges; difficulties with implementing economic tools to internalize the value of environmental services; and the absence of traceability and certification standards for the environmental services embedded in natural products.

4 CPI (2018).

2.64. Investing in the bioeconomy can bring sizeable gains. TNC (2021) shows that the total value added of the production chain of açai palm in the state of Para can increase from R$3.7 billion in 2019 to R$109.3 billion in 2040. Moreover, WRI (2021) finds that non-exhaustive extraction activity, which includes 37 items from 31 native plant groups, generates an average revenue of between US$334-470 per ton (R$1,750-2,460 per ton), and is thus highly competitive. At its lower end, this average revenue is identical to that derived from charcoal production and cattle raising, and higher than that from temporary (indiscriminate) logging and firewood harvesting. At the upper end, the average revenue from non-exhaustive extraction is almost double that from temporary crops, and 30% higher than revenue from cattle raising.

2.65. The development of agriculture is key in a green economy. The agri-food sector (including agricultural and agro-industrial activities) is one of the most dynamic in the Brazilian economy. In 2019, it accounted for 22% of Brazil's GDP, 44% of total exports, and 37% of national employment (Vieira Filho and Fishlow, 2017; IA and CEPEA, 2021). Brazilian agri-food exports are worth approximately US$100 billion annually, and the country is one of the world's main exporters of soybeans and their derivatives, coffee, sugar, orange juice, meat (beef, pork, and poultry), corn, cotton, and bioethanol, among others. Primary activities generate 15 million jobs directly, with family farming accounting for two-thirds of the total. WRI (2021) points out that the preservation of competitiveness and production capacity in this sector is strategic for Brazil.

2.66. Agriculture is associated with deforestation, especially in the Amazon and Cerrado biomes. The expansion of agricultural activities has been commonly associated with illegal deforestation. Agriculture and ranching are the primary drivers of ecosystem degradation and deforestation in Brazil, particularly in the Amazon, Atlantic Forest, and Cerrado ecoregions (GFW, 2021). In the last 35 years, 64 million hectares throughout the country were deforested and converted to pastureland (Feltran-Barbieri and Féres, 2021). In last 20 years, Brazil lost 62.8 Mha of tree cover, meaning a 12% reduction in tree cover, and the release of 34.5Gt of CO_2 emissions (Global Forest Watch, 2021)[5].The conversion of native forests to row crops is also a major driver of ecosystem loss: soy production, for example, contributed to nearly 22 million hectares of forest loss in the Amazon and Cerrado regions between 2006 and 2017 (Asher, 2019). These rapid shifts in land-use change are not only a threat to biodiversity and habitat loss in globally important ecoregions, but also economically unsustainable. Ecosystem services—such as micro-climate stability, soil fertility, water availability, and pollination—underpin the productivity of agricultural and pasture lands. As a driving force of ecosystem degradation, Brazil's ranching sector is eroding the natural capital it depends on for long-term success. More than half of Brazil's 173 million hectares of pastureland are classified as degraded, and nearly a quarter as severely degraded. This leads to decreased carrying capacity and production per unit area and is a major liability to the sustainability of the sector (Feltran-Barbieri and Féres, 2021).

2.67. Agricultural intensification has stagnated in recent years. The agri-food sector in Brazil contributes approximately 73% of greenhouse gas emissions (SEEG, 2020). Therefore, production techniques that reduce deforestation and emissions are essential for the country to meet its commitments on Nationally Determined Contributions (NDC). At the same time, agriculture faces challenges in adapting to climate change. 95% of losses in Brazilian agriculture are due to droughts or excessive rainfall (Assad, E. et al., 2010), and these effects can be aggravated by temperature increases and changes in rainfall patterns (Hansen et al., 2012). The intensification of agricultural activities plays an important role in avoiding deforestation, given that higher productivity reduces the need for expanding land use to increase production. Howe-

5 Brazil ranks 2 out of 197 countries in terms of tree cover loss (in hectares). https://www.climatewatchdata.org/countries/BRA).

↓ **TABLE 2.2** Cattle and pasture stocking rates

	1996		2006		2017	
	Cattle herd (millions)	Stocking rate (cattle/ha)	Cattle herd (millions)	Stocking rate (cattle/ha)	Cattle herd (millions)	Stocking rate (cattle/ha)
Brazil	153.0	0.86	176.1	1.10	172.7	1.08
North	17.3	0.71	32.5	1.21	34.8	0.94
Northeast	22.8	0.71	25.8	0.84	21.7	0.95
Southeast	36.0	0.95	34.6	1.24	31.5	1.29
South	26.2	1.27	23.6	1.50	23.5	1.59
Midwest	50.8	0.81	59.6	1.00	61.1	0.95

Source: WRI (2021), IBGE, Agricultural Census.

ver, WRI (2021) shows that stocking rates of pasture (cattle per hectare of pasture) have stagnated in recent years, and even decreased in the Midwest and North regions over the last decade.

2.68. The modernization of agriculture is an important step towards a low-carbon economy. Modernizing the agricultural sector can increase productivity, but more than 85% of rural establishments in Brazil lack technical assistance and rural extension (ATER). Overcoming this major challenge is the starting point for a production revolution (IBGE, 2018). There are constraints on access to support services by family producers, especially for technical assistance and credit. The latest Agricultural Census, conducted in 2017, shows that out of approximately 3.9 million family farmers nationwide, only 18% reported receiving ATER. Lack of technical assistance is aggravated by the low level of training and schooling of farmers— for example, 16% of producers in the Amazon never attended school (IBGE, 2018). Family farmers are served primarily by state technical assistance and rural extension agencies, which historically face financial difficulties. Access to credit is also an important obstacle. According to data from the 2017 Agricultural Census, about 15% of Brazilian family agricultural establishments accessed some form of credit, from public or private funds. This share dropped to 9% in the North and 13% in the Northeast, both below the national average.

2.69. There is a significant space for expansion of sustainable tourism. Sustainable tourism still has a low economic impact: there is little supply of tourist equipment and services; low domestic and international flow; and few jobs and revenue generated. According to the categorization data of the Tourism Regionalization Program in Brazil, which evaluates these indicators together, in the north region, only 9% of the tourist municipalities in this region are in categories A and B, therefore, with greater positive economic impact from tourism. Most are between categories C (22%), D (57%) and E (12%), which still indicates low economic impact of tourism (Mtur, 2019). In the northeast region, there is a greater share of municipalities, 12%, in categories A (3%) and B (9%) of the, 19% in category C, 57% in category D and 12% in category E.

2.70. Building a green economy can attract long-term capital for development. Global Sustainable Investment Alliance (GSIA) shows that in 2020, sustainable investment assets globally

↓ **TABLE 2.3.** Global sustainable assets, and proportion of sustainable assets relative to total managed assets

	2016	2018	2020	2014	2016	2018	2020
Europe	12,040	14,075	12,017	58.8%	52.6%	48.8%	41.6%
United States	8,723	11,995	17,081	17.9%	21.6%	25.7%	33.2%
Canada	1,086	1,699	2,423	31.3%	37.8%	50.6%	61.8%
Australasia	516	734	906	16.6%	50.6%	63.2%	37.9%
Japan	474	2,180	2,874		3.4%	18.3%	24.3%
Total (US$ billions)	**22,839**	**30,683**	**35,301**				

Source: GSIA (2020)

stood at US$35.3 trillion compared to US$22.8 trillion in 2016. Such assets already account for more than 50% of total assets professionally managed in Canada, almost half in Europe (41.6%), 33.2% in the United States, and 24.3% in Japan (GSIA, 2020). According to Bloomberg Intelligence (2021), global ESG assets are on track to exceed US$53 trillion by 2025, representing more than a third of the US$140.5 trillion in projected total assets under management. However, Latin America, including Brazil, lags behind in the growth of sustainable assets.

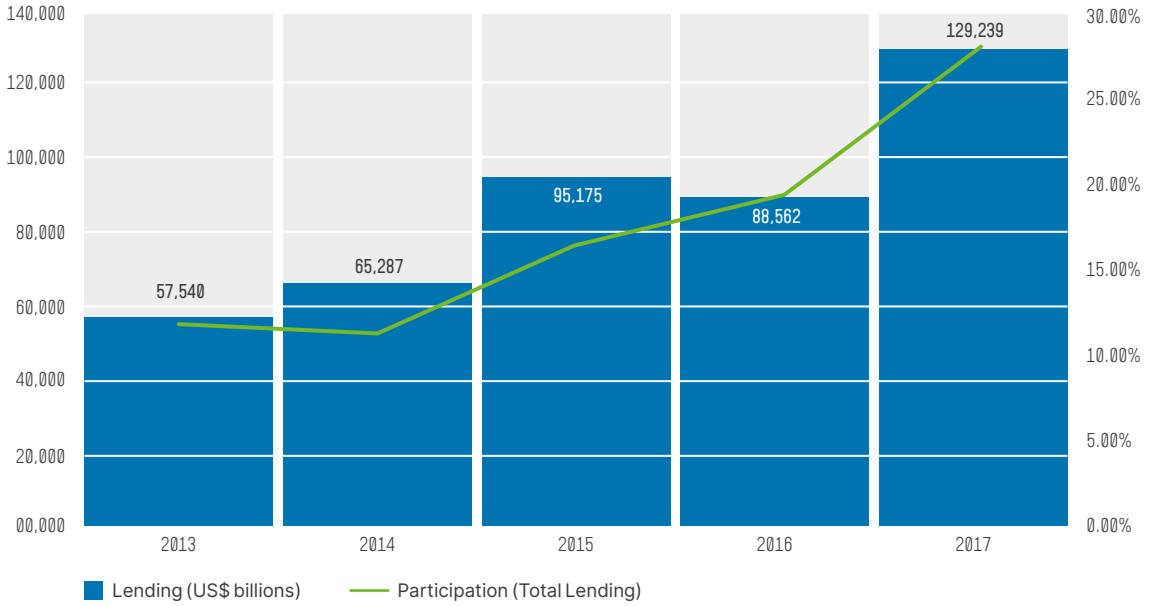
2.71. The financial sector has a fundamental role in nudging the productive sector toward the green economy. In its capacities as a financial intermediator (through credit operations) as well as an institutional investor and insurer, the financial sector will play a significant role in the transformation of the economy. The financial industry should incorporate socio-environmental analysis, policies, and processes into all layers of financing, taking into consideration the typology of customer and their activities. Key action points for the financial sector include: monitoring the effectiveness of institutions' socio-environmental policies and processes; improving tools for socio-environmental risk analysis; developing a qualitative rating of ESG factors to be analyzed in parallel with economic and financial aspects; incorporating ESG factors into stock prices via a valuation model; developing probability scenarios that include analyses of share price sensitivity to ESG aspects; adoption of the Corporate Sustainability Index (CSI) portfolio, as a benchmark for responsible investments or as a methodological basis for analyzing portfolio companies; increasing the importance of socio-environmental risk analysis in pension-fund investments.

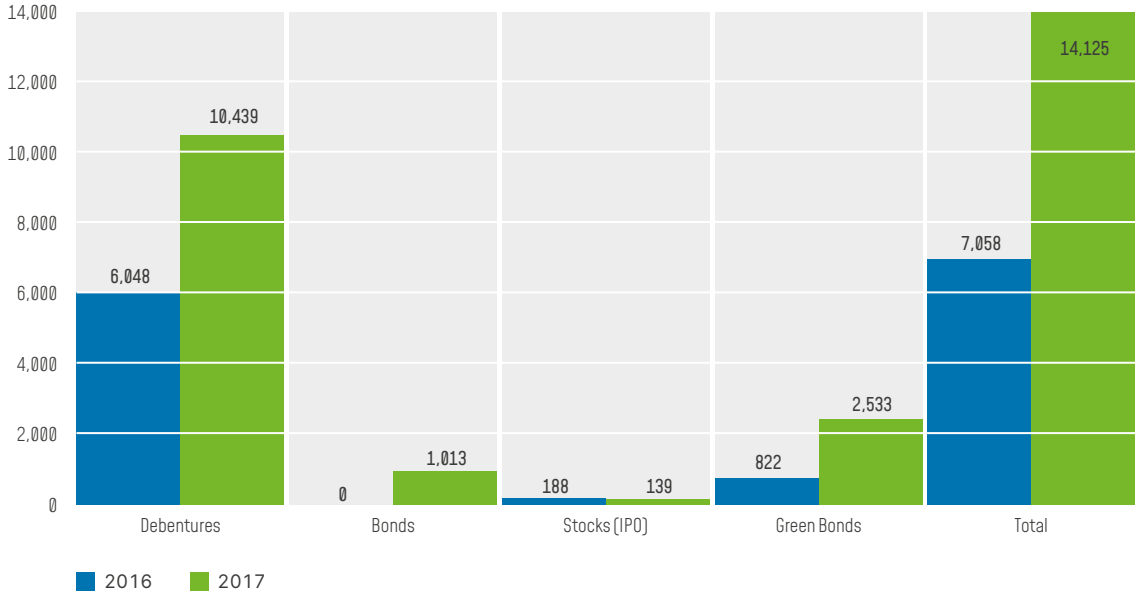
2.72. Green bonds are growing in Brazil. Green and thematic bonds are gaining ground, with more issuances every year, and the green bond market is already the most developed among thematic bonds. From 2015 (when the first green bond was issued in Brazil) up to June 2021, there were 78 issuances of Brazilian green bonds worth a combined US$10.3 billion, out of a total across Latin America estimated at about US$26.3 billion.[6] The main challenges in this sector are: achieving transparency and security in the criteria for the use of bond sale proceeds; establishing clear impact indicators; and having issuances reviewed by recognized third parties. In this regard, the IDB Green Bonds Transparency Platform plays a key role in in promoting transparency in this market.

6 Climate Bonds Initiative. September 2021.

2.73. The domestic financial sector is working to address sustainability issues. Febraban (2019) finds that the banking sector needs to resolve several issues to develop low-carbon finance in Brazil. The authorities can support this process by facilitating compliance with applicable laws and regulations; reducing legal uncertainty; improving social and environmental risk management practices; and promoting business opportunities aligned with sustainable development. In 2017, total bank credit to corporate clients reached US$469 billion, of which 27.6% was directed to sectors of the green economy. The share of securities issued by green-economy players increase from 21.1% of US$33.4 billion to 24.3% of US$58.1 billion in 2017.

FIGURE 2.15. Bank lending to the green economy, and issuances of securities to finance the green economy (US$ billion)





Source: FEBRABAN (2019)

3 Strategic Pillars and Development Priorities

3.1. **This chapter outlines a policy strategy, based on actionable recommendations, to generate economic opportunities and foster sustainable growth.** Chapters 1 and 2 identified Brazil's key development challenges and articulated a high-level policy plan to address them. Chapter 3 offers practical policy recommendations to implement that plan and close the country's crucial development gaps.

3.2. **The Brazilian government should focus on pragmatic measures that prioritize sustainable and inclusive growth over a temporary uptick in economic activity.** Brazil's ongoing recovery from the COVID-19 pandemic should not be interpreted as a sustainable growth trajectory, whose achievement will instead require addressing the root causes of the country's challenges. Appropriate policy solutions will need to balance growth and equity, manage tradeoffs between relevant objectives, and ensure that long-term benefits outweigh short-term costs.

3.3. **The rest of the chapter details the four strategic pillars and presents policy recommendations designed to address Brazil's complex development challenges.**

1º PILLAR

Promoting a Resilient Recovery

Recommendations for promoting a resilient recovery are structured around six priorities: **(1) support integration with international markets; (2) boost investment in infrastructure; (3) foster public-private partnerships (PPPs); (4) remove barriers to business growth; (5) enhance access to finance;** and **(6) implement fiscal reforms to bolster public finances and enhance the effectiveness of public policies.**

(1) Support Integration with International Markets

The external sector is key to creating the conditions for sustainable growth. The reconfiguration of global value chains accelerated by the pandemic, and regional integration with other LAC markets can help the Brazilian economy forge stronger international connections.

3.4. International integration is a powerful tool for growth. The international integration plays an important role in resuming the productivity growth of the economy, reducing production costs and consumer prices, and increasing social welfare, especially in the poorest portions of the population.

3.5. Brazil lacks a consistent strategy for international integration. Although successive governments have taken steps towards greater integration, these have not matched the more-open trade policies pursued by similarly developed countries in recent decades. Brazil's trade protection thwarts its participation in global trade, competitiveness, and productivity growth.[1] Notably, Brazil is among the few countries in the world that did not significantly reduce tariffs over the past 25 years, thus missing out on a period of intense liberalization in global trade. Tariffs on capital goods are especially punitive, which bodes poorly for the country's supply potential,[2] while non-tariff measures and trade-related red tape are problematic. Brazil ranks 102nd globally on efficiency of the customs clearance process: clearance times average two days for import shipments that do not require physical inspection, and five days for those requiring inspection.[3] The country lacks border cooperation, integration and regional public goods at the borders.

3.6. Integration with other LAC countries faces several hurdles. High transport costs for exports and imports; poor logistical integration between countries; high tariffs on capital goods and intermediaries in the region's largest economies; sub-regional trade agreements that do not address critical issues, such as non-tariff barriers, disparate rules of origin, and restrictive trade regulations. These constraints inhibit Brazil's ability to access international value chains, while slowing the growth of intra-regional trade and investment.[4] Nearshoring efforts in Brazil face challenges similar to those that inhibit intra-regional integration. Moreover, the chains most likely to be impacted by ongoing changes involve sophisticated, high-tech manufacturing. Brazil is the only country in the LAC region where advanced manufacturing plays a meaningful role in domestic production and, to a lesser extent, exports. However, the importance of manufacturing to Brazil's

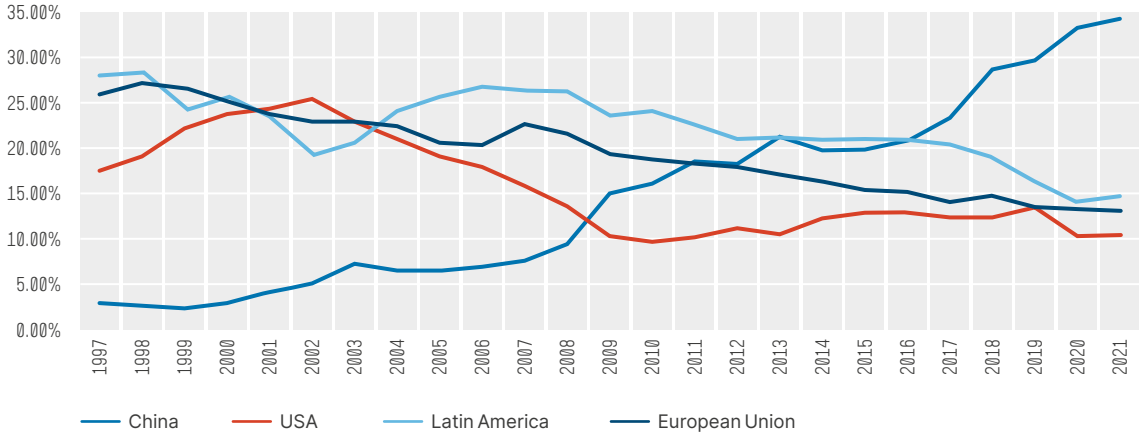
1 A vast literature links the evolution of productivity in Brazil to trade openness. Studies based on firm-level data show that the growth of total factor productivity in Brazilian manufacturing in the second half of the 1990s can be attributed to trade liberalization at the beginning of the decade. The results suggest that greater exposure of firms to foreign competition, as well as greater access to foreign inputs, led to productivity gains. See Rossi and Ferreira (2003) and Muendler (2004).

2 In November 2021 the government announced a 10% reduction in import tariffs for approximately 87% of goods and services. This was the first revision of the Mercosur common tariff in 25 years.

3 World Bank (2018).

4 Moreira et al. 2008); Cadestin, C. et al. (2016). Another relevant factor is the rise in political and institutional instability in the largest countries in the region in recent years.

FIGURE 3.1. Major Destinations for Brazilian Exports



Source: SECEX

production and export base has steadily declined, and several major companies have disinvested from the country in recent years due to its unsatisfactory business climate. Seizing the opportunities offered by the nearshoring trend requires more-active policies to attract FDI, as well greater openness to trade.

Policy Recommendations

3.7. Make progress on the trade policy agenda. To overcome existing barriers to international integration, Brazil should review its main tools for regulating trade: tariffs, non-tariff measures, mechanisms that restrict trade in services, and trade negotiations. Relevant steps include finalizing the Mercosur-EU agreement, which may require demonstrating greater cooperation on climate change and sustainability matters. Addressing electronic trade as well as cooperation on trade facilitation, customs, sanitary and phytosanitary standards, and technical regulations. Reviewing and reducing import tariffs, especially on capital and intermediate goods.[5] Pursuing digital trade agreements to boost growth in the information and communication technologies (ICT) sector, especially among small businesses.

3.8. Accelerate Regional Integration. Negotiate a full-scope free-trade agreement (FTA) with Mexico. Promote the harmonization of regional trade agreements, especially those between Mercosur and the Pacific Alliance.[6] Work with Mercosur partners to strength and modernize the bloc.

3.9. Improve trade facilitation and bolster logistics for exports.[7] Brazil should reduce the administrative cost of trade by consolidating all import processes into the electronic foreign-trade single window and simplifying the relevant procedures. Optimizing and automating customs and border processes, and their supporting systems. Enhancing coordination among national and subnational institutions, as well as with other countries, within the framework of coordinated border management (CBM). Reducing clearance times and border inspections for imports, by using appropriate data and predictive analytical models to improve risk management. Expanding partnerships with the private sector to establish Authorized Economic Operator (AEO) programs and defining agreements for their mutual recognition.[8] Implementing the Electronic Transport Document

5 Brazil has lowered import duties on capital goods in recent years (McGeever, 2021; HKTDC Research, 2022).
6 See Blyde, Giordano, Li and Mesquita Moreira (2018) on the expected benefits of convergence towards a pan-regional LAC-FTA.
7 In February 2022, a Protocol to the Agreement on Trade and Economic Cooperation (ATEC) with the US came into force. It includes new commitments on trade facilitation with respect to the single window, Authorized Economic Operator programs, and electronic documents and payments for traders, among other areas (Brasil e Estados Unidos colocam em vigor acordo comercial, 2022; Protocol to the ATEC, 2020; Comércio Exterior – O desafio da competitividade industrial, 2022).
8 Brazil has signed AEO mutual recognition agreements (MRAs) with Bolivia, China, Colombia, Mexico, Peru, and Uruguay, as well as a regional MRA within Mercosur (Receta Federal, n.d.).

(DT-E) and broadening its scope both in terms of geographical coverage and the range of stakeholders involved. Addressing product-specific bottlenecks to exports due to transportation, logistical, or regulatory factors. Developing port-community systems (PCS) to standardize and optimize port operations. Liaising with private operators to achieve better coordination across ports.

3.10. Attract foreign investment and promote exports. Brazil's access to global value chains hinges on boosting foreign direct investment and increasing the international exposure of domestic firms. Measures to this effect include Developing an Electronic Single Window for Investment, to guide foreign and domestic investors through all relevant administrative requirements and offer simplified digital channels for meeting them. Reengineering and automating post-incorporation processes for firms (e.g., licensing, tax payments), after assessing how such processes affect investment in sectors with export potential. Bolstering policy advocacy and investor aftercare, through the Direct Investments Ombudsman and in collaboration with ApexBrasil. Building investment-attraction and export-promotion capacity at the subnational level—particularly among states in the North and Northeast—leaning on enhanced cooperation with ApexBrasil. Providing digital tools, such as CA White Labels, to support the development and internationalization of SMEs. Developing sustainability certifications and improving traceability (e.g., in the livestock industry), in collaboration with the private sector. Supporting the development and refinement of financial instruments in support of exports and investment, such as export credit guarantees for SMEs. Support the implementation of Industry 4.0 technologies, critical to improve the competitiveness of Brazilian companies (including SMEs) and to promote their integration into global value chains[9].

3.11. Pursue accession to the OECD. The reforms necessary to ensure Brazil's accession to the OECD are subject to ongoing negotiations, but they will inevitably entail addressing some of the country's major challenges. The accession process is a significant opportunity for Brazil to make its business environment more modern, efficient, and transparent. According to a recent study by Canuto and Santos (2021), accession to the OECD can lead to an additional GDP increase of 0.4% per year. As of June 2022, Brazil had already complied with over 44% of the instruments needed for accession, more than any other non-member country.

(2) Boost the investment in infrastructure[10]

Shortcomings in transport and utilities infrastructure hinder Brazil's growth, increase operational risk, and burden supply chains with costs and delays. Inadequate availability and poor quality of infrastructure are among the key barriers to doing business in the country.

3.12. Current levels of investment are insufficient to close Brazil's infrastructure gap. In 2020, infrastructural investment in Brazil, expressed as a percentage of GDP, amounted to 0.18% in sanitation, 0.76% in electricity, 0.31% in transport and logistics, and 0.42% in telecommunications, for a total of 1.67%—well below the minimum annual investment required in these sectors, equal to 4.31% of GDP. The spending gap was especially large in transport and logistics, which need infrastructural investment on the order of of 2.26% of GDP (600% more than 2020 levels); and in sanitation, where the minimum necessary investment amounts to 0.45% of GDP (150% more than 2020 levels).[11]

3.13. Institutional and regulatory challenges hamper investment in infrastructure. The public sector has limited capacity to structure infrastructural projects, leading to shortcomings in project

9 See pillar 3 for details on industry 4.0.

10 Here are analyzed the challenges for the sector. Pillar 4 discusses specific challenges for transport, energy, and water and sanitation. Pillar 3 studies the telecommunication sector.

11 BNAmericas Intelligence Series. Brazil's Robust Infrastructure Agenda: A Peak Year for Tenders. February 2022. Achieving universal sanitation services by 2033 would require investments of US$139 billion and BNAmericas Intelligence Series. Opening the Floodgates to Private Investment in Brazil's Water Sector. January 2021. (https://app.bnamericas.com/report/section/all/content/xeu58ef4o-opening-the-floodgates-to-private-investment-in-brazils-water-sector_

design and overly complex approval processes. Overlapping responsibilities between federal, state, and municipal environmental agencies, combined with procedural issues around licensing and procurement, are frequent sources of delays.[12] Moreover, regulatory uncertainty is a concern for investors,[13] due in part to the limited autonomy of certain regulators and their vulnerability to interference from both political and private interests (for example, there is evidence that regulatory agencies have become increasingly politicized over time).[14] Finally, coordination across municipalities is inadequate, affecting investments in water and sanitation in particular.[15]

3.14. Reforming public investment management (PIM) is crucial to increasing investment in infrastructure. Effective PIM institutions and processes improve the quality of public infrastructure in G-20 countries,[16] and can enhance the impact of public investment on growth in emerging markets and developing economies.[17] In Latin America, improved project selection, optimized infrastructure portfolios, reduced cost overruns and delays, and adequate maintenance can generate substantial efficiency gains, potentially saving more than 1% of GDP per year.[18]

3.15. Planning within and across levels of government is insufficient and poorly coordinated, undermining the efficiency of public investment. At the federal level, both the Executive Office of the President (Casa Civil) and the Ministry of Finance (Ministério da Economia) contribute to defining investment priorities and allocating budgetary resources, but their objectives are often inconsistent or conflicting. The Multiyear Plan (Plano Plurianual, PPA) is designed to consolidate investment planning, but its effectiveness is undermined by the absence of a medium-term budgetary framework (MTBF), infrequent updates, and poor integration with both the annual budget and sectoral investment plans. In addition, Congress typically introduces multiple amendments to the budget that stray from the priorities set out in the PPA.

3.16. The methodologies for project appraisal and selection lack robustness and consistency. Procedures for rigorous project appraisal and selection often do not exist, and when they do, they are insufficient and applied inconsistently. The costing process is flawed, as it does not account for the recurrent operation and maintenance costs of new public assets. No systematic tools are used to assess costs and benefits, estimate value for money, or establish private-sector benchmarks to inform a choice between PPPs and direct government procurement.[19]

3.17. Project implementation is costly and prone to delays. Pre-investment studies are often inadequate, leading to significant delays and cost overruns in the execution phase. Procurement laws and regulations are frequently circumvented, creating more space for corruption. Budget sequestration procedures, revenue shortfalls, and increases in mandatory expenditures can all hamper project execution. Maintenance budgets are generally inadequate, due in part to the absence of ex ante assessments. Project management capacity is limited, especially at the subnational level, and ex post audits and evaluations are not universal, systematic, or risk-based. The PIM system is vulnerable to undue political influence, such that many projects do not reflect the government's stated development priorities, are at high risk of failure, and/or offer benefits that do not justify their cost.

12 World Bank, 2017
13 Amann et al., 2016.
14 Correa, Melo, Mueller, and Pereira, 2017 in World Bank, 2017.
15 World Bank Group, 2018. As an example, regulation of the transport sector is shared across three federal regulatory agencies - ANTT, ANTAQ and ANAC. Nevertheless, no entity is responsible for evaluating the consistency of regulation, or for fostering the integration of different modes of transport. The National Council for the Integration of Transport Policies (CONIT) has not delivered the expected outcomes. As result, sectoral planning lacks coordination and long-term vision.
16 IMF, 2015.
17 Furceri and Grace (2017) find that increased public investment raises output in the short and medium term, and the effects are larger in countries with more efficient management processes.
18 Serebrisky et al., 2018; IDB, 2018.
19 In recent years, the Ministry of Finance, through the Secretariat for Productivity, has taken steps to introduce cost-benefit analysis.

3.18. The PIM system is especially weak at the state and municipal levels. Subnational investment projects are not well aligned with national priorities, and there is no institutional body to coordinate actions across levels of government. However, limited planning and management capacity at the state and municipal levels is the most binding constraint on PIM efficiency.[20]

3.19. Access to long-term finance remains a challenge. Brazil's capital markets are among the most developed and sophisticated in the LAC region. However, only 1.5% of all fixed-income securities, from both public and private issuers, have a maturity of more than five years.[21] High interest rates and a history of inflation have eroded investors' risk appetite, discouraging the issuance of long-term corporate bonds. Moreover, Brazilian institutional investors are reluctant to bear the construction risk arising from infrastructure projects—which thus usually rely on support from BNDES or other public sponsors—and lack expertise in project finance. Finally, foreign-exchange risk has limited the inflow of long-term foreign capital, particularly for infrastructure projects, as hedging options are scarce and prohibitively expensive.

3.20. The role of the public sector in infrastructure finance has been evolving, while the private sector needs to step up its efforts. Instruments such as incentivized debentures have become more common.[22] However, tapping long-term finance for infrastructural projects remains a challenge. The Brazilian financial market is crowded,[23] but most players focus on short-term lending.[24] It is therefore essential to encourage the private sector, especially institutional investors, to expand their role in long-term financing.

Policy Recommendations

3.21. Build a National Public Investment System. National Public Investment Systems (NPIS) enhance investment allocation both technically and institutionally. On the technical side, NPIS prioritize investments that offer greater social returns; on the institutional side, they implement government strategy and policies. In countries that adopt international best practices, technical considerations limit political discretion over the allocation of public investment resources. A national investment system would allow for centralized project evaluation, clear criteria for project selection and prioritization, and the integration of cost-benefit analysis into the investment cycle.[25] Moreover, a medium-term budgetary framework (MTBF) could strengthen the implementation of long-term planning. An NPIS should aim to achieve five discrete objectives:[26]

I. *Improving investment-planning coordination between the federal and subnational governments.* The legal and institutional framework should include mechanisms to coordinate federal and subnational investment plans, and align public investment across sectors.[27] Moreover, reforming funding mechanisms could reduce the fragmentation of federal financing. The government should build capacity at both the federal and subnational levels, focusing on the skills necessary to formulate medium-term investment plans consistent with their respective financing capabilities.

II. *Supporting the strategic prioritization of public investments and developing a medium-term portfolio of priority projects.* The government would benefit from developing a national investment strategy based on a long-term vision and broad objectives,

20 World Bank, 2017.
21 World Bank (2017)
22 In 2021 there were 27 emissions of *debentures incentivadas* in the transport and logistics sector, amounting to R$14 billion. Ministerio da Infraestrutura, 2022. In June 2022, Brazil's lower house approved a bill extending tax breaks for infrastructure financing, which is expected to boost the local capital market. Source: BNAmericas
23 The Brazilian financial system comprises more than 1,500 entities, including public and private banks, cooperatives, credit societies, leasing companies, and more.
24 Long-term financing by commercial financial institutions accounts for only 8% of the total. BNDES and other government development entities provide the remainder.
25 FGV, 2018.
26 This section is based on ongoing research on public investment management in the Fiscal Management Division, experience from assistance to various LAC countries, as well as international evidence. Eguino and Saldarriaga (2018); IDB (2018); OCDE (2014); World Bank (2014).
27 Successful examples include the Canadian Regional Federal Councils, and the Council of Australian Governments. See OECD, 2013 and IMF, 2015b.

backed by a prioritized portfolio of major projects. This should go hand in hand with a new, rigorous process for appraising, selecting, and approving proposals for large public-investment projects; and with the introduction of guidelines on cost-benefit analysis, value-for-money analysis, and other pre-investment evaluation tools. Independent institutions should be responsible for the technical and financial assessments of proposed projects.[28] Budget preparation should reflect a realistic appraisal of the capital budget and make funding more reliable, through multiyear appropriations if possible. Finally, a systematic approach is needed to plan, budget for, and execute the maintenance of new assets.[29]

III. *Strengthening cost management on public projects,* through tightened oversight of procurement and budget execution.[30]

IV. *Developing ex post monitoring and evaluation instruments.*[31] Chile, for example, has successfully introduced mandatory short-, medium- and long-term evaluations to measure project outputs and outcomes.

V. *Building the capacity of the civil service across all aspects of investment management.* In particular, it is important to enhance the ability of public officials to adopt and implement sound procurement processes.

3.22. Reform the environmental-licensing process. Environmental-licensing agencies should participate in investment projects from the planning phase, and have access to reliable information about environmental risks. A central agency could coordinate all relevant environmental-licensing bodies, while increased resources, additional technical staff, and improved management processes could enhance their effectiveness. The interaction between licensing agencies and control courts (TCU) can be improved.[32] Project selection and prioritization ought to account for science-based metrics of environmental sustainability, climate resilience, and impact on natural capital.[33]

3.23. Improve the regulatory and institutional framework for public investment. The government should insulate regulatory agencies from political influence and expand their budgetary and administrative autonomy, while mandating that public-investment agencies are managed by professionals holding appropriate technical qualifications.

3.24. Mobilize private capital for long-term financing. Support from BNDES, multilateral development banks (MDBs), and the Brazilian government remains instrumental to improving the business environment and attracting domestic and international private investors—although with the government acting as a catalyst rather than a major provider of long-term funding. Areas in which the private sector will require extensive institutional support include risk mitigation, financial structuring, and advisory services, among others.

3.25. Incentivize banks to offer long-term lending. Lending from commercial banks has traditionally been the main source of infrastructure finance globally, but in Brazil it only accounts for 19% of the total.[34] Instruments such as mini-perm loans,[35] which have been successful in other LAC countries,[36] can help mobilize bank financing

28 See, e.g., Korea's specialized agency (PIMAC) and its Analytic Hierarchy Process, a decision-making approach based on multiple criteria (Kim, 2012).

29 Several reforms are underway. For example, to promote private investment, in 2016 the government launched a program to better coordinate and centralize concessions; the Minister of Planning is developing central project-selection guidelines, while the Casa Civil is working on a long-term national investment plan. The legal framework has been reformed to improve state-owned enterprises governance (Lei 13,303 de 2016). Draft laws aim to improve the governance of regulatory agencies and update the public financial management system, as well as to establish a national investment bank (*Proposta de Nova Lei de Financas 2085 de 2016*). The effective implementation of these initiatives will require developing institutional and managerial capacity.

30 E.g., Korea's Total Project Cost Management System (Kim, 2017).

31 See Meunier and Welden (2017) for an analysis of ex post evaluation frameworks in Norway and France.

32 McKenney et al., 2016; Watkins et al., 2017

33 The IDB new Environmental and Social policy Framework (ESPF) is an example than can be adhered by the country.

34 OECD (2018)

35 In project finance, a mini-perm is a medium-term bank loan, usually coming due within three to five years, that allows the project to reach financial and physical completion. This lending structure usually has a back-ended amortization profile, leaving most of the outstanding balance to be repaid or refinanced by the end of the established term.

36 E.g., Chile, Peru, and Colombia

early in the project cycle, during the construction phase.[37] BNDES and MDBs can promote these tools by offering guarantee mechanisms to share in the completion risk, as well as put options[38] that can be exercised after the mini-perm loan comes due as a hedge to refinancing risk.[39] A further challenge arises from the implementation of the Basel III framework, which measures the risk of counterparty concentration in a way that might diminish commercial banks' appetite for long-term lending. To mitigate this issue, particularly in project-finance arrangements, the bank's counterparty risk should be disassociated from the sponsor of the project-specific special-purpose vehicle (SPV) after financial completion.[40]

3.26. Encourage institutional investors to increase their exposure to the private sector. Asset managers and private investors in Brazil can invest in long-term securities, but as much as 80% of pension-fund assets are allocated to government bonds, and only 2% to corporate debt.[41] A greater share of these resources needs to be directed towards long-term securities issued by the private sector, with help from appropriate risk-mitigating mechanisms and innovative investment structures.

3.27. Transform the role of public banks. As their direct lending tapers off, public banks should chiefly focus on mobilizing private capital. While letting the private sector fund commercially viable investments, public banks could act as lead arranger of syndicated loans, thus helping attract domestic and international investors. Public banks can also encourage private-sector lending through credit-guarantee schemes, risk-sharing mechanisms, or by helping match private equity funds with available investment opportunities.

3.28. Enhance the role of capital markets. Although Brazil's capital markets have an important scale advantage over the rest of the LAC region, firms need better incentives to use them for raising debt and equity. A stronger institutional framework and improved investment environment would bolster investor confidence and risk appetite, thus increasing private-sector participation in long-term financing. On the demand side, capital-market investors still favor low-risk, low-tenor transactions. Credit enhancements, in the form of partial credit guarantees and full wraps of long-term bond issuances, would help bridge the gap between investors and issuers.[42] BNDES and MDBs could offer these solutions, in addition to underwriting bond issuances. Multilaterals can support FIDCs, and banking disintermediation, for instance, by providing credit lines to support subnational development banks to take junior/subordinated positions in FIPs to support innovation/infrastructure development.

3.29. Promote long-term finance and guarantee mechanisms to support public and private investments in Infrastructure.[43] As project finance is still a niche in Brazil, entities such as BNDES and MDBs could offer advisory services to investors in the structuring phase (including for PPP schemes). They could also provide risk-mitigating mechanisms—particularly to cover construction risk—to improve the bankability of projects and reduce the need for price adjustments for end-users. In addition, investment-fund structures[44] could mobilize resources for long-term finance and create secondary markets for long-term bonds. BNDES and MDBs could source experienced asset managers to lead these initiatives and provide funding and guarantee mechanisms (including first-loss arrangements) to attract private investors. Finally,

37 After construction is complete and projects have a more stable revenue stream, the loans can be refinanced in the capital markets, attracting institutional investors with lower risk tolerance but a longer-term outlook.
38 The seller of a put option commits to refinancing the project loan after a specific milestone has been reached (i.e., at project completion), thus eliminating refinancing risk for commercial lenders.
39 Allain (2017)
40 Currently, counterparty risk is capped at 25% of bank's regulatory capital and extends through the life of the financing, including after financial completion, when the risk from the SPV is usually no longer tied to the risk from the sponsor.
41 S&P Global Ratings (2017)
42 In 2017, IDB Invest approved two renewable energy projects with a full-wrap credit guarantee mechanism for infrastructure debentures in the local capital market.
43 87% of institutional investor resources worldwide are held in high income countries and 11% in upper middle-income countries (McKinsey Global Institute, 2016).
44 Investment funds can be structured as debt, equity, mezzanine or guarantees funds.

attracting foreign capital requires measures to mitigate foreign-exchange risk. For example, tariffs for infrastructure projects could be indexed to a basket of foreign currencies, while BNDES could offer long-term swap options to investors and ensure their liquidity.[45]

(3) Develop Private-Public Partnerships

PPPs can be a powerful tool to engage the private sector in national development. PPPs can promote the adoption of new technologies and improved processes while enhancing the efficiency and transparency of Brazilian infrastructure investment and social policies. It is expected that in 2023[46], Brazil will have the opportunity to grant the private sector 141 assets, mobilizing almost R$245 billion in new disbursements, focusing on infrastructure.

3.30. Brazil has made a concerted effort to implement PPPs over the past 20 years.[47] Brazil uses PPPs to direct private investment in public infrastructure to a greater extent than other countries, both in the region and worldwide. In addition, Brazil's market for private participation in infrastructure is among the most active in the developing world. According to data from the World Bank's Private Investment in Infrastructure database, between 1993 and 2021, at least 9,280 privately funded projects in energy, transport, and water reached financial closure in Brazil. On an annualized basis, those contract account for up to 21% of all identified private investment in infrastructure in the developing world over that timeframe. Yet, PPP projects have been largely concentrated in energy and transportation. The new Sanitation Law (Law 14.206 of 15 July 2020) is generating a sizable pipeline of projects with private participation. In health and education, there are fewer projects that tend to be attractive for their financing, including through the capital markets, given their smaller investment size and operational track record as PPPs.

3.31. Issues around governance and risk allocation complicate the PPP process. In addition to facing the broad challenges common to all infrastructure development in Brazil, PPPs and public concessions lack systematic planning and must navigate a complex, multilevel governance structure. The Infrascope 2021 study highlighted four key issues for PPP development in the country: ensuring appropriate risk allocation between public- and private-sector participants; improving coordination between agencies involved in project development, oversight, and implementation; enforcing PPP contracts; and conducting ex-post evaluations of environmental and social impacts. Brazil lacks clear and standardized rules for identifying, quantifying, and allocating risks.[48] Project structurers often outsource the definition of the project risk matrix to external consultants, and public officials are not always equipped with the technical capacity to evaluate different risk matrix proposals. Moreover, the public sector tends to transfer all risks to private partners, especially for common concessions (i.e., PPPs whose revenue derives solely from user tariffs). This strategy can significantly increase the total cost of a PPP, particularly when a private partner cannot fully manage a risk that is difficult to predict and quantify. Finally, PPP contracts may fail to adequately mirror the risk matrix, thus creating ambiguity in execution, potential conflicts, and a need for renegotiation.

3.32. Capacity constraints at the subnational level limit engagement with private partners. Although a federal PPP law exists, subnational governments can create their own PPP institutions, policies, and processes. However, subnational governments suffer from institutional and capacity constraints that hamper their ability to identify, appraise, design, execute, and monitor projects, particularly in non-traditional sectors.[49] Such shortcomings also create uncertainty, as they increase the likelihood that a project will need renegotiating at a later stage.

45 World Economic Forum, Inter-American Development Bank (2019); Chambers and Partners (2021)
46 PPI, 2022.
47 The IDB defines a PPP as a long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance. Under Brazilian regulation, projects can meet this definition under three types of contracts: the *concessão comum*, a PPP funded exclusively by user tariffs; the *concessão adminstrativa*, a PPP funded exclusively through government payments; and the *concessão patrocinad*a, a PPP with mixed funding.
48 IADB (2022); IADB (2017); IADB - Infrascope (2022).
49 EIU, 2017.

Subnational governments rarely use transaction advisors, due in part to time and budget constraints, and project-preparation facilities have limited capacity, as working capital needs to be provided up front then reimbursed through a "success fee."

3.33. Political risk reduces the expected profitability of projects. Political risks threaten the government's ability to meet its payment obligations, either direct or contingent. On projects whose revenue largely derives from direct public payments, the risk that public partners will fail to honor their obligations discourages private investment.[50]

3.34. PPPs create challenges to the effective management of aggregate fiscal liabilities. PPPs can generate both direct and contingent long-term fiscal liabilities. Direct liabilities are explicitly determined in a PPP contract; contingent liabilities, on the other hand, depend on uncertain future events, and reflect the risks allocated to the government in a PPP agreement.[51] However, the controls on PPP liabilities set out in Brazilian law only apply to the latter type. Moreover, most subnational governments do not record contingent liabilities or other balance-sheet impacts arising from PPPs, thereby undermining federal regulations on fiscal commitments.

3.35. PPPs can enhance transparency in infrastructure development. PPP arrangements focus on the outputs of infrastructure-based services, as opposed to traditionally procured projects that focus on inputs. The financial terms of PPPs can therefore better reflect the effective cost of the outputs delivered to society, thwarting potential corruption in infrastructural projects.

Policy Recommendations

3.36. Maintain a centralized PPP program. The framework established in 2016, with the creation of the Investment Partnerships Program (PPI) (see Box 1), allows for adequate checks and balances. Investment decisions require approval from the PPI Council, which reports into the Presidency of the Republic and includes representatives from several ministries and public institutions, ensuring that all stakeholders have access to expert technical opinions. Thanks to the PPI, the project pipeline can reflect a long-term strategic vision for infrastructure investment. Enhanced centralization of project screening, stronger contract oversight, and better mechanisms for project prioritization can further improve the investment portfolio.

3.37. Streamline the PPP process and enhance its transparency. The environmental-licensing regime needs reforms to minimize red tape while preserving its mission, whereas transparency and accountability mechanisms require improvements to stifle corruption. Project proposals must be assessed against the latest technological standards, to ensure their adequacy over the long term. Pre-feasibility and feasibility studies, with clearly regulated outputs and outcomes, are essential. Similarly, clarity about the criteria for project approval, as well as the allocation of responsibilities for their assessment, is paramount. Finally, a consistently applied value-for-money analysis is necessary for ensuring efficiency in project development and service delivery, as well as for avoiding long-term fiscal strains.

3.38. Build institutional capacity for PPP design and implementation, especially at the subnational level. Public agencies across all levels of government need training in project finance and early project analysis to support efficient infrastructure PPPs, drawing on global experience and best practices. The government could further bolster the knowledge base of public agencies through a national repository of PPP know-how, including detailed guidelines covering specific sectors or phases of the project cycle. Finally, the federal government should

50 The Brazilian legal framework allows governments to offer guarantees against possible defaults on its contractually determined financial obligations. These can take the form of: pledges of non-tax revenues; special funds accessed directly by contractors in case of default; insurance or third-party guarantees; guarantees from international organizations; and guarantees provided by a state-owned company, created for this purpose.

51 The fiscal effects of PPPs are generally harder to measure and monitor than those of traditionally procured projects, because PPPs feature more-sophisticated payment mechanisms, the relevant contracts do not always address contingent liabilities explicitly, and payment triggers can be open to interpretation.

support subnational agencies active in PPPs, along the lines of recent efforts by the Federal Economic Fund (*Caixa Econômica Federal*, CEF)[52] on street lighting and water and sanitation. The institutional capacity for social infrastructure is also limited among subnationals.

3.39. Mitigate political risk for investors and lenders. Federal PPP projects would benefit from better fiscal management of the direct and contingent liabilities they create, so that the risk level of loans to PPP projects ultimately approaches that of sovereign bonds. This would allow for a drastic reduction in the cost of private capital for many PPPs. The existing *Fundo Garantidor de Infraestrutura*, backed by the Brazilian treasury, could be used in support of PPP liabilities assumed by the federal government. In addition, PPP projects at the subnational level would benefit from a centralized system of guarantees, whereby federal revenue transfers to subnational governments would be redirected to creditors in case of subnational default. Such a scheme would also allow for centralized selection of sound projects and enforcement of good risk-allocation practices.[53]

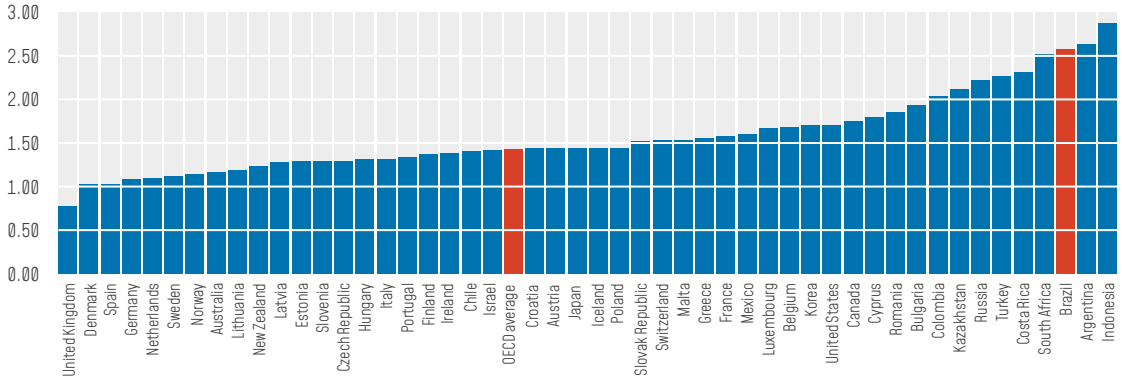
3.40. Improve the fiscal management of PPPs. Federally mandated fiscal boundaries and rules should apply to all PPPs, irrespective of their revenue models. Subnational governments would then need to establish appropriate enforcement mechanisms, particularly for rules about the management of contingent liabilities and other fiscal obligations arising from PPPs.

(4) Remove barriers to business growth

A key step for a resilient growth is to remove the barriers that inhibit growth of firms. Excessive and burdensome regulation, bureaucracy, and high cost of capital are key challenges for the expansion of the private sector and generation of jobs. Improving the regulatory framework through removing unnecessary barriers to competition can foster productivity and growth. Allowing SMEs to grow boost job creation and economic growth. [54]

3.41. Burdensome regulation degrades the business environment. Brazil has a highly distortive approach to market regulation. According to the OECD's product-market regulation indicator, in 2018 Brazil's markets were more heavily regulated than those of any OECD country, albeit less so than in other major emerging economies such as China, India, and Indonesia. According to the 2019 PMR indicator, the regulatory framework in Brazil is less competition-friendly than in the average OECD country, or in other Latin American economies. According the 2019 economy wide PMR indicator

FIGURE 3.2. OECD Product-Market Regulation Indicator Scores, Brazil and Comparators, 2018



Source: OECD

52 The CEF supports subnational entities in developing PPPs in accordance with Law nº 13,529/2017.

53 The Ministerio de Desenvolvimento Regional is structuring the Fundo de Desenvolvimento da Infraestrutura Regional Sustentável, which can be critical in addressing regional PPP preparation and guarantee mechanisms to support PPP development in Brazil. See: https://www.gov.br/mdr/pt-br/ultimas-noticias/mdr-seleciona-administrador-para-o-fundo-de-desenvolvimento-da-infraestrutura-regional-sustentavel;

54 Lack of human capital is also a barrier for businesses in Brazil. This challenge is discussed in pillars 2 and 3.

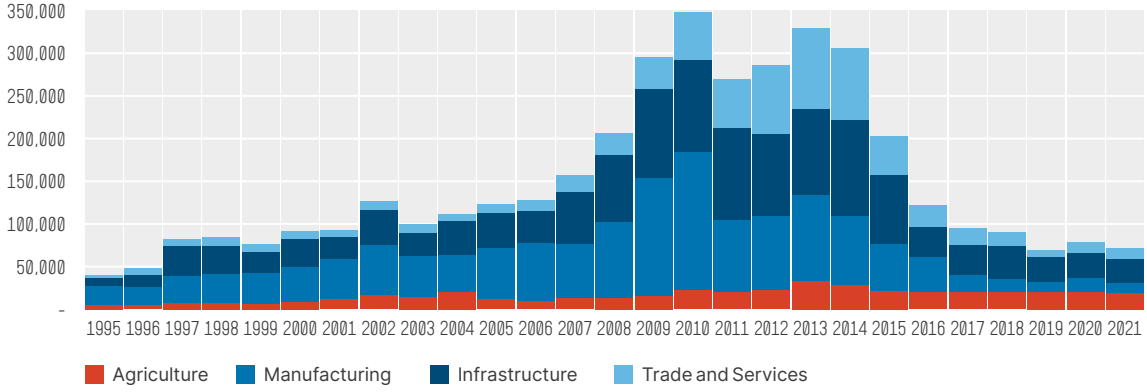
the regulatory framework in Brazil is less competition friendly than its international peers comparing unfavorably with the OECD average and other Latin American economies. The regulatory framework in Brazil creates barriers to competition, generating obstacles to the entry of firms, inhibiting the entry of firms, or restricting activities in professional and network sectors. High-quality regulations can stimulate productivity by encouraging the efficient allocation of resources and promoting innovation. In turn, these measures can reduce prices for consumers, stimulate the creation of jobs, and help improve living standards (OECD, 2022).

3.42. Access to finance is critical to social and economic development. At the national level, financial access directly impacts economic growth,[55] productivity,[56] competitiveness,[57] and innovation.[58] Brazil's financial markets have becoming increasingly sophisticated over the past decades, but important challenges persist.[59]

3.43. Credit remains scarce in Brazil, but progress has been visible. Total domestic credit to the non-financial sector as a share of GDP reached 54% at the end of 2021,[60] well below the OECD average of 160.7 percent.[61] However, according to the Brazilian Association of Financial and Capital Market Institutions (ANBIMA), in 2021 Brazilian companies raised R$596 billion on the domestic market across stocks, fixed income, and hybrid instruments—60% more than in 2020. Fixed income and hybrid instruments accounted for R$467.9 billion, with debenture issuances alone worth R$253.4 billion (more than twice as much as in 2020), while stock issuances reached R$128.1 billion. In addition, with the exception of the pandemic period, since 2015 earmarked credit has been shrinking, while non-earmarked credit has been on an upward trajectory. Finally, credit stimulus programs launched in 2020 to mitigate the impact of the pandemic have expanded the availability of credit for small companies.

3.44. Long-term credit is in short supply, particularly from commercial banks. The BNDES loan portfolio rose from R$220 billion in 2008 to R$314 billion in 2015, before falling to R$64 billion in 2021.[62] Infrastructure loans account for about 40% of it. Due to deteriorating fiscal indicators and rising debt in the wake of the 2014-16 recession, the gover-

↓ **FIGURE 3.3.** Annual BNDES Disbursements by Sector, 1995-2021



Source: BNDES

55 Aghion et al. (2005); Bech et al. (2000); Rajan and Zingales (1998).
56 Arizala et al. (2013) and IDB (2010).
57 Galindo et al. (2007) and Manova and Yu (2010)
58 Aghion et al. (2010).
59 Examples of progress in the market include: the launch of the infrastructure bond instrument (2012); the creation of ABGF, the Brazilian Agency of Guarantees; the strengthening of risk-mitigation instruments, with an innovative fund managed by SEBRAE (FAMPI); and the introduction of Credit Guarantee Companies (SGC), following the successful example of European cooperative guarantee systems. Between 2005 and 2014, the financial market attracted more than 50 million clients, making the financial system accessible in 5,569 out of 5,570 Brazilian municipalities (BCB, 2015).
60 Central Bank monetary and credit statistics.
61 World Bank, 2020.
62 BNDES, 2021.

nment has chosen to scale down its direct role in long-term financing and infrastructure investment. As a result, the treasury has been reducing its transfers to BNDES; conversely, since 2015 the bank has been repaying federal loans. The Brazilian financial system is crowded, but most players focus on short--term lending. Long-term commercial bank financing, when available, only extends up to 10 years, whereas infrastructure finance requires average loan maturities of 25 years.

3.45. The Brazilian National Development plays an important role in expanding credit. The Brazilian National Development Financial System (NDFS) amounts approximately US$ 400 million (R$2 trillion) in total credit portfolio, which represents 45% of Brazil's credit market – notably in longer-term operations (73% of total credit) to sectors such as infrastructure, agriculture, and utilities. It comprehends a group of 34 institutions and currently has 37.9 million customers, representing 19% of the national financial system. NDFS' national reach, sector and regional specialization potentialize their presence and relevance both in public and private segments. National commercial and development banks provide the bulk of financing, whereas subnational Development Financial Institutions (DFIs) and regional federal banks, despite significantly smaller in size, are known for their expertise in working at different regions and sectors in Brazil. Therefore, they are also important players, especially for financing MSMEs and municipalities.

3.46. Brazil's financial system is among the largest and most sophisticated in Latin America, but the financing available to firms is scarce and expensive. Balassiano and Vidal (2019) show that Brazil has the second-highest banking spread in the world, due to a variety of factors. For example, the recovery of credit through judicial means in Brazil is among the lowest in the world: only US$0.11 for every US$1 borrowed is recovered. In Japan, which has the lowest banking spread in the world, US$0.92 is recovered for every US$1 borrowed, and the global average is US$0.34 per US$1 borrowed. Other studies cite additional factors: costs associated with provisioning, high levels of non-performing loans, taxation, high operational costs for banks (including labor costs), and high concentration and poor competition among banks. The relative importance of each factor depends on the type of credit (SMEs, large companies, household, or working capital). As a result, neither banks nor the capital markets meet the long-term financing needs of Brazil's private sector. The banking system offers credit mainly for short-term financing of households and businesses. SMEs face especially low liquidity and high costs for long-term financing, and the market for long-term bond issuances is yet to fully develop.

3.47. Brazil's banking market is highly concentrated. The five largest banks (excluding BNDES) account for more than 76% of total assets, 77% of total bank credit to households, 64% of credit to firms, and almost all housing credit. Two of the top five banks, including the largest one, are state owned.[63] However, concentration in the banking sector has slightly reduced in recent years.

3.48. Micro, small, and medium-sized enterprises (MSMEs) are important generators of employment and income in the Brazilian economy. According to the 2018 Annual Social Information Registry (RAIS), private firms with up to 249 employees (which match the definition of MSMEs) account for more than 99.8% of all companies, 58.0% of formal jobs, and 44.3% of formal salary payments in the country. This data demonstrates the major role of MSMEs in creating employment and income, across sectors and regions.[64]

3.49. MSMEs have limited access to finance. This issue stems from two key factors:

I. the features of the Brazilian financial sys-

63 Central Bank of Brazil, 2020.

64 Netto, Maria; Viturino, Cristiane; Porto, Rodrigo P. Apoio às MPMEs na crise da Covid-19: desafios do financiamento para resiliência e recuperação. BID e ABDE, junho de 2021. Ver: https://publications.iadb.org/pt/apoio-mpmes-na-crise-da-covid-19-desafios-do-financiamento-para-resiliencia--e-recuperacao.

tem, which is highly concentrated,[65] relatively inefficient, and generally offers expensive services;[66] and

II. the perception among financial institutions that lending to SMEs is risky, due to:

a. the poor availability and reliability of business information for credit assessments;

b. the small scale of SME transactions, which raises the cost of serving this market segment; and

c. the dearth of assets that SMEs can offer as collateral.[67]

The resulting scarcity of credit limits production capacity and innovation, and can even trigger business closures and job losses. Furthermore, the stunted development of SMEs discourages the creation of new firms and limits the dynamism of the economy.

3.50. Information asymmetry constrains access to credit for MSMEs. Small entrepreneurs frequently complain of "excessive red tape" when seeking bank credit—i.e., requests for information, documentation, and guarantees that they struggle to meet. It is then common for SMEs to seek non-bank financing (including self-financing), or credit lines more flexible but less suited to their needs. On the other hand, financial institutions must contend with high rates of default and business mortality. For comparison, in 2019 the average default rates among micro (10.0%), small (8.3%), and medium-sized companies (5.9%) were substantially higher than among large companies (3.3%).[68] In addition, according to the Brazilian Institute of Geography and Statistics (IBGE), [69] almost half of all SMEs survive only four years since being established, due to difficulties in achieving productivity gains and accessing credit.

Policy Recommendations

3.51. Improve the regulatory framework. Adopting a simple, transparent regulatory framework and ensuring compliance would reduce regulatory risk and improve the business climate. Eliminating redundant responsibilities between regulatory agencies would reduce compliance costs and bolster business confidence. The efficiency of regulatory agencies would also benefit from stronger independence and financial autonomy, and from staff recruitment based on technical qualifications.

3.52. Simplify regulation and leverage technology to streamline administrative processes. Stronger oversight of, and transparency in, the regulatory process would help contain the proliferation of regulatory requirements and ensure that their benefits justify their cost. At the same time, relevant authorities should solicit input from the public when contemplating regulatory changes.[70] Moreover, new technologies could help reduce delays, consolidate services, and reduce the need for in-person visits to government offices.

3.53. Create the enabling conditions for lower banking spreads. Encouraging more private participation in long-term finance will require lower real interest rates on government bonds,[71] as well as fewer issuances. This would prompt institutional investors, such as pension funds, to look away from traditional government debt and allocate resources in other areas.

3.54. Support the BC# Agenda. The 'Competitiveness Dimension' of the Central Bank's BC# agenda seeks to promote adequate pricing of financial services through competitive access to market.

65 High concentration in the financial system tends to increase interest rates because of limited competition. It has also been argued that, given the positive relationship between concentration and bank fragility, increased competition reduces a country's likelihood of suffering a systemic banking crisis. Boyd and De Nicolo, The Theory of Bank Risk Taking and Competition Revisited, 2005

66 The cost of finance for SMEs in Brazil (34.7%) is considerably higher than in Mexico (9.1%), Chile (4.3%), and Colombia (3.9%).

67 Barboza, R., et al., O BNDES e as micro, pequenas e médias empresas, BNDES, Textos para discussão No. 146, 2019.

68 Netto, Maria; Viturino, Cristiane; Porto, Rodrigo P. Apoio às MPMEs na crise da Covid-19: desafios do financiamento para resiliência e recuperação. BID e ABDE, junho de 2021. Ver: https://publications.iadb.org/pt/apoio-mpmes-na-crise-da-covid-19-desafios-do-financiamento-para-resiliencia-e-recuperacao

69 IBGE. Demografia das empresas. Disponível em: https://www.ibge.gov.br/estatisticas/economicas/servicos/9068-demografia-das-empresas.html?=&t=o-que-e. Consulta em 4/5/2020.

70 OECD/Korea Development Institute (2017), Improving Regulatory Governance: Trends, Practices and the Way Forward, OECD Publishing, Paris.

71 Private assets must offer a premium return over public bonds, to reflect added credit and liquidity risk. However, interest rates on public bonds in Brazil have historically been high, limiting financing opportunities for the private sector.

The agenda included the rollout of the PIX instant-payment system, the implementation of open banking, improvements to the regime on guarantees, and the introduction of a regulatory sandbox. The 'Inclusion Dimension' of the agenda focuses on non-discriminatory access to market for all—small and large businesses, entrepreneurs, investors, and borrowers, both domestic and foreign—through the promotion of digital platforms, simplified procedures, and reduced red tape. The Central Bank is also supporting the shift from public to private sources of financing in the credit market.

3.55. Support strengthening of Development Financial Institutions (DFIs). Boosting their institutional capacity is an opportunity to leverage and potentialize their action. DFIs can strengthen their governance, and internal capacities. The Digital transformation can reduce their cost and lead to higher productivity amplifying the supply of credit, notably for MSMEs. Develop guarantee funds that already exist in the country and identify alternatives for expanding their reach aiming to reduce risks and consequently increase volume of resources available for new investments, mainly riskier ones that would benefit the most from a robust guarantee arrangement in place. Support the readiness of DFIs to attract international resources for a sustainable transition in Brazil.

3.56. Promote credit, develop capital markets, and crowd in private sources of finance to encourage investment and expand financial access. Improved financial infrastructure and guarantee systems for SMEs are especially important to promote competition and expand financial inclusion. Building credible information-sharing systems in bond and equity markets could reduce information asymmetry. Moreover, the authorities should identify, promote, and develop pooling and digital-economy instruments to expand access to bond markets, especially for SMEs. Credit guarantees, backed by appropriate risk-mitigation mechanisms, are key to supporting viable and efficient SMEs. Approve and implement the new framework for guarantees (Novo Marco de Garantias), which is currently before Congress, would mark a step in the right direction.

(5) Strengthen the Fiscal framework

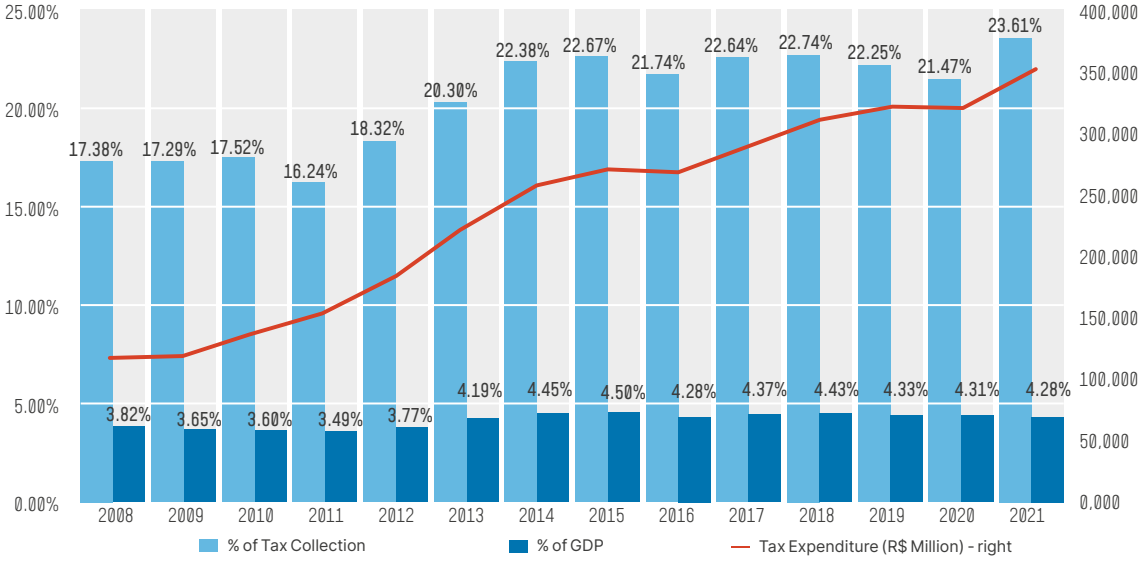
Current public policies do not ensure equal access to opportunities or economic growth. Without appropriate policies in place, inequalities concentrate political influence among those who are already better off, thus preserving or even widening opportunity gaps. Such biases erode trust in the ability of governments to address the needs of the majority. In turn, lack of trust can affect economic performance and policy effectiveness, hurting growth and social cohesion.

3.57. A large share of public spending is conducted without a systematic analysis of its impact. As an example, in 2019 tax expenditures totaled R$320.9 billion (4.33% of GDP), an amount higher than the total expenditure on education and health. Tax expenditures comprise tax breaks and credit or financial subsidies and include myriad benefits such as the Manaus free trade zone (8.49% of total tax expenditure, or R$26.4 billion), the *Simples* tax rule for SMEs (23.1%, or R$71.9 billion), income tax deductions for health and education expenses (9.84%, or R$30.5 billion), agriculture and agroindustry incentives (9.88%, or R$30.7 billion) and other programs. According to IPEA (2018)[72], out of four large government programs that disbursed R$173 billion in subsidies, none has reached its objectives.[73]

3.58. The rigidity of the budget hinders improvements to the social protection system. Budget rigidity limits the efficiency and effectiveness of public policy. Mandatory expenditure represents around 94% of the federal government's total primary spending. The growth of mandatory expenditure has been compressing the fiscal space available to finance discretionary expenses, a category that includes public investment and any other social policy not classified as mandatory. Given its importance to economic development, the country´s fiscal framework would benefit from being

72 IPEA (2018).
73 The programs assessed were: Payroll exemption, PSI (Program for Sustaining Investment), PROFROTA, and PROUCA (Program for one computer per student).

FIGURE 3.4. Tax Expenditure

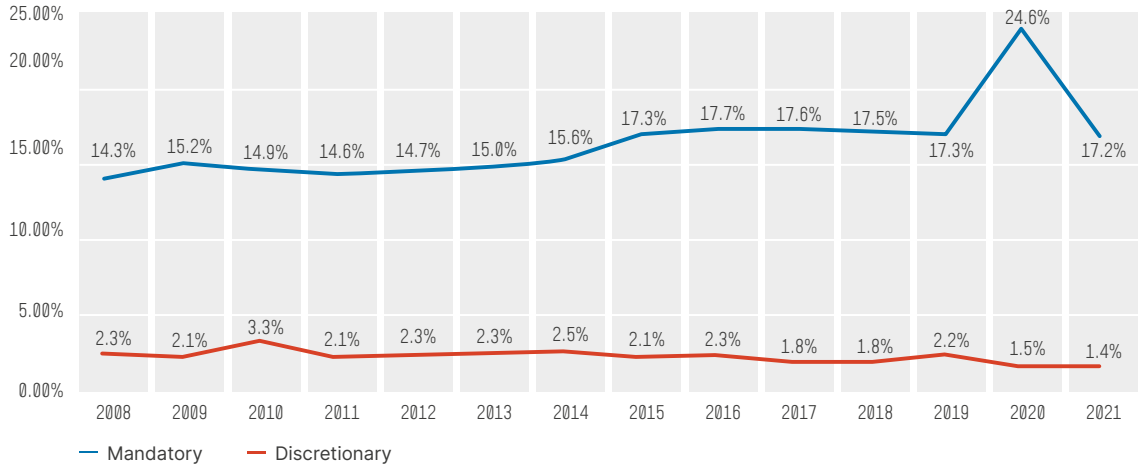


Source: Receita Federal do Brasil – 2020 and 2021 (projections)

reevaluated, with the aim of strengthening the credibility of fiscal policy, ensuring a sustainable trajectory of the public debt, and granting more flexibility and fiscal space to public investments and programs that reduce social inequalities.

3.59. The general government's wage bill is high by international standards. Among the mandatory spending items, the public sector wage bill should be reviewed. Its scale stems from high salaries and aggregate benefits, rather than from an excessive number of employees.[74] This pattern is especially visible in the federal government, whose employees are generally better paid than both subnational government and private sector workers. Containing such expenditure can benefit public accounts, as well as improve public service delivery[75] and overall productivity.[76] According to a study from the World Bank

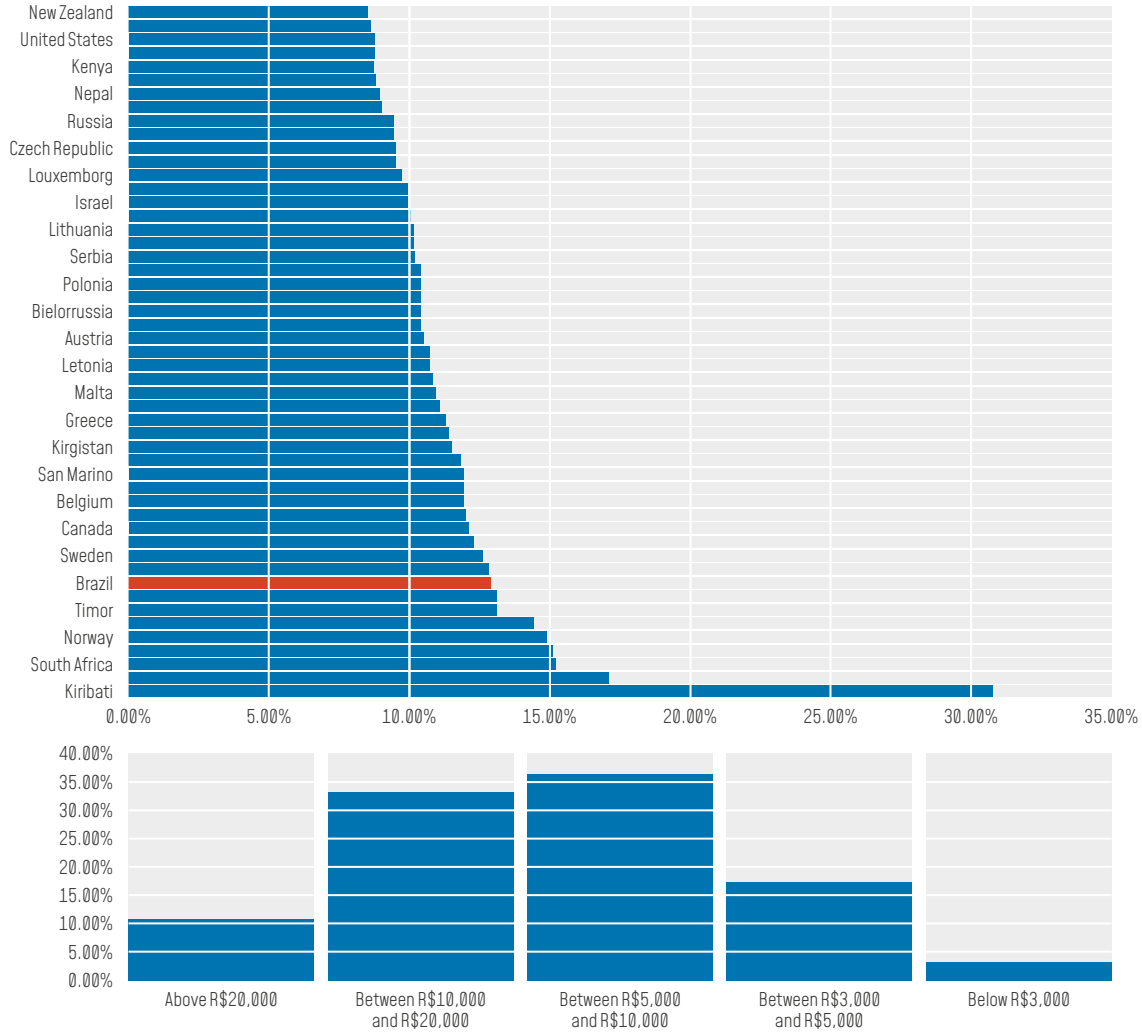
FIGURE 3.5. Evolution of Mandatory Expenditure (% of GDP)



Source: National Treasury

74 World Bank (2018).
75 For example, by implementing periodic evaluations of public servants and increasing flexibility in their allocation.
76 Cavalcanti and Santos (2021).

↓ **FIGURE 3.6.** Total spending on personnel (% of GDP) and distribution of salaries within the Federal government



Source: IMF and World Bank (2019) using data from SIAFI.

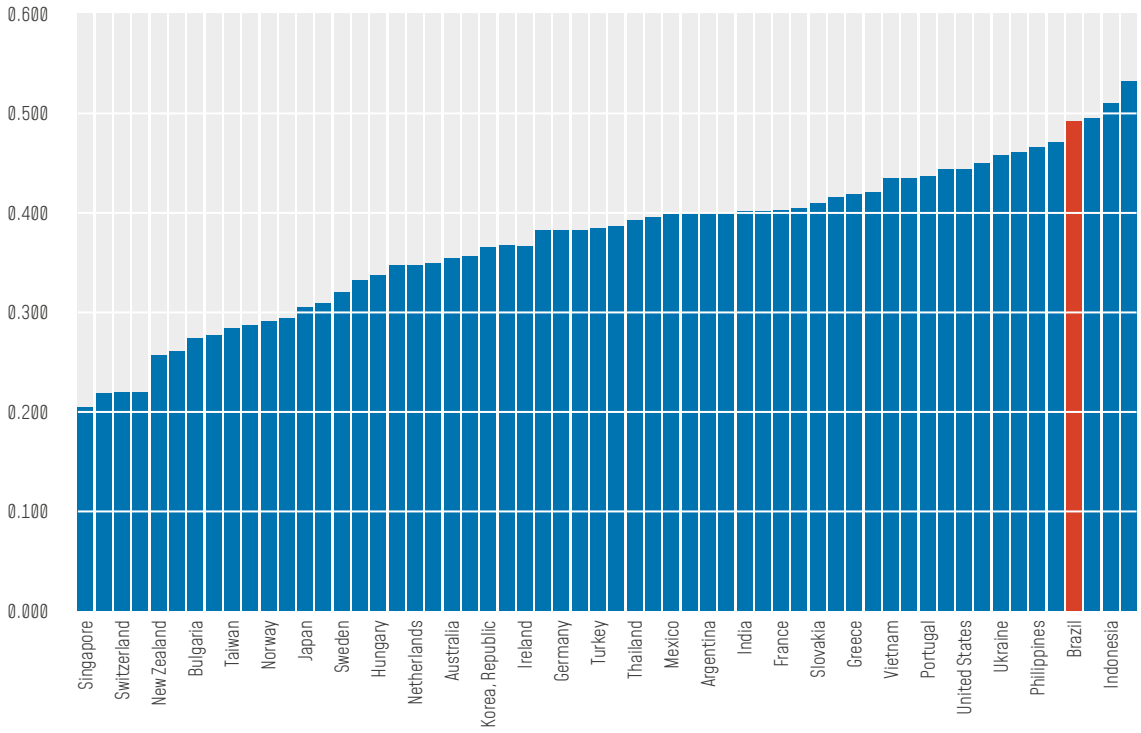
(2020), there are sizeable inequalities between civil servants and the rest of society. For example, 54% of public sector workers at all levels are among the 20% of Brazilians with the highest incomes. Moreover, the wage premium in the public sector (i.e., the gain compared to workers with similar characteristics and roles in the private sector), amounts to 97% for federal government employees, and to 36% for state government employees. Notably, federal civil servants enjoy a 35.7% salary premium over workers employed in similar roles by the country's 500 largest companies.

3.60. Tackling post-pandemic social challenges will require reforms to Brazil's fiscal federalism. The Brazilian federalism framework limits the scope for social intervention due to resource constraints, budgetary rigidities, poor incentives, and the structural evolution of the tax base for the major sales tax (*Imposto sobre Circulação de Mercadorias e Serviços*, ICMS) and other taxes. Moreover, the current transfer system does not adequately address territorial, social, economic, and fiscal disparities at the subnational level. On the other hand, uniform spending obligations (e.g., those deriving from constitutional rights to health and education) at the local level distort the allocation of resources. Cooperation among subnational governments should be reinforced, as it is currently insufficient and constrains the efficiency of the public sector. The legal framework regulating interactions among subnational governments

and with the federal government does not induce cooperation. For instance, the framework allows tax-break competition between subnational governments striving to attract businesses, leading to the so-called "fiscal war" among Brazilian states, which has increased aggregate exemptions far beyond socially optimal levels.[77] A disorderly decentralization of administrative functions and financial flows has distorted the allocation of resources across levels of government. As a result, subnational governments (SNGs) do not receive sufficient funding to provide the public services for which they are responsible. SNGs collectively account for 44.1% of total public spending, equivalent to about 24% of GDP—close to the OECD average of 33% of GDP. However, SNGs collect just 11% of GDP in revenue, creating major vertical imbalances and dependence on intergovernmental transfers. Overlapping expenditure responsibilities among federal, state, and municipal governments in key areas such as education, healthcare, and social assistance further complicate the fiscal federalism framework.[78]

3.61. The limited fiscal space highlights the need to strengthen fiscal risk management. Brazil needs to improve the governance processes and management of contingent liabilities and precatorios. Following the digitalization of judicial processes and greater productivity of the Judiciary branch, the value of the lawsuit stock against the FG increased 296% from 2014 to June 2021, reaching R$ 2.22 trillion (25% of GDP). Annual expenses with judicial losses present an upward trajectory: from BRL 20.7 billion in 2014 to BRL 54.7 billion in 2021, equivalent to 46% of discretionary spending. The amount for 2022 was calculated at BRL 89.1 billion, but a Constitutional Amendment limited the payment, postponing part of this expense to the following years. This provided short-term relief, but without dealing with the structural bottlenecks that led to the disorderly growth of precatorios.

FIGURE 3.7. Tax Complexity Index



Source: taxcomplexity.org

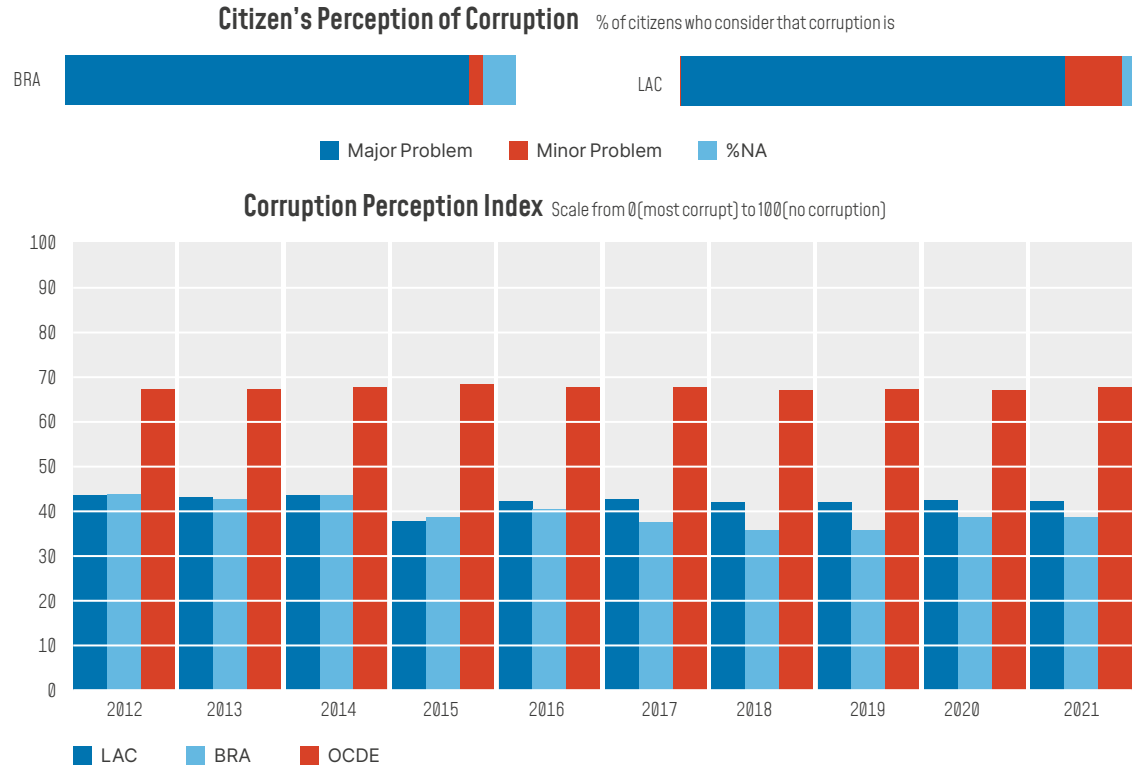
77 Ter-Minassian, T. (2015).

78 For example, a recent 35% reduction in the tax on industrial products (IPI) will cost the federal government R$7.6 billion in lost revenue in 2022, and R$10.2 billion in 2023. Considering that receipts from this tax are shared with subnational entities, the IFI (*Instituição Fiscal Independente*) estimates that states, municipalities, and regional funds will lose R$11.1 billion between April and December 2022, and R$14.8 billion in 2023.

3.62. A tax reform will boost growth and reduce inequalities. The Brazilian tax system is obsolete, unfair, and costly to comply with. The Brazilian taxpayer spends an excessive amount of time and money to comply with ever-changing tax rules, as well as fulfilling ancillary obligations. The tax system drives foreign investment away from the country and does not adequately redistribute wealth to those most in need. Brazilians spend 1,501 hours a year on average attempting to comply with tax obligations, causing Brazil to rank lowest in overall tax efficiency according to the OECD. This complexity generates an enormous volume of litigation between taxpayers and the tax authorities, thus raising costs for companies, producing legal uncertainty, and discouraging investments. Messias et al. (2020)[79] show that the sums at stake in tax-related proceedings in Brazil reached R$5.4 trillion in 2020, or 75% of GDP. Finally, the current tax system has a regressive impact, as it taxes consumption more than income or wealth. Notably, income and wealth taxes only account for 22% of Brazil's total tax collection, versus 60% in the USA, 67% in Denmark, and 40% on average in OECD countries.

3.63. Brazil ranks better than regional peers on transparency, but standards are inconsistent across levels of government. In the 2019 OECD OURdata Index—measuring government efforts to enable and encourage open data in three areas: availability, accessibility, and support for data reuse—Brazil received a score of 0.63, better than the LAC average of 0.43 and the OECD average of 0.60. Meanwhile, the International Budget Partnership's (IBP) 2021 Open Budget Survey assessed public access to central government budget information, formal opportunities for citizens to take part in the national budget process, and the role of oversight bodies, such as the legislative branch and external auditors. This survey assigned Brazil a score of 80, better than the LAC average of 51 and the OECD average of 66. On financial integrity, Brazil performed better than the LAC average, but worse than the

↓ FIGURE 3.8. Corruption indicators



Source: Our World in data

79 Lorreine Silva Messias, Larissa Luzia Longo, Carla Mendes Novo e Breno Vasconcelos (2020). Contencioso tributário no Brasil.

OECD average. Brazil's freedom of information law (Law 12,527/2011, *Lei de Acesso à Informação* – LAI) aims to reduce the cost of accessing public information, and the control of government officials over it, while allowing for monitoring of the government; however, compliance at the municipal level remains very low and overall results have been very modest.[80] On the fiscal side, despite progress since the enactment of the Fiscal Responsibility Law (Complementary Law 101/2000), data on tax benefits remains opaque, particularly at the subnational level.

3.64. Recent reforms have enhanced public procurement processes, but further progress is possible. Law 14,133/2021 aims to make public procurement more efficient and transparent. Enacted in April 2021, the law granted a two-year adjustment period to the public administration before it fully comes into force in 2023. Among other reforms, the law created the National Public Procurement Portal (PNCP) to consolidate various categories of data, for the benefit of public bodies across all levels of government. The PNCP encompasses annual contracting plans, electronic standardization catalogs, accreditation and pre-qualification notices, direct contracting and tender notices, price registration minutes, contracts and additive terms, and electronic invoices. Brazil should continue to promote innovation, inclusion, and transparency in public procurement, drawing on international experience and the vast literature in this field.[81] In addition to fiscal, economic, and service delivery impacts, a well-designed public procurement system can promote secondary policy objectives, such as contributing to a greener economy and increasing opportunities for SMEs, women, or marginalized groups.

Policy Recommendations

3.65. Strengthen program evaluation. The federal government has been working to improve public policy evaluation. The Public Policy Monitoring and Evaluation Council (CMAP), established in 2019, is tasked with evaluating policies financed through direct expenditures and tax subsidies. After concluding its evaluation, the CMAP offers recommendations to policy managers. In addition, constitutional amendment 109 mandates evaluation of public policies for the entire public administration, at the federal and subnational levels. However, governance issues still hamper systematic feedback from evaluations into the budget process. In addition, valuable tools to guide budget allocation and improve policy design, such as ex ante evaluations, have not been implemented. Finally, states and municipalities remain a step behind: they lack consistent mechanisms to evaluate policies and resources, leaving room for budget choices that are more political than technical.

3.66. Reinforce the link between planning, budget and performance at the institutional level.[82] In a results-focused budgeting framework (encompassing programming, approval, execution, and accountability), the government does not focus on inputs, but on outcomes for citizens. Policy results are analyzed through performance indicators and systematic evaluations, then used as input for determining resource allocation in the following fiscal year. This approach favors efficacy and efficiency in public spending, offers flexibility, admits gradual adjustments, and generates more transparent results. Effective implementation is based on four pillars:

I. functioning performance-information systems;
II. institutionalized production of credible and relevant information to orient budget allocation;
III. mechanisms to foster effective employee performance, such as institutional and personal incentives;
IV. robust capacity of executing agencies, and a resulting decentralization of public resource management.

The budget process in Brazil is currently program-based (per Decree-Law No. 200/67).[83]

80 Batista, Rocha, and Santos (2020).
81 Fazekas (2014) describes innovative uses of big-data analytics to identify high-level corruption. Brunetti and Weber (2003) show a positive relationship between administrative quality and transparency in public procurement. Basheska (2011) argues that increasing income levels and standards of living can decrease incentives for fraud. Piga (2014) shows that strengthening the monitoring of terms and performance in public contracts can increase transparency and promote efficiency.
82 IADB (2014); IADB (2015); IADB (2007).
83 IADB (2014); IPEA (2022).

3.67. Strengthen the functions of the Governance Center. The Governance center (CoG) in Brazil would benefit from a limited and well-communicated number of shared goals to mobilize and challenge the public administration effectively. The CoG in Brazil could mitigate the effects of the fragmentation of government actions and programs by carrying out functional reviews and taking measures to promote continuity through change, including reducing staff turnover. The planning process would benefit from prioritization mechanisms to make sure the government is acting on the most important issues, in a coherent manner and armed with the most relevant evidence. The CoG's ability to foster outcome-oriented strategic planning could also be improved through better alignment and integration of the different planning systems across government. The Brazilian government could benefit from the Budget Execution Board bringing the outputs of the planning function into the strategic phase of the budget and from designing and implementing a spending review framework to assess the performance of existing expenditure against the relevant policy objectives. Developing and harmonizing monitoring tools and working routines within Casa Civil, aimed at the implementation of cross-cutting government priorities, developing explicit quality assurance and control mechanisms and promoting the use of evaluation results through a communication strategy can enhance the robustness of the evaluation system. The government should continue to institutionalize key processes, enhance multi-level co-ordination and professionalize core capabilities. In doing so, the government should pursue an evidence-driven communication approach as part of its whole-of-government strategy to better respond to the needs of different audiences and show its contribution and impact on broader policy objectives. It will also be important to communicate participation opportunities to establish an open and meaningful dialogue with the public across the distinct stages of the policy-making process, in particular with vulnerable groups.[84]

3.68. Evaluate and rationalize tax expenditures. Brazil needs a legal standard to clearly define tax expenditures and estimate both their total cost (in terms of forgone revenue) and the budgetary resources necessary to compensate for them. Mechanisms for monitoring and evaluating tax benefits could help guide ministries in estimating the efficiency and effectiveness of tax expenditures, and in cutting down on special regimes and exemptions that generate distortions across economic sectors while costing an estimated 4% of GDP per year.[85] A broad reduction in tax expenditures could enhance equity and efficiency. The federal government has submitted to Congress a plan for a gradual reduction of tax benefits (PL 3203/2021) to 2% of GDP by 2029, but its approval and implementation will be opposed by interest groups.

3.69. Adopt a Medium-Term Budget Framework.[86] Brazil's budget laws provide for a multi-year plan (*Plano Plurianual* – PPA) that is meant to guide the annual budgets, but in practice, key elements for a sound medium-term fiscal planning are missing:

I. the budget process is fragmented and focused on the short term;
II. there are no medium-term fiscal goals;
III. planning and budgeting are not based on realistic assessments of medium-term financial constraints; and
IV. the management of fiscal risks is limited.

A Medium-Term Budget Framework (MTBF) could boost the credibility of fiscal policy, identifying fiscal risks related to expenditures and revenues and permitting timely action to comply with fiscal rules. An MTBF linked to evaluations of public policies could facilitate compliance with the spending rule introduced by Constitutional Amendment 95 of 2016, laying the groundwork for more rigorous and strategic budgetary decisions. Most OECD countries have successfully adopted MTBFs, and in the last two decades several developing countries (including in LAC) have

84 OECD (2022). Centre of Government Review of Brazil: Toward an Integrated and Structured Centre of Government.
85 Ministry of the Economy.
86 FMI (2019); Salto and Pellegrini (2020); Tollini (2018).

Establishing a Medium-Term Budget Framework

The authorities can strengthen medium-term fiscal sustainability and improve budget planning within and across levels of government by adopting modern budgetary procedures. Key objectives include:

I. incorporating an MTBF into the Multiyear Plan;
II. including multiyear expenditure estimates for new spending in the annual Law on Budgetary Guidelines (Lei de Diretrizes Orçamentárias, LDO) in accordance with the expenditure rule;
III. prohibiting in-year approvals of additional appropriations that would impact the primary balance, except during public emergencies; and
IV. limiting the accumulation of unpaid expenditure obligations.[1]

THE AUTHORITIES CAN ACHIEVE THESE GOALS BY:

Creating a medium-term macro-fiscal framework to be updated annually. This document would complement the LDO annex on fiscal targets and would be fully integrated into the budget-programming process.

Transforming the LDO annex on priorities and goals so that it is no longer a dispersed list of spending initiatives and short-term production goals unconnected to policy objectives. Instead, the annex should incorporate a medium-term perspective and align spending with government priorities.

Transforming the LDO annex on expenditures from a document on expenditure rigidity to an evaluation instrument designed to make spending more flexible.

Strengthening the spending limits communicated to sectoral agencies by defining them more precisely and transforming them into medium-term instruments covering a minimum period of three years, rather than a single year.

Producing an annually updated medium-term baseline forecast of expenditures and service delivery in accordance with existing policies. This forecast would allow policymakers to consider the fiscal cost of existing policies and the tradeoffs involved in resource allocation before making decisions about new policy initiatives.

Formally incorporating ex ante and ex post monitoring and evaluation procedures into budget programming, which would help identify opportunities to increase budget flexibility, among other advantages.

Strengthening preproposals and proposals by sectoral agencies and budget units by including the results of expenditure evaluations, enabling a more strategic medium-term reallocation of resources that reflects government priorities and budget constraints.

Introducing an annually updated MBTF that reconciles the restrictions and medium-term guidelines defined by the central government with the medium-term proposals of sectoral agencies and budget units.

Transforming the Budget Execution Board into a formal Fiscal Committee responsible for making key decisions within the executive branch regarding macro-fiscal management, budgetary controls, and public policy evaluations.

1 Moreno (2018) and Fortis, F.; Gasparini, C. & Rossi, J. (2017).

used them to reform the budget process.[87] As of 2008, more than two-thirds of countries worldwide had implemented MTBFs, albeit with a high degree of heterogeneity.[88] The available evidence suggests that countries with strong MTBFs tend to more effectively achieve their fiscal goals.[89] The Brazilian government would need to reform the current budget process to accommodate an MTBF encompassing macro-fiscal programming, planning, and monitoring and evaluation.

3.70. Reform the civil service. Such a reform would be an opportunity to recognize good civil servants and improve public services, while addressing critical issues such as pay policy in the public sector. Changes in how the civil service is managed can help improve strategic workforce planning, increase productivity, and identify the best-performing workers. The recently launched merit-based selection system for public managers, aligned with the practices adopted in OECD countries, including Chile, should be expanded (Programa Líderes que Transformam). The federal government would benefit from adopting a performance-based framework, to promote a results--oriented culture in public institutions. Moreover, civil service reform can generate substantial savings. IPEA modelled the fiscal impacts over the period 2020-2039 from measures that rationalize public personnel expenditure, such as:

I. a two-year freeze on salaries (Complementary Law 173/2020);
II. a slowdown in the replacement of retired public servants, supported by the digital transformation;
III. a reduction in the starting salaries of new hires; and
IV. longer intervals for career advancement.

Ten-year projections show that the aggregate fiscal impact would be sizable under each scenario, with potential savings of up to 11% of GDP.[90]

3.71. Revise the tax system. Reducing the number of taxes, sharing information between tax authorities, and adopting automatic, universal taxation systems with less room for exceptions and special regimes could enhance the efficiency of tax collection and encourage compliance. A simpler tax system would also improve the business environment and increase competitiveness, with positive effects on tax collection. The tax system should also become more progressive, relying more on direct taxes. The total tax burden in Brazil (33.8% of GDP) is comparable to the levels of OECD countries, but consumption taxes—rather than the more-progressive income taxes—have a greater weight. Consumption taxes in Brazil were equivalent to 14.2% of GDP in 2019, versus the OECD average of 10.9%; conversely, taxes on income and capital gains were equivalent to 7.4% of GDP, versus the OECD average of 11.5%.[91] As a result, poor households in Brazil contribute proportionally more to tax collection than wealthier ones.[92]

3.72. Embrace a more cooperative model of federalism. Better coordination among levels of government and safeguards to subnational autonomy are key to institutional progress. Creating a council of states to discuss shared fiscal issues would facilitate relationships with the federal government. Such council could be led by state governors (who may chair it on a rotating basis), hold regular meetings, and have a lean secretariat based in the federal capital. Overlaps in expenditure responsibilities need to be reduced, especially to improve the governance and funding of metropolitan areas[93] and encouraging less judicialization of budget questions.

3.73. Review inter-governmental transfers. Tax reform proposals need to take a federative approach, outlining a revision of inter-governmental transfers that accounts for their redistributive effects, and allows for adequate funding of regio-

87 IDB, 2009.
88 World Bank, 2013.
89 Ibid.
90 IPEA (2020).
91 OECD et al (2021). Revenue Statistics in Latin America and the Caribbean.
92 IPEA (2021); IPEA (2011).
93 Slack, 2017; Martinez-Vazquez and Muñoz.

nal development. Inter-governmental transfers must incentivize the efficient allocation of public resources, promote sound fiscal management, and stimulate local revenue mobilization. The FPE and FPM need reforms to fulfill their mission of reducing regional inequalities and vertical imbalances.

3.74. Enhance fiscal transparency. Fiscal reporting should be extended to all state-owned companies and public banks, to produce an overview of the fiscal performance of the entire public sector. Public balance sheets should fully reflect the market value of government infrastructure, underground assets, as well as the benefits and entitlements of all public officials. The key elements of fiscal policy and sources of fiscal risk (e.g., the performance of public banks) should be disclosed to the public in greater detail. The government can enhance transparency in the relationship between the central bank and the treasury, by separately reporting their transactions and balance sheets and clearly defining their policy objectives and fiscal outlays. Moreover, digital tools can help to better control public expenditure: according to the Federal Court of Accounts (TCU), the highest federal audit institution, the use of data analytics to oversee the public sector's payroll has already generated annual savings of nearly US$80 million since 2015.1. The use of digital tools could therefore by extended to the States' and Municipal Courts of Accounts, which oversee public expenditure at the subnational level. Finally, a continued focus on financial integrity and transparency standards—such as those recommended by FATF—will contribute to Brazil's financial strength and stability.

3.75. Reinforce the integrity of fiscal statistics. A permanent interinstitutional committee should be set up to harmonize classifications used in macroeconomic statistics, while macroeconomic data sets need periodic consistency checks. The major tax aggregates should be reconciled within and between fiscal reports, and transactions between the central bank and the treasury should be recorded following international statistical best practice. The national public procurement network's[94] technological platform should regularly identify, analyze, and disseminate good management practices, publicize research on public procurement, and certify public officials in procurement skills. Subnational governments should develop their own strategic plans for improving public procurement. Across levels of government, adopting innovative technologies can enhance the efficiency, effectiveness, and transparency of public procurement. Governments should promote public procurement focused on gender and race.

3.76. Enhance the fiscal risk management. The measures include

- **I.** improving the management of lawsuits and court settlements to avoid new precatorios;
- **II.** integrating the information flow between the Executive and Judiciary branches over the various fragmented judicial processes;
- **III.** modernizing the economic and financial modeling and assessment of fiscal risks; and
- **IV.** increasing transparency.

3.77. Improve the governance of State-Owned Enterprises. The Brazilian government directly owns 46 companies, with total assets of R$5.3 trillion (70% of GDP).[95] These state-owned enterprises (SOEs) are active across a wide range of sectors, from data processing and airport management to oil and gas, banking, and electricity. Their missions are not strictly profit-based and encompass socio-economic goals as well. In fact, certain SOEs operate at a loss, supported by periodic contributions from the federal government. Improvements in the efficiency of SOEs will not only benefit the government's financial position, but also enhance the provision of key services and goods, and help Brazil close its socioeconomic gaps. In the near future, meeting Brazil's public policy objectives will require management and governance reforms that also cover subnational SOEs.

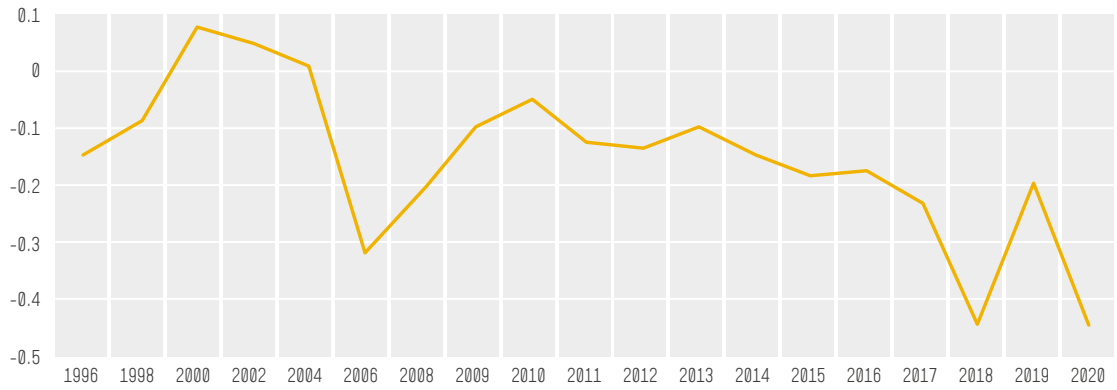
94 www.compraspublicasbrasil.gov.br.
95 Ministry of Economy (2021).

2.0 PILLAR

Adopting a new social agenda for inclusive growth

Recommendations on a new social agenda for inclusive growth fall under five policy areas: **(1) Focus public policies to reduce poverty and inequalities; (2) Prepare the youth for the future; (3) Build strong social protection and labor markets; (4) Improve the accessibility, quality, efficiency, and equity of health services; and (5) Make cities safe and inclusive.**

FIGURE 3.9. Government Effectiveness Index - Brazil



Source: World Bank

3.78. Brazil suffers from a shortage of trust in public institutions, and from ineffective government policy. On the World Bank's Government Effectiveness Index, Brazil is below the LAC median. Not only is the absolute level of effectiveness problematic, but it has been falling in recent years. Brazil faces problems with the perception of the quality of public services, the quality of the civil service and its independence from political pressure, the quality of policy formulation and implementation, and the credibility of the government's commitment to its own policies.

(1) Focus public polices for reducing poverty and inequalities

The discussion in chapter 1 showed that growth and the actual social policies were not able to consistently reduce social inequalities especially for women, afro-descendants and other vulnerable groups. The evidence indicates that the country should formulate public policies that effectively promote equity and target these groups. Besides enhance opportunities, targeting social policies would boost growth and enhance productivity growth.

3.79. Inequality affects productivity growth. There are important productivity gains from racially diverse teams and office environments. Diverse companies have 2.3 times higher cash flow per employee, and companies with high racial and ethnic diversity are 35% more likely to have financial returns above their respective national industry medians. As for gender, a World Bank study finds that promoting gender equality can make a substantial impact on long-run growth in Brazil, due to gains in women's time allocation and bargaining power. An "equal work, equal pay" policy, ensuring

that women earn a wage fully reflective of their marginal contribution to market production, could add up to 0.2 percentage points to the country's annual growth rate. Hsieh, Hurst, Jones and Klenow (2019) show that between 20% and 40% of productivity growth in the US over the past 50 years can be attributed to better talent allocation, with the fall of barriers (reduced hidden bias, decriminalization, and the introduction of affirmative action) to the participation of marginalized women and groups in some areas. The gains in allocative efficiency were accompanied by greater diversity, with no conflict between meritocracy and diversity. In a study of 31 Latin American countries, Woo-Mora (2022) shows that higher levels of income inequality between racial groups are associated with worse economic development outcomes.

3.80. Tapping the potential of female labor and entrepreneurship can boost productivity. Citigroup estimates that closing the gender gap could boost global GDP by US$2 trillion while creating up to 433 million jobs, and that the return from every US$1 invested in women-owned start-ups ($0.78) is more than twice as high as that generated by men-owned start-ups ($0.31).[1] Yet, venture capital invested in female-owned start-ups is a fraction of that flowing to male-owned start-ups. A study of start-up investments in Brazil across sectors shows systematic gaps in the number and average ticket value of investments between male- and female-owned companies. In the health sector, for instance, women-led start-ups were only involved in 25% of all deals, with an average ticket value eight times lower than that for men-led start-ups.[2]

3.81. There are important disparities between white and afro-descendant population. Black (*preto*) and brown (*pardo*) population in Brazil has higher illiteracy rates (9.1%) than the white population (3.9%) (IBGE, 2021). There was no significant difference in 2018 between the proportions of white and black or brown children ages 6 to 10 in primary education school (96.5% and 95.8%, respectively), however the rate of completion of secondary school for the black or brown population (61.8%), continues to be lower than the rate for the white population (76.8%), despite progress in recent years. Furthermore, the proportion of white youth ages 18 to 24 who were in or had completed higher education (36.1%) was almost double that observed among black or brown youth (18.3%). In turn, the dropout rate is 6 percentage points higher in Afro-Brazilian youth ages 18 to 24 than in their non-black non-indigenous peers. A larger gap can be found in formality rates as Afro-Brazilians are majority among informal workers. In turn, Afro-Brazilians earn about 60% of the income of the white population and are less likely to hold a leadership position in their workplaces. Underemployment rate among Afro-Brazilians (64%) is almost twice the rate among white workers (34%)[3].

3.82. Despite recent progress, being black, indigenous, or LGBT entails a greater likelihood of poverty. *Brancos* earn 66% more than other ethnic groups, while non-*brancos* are 60% more likely to lack access to basic sanitation, and more than twice as likely to be illiterate (OECD, 2020). *Preto* women are the group with the highest unemployment rate, at 20.1%, compared with 12.9% for both *preto* men and *branco* women, and 9.1% for *branco* men (UNDP, 2022). Discrimination also limits equal access to opportunities in education, work, and housing for LGBT people[4] (UNDP, 2021).[5]

3.83. Gender biases undervalue female human capital. Gender bias and prevailing social norms contribute to the gap in female labor force participation. For example, 14% of working-age women who are out of the labor force report domestic work and care responsibilities as their main reason for not seeking employment, versus just 1% of men. Underemployment is also higher among

1 Citigroup. *Women Entrepreneurs: Catalyzing Growth, Innovation, and Equality.* Citi GPS: Global Perspectives & Solutions, 2022
2 Female Founders Report 2021: Liderança feminina e empreendimentos no ecossistema brasileiro de inovação
3 IBGE. Síntese de Indicadores Sociais, 2021
4 There is a lack of information on the issue -- the first-time Brazil has researched sexual orientation was the National Health Survey (PNS), 2019.
5 There are some difficulties in the identification of indigenous and pardos even though the data is collected (please see https://brasil.mongabay.com/2021/06/nao-sou-pardo-sou-indigena-mobilizacao-indigena-para-autodeclaracao-no-censo-de-2022/ for reference).

working women (52%) than among working men (47%). The average salary of women in formal jobs is 20% lower than that of men, even though women have higher levels of education (12 years of schooling on average, versus 10 for men).[6] Among the employees of the largest Brazilian companies, women earn 23% less than men of comparable education, age, and experience.[7]

3.84. The Afro-Brazilian population lags on several indicators of education and employment. The illiteracy rate for the Afro-Brazilian population (*preto* or *pardo*) is higher than for the white population (*branco*) (9.1% versus 3.9%; IBGE, 2021). As of 2018, the share of children aged 6 to 10 enrolled in primary education was similar among *brancos* (96.5%) and *pretos* or *pardos* (95.8%), but the rate of completion of secondary school among *pretos* and *pardos* (61.8%) remained lower than among *brancos* (76.8%), despite progress in recent years. Furthermore, the proportion of *brancos* aged 18 to 24 who were attending or had completed higher education (36.1%) was almost double that of *pretos* and *pardos* (18.3%). In turn, the dropout rate among Afro-Brazilians aged 18 to 24 is 6 percentage points higher than among their non-black, non-indigenous peers. In the labor market, the formal employment rate of Afro-Brazilians is 12% lower than that of *brancos*, their underemployment rate is almost twice as high (64% versus 34%), their average income is about 60% lower, and they are less likely to hold leadership positions in their workplaces.[8]

3.85. Inequality is visible at all levels of education. In primary school, 23.4% of poor students and 29.4% of students in the North region have sufficient levels of literacy, compared with a national average of 45%. In primary school, 32.7% of Afro-Brazilian students, 29.7% of poor students, and 33.9% of students in the North region have sufficient levels of learning in mathematics, versus a national average of 51.5% Inequality persists at higher levels of education. At the end of middle school and high school, the national averages for mathematics were, respectively, 24.4% and 10.3%, versus 14.4% and 4.6% among Afro-Brazilian students, 13.5% and 4.9% among poor students, and 13.6% and 4.3% among students in the North region. Overall, *branco* students outperform Afro-Brazilian students by approximately 10% (SAEB, 2019).

3.86. Unconscious biases greatly contribute to inequality in education. According to the OECD's PISA study (2018), Brazil has the highest rate of perceived student discrimination in South American countries for which data was available, and is only behind Panama in Latin America. 80% of Brazilian students had teachers who reported a need for professional development to help them work in multilingual, multicultural environments—the highest percentage among all countries evaluated by PISA. Empirical evidence suggests that teachers have negative biases toward Afro-Brazilian students when assigning grades in mathematics (Botelho, Madeira, & Rangel, 2015), and that textbooks often display gender and racial biases (World Bank, forthcoming).[9] Stereotypes and biases also contribute to gender differences in STEM interest and academic outcomes (Master and Meltzoff, 2020).

3.87. Structural inequalities prevent vulnerable groups from accessing good jobs. Certain vulnerable groups such as women, the poor, and the young are at a disadvantage in the labor market. Women have a higher school attendance rate than men, but may lack specific skills that the job market demands. In addition, women have traditionally been the primary providers of family and domestic care in Brazil: on average, they dedicate 18.1 hours per week to housework, almost twice as long as men (10.5 hours). These factors contribute to a lower employment rate (45.3%, versus 65.7% for men), and female wages equivalent to 76% of men's wages. Afro-Brazilians, on the other hand, face structural

6 IDB. SCL Data Indicators calculated from Pesquisa Nacional por Amostras de Domicílio Contínua PNADC 2020
7 Lins de Oliveira, C. & Morrison, J. *Raça e Gênero nas Grandes Empresas: Um perfil da força de trabalho do brasil*. Nota técnica – BID, 2021
8 IBGE. Síntese de Indicadores Sociais, 2021
9 This issue is not unique to Brazil. A review of textbooks in Chile identified greater prominence of male figures and stereotyped gender roles. Specifically, male figures appear in leadership roles, take risks, and display self-sufficiency or ambition, while female figures focus on caregiving roles in private contexts, and are not involved in politics or science (Covacevich, 2014).

inequalities since childhood and through their working lives.[10] For example, an analysis of the 2,000 largest companies in Brazil revealed that *branco* men filled 61% of director-level roles, versus 11% for Afro-descendant men, and less than 5% for Afro-descendant women. Moreover, *branco* employees filled almost 80% of management positions, even though Afro-descendants made up 53% of the total workforce.[11] Finally, young people have a typically a fragile status in the labor market. Lack of experience and skills is a barrier for the young, who spend more time searching for jobs than older jobseekers (Cunningham, 2016). Moreover, young people who entered the job market during the economic crises of recent years can suffer their impact for decades.

Policy recommendations

3.88. Promote universal access to high-quality preschool education. This strategy can prevent the development of skills gaps in early years, particularly among children from disadvantaged backgrounds. A recent study (Friedman-Krauss and Barnett, 2020) in two US cities (Boston, Massachusetts, and Tulsa, Oklahoma) found that when black and white children had universal access to high-quality preschool with highly trained teachers, low student-teacher ratios, and well-equipped indoor and outdoor facilities, racial gaps in reading at entry to kindergarten were virtually eliminated, and gaps in mathematics were cut in half.

3.89. Address the educational needs of minority groups. Brazil has a sizable rural, indigenous, and *quilombola*[12] population, but the education system often fails to offer specific programs for it. According to the 2021 Education Yearbook, 4,426 Brazilian municipalities reported being home to students who lived in rural areas, but only 2,570 had specific educational practices and materials for them. Similarly, indigenous students were present in 420 municipalities, but only 279 had specific programs for them; while *quilombola* students were present in 658 municipalities, of which 484 had targeted educational policies. The lack of targeted programs and materials creates a disconnect with the needs of minority students, fostering disengagement, underperformance, and potential dropout.

3.90. Prevent unconscious biases to reduce racial inequality. This requires:

I. conducting more research into the biases prevalent in Brazil;
II. updating teacher training programs, highlighting common biases and how to avoid them; and
III. updating textbooks and academic materials, which shape the perceptions and expectations of both teachers and students.

3.91. Reinforce cognitive and socio-emotional and technical skills. Strengthening socio-emotional skills increases high-school graduation rates and other important outcomes (Jackson et al., 2020). Some examples of effective practices, such as the school-based group counseling program 'Becoming a Man' developed in the US, focus on emotional support to black youth to maximize their engagement and opportunities, while minimizing potential conflict with authority figures.

3.92. Develop training job programs. Apprenticeship programs for Afro-descendant youth may promote job placement. Youth employment rates have fallen more sharply than those of older age groups (ILO, 2020), while Afro-descendants experience higher unemployment rates overall (World Bank, 2018). An apprenticeship program that targeted Afro-Uruguayans may serve as a useful model: participating in it increased access to formal jobs by 5% on average one year after completion, with stronger effects among the most vulnerable youth (MIDES, 2016). Training programs to reduce discriminatory behavior against Afro-descendants and other traditionally marginalized groups are becoming more common in both the private and public sectors, but evidence of their effectiveness is still lacking. On

10 Instituto Brasileiro de Geografia e Estatística (IBGE) - PNAD Contínua
11 Lins de Oliveira, C. & Morrison, J. *Raça e Gênero nas Grandes Empresas: Um perfil da força de trabalho do brasil*. Nota técnica – BID, 2021
12 This term refers to Afro-Brazilian residents of *quilombo* settlements, first established by escaped slaves.

Improving Affirmative Action in Brazil's Higher Education System

Several studies of Brazil's higher education quota system have shown significant improvements in educational and labor-market outcomes among *preto* and *pardo* students. Studies of specific universities have found that the policy has had a positive impact on college completion and earnings, particularly among male beneficiaries.[1] Despite public concerns that students entering universities would not be able to compete with other students, Campos et al. (2016) found that there is no statistical difference between dropout rates among students admitted through the quota system and those accepted from the general pool of applicants.

Affirmative action has helped expand access to colleges and universities. From 2000 to 2010, higher education enrollment rates among *pretos* and *pardos* increased by 273%.[2] In 2012, Brazil's flagship national affirmative action policy was signed into law: Lei nº 12.711 reserves 50 percent of federal university seats for students from the nation's public high schools and requires that these spots be filled in a manner that reflects the local racial and ethnic composition of the state.[3] Brazil has the most extensive university-level affirmative action program in Latin America, and all 128 federal public universities have formal affirmative action programs.[4]

The available evidence suggests that students admitted through affirmative action programs have enjoyed considerable academic success. A study by the Universidade de Campinas (UNICAMP) reported that students admitted through affirmative action outperformed students from higher socioeconomic and educational backgrounds due to "educational resilience."[5] Moreover, affirmative-action students scored 87% higher on an educational performance index than their general-admission counterparts. At the Universidade Federal da Bahia, students admitted through the quota system performed no differently from other students on their entrance exams across most fields, and in some, such as law, they outperformed general-admissions students.[6] Similar results have been found at a wide range of universities, including the Universidade de Brasilia,[7] the Universidade Estadual do Norte Fluminense,[8] the Universidade Estadual do Rio de Janeiro,[9] and the Universidade Federal do Espirito Santo.[10]

Most *pretos* and *pardos* are first-generation college students, and information asymmetries may limit their awareness of educational opportunities and subsequent career paths. Better reporting by the Ministry of Education's Programa Universidade para Todos (ProUni) could ease these constraints. For example, requiring individual ProUni universities to publicly report racially disaggregated job-placement statistics by field of study would help disadvantaged students make more informed decisions about their choice of university and field of study. An interactive digital platform would be the most effective format in which to communicate this information to its target audience.

A more complete understanding of these programs is essential to further refine and expand affirmative action. For example, studies have found that Brazil's public universities are an important driver both of social mobility and gender equity among *pretos* and *pardos*.[11] However, because these studies have examined dynamics within specific federal universities and found different gender patterns in long-run earnings, a broader analysis of the labor-market effects of affirmative action will be necessary to identify the drivers of gender inequality across fields.

1 Francis and Tannuri-Pianto (2012; 2018)
2 Census 2000 and 2010.
3 A public sector complement to this law was signed in 2014, Lei nº 12.990, placing a 20 percent quota on federal positions requiring civil service exams (*concursos públicos*).
4 http://www.seppir.gov.br/central-de-conteudos/noticias/2016/03-marco/em-3-anos-150-mil-negros-ingressaram-em-universidades-por-meio-de--cotas. https://g1.globo.com/bahia/noticia/sancionada-ha-cinco-anos-lei-federal-de-cotas-muda-a-cara-do-ensino-superior-era-muito-limitado.ghtml
5 Tanya Hernandez, 2013– https://www.americasquarterly.org/affirmative-action-in-the-americas
6 Teles dos Santos and Mascarenhas Queiroz, 2016.
7 Velloso, J., & Cardoso, C. B. (2011). Five years of quotas: the probability of enrolling blacks at the University of Brasília. Brazilian Journal of Pedagogical Studies, v. 92, n. 231, 221-245.
8 Shirlena Campos de Souza Amaral, Marcelo Pereira de Mello, Cotas para Negros e Carentes na Educação Pública Superior: Analise do Caso UENF, de 2004 a 2010, , em InterScience Place v. 1, n. 22 (2012).
9 Machado, Elielma Ayres. Ação afirmativa, reserva de vagas e cotas na Universidade do Estado do Rio de Janeiro (2002-2012). Coleção Estudos Afirmativos, v.2, Rio de Janeiro, FLACSO, 2013; and Peria, Michele. Ação afirmativa: um estudo sobre a reserva de vagas para negros nas universidades públicas brasileiras. O caso do Estado do Rio de Janeiro. Dissertação de Mestrado. 2004
10 Furtado, W. (2011) The practice of inclusion in the university: representations from professors and students. Ph.D. Thesis, FEESP.
11 Duryea et al., 2019

the other hand, empirical evidence shows that work training and courses for the unemployed have promoted paid female work in LAC (Bando, 2019), and raised the female employment rate in Peru, Chile, Argentina, and Colombia (Valdivia 2015; Kaplan et al. 2015; Aedo and Nuñez 2004; Ñopo et al. 2007; Gonzalez-Velosa et al. 2012; Urzúa and Puentes 2010).

3.93. Build affordable childcare and eldercare support to increase female participation in the labor force. Programs focusing on affordable care services have had a positive impact on female labor force participation and number of hours worked by young mothers. An IDB-financed public childcare program in Rio de Janeiro in 2008 led to a 27% increase in mothers' employment, while finding that direct transfers to mothers via vouchers were more cost-effective than the public provision of childcare.[13]

3.94. Incentivize the private sector to boost female participation in the workforce and reduce discrimination towards minority groups. The private sector could play a key role, partnering with academia to update job specifications and skills demanded so to better reflect labor market needs, and encouraging female participation in STEM programs, where Brazilian women remain underrepresented.

(2) Prepare the youth for the future

Brazil needs improvement in how it forms the human capital of its youth, to foster thoughtful, productive, and engaged citizens. The development and acquisition of multidimensional skills and capabilities, which can occur at multiple times in life, are key to a more developed and inclusive country.[14]

EARLY CHILDHOOD DEVELOPMENT (ECD)

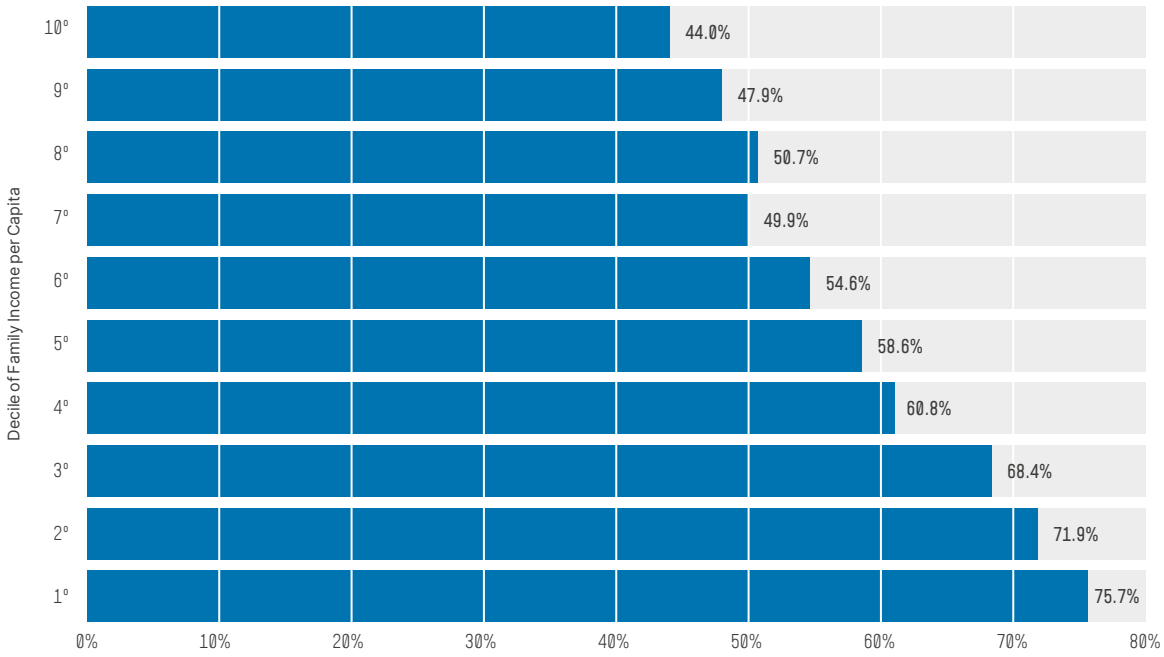
3.95. Early Childhood Development: A persistent effect in the life. Several studies have shown the importance of early childhood development in a person's life, with positive effects that range from better grades in school and higher probability of completing high school, to lower probability of unemployment and higher average monthly income in adulthood (Heckman et al., 2010; Heckman et al. 2013). There is also evidence of effects on health, including lower blood pressure and reduced chances of hospitalization more than 20 years after early childhood interventions (Conti et al., 2016). Conversely, Cunha et al. (2006) show that inequalities experienced in early childhood tend to persist throughout life.

3.96. Infant and maternal health have vastly improved over the last 30 years, but significant socio-economic disparities remain. Brazil has experienced significant reductions in child mortality (from 47.1 deaths per 1,000 live births in 1990, to 12.2 in 2020) and maternal mortality (from 143 deaths per 100,000 live births in 1990, to 58 in 2019).[15] In addition, the national immunization program, *Programa Nacional de Imunização* (PNI), achieved more than 95% coverage for essential vaccines in 2003,[16] a rate comparable to high-income countries. However, infant mortality rates vary widely: from 7.7 deaths per 1,000 live births among children of mothers with more than 12 years of schooling, to 101.9 (almost 13 times as many) among children of mothers with no education. Inequalities begin during gestation: 72% of mothers have at least seven prenatal care appointments, but only 38% of mothers with no education have any appointment at all (FGV, 2019).

3.97. The number of children attending childcare has more than doubled since 2007, but supply is insufficient, and quality is low. Pre-pandemic data showed that more than one in four children under the age of three attended a childcare center, but demand is not fully covered, and access is unequal across income levels, races, and regions (Cruz et al, 2022; FGV, 2022). Figure 3.10 shows major disparities in access to childcare by income: 75.7% of children under the age of four in the lowest (first)

13 Mateo Diaz, M. & Rodriguez-Chamussy, L. *Childcare and women's labor participation: evidence for Latin America and the Caribbean*. Technical Note – IDB, 2013
14 Cunha and Heckman 2007, Cunha et al. 2010.
15 Coordenação-Geral de Informações e Análises, Ministério da Saúde. http://svs.aids.gov.br/dantps/acesso-a-informacao/acoes-e-programas/busca-ativa/indicadores-de-saude/mortalidade/. In 2020, the Maternal Mortality Ratio reversed a downward trend and reached 74.7.
16 Brasil Ministério da Saúde. Programa Nacional de Imunizações - 30 anos/Ministério da Saúde, Secretaria de Vigilância em Saúde – Brasília 2003. https://bvsms.saude.gov.br/bvs/publicacoes/livro_30_anos_pni.pdf (accessed January 10, 2021).

↓ **FIGURE 3.10.** Proportion of children between 0 and 3 years old that do not have access to childcare by income



Source: PNADC/IBGE

decile of the income distribution did not attend preschool in 2019, versus 44% of those in the highest (10th) decile (FGV, 2022). 36.2% of *branco* children under the age of four attend daycare, versus 29.8% of *preto* or *pardo* children. Lack of vacancies near the family residence is the main reported reason for not attending daycare. Although the supply of childcare centers has expanded in every region, the North and Center-West regions still have, respectively, only 3.1 and 3 centers for per 1,000 children. Finally, the quality of child-adult classroom interactions in childcare, as measured by the CLASS instrument, is very low (Bartholo et al, 2022; Cruz-Aguayo et al 2016).

3.98. Programs to support child development at home have expanded but maintaining quality at scale is a challenge. The federal program *Programa Criança Feliz* (PCF) has become the world's most extensive home-visiting program. In its early years, PCF expanded coverage rapidly and faced quality challenges, but home visits were found to be effective at improving parenting practices and home environments, obtaining long-term results for children such as better school performance, behavior, and salary (Gertler et al, 2014). However, the high cost of home-visiting programs entails challenges in scaling them while maintaining quality, consistency, and effective supervision; for example, the PCF was meant to carry out 24 visits per family per year, but only achieved around 10. Blended approaches, such as those evaluated by the IDB in Boa Vista, Brazil (Brentani, et al 2022) and other countries during the pandemic, have shown promising results.

3.99. Brazil has been a pioneer of conditional cash transfer programs for families with children. The social protection program *Auxilio Brasil* (and the former Programa Bolsa Família) have sought to reduce poverty by providing a minimum level of income to low-income families. It is important to mention that the control of students' presence at schools must continue to be monitored to receive the benefit. During school closure, the control of that variable was weakened and now must be enforced. In addition, the *Programa Brasil Carinhoso* (PBC2, later replaced by the *Auxílio Criança Cidadã*) provided income as well as support on various aspects of child develo-

pment, such as education and health. According to official data, the PBC2 program has reached at least 2.8 million children. Yet, there is a lack of consistent evidence on child development outcomes to help assess and inform public policies.

Policy recommendations

3.100. Expand childcare coverage and improve its quality, through enhanced supervision and training of caregivers and better infrastructure and equipment. Relevant measures include improving the quality of interactions to foster child development and investing in teacher/caregiver training programs and supervision protocols.

3.101. Enhance the PCF. It is important to validate the approaches and materials used by home-visitors, and how they adjust to different socio-cultural contexts. Various aspects of child visits (e.g., frequency, use of technology, emphasis on group or individual visits) could be revisited drawing on lessons learned from the pandemic. The PCF may consider strategies to train and retain visitors, while it is essential to strengthen the supervision, monitoring, and evaluation of the program. Finally, greater efficiency calls for better information systems and coordination across government departments.

3.102. Improve the design and implementation of cash transfer programs, to maximize their impact on young children. Experience from the LAC region shows that conditional cash transfers improve health, cognitive, and language development levels in children in the short term, and even more so when they reach the poorest households (Lopez Boo and Creamer, 2019). However, recent evidence from the US (Noble et al., 2021) shows that adjusting the quantum of transfers or removing conditions might be as effective to attain better child development outcomes, while lessening the burden of monitoring. These options—including changes to the value, coverage, and conditions of cash transfer programs—are worth exploring, especially considering fiscal constraints after the pandemic.

EDUCATION

3.103. Brazil has expanded access to education. Since the enactment of the 1988 Constitution, Brazil has increased its investment in education as a percentage of GDP. Access to school has improved significantly at all levels: daycare (DC), preschool (PS), elementary school (ES), middle school (MS), and high school (HS). The enrollment rate among children between the ages of 6 and 14 has reached 99.4% (Education Yearbook, 2021).

3.104. Enrollment rates have still room for growth. Enrollment rates for DC (37.0%) and PS (94.1%) remain below the National Education Plan's (PNE) targets (50% and 100%, respectively, by 2024). Access is also unequal across regions: in the North, enrollment rates reach 18.7% for DC and 88.2% for PS, versus 44.0% and 95.2% in the Southeast. Moreover, as of 2020, only 12.9% of students were enrolled in full-time education, which was offered by 29.5% of schools (versus 2024 targets of 25% and 50%, respectively). Raising the rates of children in DC, PS, and full-time education requires not only more seats available, but also recreational, sanitary, and food facilities.

3.105. Supporting infrastructure is poor. Despite recent progress, many schools lack basic material resources and infrastructure. In 2017, between 3% and 6% of schools lacked water, power, or sewage facilities, and over 65% lacked a canteen. Over 10% of schools reported that their ceilings, floors, doors, classrooms, and bathrooms were in poor condition. Moreover, green spaces and playgrounds are only available in 25% of schools. The quality of school infrastructure is worst in the North and Northeast, and generally poorer in public than in private schools. [17]

3.106. The quality of education is low, and inequality is high. The quality of MS and HS teaching is poor, and Brazil was among the worst performers in the 2018 PISA test. On a scale of one to ten, approximately 43% of Brazilian students were below level two (considered the level of minimum

17 OECD (2021b), *Education in Brazil: An International Perspective*, OECD Publishing, Paris, https://doi.org/10.1787/60a667f7-en.

proficiency) in all fields surveyed—reading, mathematics, and sciences—compared with an average of 13.4% in OECD countries. On reading, Brazil ranked 57th among the 77 countries and regions for which data was available. In mathematics and sciences, the country was ranked 70th and 64th respectively, out of 78 nations. Furthermore, inequality is glaring: poorer, Afro-Brazilian, and rural students, as well as students in the North region, underperform significantly.

3.107. The pandemic has exacerbated pre-existing challenges. After most schools closed for almost a year, learning attainments will suffer, especially among the most vulnerable students. In Sao Paulo in 2020, students learned an estimated 28% of what they would learn in a typical year, and the high-school dropout rate soared by 247% (Lichand et al., 2021). The economic damage from disruption to education may reach R$700billion, or approximately US$140 billion (Paes de Barros, R., 2020).

3.108. The uptake of technical and professional courses (TPC) is inadequate. Although TPC enrollments have increased in recent years, they remain low relative to other countries. The proportion of students attending technical vocational education at secondary level, relative to the number of students enrolled in general high school, is only 11% in Brazil, versus 47% in the EU, 42% in the OECD, 27% in Colombia, and 16% in Chile.

3.109. Brazil has recently launched two major reforms, but states and municipalities are not ready to implement them. The new national curriculum (BNCC) will include 21st-century skills, such as socio-emotional and digital skills. Meanwhile, the HS reform will make the HS curriculum more flexible, allowing students to choose between academic or technical streams. Both reforms also aim to close the gap between schools and the labor market and are so structural that most teaching practices will need updating. It is unclear how states will make the necessary adjustments, especially with regard to hiring teachers and adapting educational content. As of 2022, no state has completed all five actions considered essential to implementing the HS reform. On the contrary, about 60% of states have not completed any of them (Portela, 2022).

3.110. Monitoring is still a challenge. The federal government conducts no formal monitoring of DC and PS, hampering quality evaluation. Since 2011, the share of students who achieved adequate learning in ES has increased by around 50% (from 40.0% to 61.1% in Portuguese, and from 36.3% to 51.5% in mathematics). As of 2016, the share of students in the 3rd grade with sufficient literacy was 45.0%, which will likely cause learning challenges in the future. In MS, there was significant improvement in the rates of students with adequate learning: from 27.0% to 41.4% in Portuguese, and from 16.9% to 24.4% in mathematics. In HS, rates for Portuguese moved from 29.2% to 37.1%, and in mathematics they remained at 10.3%. Only 3% of teachers had to take a test, and 43% had their performance evaluated for promotion (SAEB).

3.111. Dropout and repetition are major issues. In 2020, only 69.4% of people aged 19 had completed HS, and the rate was even lower among Afro-Brazilians (61.4%), the poor (58.8%), and those enrolled in the North region (58.8%) (Education Yearbook, 2021).[18] The main causes for repetition and dropout are:[19]

I. academic hardship,
II. need to work,
III. lack of support from relatives,
IV. pregnancy, and
V. lack of interest in finishing school.[20]

3.112. Poor inter-governmental coordination thwarts the efficiency of public education spending. Brazil's National Basic Education Guidelines (*Lei de Diretrizes e Bases da Educação Básica,* LDBs) mandate that municipalities have sole responsi-

18 This year was not an exception. The results are similar over the years.
19 https://periodicos.ifsul.edu.br/index.php/educarmais/article/view/1823
20 According to a 2010 study, Brazilian students expressed the belief that if HS education increased their job opportunities, they would have a sufficient incentive to graduate (Fernandes, 2010). This is consistent with evidence that access to technical education can increase motivation and engagement (e.g., Shernoff et al., 2003; Carbonaro, 2005); reduce dropout rates (Kemple and Willner, 2008; Kemple and Snipes, 2000; Hall, 2012); and increase the probability of graduation (e.g., Polidano and Tabasso, 2014; Dougherty, 2018). Additionally, internships and training with potential employers can improve chances of finding a job (Fazio et al., 2016; Novella and Perez-Davila, 2017) and, therefore, increase the likelihood of graduation.

bility for delivering early childhood services, the states for secondary education, and the federal government for tertiary education. In practice, however, there are significant overlaps. In São Paulo, for instance, the state runs daycare facilities and public universities, and many municipalities provide secondary and tertiary education. Primary education is the only level for which the LDBs prescribe shared delivery between municipalities and states, which has resulted in a multitude of arrangements across the country. In most cases, the overlaps encourage state and municipal schools to compete for student enrollment, undermining the efficiency of public education spending.

3.113. Recent efforts to direct more resources to education and foster equality may fall short of the intended results, due to inadequate institutional capacity among the poorer states and municipalities. Changes to the functioning of the Basic Education Development Fund (FUNDEB) will:

I. raise the amounts that the federal government will transfer to poorer municipalities and states; and
II. require states and municipalities to perform specific tasks and achieve certain results to access additional resources.

As an example, states will have to pass a law allowing for part of their ICMS tax to be transferred to municipalities, based on the latter's performance in the National Basic Education Evaluation System (SAEB). Municipalities that perform better or improve the most will receive more resources, which is expected to increase their engagement.[21] However, poorer states and municipalities have the least institutional capacity to perform required tasks or achieve targets. In the absence of support for them, inequality will persist.

3.114. Schools struggle to attract, support, and motivate qualified teachers. Teaching is often deemed an unattractive career option, and the hiring process does not effectively select the best candidates. Only 5% of high school students report being interested in a teaching career, while undergraduate courses for teacher training admit many low performers: 83.1% of the undergraduates studying to become teachers had the lowest average scores in the standardized university admission exams. In addition, most undergraduate courses in teaching are offered by private institutions, and about one-third are unregulated distance-learning programs. Teacher recruiting procedures (*concursos*) are not designed to recognize differences in quality between undergraduate programs, and they fail to systematically recruit the best teachers.[22] Local governments do not offer newly hired teachers' supervision and training during their mandatory probationary periods, and on-the-job training is limited in scope and quality. Furthermore, career advancement is not meritocratic, and salary structures are rigid. Raises are limited and allocated on the basis of academic qualifications and years of experience, not classroom performance. A handful of states introduced merit-based payment programs, but most suspended them afterwards.

3.115. School staffing can be disconnected from actual needs. Expenditure decisions are not based on data, contributing to inefficiency in the management of the educational labor force. In private schools, teacher hiring is closely aligned with demand, but public-school systems have hired more teachers as enrollment figures declined. In addition, local governments struggle with teacher shortages in remote and disadvantaged schools. Finally, schools serving the most vulnerable students are more likely to have underpaid, inexperienced, temporary, and uncredentialed teachers, compared with schools that serve higher-income students.

Policy Recommendations

3.116. Use technology to expand and improve access to quality education: digitally transform education pedagogical practices and management systems. Online learning can extend school time, or make it possible to offer courses that would not otherwise be available in remote or sparsely populated regions.

21 This approach has been implemented in Ceará, the state that has been most successful at improving literacy rates in all its municipalities.
22 Elacqua et al., 2018.

3.117. Enhance student performance. Targeted measures may include:

I. in-person and online tutoring programs, to help students who struggle the most;
II. behavioral nudges to suggest activities for families and students; and
III. lowering barriers to staying in school, by promoting family support or providing financial assistance through conditional cash transfers and scholarships.

3.118. Implement the BNCC curriculum reform. The BNCC will better prepare students for an ever-changing labor market, and for building positive relationships with future colleagues. According to the 2018 PISA, 48% of students in Brazil reported that their schoolmates co-operated with each other (versus the OECD average of 62%) while 57% reported that they competed with each other (versus the OECD average of 50%). Moreover, Brazil was ranked below average on all the digital skills assessed.[23] Updating student skills requires a deep revision of educational systems and tools, such as instructional materials, teacher training, evaluation processes, laboratories, and equipment. Programs to develop 21st-century skills can also take place outside the classroom or in extra-hours activities (Mateo Diaz and Rucci, 2019). Blended and technological learning tools are gaining ground, but evidence of their effectiveness remains sparse.

3.119. Advance in the HS reform. The HS reform aims to make curricula more engaging and flexible, and to better connect students with professional opportunities. Students in the 10th grade (the first grade of HS, when students are typically between the ages of 15 and 16) will be able to choose one pathway among Mathematics, Languages, Natural Science, Human Science, and Professional Education. To allow for the additional time that certain pathways require, schools will have to offer at least five hours of classes per day, instead of four hours.[24] The implementation of the reform still faces a number of challenges:

I. lack of teachers for certain subjects, especially in remote or scarcely populated areas;
II. lack of laboratories, especially for technical education; and
III. schools located in remote or scarcely populated areas will not be able to offer all pathways.

Additionally, the curriculum update will only be successful if schools are effectively connected with labor markets (Busso et al, 2012). This curriculum reform, opens an opportunity to streamline socio-emotional and education skills for climate change in the new curriculum.

3.120. Enhance teaching effectiveness. The federal government should comprehensively reform teacher-management policies to recruit, support, and motivate the best candidates. Brazil's demographic transition will reduce the demand for new teachers, providing an opportunity for the federal government to create more rigorous undergraduate teaching programs (as has been the case in Chile, Colombia, and Ecuador). More meritocratic career paths, in which promotions do not rely chiefly on years of tenure and academic degrees, would make teaching more attractive to high-quality candidates. Local governments should also overhaul their recruitment and assignment processes to attract applicants well suited to the teaching profession, and to create incentives for teachers to work in hard-to-staff schools. Governments can take advantage of existing instruments to design cost-effective programs to support newly hired teachers.[25] Active teachers' salaries make up 71% of the public education budget, but these resources can be allocated in a more effective and equitable way.[26] 37% of prin-

23 Brazil's results on digital skills relative to the OECD average were as follows: 20.2% of students in Brazil have good task-oriented internet browsing skills (OECD average: 31.7%); students use digital devices in school activities for an average of 30.5 minutes per week (OECD average: 40.7 minutes per week); 41.9% of students in Brazil learned in school how to use keywords in online search engines (OECD average: 55.9%); 57.0% of students in Brazil learned in school how to compare web pages and decide what information is most relevant for schoolwork (OECD average: 62.6%); and 52.0% of students in Brazil learned in school how to decide whether to trust information from the internet (OECD average: 69.3%).

24 The federal government is also encouraging states to increase the share of students in full-time education, which requires more than seven hours a day in school. The Ministry of Education is providing states with additional resources for infrastructure upgrades, as well as additional transfers for each student enrolled in full-time education.

25 For example, the city of Manaus, in the state of Amazonas, provides mentoring and support to incoming teachers during their probationary period to improve their teaching skills. High-quality on-the-job training for tenured teachers, coupled with systematic teacher evaluation, also have the potential to improve teacher effectiveness.

26 IDB's experience in Ecuador and Peru shows that upgrades to online systems can improve allocation to hard-to-staff schools, and narrow the gap in teacher quality between poor and rich schools.

cipals reported having assigned their most-senior teachers to classrooms with better-performing students (SAEB), a trend that perpetuates inequalities. Student allocation can also be improved: only 61% of HS principals reported having enough information to analyze demand for new classrooms, and 50% of them reported adopting a first-come, first-served rule to allocate students (SAEB). Lack of control allows school principals to keep classes below their optimal capacity, increasing personnel costs. Furthermore, student transportation is not optimized to try and reduce the cost or time of student travel, especially in rural areas.

3.121. Improve the selection of school principals and monitoring practices. According to the 2021 Education Yearbook, 49% of school principals were appointed without a competitive selection process. Moreover, evaluation instruments and data are key to improving educational practices and processes, but they are not usually available. For example, the federal government does not offer evaluation tools for daycare, and only 23% of municipalities perform their own evaluation (SAEB). Only 45% of secretaries use their result at SAEB to define targets for the following year, and only 7% use them to reassign or dismiss school principals (SAEB). Data is poorly used, without adopting artificial intelligence tools or respecting citizens' privacy (Cabrol et al, 2020). Finally, there is little coordination between education departments and other social departments, hampering improvements in efficiency.

3.122. Mitigate the impact of the pandemic. The loss of learning and rise in inequality due to school closures call for action, notably:

I. remediation programs[27] and online tutoring[28] to help students who suffered the most;
II. emotional support for students and teachers returning to school;
III. early warning systems and behavioral nudges to increase engagement and prevent dropout (Lichand, 2021);
IV. financial support to keep students in school, at least until the academic and financial contexts improve (Pereira, Vitor; 2016); and
V. support to education departments to improve sanitary conditions in schools, so that students can safely return to the classroom.

3.123. Increase the use of technology to improve education management. New technologies can integrate information systems and build statistical capacity among local governments, enabling them to improve the efficiency and equity of education expenditures. Improve data collection, create an integrated intelligence platform, and foster a sector-wide culture of performance monitoring and expenditure evaluation.[29] Information technology can also enable states and municipalities to predict where new infrastructure will be most effective and to better attend to the needs of new teachers. Finally, distance-learning technologies can help the school system reach students in remote rural areas.

3.124. Improve the institutional capacity and processes of states and municipalities. Brazil should:

I. support education departments to identify potential process improvements, especially using the IDB's SIGED Framework and allowing for interoperability among social departments;
II. strengthen the innovation ecosystems, and support education departments to acquire innovation from external sources;
III. promote the use of responsible and effective artificial intelligence, to enhance efficiency without perpetuating biases;
IV. support governments to reform teacher recruitment and attract better candidates; and
V. encourage education departments to evaluate the performance of students and school staff, and to offer incentives to high-performing principals and teachers.

27 The most widespread such program is Teaching at the Right Level (TaRL), which has been implemented under various models with different impacts.
28 Online tutoring programs obtained important results in improving outcomes for the most vulnerable students (Almeyda, 2022).
29 Monitoring and analysis of data have helped the state of Pernambuco identify and manage inefficiencies in the school system (e.g., teacher absenteeism and underutilization), and reallocate resources to programs with a greater impact on learning.

3.125. Support private-sector participation to address key challenges. The operational experience in health PPPs and other modalities of private-sector service delivery could offer ideas to address the needs of the education system. Adequate infrastructure to support learning will be particularly important, as students return to school while the COVID-19 pandemic continues.[30]

(3) Build strong social protection and labor markets

Strong social protection and labor systems help people find jobs, become more productive, cope with shocks, and invest in the health and education of their children; at the same time, they support an aging population. Jobs are critical to reducing poverty and promoting prosperity. In a healthy labor market, people have the right skills to

TABLE 3.1. Social Protection Net in Brazil

Program	Formal Workers Only	Government Financed	Target
Bolsa-Familia (Auxilio Brasil)	No	Yes	Low Income
Bolsa Verde	No	Yes	
BPC	No	Yes	
Abono Salarial	Yes	Yes	
Salário-Familia	Yes	No	
Garantia-Safra	Yes	Yes	
Salário Mínimo	Yes	No	All workers
13 Salário	Yes	No	
Vale transporte	Yes	No	
Férias	Yes	No	
Seguro-Desemprego	Yes	Yes	
FGTS	Yes	No	
Licenca Maternidade e Paternidade	Yes	No	
Auxílio-Doença	Yes	Yes	
Auxílio-Acidente	Yes	Yes	

Source: Souza et. al. (2020)

30 OECD, 2021

secure good jobs, the right protection against risks arising from a volatile economy, and the right mechanisms to transition smoothly and safely from one job to another.

SOCIAL PROTECTION

3.126. The social protection system in Brazil is extensive, but fails to adequately cover informal workers. In recent decades, Brazil has created a social protection net to protect workers from economic fluctuations, alleviate poverty, and mitigate inequalities. However, several challenges remain. Most existing programs focus on formal workers: according to Souza et al. (2016), 75% of the public resources available for social protection programs in 2014 were limited to formal workers, although these only make up 45% of the employed workforce. Another problem is a lack of joint planning, whereby although each program in the protection network has a rationale in isolation, there are overlaps and gaps at the systemic level (Barros et al., 2021; Souza et al., 2020). While those with the highest incomes benefit from the protection network for formal workers, and the most-vulnerable families receive assistance from the government's income transfer programs, a third group is marginalized in terms of social protection: low-income workers who spend most of their productive lives in informality. Although these workers make an income that takes them above the poverty line, their key issue is its instability. Any fluctuation in the economy, including health crises, directly affects informal workers. Chapter 1 showed how this became apparent during the pandemic, with increases in poverty and inequality and the subsequent success of emergency aid (*auxilio emergencial*).

3.127. The budget for social programs has been shrinking. To reduce duplication and inefficiencies and improve the coverage and effectiveness of social assistance for the most vulnerable, in 2004 Brazil instituted the National Social Assistance Policy (PNAS), which established clear principles for social protection, defined its typologies, and assigned responsibilities to each level of government. The PNAS created the Single System of Social Assistance (*Sistema Único de Assistência Social,* SUAS), defining its service portfolio and the configuration of territorial networks. SUAS services are organized into:

I. Basic Social Protection, which is preventative in nature and delivered through the Social Assistance Reference Centers (CRAS); and
II. Special Social Protection, to remediate breaches of social rights, offered through the Specialized Reference Centers for Social Assistance (CREAS).

The SUAS network covers all municipalities in Brazil through 8,488 CRAS and 2,794 CREAS, reaching approximately 57 million people. One of the main functions of the CRAS is to coordinate beneficiary management in the Cadastro Único (CadU), the single registry of beneficiaries designed by the central government. In addition, the CRAS manages the enrollment of families into conditional cash transfer programs (Bolsa Familia (BF), and its replacement Auxilio Brasil since its introduction in 2021). However, the effectiveness of SUAS has been limited by institutional constraints, a lack of financing for service delivery, the absence of clear protocols and guidelines, and coordination challenges. The SUAS' annual budget has significantly reduced in recent years, from approximately US$570 million to US$175 million between 2019 and 2021.

3.128. Non-contributory transfers seek to provide a minimum income to people who do not participate in contributory benefit schemes. The main non-contributory programs are: Auxílio Brasil (AB), a conditional cash transfer program; Benefício de Prestação Continuada (BPC), a transfer benefiting those with disabilities or insufficient income from work or pensions, and who do not have other resources; and a rural pension, recently modified by the pension reform. Additionally, the SUAS—operated by subnational governments with partial funding from the federal government—offers various support services to poor households and individuals. To mitigate the shock from the pandemic, the federal government adopted emer-

gency responses including the expansion of AB coverage, and temporary transfers equal to about half the minimum wage.[31]

3.129. The pandemic has revealed the existence of "invisibles". In response to the social crisis resulting from the pandemic, in March 2020 the government designated 1.2 million additional families as beneficiaries of the BF program. Additionally, in April 2020 the government started implementing the Emergency Assistance (Auxilio Emergencial, AE) program for informal workers, the self-employed, and the unemployed. The AE was designed as a temporary program, granting R$600 per month per person (equivalent to 57.4% of the minimum wage, or three times the value of the average BF transfer) to up to two people in the same family. For families in which a woman was the sole breadwinner, the monthly value of the benefit was extended to R$1,200. The CadU, which included almost 28.5 million families (30% of the country's population) as of March 2020, was the main platform for identifying AE beneficiaries. However, additional digital mechanisms were developed so that families outside the CadU, and who declared that their income had been affected by the pandemic, could apply for AE. More than 68 million people benefited from AE (60% identified by the CadU, and the rest through digital tools), at a cost of more than US$52 billion. A large body of independent evaluations credits the AE with ensuring that the level of poverty did not worsen—or even declined—during 2020, and with particular success in protecting Afro-Brazilian women.[32]

3.130. The new parameters of the conditional cash transfer program Auxílio Brasil (AB), which replaced Bolsa Familia in 2021, may generate new distortions and increase fiscal pressure. The AB program is organized around two benefit types:

I. a set of three direct income-transfer benefits, called "financial benefits", focusing on families in extreme poverty and those with children under the age of three; and
II. six benefit mechanisms to "incentivize individual effort and productive emancipation."

AB sets a minimum value of R$400 for each financial benefit to families, so that the minimum AB transfer is around twice as large as the average BF transfer. In addition, raises to the poverty and extreme poverty lines may increase the number of beneficiary families from around 14.5 million to over 17 million. The AB budget is expected to jump by 174%, from R$35 billion (as in the 2021 BF budget) to R$96 billion in 2022, and to reach 1.1% of GDP.

3.131. The AB program introduces novel supplementary benefits, but some of them could be difficult to implement. Such benefits include the School Athletic Benefit, the Beginning Junior Scientist Scholarship, the Child Citizen Benefit, the Rural Productive Inclusion Benefit, and the Urban Productive Inclusion Benefit, which can be granted to members of families who receive the core AB benefits. The supplemental Child Citizen Benefit provides families with a voucher to cover private day-care costs; however, the modest value of the voucher, and a lack of established screening and supervision mechanisms, may increase the risk of engaging low-quality providers. The Rural Productive Inclusion Benefit includes a requirement for beneficiaries to offer food donations in return, which could however be unfeasible, due to insufficient surplus production among family farmers and to high costs from logistics, warehousing, and perishable losses.

3.132. Support is available for persons with disabilities, but major gaps remain. Approximately 16% of the Brazilian population has a disability (above the average of 13% in Latin America), and the percentage rises to about 25% among those aged over 60. People with disabilities face greater economic vulnerability due to fewer income-ge-

31 The average value of a BF transfer, before AB, was around R$220.

32 For example, Costa, E. e Acioli, M. (2021). "Estudo de avaliação do Programa de Auxílio Emergencial: Uma Análise sobre Focalização e eficácia a nível municipal". *Brazilian Journal of Developmen*t. Nassif-Pirez, L., Cardoso, L., y Matos de Oliveira, A. (2021). "Gender and race in the spotlight during the COVID-19 pandemic: the impact of the Emergency Benefit on poverty and extreme poverty in Brazil". Levy Economics Institute of Bard College Policy Note.

nerating opportunities and higher health and support costs in their households. Moreover, those with motor disabilities suffer from a limited supply of adapted infrastructure and transport; for example, according to the IBGE's 2017 MUNIC survey, only 11.7% of the municipalities assessed had a fully adapted bus fleet. The main support program for people with disabilities living in poverty in Brazil is the BPC, which reaches 2.2 million people with a monthly monetary transfer equal to one minimum wage. It is estimated that almost 1 million people await a medical examination to determine their eligibility for this benefit. The BPC, which also grants a non-contributory pension to older adults living in poverty, has a budget corresponding to 0.8% of GDP. In addition, people with disabilities suffer from several challenges related to education, income and labor force participation.

3.133. **Brazil has a rapidly aging society.** As of 2020, 10.5% of those aged over 65 in Brazil were estimated to be in a situation of functional dependency—i.e., in which they struggle to carry out basic activities of daily life (Aranco, Ibarrarán, and Stampini, 2022). Based on a conservative assumption in which the dependency rate by age group remains constant over time, the incidence of dependency is expected to increase to 12.4% in 2050. This implies that the number of dependent older adults will triple in the next three decades, going from 2.1 million to 6.4 million people. The main reason for this accelerated growth is the increase in the longevity of the population and, in particular, the rise in the proportion of people aged 80 and over. Between 2020 and 2050, the percentage of adults aged 65 and over will increase from 9.6% to 22.7%, while that of adults aged 80 and over will go from 2% to 7%. The supply of services for the elderly varies across the country but is often limited in both coverage and quality.

Policy Recommendations

3.134. **Expand and improve the existing structure of social protection.** It is necessary to improve the focus of social protection programs, enhance their coordination, ensuring protection for workers while fostering productivity (which has been stagnant for years), and expanding protection for informal workers. These improvements require four key steps:

I. an effective use of municipal quotas, based on estimates of families in extreme poverty;
II. more frequent re-registration, and intensification of home visits to achieve better quality of CadU information;
III. use of all CadU information, and not just declared income, to assess vulnerability; and
IV. greater engagement on the part of Municipal Councils of Social Assistance (CMAS) (Barros et al., 2021).

3.135. **Improve data quality to better identify the vulnerable population.** Data on formal workers, available from the Annual Report of Social Information (*Relação Annual de Informações Sociais*, RAIS), is updated annually, but the same is not true for CadU data. Camargo et al. (2022) estimate that as of 2019, the CadU featured up-to-date information for slightly over half of those registered. The AE program boosted registration, but how this data will be updated and used to improve the focus of the program remains to be seen. The pandemic revealed the need to expand the protection network, reaching groups not covered by worker protection programs—especially informal workers.

3.136. **Encourage the debate on social protection for informal workers.** The current debate focuses on two main proposals: bringing informal workers into formality, placing them in the same protection network as formal workers; or develop dedicated assistance programs, such as AE. Botelho et al. (2020) propose the creation of a so-called Social Responsibility program, while other approaches call for a protection program for individual microentrepreneurs or a universal basic income.

3.137. **Review and consolidate adjustments to the conditional cash transfer program AB.** Studies on the implementation, modeling, and impact of the

new transfer scheme could provide a useful basis for design and operational modifications. Many subnational governments also maintain complementary conditional cash transfer programs, whose features and applicability must be reassessed in light of the new federal transfer system. Finally, a stable financing source for AB will need to be determined, considering the current fiscal situation and expenditure ceiling.

3.138. Enhance the effectiveness of the SUAS. The SUAS would benefit from a research agenda to guide necessary reforms that go beyond those regarding the CadU, with a particular focus on the human resources available to the CRAS and CREAS services. Improving quality of service also requires evidence-based protocols and guidelines, as well as incentives to greater coordination, especially between health, educational, and labor services. The adoption of information systems for monitoring, and the rigorous use of data for the follow-up and evaluation of social policies, can lead to a more-efficient use of financial resources in an increasingly restricted fiscal context.

3.139. Prioritize the social inclusion and autonomy of people with disabilities (PWDs). A national certification system could ensure the consistency of eligibility criteria and the accessibility of programs that promote the autonomy of PWDs, from enrollment to graduation. For those who are functionally dependent, access to qualified care services should be encouraged as an alternative or complement to unpaid family care, which generally falls on the women of the household. Finally, more research is needed to expand the currently limited knowledge about the situation of PWDs in Brazil, the existing services for them, and the potential cost of extending their reach.

3.140. Develop a comprehensive long-term care policy for the functionally dependent. Most people who are functionally dependent and in need of long-term care are elderly, live in the community, and are supported by informal caregivers (family or friends, mostly women). Maintaining their quality of life requires access to long-term, comprehensive care from interdisciplinary teams, with the aim of reversing or slowing down the pace of loss of functional capacity, ensuring dignity and well-being, and providing guidance and support to caregivers. However, such services are scarce in Brazil, imposing a major burden on caregiving families and limiting the chances of healthy aging for those with reduced functional capacity. A systematic, in-depth review of day-services models available in Brazil and internationally would be a first step toward designing a better socio-sanitary (i.e. shared between health and social assistance) community-based service for elderly people in a situation of functional dependence.

MIGRATION

3.141. The inflow of Venezuelan refugees and migrants into Brazil is a humanitarian crisis that further presents development challenges. Between 2013 and 2019, over 260,000 Venezuelans applied for refugee or residency status in Brazil, with the vast majority entering through Roraima.[33] As of May 5th, 2022, there were approximately 345.000 Venezuelan migrants settled in Brazil.[34] Overall analysis suggests that although legal constraints are minimal and work permits are relatively easy to obtain, Venezuelan refugees and migrants in Brazil face challenges integrating into the education system, social protection programs, and the formal labor market. They are 53 percent less likely to be in school, 64 percent less likely to be formally employed, and 30 percent less likely to access social assistance programs as compared to their native counterparts.[35] Venezuelan students are more likely to be enrolled in grades lower than their Brazilian age cohorts. They are also more

33 *The Economy of Roraima and the Venezuelan Flow* (2020), UNHCR.
34 https://www.r4v.info/es/document/r4v-america-latina-y-el-caribe-refugiados-y-migrantes-venezolanos-en-la-region-mayo-2022.
35 *Integration of Venezuelan Refugees and Migrants in Brazil* (2021), World Bank and UNHCR.

likely to attend overcrowded schools. Working-age Venezuelans face professional downgrading and are more likely to be in short-term jobs characterized by lower wages and longer hours and the situation is even worse for women.

Policy Recommendations

3.142. Adopt strategies to improve socioeconomic integration of migrants. The strategies include the improvement in school capacity, the provision of language training to migrants arriving in the country and specially at schools, the facilitation on the accreditation of Venezuelan education degrees or the certification of competencies, the strengthening in labor market insertion policies, including job intermediation, training, raising awareness of the legal rights, and providing assistance with documentation and Supporting voluntary relocation programs to places with favorable employment opportunities and labor force scarcity.

LABOR MARKETS

3.143. The state of the Brazilian labor market has been deteriorating since 2015. An economic slowdown worsened unemployment, which rose from an average of 7.2% between 2012 and 2014, to 13.9% in 2017.[36] Improvements in formalization also came to a halt. From around 56% in the 1990s, the informality rate plunged below 44% in 2014 but then started growing again, exceeding 47% in 2019 (Veloso, Peruchetti and Barbosa-Filho, 2022). Overall, immediately before the COVID pandemic, the Brazilian labor market was already showing signs of stress, with growing numbers of unemployed and informal workers.

3.144. The pandemic has added major challenges, with about 11.3 million jobs lost and more people leaving the workforce. The pandemic has reduced the number of people employed in the formal sector by 4.2 million, and in the informal sector by 7.1 million. The social-distancing measures made necessary by the health crisis entailed that the informal sector was the most affected and could not function as a cushion as during previous economic crises. Moreover, the drop in the participation rate was unprecedented: from an average of 62.9% between 2012 and 2019, it fell to 57.3% in the second quarter of 2020.

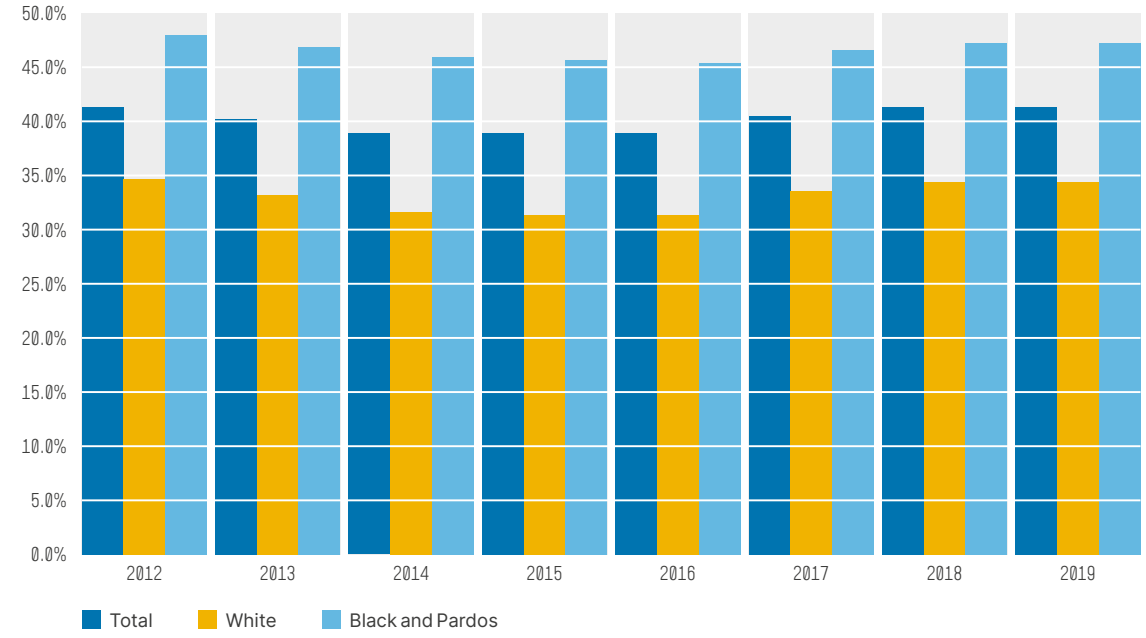
3.145. These challenges are even more intense for specific population groups such as women, Afro-descendants, and young people. Subgroups of the population face an even more fragile scenario, the unemployment rate is higher for Afro-descendants, for women, and for the youth of 18 to 24 years old[37]. In the case of young people, this distance is now more significant than before 2015: before, the youth unemployment rate was 7.6 percentage points above the average of the workforce, and since then, this difference has been around 13.0 percentage points. Furthermore, it is essential to note that the unemployment rate is just one of many indicators of how vulnerable certain groups are in the Brazilian labor market. However, there are also significant gaps in the participation rate, wages, and the quality of the jobs they occupy.

3.146. Brazil's labor market has been suffering from structural issues for decades. Brazil's labor productivity has been stagnant for decades and is currently only equivalent to 23% of US levels—much lower than in countries such as Israel (66%), South Korea (63%,) and LAC peers such as Chile (42%), Mexico (35%), Uruguay (36%), and Colombia (26%). Low productivity growth affects the prospects for sustainable long-term growth and the creation of quality jobs. Notably, the growth in formalization experienced between the 1990s and 2014 (see paragraph 3.158) was not accompanied by structural gains in productivity.

3.147. Informality excludes workers from social security networks. In Brazil, informal workers

36 Instituto Brasileiro de Geografia e Estatística (IBGE) - PNAD Contínua
37 Instituto Brasileiro de Geografia e Estatística (IBGE) - PNAD Contínua

FIGURE 3.11. Proportion of the labor force in the informality – 2012-2019



Source: IBGE

can make independent pension contributions, but monetary and non-tangible costs affect pension coverage. Only 65% of the employed population in Brazil is covered by a pension system, ranging from 79% of employees (formal and informal, in the public or private sector), to 40% of domestic workers and 31% of the self-employed (IPEA, 2021). As a result, 16% of the elderly population has no coverage—a proportion that would be 4 percentage points higher in the absence of the BPC, which grants the low-income elderly the monthly equivalent of a minimum wage. While this protection is commendable, it may also incentivize informality, although data on the matter is inconclusive.

3.148. The labor market features high turnover and short average job tenure. The average tenure of employment in Brazil is around five years, the second-lowest after the US among 22 countries assessed by the OECD (Silva and Almeida, 2015). While labor regulation in the US is flexible, the case of Brazil is different: Brazilian legislation is relatively rigid but, despite the 2017 Labor Reform, it offers perverse incentives for both workers and employers to sever potentially productive work relationships. High turnover also disincentivizes employers and employees from investing in training and education, further affecting productivity.

3.149. A rapidly aging population puts pressure on the pension system. Brazil implemented a meaningful pension reform in 2019 which, according to estimates from the Ministry of Economy, will save around R$855.7 billion over 10 years (about 9.8% of GDP in R$ of 2019). However, population aging is accelerating across LAC, and Brazil is no different: the period for people aged 65 and over to grow from 10% to 20% of the total population will be just 25 years in Brazil, versus around 75 years in the UK, 67 in France, and 53 in Germany (Bosch, Pagés, and Ripani, 2018). This rapid shift will also stress the sustainability of the social security system, at both the federal and subnational levels.

3.150. Students and workers lack technical and socio-emotional skills that the job market expects.

The slow growth of labor productivity in Brazil in recent years has been accompanied by a significant rise in the level of education among the population. Average years of schooling rose from 6.1 in 2001 to 7.9 in 2013, a growth of 28% (or 2% per year on average) (Ferreira, Menezes-Filho, and Komatsu, 2017). Yet, as in other LAC countries, there is a disconnect between the skills taught in school and those demanded for entry-level jobs (Accenture, 2018; Bassi et al, 2012). Even when the country invested in extensive education and professional training programs, it failed to achieve results in employability. A notable example is Pronatec, one of the largest professional qualification programs in history. Between 2011 and 2016, it served 9.7 million people, with expenditures of R$38.5 billion.[38] However, evaluations of the program showed no positive effects on employability or remuneration (Barbosa-Filho, Porto and Liberato, 2015). On the other hand, a specific program variant which received input from the private sector enhanced employability by between 8% and 16% (O'Connell et al., 2017). The Brazilian Apprenticeship Law suffers from poor compliance, as companies do not consider hiring young apprentices a worthy investment.

3.151. The systems available to jobseekers are inefficient. The use of public employment systems (PESs) is low in Brazil and in LAC in general. In the region, only 30% of workers seek jobs through formal employment services, which are often targeted to informal workers (Alaimo et al., 2015). In Brazil, between 2012 and 2017, only 3.9% and 3.4% of the unemployed used the SINE (the country's PES) as the primary method for finding a job (Moretto et al., 2018), while more recent data yields an even lower percentage (around 2% in Q2 2021). SINE service stations also offer access to unemployment insurance, but the two programs are not coordinated, nor do they liaise with training programs. Regional studies, which include Brazil, show limited coordination between income-support mechanisms and active labor market programs (ALMPs) (Amarante, Arim and Dean, 2011; Gerard and Gonzaga, 2013; González-Rozada and Pinto, 2011; Medina, Núñez, and Tamayo, 2013; Huneeus, Leiva, and Micco, 2012). Workers and companies could benefit from formal job-search methods that have positive impacts on wages and productivity, are cost-effective (Card, Kluve, and Weber, 2015, 2010), shorten the duration of unemployment, and increase the rehiring rate (Davis and Michaelides, 2013; Forslund et al., 2011).

3.152. Labor legislation and the regulatory environment stifle the creation of quality jobs and the growth of productive companies. Brazil implemented a labor reform in 2017, whose key points included: the abolition of taxes to fund unions, which had the effect of reducing the unions' influence; the potential allocation of legal costs to workers in case of defeat in employment disputes; and more flexibility in hiring policies. However, employers still perceive general non-wage costs, as well as wage costs for low-skilled workers, as high. This tends to harm formalization, particularly at times of economic stagnation. In addition, the reform did not address the overlap in benefit entitlements that arises only in the event of dismissal—e.g., FGTS[39] and unemployment insurance—and which creates perverse incentives, such as dismissals encouraged by the workers themselves (although this issue loses relevance when the labor market is less favorable). Finally, the reform did not promote greater connection between active and passive labor market policies.

Policy Recommendations

3.153. Bolster the technical and socio-emotional skills of students and workers. It is essential to create incentives for employers to invest in training that is relevant to their actual demand for skills, and which can increase productivity and formality. The

38 Carta do FGV-IBRE Instituto Brasileiro de Economia.
39 Severance Indemnity Fund, or Fundo de Garantia do Tempo e Serviço.

current policy focus on job-readiness and digital and soft skills is timely, as is support for curricula and learning approaches aligned with labor market demands. Public-private partnerships can help identify firms' needs and skills gaps and build a feedback ecosystem (Bos and Rucci, 2020). In addition, government-led programs can be coordinated with results-based incentives for private investment. Modular and stackable training courses, combined with certification systems, may allow people to improve their employability. The 2017 High School Reform is a step in the right direction, as it seeks to expand the offer of technical education and define a more-flexible curricular organization.

3.154. Consider policy options to reduce informality. Barros et al. (2021) point out that high costs of formal employment strongly affect employers' willingness to hire, maintain, and dismiss a worker in the formal sector. Some of these costs are directly related to a worker's remuneration (such as 13th salary or paid leave), while others are more indirect consequences of labor legislation. Thus, a well-designed reduction of such indirect costs can increase demand for formal work, without changing incentives for workers. Certain studies show that a reduction in employment charges results in an increase in formal pay, a fall in the informality rate, and a potential increase in total employment (Gruber, 1997; Fernández and Villar, 2017). For Brazil, Ulyssea (2018) estimates that eliminating employer contributions would cause a fall in the number of informal firms and workers and, consequently, an increase in wages. On the other hand, Pagés (2017) argues that policies promoting formalization through subsidies or exemptions from social security contributions usually have a limited impact in terms of formal job creation, while incurring high costs in terms of forgone tax revenue. Moreover, Corseuil et al. (2016) find that the Individual Microentrepreneur (MEI) law had no impact on the formalization of companies but increased the likelihood of contribution to social security. Finally, ongoing structural changes in the labor market—expansion of the gig economy, a globalized market, remote work, and more flexible labor relations—can erode the effectiveness of a strategy to promote formalization through subsidies or exemptions (Harris and Krueger, 2015; Harris, 2018; World Bank, 2019; Boeri et al., 2020).

3.155. Invest in the Public Employment System to better match jobseekers with vacancies. The SINE has been undergoing structural changes (IGD-Sine-Barbosa Filho, Ferreira and Araújo, 2020), paving the way for payments conditional on worker placement. However, there is room for improvement, especially on three fronts:

I. the use of technological and AI-based tools for matching purposes;
II. coordination with unemployment insurance and training programs; and
III. accessibility of physical facilities and staff training.

AI-based tools may improve matching quality and provide tailored advice to jobseekers, while combining big data with traditional sources of information may help anticipate labor market needs and new tasks, occupations, and sectors, such those connected to the green transition. Better coordination with unemployment insurance and training programs would increase employability, provided that training programs are effective and relevant to market demand. Finally, it is vital that SINE's facilities are accessible to people with disabilities or special conditions, and that its staff has the know-how to use technological tools and data and provide adequate guidance to groups with specific needs—for example, women who are returning to the job market, young people, and other groups traditionally discriminated in the job market.

3.156. Develop qualification and requalification programs. New technologies can help qualification providers to identify skills in demand in the private sector, train professionals for careers in technology, offer labor intermediation, and make data interoperable. For example, data from SINE could be cross-referenced with the CadU

to actively search for the unemployed and those too discouraged to seek employment. Moreover, interoperable data would allow service centers for the vulnerable population (CRAS) to provide basic guidance services and coordinate with SINE.

3.157. **Consider incentives to hiring.** By reducing labor costs, hiring credits can spur job creation, and are more effective in a recession if applied broadly rather than solely to disadvantaged groups (Neumark, 2013). Evidence from the LAC region also suggests that they can increase employability and formality among certain vulnerable groups (Novella and Valencia, 2019; Galasso, Ravallion and Salvia, 2004), particularly when there are constraints to the downward adjustment of wages in scenarios of low labor demand (Pagés, 2017).

3.158. **Monitor and adjust the pension system.** Despite the Pension Reform of 2019, the accelerating rate of demographic ageing requires continuous monitoring and adjustments. It is essential for Brazil to make federal and state-level pension systems more sustainable and equitable over time. A major step toward this outcome is determining the objectives of the pension system explicitly, based on the system's actual capacity and the coverage and quality of healthcare and long term-care programs. This exercise would help federal and state programs define appropriate parameters and quantify the necessary funding, while shedding light on and helping remove existing inequities—such as long vesting periods, or pension formulas that benefit high earners.

(4) Improve the accessibility, quality, efficiency, and equity of health services

A significant share of the population faces barriers to accessing healthcare, with increased risk of poor health outcomes and health disparities. Healthcare is a right of all citizens, but its quality raises several concerns.

HEALTH

3.159. **Brazil's total health expenditure is comparable to other countries with universal health systems, but unlike in most of them, it is driven by private spending.** In 2019, Brazil spent the equivalent of 9.6% of its GDP on health, in line with OECD countries with universal health systems such as the UK (10.2%), Spain (9.1%), Australia (9.4%), and Canada (10.8%) (IBGE, 2022; OECD, 2021). However, while public expenditures make up 70% of the total health expenditure in the OECD, in Brazil they only add up to 48%, making it the only country with a universal health system where private spending on health is higher than public spending. This relatively low public health expenditure hinders the achievement of an effective system offering universal coverage of all health needs (Rocha, Furtado and Spinola, 2019; Fiocruz, 2012). An immediate consequence of low public spending is that the quality of healthcare services is suboptimal. Recent studies have found that around 65% of the deaths of children under the age of 5 could have been prevented, and that more than two-thirds of the preventable deaths were due to the poor quality of care offered to women (during pregnancy and while giving birth) and newborns (Kale et al., 2019; Saltarelli et al., 2019; Malta et al., 2019). Moreover, in municipalities with subpar primary health care services, the number of preventable hospitalizations is 21% higher than in better-performing municipalities (Castro et al., 2020).

3.160. **Brazil has one of the most complex health-service delivery models in the region.** Providing access to quality health services requires coordinating responsibilities at the municipal, state, and federal levels. The federal government contributes 43.2% of the health budget, the 27 states contribute 25.7%, and the country's more than 5,500 municipalities contribute the remaining 31.1%. [40]Municipalities are responsible for delivering many

40 Source: Massuda et. al. (2022).

frontline health services, but their technical and operational capacity is often low.

3.161. The COVID-19 pandemic highlighted coordination flaws in the health sector. Brazil is one of the countries that have suffered most from the COVID-19 pandemic, ranking second globally in cumulative deaths (Johns Hopkins Coronavirus Resource Center). The pandemic overwhelmed the Unified Health System (SUS), exacerbating existing difficulties and capacity constraints, as well as regional inequalities. The decentralization of the SUS implied the need for strong coordination from the federal government, but it contributed to challenges in the response to the crisis. COVID-19 overran the health systems in all five regions of the country, but hospital admissions and mortality were considerably higher in the North and Northeast regions at the outset of the pandemic (for example, 31% of patients aged under 60 died in hospitals in the Northeast, versus 15% in the South) (ISGlobal, 2021).

3.162. Brazil devotes a large share of resources to relatively inefficient hospital-based services. In Brazil, hospital services account for half of public health spending, well above the OECD average of 40%. Numerous studies have used data-envelopment analysis to reveal potential efficiency improvements in the hospital system, identifying small operational scale and low utilization of installed capacity as key sources of inefficiency. Most of the country's more than 5,500 hospitals have fewer than 50 beds, and 80% have fewer than 100 beds. By contrast, the optimal size to achieve economies of scale is estimated at between 150 and 250 beds. In addition, the overall bed occupancy rate is only 35%, well below both international standards and the prevailing rates in the private sector. Finally, the Brazilian health sector has limited experience with methods of service provision that have reduced hospitalization rates and hospital stays in other countries, including outpatient surgery, home care, and intermediate care, as well as innovative management practices designed to improve governance.

3.163. Access to primary care remains limited. Brazil's primary healthcare approach (the Family Health Strategy—ESF) promoted a rapid expansion of coverage, reaching 63% of the population (or more than 133 million people). It was associated with improvements in access, financial protection, quality of services, and health system efficiency, with positive impacts on health outcomes (Macinko and Mendonça, 2018), mirroring results obtained in other countries (Starfield, Shi and Macinko, 2005). However, the Brazilian health system does not effectively meet the demand for primary-care services.[41] About 30 % of hospitalizations are for primary care-sensitive conditions, implying that almost a third of hospitalizations could have been resolved at a less complex level of care. The potential savings from aligning the supply of primary-care services with demand have been estimated at 0.1% of GDP, or 3.1% of total public health spending. However, concerns about the quality of primary care and its resolutive capacity remain unaddressed, and there is evidence that the provision of patient-centered care could be improved, especially in terms of access to doctors and facilities, communication with facilities, coordinated care, and guidance on disease prevention and health promotion.

3.164. Brazil bears multiple burdens of disease: infectious diseases and conditions related to Maternal, Newborn and Child Health (MNCH), widespread Non-Communicable Diseases (NCDs), and as well as physical injuries, mental health conditions, and new communicable diseases. Brazil has succeeded in reducing infant mortality—from 117 per 1,000 live births in 1960 (Barreto, 2013) to 12.4 in 2019 (Proadess, n.d.)—mainly due to a reduction in post-neonatal mortality, whi-

41 The ESF covers only 62.5% of the population, and between 35% and 55% in large municipalities that joined the program late. In many such municipalities, the population tends to seek medical attention in the emergency services of hospitals, a resource-intensive and expensive modality of care.

ch is more a function of overall living conditions and less of the healthcare provided. Infectious diseases, on the other hand, present a complex picture: there are diseases that are controlled (smallpox and polio) or nearly controlled (human rabies, congenital rubella syndrome, diphtheria, whooping cough, tetanus, Chagas disease, and typhoid fever); diseases whose control measures have been partially successful (viral hepatitis, schistosomiasis, leishmaniasis, Hansen's disease, tuberculosis, malaria, and AIDS); and diseases that are not controlled, such as dengue fever (Barreto, 2013).

3.165. With an aging population, the proportion of deaths from NCDs is expected to increase. In 2019, NCDs were already responsible for 76% of all deaths and for the loss of 71% of all Disability--Adjusted Life Years in Brazil (GBD, 2019), while a quarter of all deaths by NCDs could be considered premature.[42] A handful of risk factors contribute to the prevalence of NCDs: smoking, alcohol abuse, obesity, high cholesterol, low intake of fruit and vegetables, and physical inactivity (Barreto, 2013; Brasil, 2022). A telephone survey in the first quarter of 2022[43] found that 12% of respondents smoked, 21% abused alcohol, 53% were overweight, and 58% were physically inactive (Hallal et. al, 2022). Fatal physical injuries—the third major cause of death— are mostly connected to road accidents, while the risk of death from violence is highest for young black men (Barreto, 2013). The prevalence of mental health conditions has been soaring, especially for depression: the share of those who reported having had a previous diagnosis of depression was 7.6% in 2013 (IBGE, 2020), versus 13.5% in 2022 (Hallal et. al, 2022). New communicable diseases have also emerged, and Brazil was particularly affected by epidemics of H1N1 in 2009, Zika in 2015, and COVID-19. Notably, Zika outbreaks in Brazil revealed the correlation between cases in pregnant women and the birth of children with microcephaly.

3.166. Health care spending is expected to rise substantially. The drivers of increased healthcare spending are manifold: on the demand side, population aging and the epidemiological transition result in more people living longer and requiring more expensive healthcare resources; on the supply side, new technologies (which often do not replace pre-existing ones) also push costs up (Rocha, Furtado and Spinola, 2019). One study estimates that total health expenditure will rise from 9.1% of GDP in 2015 to 11% in 2030, 12.2% in 2045, and 12.8% in 2060 (Rocha, Furtado and Spinola, 2019), while another forecast increases to 10.94% of GDP in 2030, 12.43% in 2040, and 13.8% in 2050 (Rao et al., 2022).

Policy Recommendation

3.167. Increase the share of public financing from general revenues to reinforce Universal Health Coverage (UHC) and improve the efficiency and quality of services. International experience indicates that public financing helps countries achieve UHC (Atun et al., 2015; Barroy H. et al., 2017; Cotlear et al., 2015; Jowett and Kutzin, 2015; Kutzin, 2012; Savedoff et al., 2012), better health outcomes (Bokhari et al., 2007; Moreno-Serra & Smith, 2015; Xu et al., 2018), and greater equity in access to health services (Xu et al., 2018). Changes in payment modalities for healthcare providers could help make better use of the resources available. Currently, most providers are paid through a conventional fee-for-service arrangement, but several other options are available:

I. negotiating service volumes within a budget cap;
II. paying the equivalent of the average cost of treating a given disease (e.g., through DRGs)[44]; or

42 In Brazil, a death from NCD is considered premature when it occurs under the age of 70. IDB calculations based on data from Ministério da Saúde, Sistema de Informações sobre Mortalidade (SIM), https://datasus.saude.gov.br/mortalidade-desde-1996-pela-cid-10

43 The COVITEL survey interviewed 9,000 adults (aged 18 or older) in all regions of Brazil. It follows similar procedures to VIGITEL, the annual survey conducted by the Ministry of Health since 2006 to monitor the prevalence of NCDs and relevant risk factors. The COVITEL was conducted by Vital Strategies and the Federal University of Pelotas (UFPel).

44 Diagnosis Related Groups, see Ghazaryan et al., 2021.

III. capitation—i.e., paying a risk-adjusted fee per person, regardless of the services required in a given year.

Many OECD countries use capitated payments for primary care and DRGs for hospital inpatient care. Experience from LAC countries has also shown that linking payment to performance can help improve efficiency and quality.[45] Finally, a Health Technology Assessment (HTA) may help achieve more cost-effective services (Castelli et al., 2020), since it analyzes evidence of the effectiveness of medical procedures, medications, and devices against their respective costs. The IDB has developed technical and operational knowledge to support efforts toward greater efficiency.[46]

3.168. Enhance coordination through a digital health strategy. The Ministry of Health (MoH) established the concept of a national platform for innovation, information, and digital transformation, called the National Health Data Network (RNDS, by its acronyms in Portuguese), which will enable the integration of health data from all health services in the country (public and private) based on international interoperability standards. The RNDS will make it possible to obtain a large amount of health data, while seeking to incentivize and facilitate the implementation of an Electronic Health Record (EHR) in the states and municipalities. EHR systems offer known benefits, such as making information more complete, secure, and accessible in real time, and improving the quality and efficiency of care (Nelson et al., 2020).

3.169. Improve the efficiency of hospital services. Brazil's hospital system comprises numerous small institutions that cannot leverage economies of scale. Moreover, a substantial share of hospital services could be provided through other means. Recent advances in medical technology and the use of ICT in the health sector can increase efficiency by facilitating remote recovery monitoring and at-home treatment. Furthermore, complementary health services, such as long-term intermediate care for chronic or subacute patients, can reduce the overall intensity of health-resource use, and release hospital beds for sophisticated forms of acute care. Finally, consolidating supplier incentives in payment systems, integrating private actors into health-service provision, carefully managing critical inputs, monitoring drivers of sectoral spending (e.g., human resources, medicines, and technologies), and adopting new management techniques can further enhance efficiency. Finally, consolidating supplier incentives in payment systems, integrating private actors into infrastructure and healthcare-service provision-including through PPPs, carefully managing critical inputs, monitoring drivers of sectoral spending (e.g., human resources, medicines, and technologies), and adopting new management techniques can further enhance efficiency.

3.170. Reorganize health-service delivery around primary care.[47] The health sector should continue shifting from a traditional model, focused on hospital-based care for acute conditions, to a curative approach for proactively managing chronic conditions. This transition can benefit from placing greater reliance on the country's primary-care platform, emphasizing health promotion and disease prevention, and creating integrated care networks with stronger referral and counter-referral mechanisms. Currently, municipalities are responsible for 61% of Primary Health care (PHC) funding (Massuda et al., 2022). Increased contributions from the federal and state governments could support expanded PHC coverage and the reduction of inequities in access and quality (Massuda et al.,

45 E.g., Argentina's Plan Suman and various programs under the Mesoamerica Health Initiative. Finance literature has also encouraged the purchase of healthcare services based on health needs or performance, to improve health-system performance (Bernal & Martinez, 2020; Celhay et al., 2019; Klasa et al., 2018; Gertler et al., 2014; Smith, 2012; Diogene & Figueras, 2010; WHO, 2010).

46 https://criteria.iadb.org/en

47 Several studies have demonstrated the association between ESF and a reduction in avoidable hospitalizations for primary care-sensitive conditions, including chronic conditions.

2022; OCDE, 2021). Health outcomes are especially enhanced when PHC is the gateway to and coordinator of care, as well as the most resolutive and cost-effective level of care, within an integrated health network. It is important to improve the governance of health networks, and to incentivize states and municipalities (e.g., through federal transfers) to strengthen their regional health coordination. Several studies point out that integrated health networks can improve system accessibility, reduce care fragmentation, avoid duplication of infrastructure, reduce production costs, and better respond to people's needs and expectations. The health sector should also better integrate with the social sector, as social conditions have a major impact on health (CSDH, 2008). Thus, information exchange and mutual support on joint or complementary actions are essential to the success of both the health and social sectors.

3.171. Utilize innovative health-service modalities. Reducing hospitalizations and shortening the average hospital stay could yield considerable cost savings. International experience has shown that outpatient surgery, home care, and intermediate-care hospitals that use semi-intensive bed models can effectively reduce hospitalization costs.

(5) Make cities safe and inclusive

Equitable, inclusive, and just cities are key to development. Violence, inadequate housing, socio-spatial segregation, insecurity of tenure, homelessness, and urban sprawl are growing phenomena that threaten the equity and sustainability of Brazilian cities.[48] *Governments should support comprehensive community urbanization programs (neighborhood requalification, disaster risk management, land regularization) and social inclusion efforts (construction of quality equipment, improved access to social services in vulnerable areas, promotion of housing improvements and local economic development through employment- and income-generating initiatives) to improve the quality of life in cities.*

CITIZEN SECURITY

3.172. Brazil is a violent country. Brazil's homicide rate was the second-highest in LAC in 2018 (27.4 per 100,000 inhabitants), but it fell by 19.5% between 2018 and 2021, in a context of falling GDP per capita (-25%) set against rising employment (+15.9%). The robbery rate, not including vehicle theft, reached 469.6 per 100,000 inhabitants in 2020, down 25% from 2019. Police data suggests that COVID-19 had an impact on property crimes such as extortion, theft, and robbery, which decreased by 41.6% in Rio de Janeiro following stay-at-home orders in 2020. The mobility reduction from lockdowns was associated with reductions in robberies and police lethality. The cost of crime and violence in Brazil was estimated at 3.78% of GDP, or US$124.3 billion in purchasing power equivalent, which makes up 53% of the total cost of crime in LAC.

3.173. Victimization rates are highest among Afro-Brazilians. 91.3% of homicide victims are men, and 76.2% are Afro-descendants. Six states accounted for 50% of homicides in 2021. Considering total homicides between 2007 and 2017, 15 cities (0.27% of all cities in Brazil) accounted for 25% of all homicides, and 95 cities (1.7% of all cities) accounted for 50% of all homicides. A study of six Brazilian cities found that on average, 25% of crimes were concentrated in 0.8% of streets, and 50% of crimes took place in 2.5% of streets. A meta-analysis published in 2016 identified Brazil as the country with the highest estimated incidence of child abuse and neglect, based on findings from a child trauma questionnaire disseminated in 28 countries. 34,918 children and adolescents suffered a violent death in Brazil between 2016 and 2020. In the same five-year period, the annual violent death rate for children under the age of five rose by 27% in the 18 Brazilian states for which data is available. Women are also affected by violence. Between 2016 and 2020, the

48 Cities for adequate housing. (www.ciitesforhousing.org).

annual number of femicides increased by 45%. In 2021, 81% of murdered women lost their lives at the hands of their partner or ex-partner.

3.174. Institutional capacity gaps thwart the country's ability to address violence and crime. State and municipal governments have limited capacity to design and deliver social prevention and policing initiatives tailored for areas with high levels of crime. Institutions have a shortage of up-to-date knowledge of crime-prevention science, specialized officers able to design and implement evidence-based prevention initiatives, and financial resources to fund high-quality prevention programs. 95% of municipalities have not developed a federally required public-safety plan.

3.175. Police work lacks a strong preventative approach. Police forces in Brazil are often perceived as reactive and repressive, while showing limited capabilities to conduct criminal investigations—which are critical to preventing impunity. For example, only 44% of all homicides nationwide in 2018 were solved.

3.176. The judicial system is highly congested. The average congestion rate (i.e., the proportion of pending cases relative to total cases) was 74% between 2021 and 2022, while the net congestion rate averaged 70% over the same period. On average, 641 days elapse between the beginning of a case and its first judgement (974 days at the state level, and 696 days at the federal level). In the 2021 Rule of Law Index, Brazil's criminal justice system falls behind both the world and regional averages in the categories termed "due process of law", "timely and effective adjudication", and "effective investigations". According to the Latinobarómetro 2021 survey, 23% of Brazilian citizens have no trust in the justice system.

3.177. The penitentiary system is overcrowded. Prison population grew from 230,000 in 2000 to a peak of 820,000 in 2021. In the latter year, about 28% of inmates were in pre-trial detention. Notably, the overall occupancy rate in the penitentiary system is 146.8%.

Policy Recommendations

3.178. Prioritize prevention. Targeted and evidence-based preventative interventions are more cost-effective than remedial interventions. Examples from international experience include focused deterrence strategies,[49] violence-interruption programs,[50] and results-based public security policies.[51] The country can benefit from the accumulated scientific knowledge of effective practices to reduce violence and crime, such as social crime prevention, situational prevention through urban management, and improvements to the deterrent capacity of police. There is also evidence of working models that reduce the caseload of the justice system and increase the participation of those involved in cases. Finally, reliable information is available on prison management and intervention practices that significantly reduce recidivism. In general, effective practices for the reduction of violence and crime are highly focused and proactive, intensive in the use of knowledge and technology, and deployed in the framework of results-oriented programs, under strict monitoring and quality-assurance systems.[52] All these elements are atypical in Brazil's national violence prevention practices, which are normally based on the provision of low-intensity, general social services for vulnerable populations, with a wide scope and universal coverage.

3.179. Increase police effectiveness. Reinforcing the Homicide Divisions within state-level

49 Braga, Weisburd and Turchan (2018).
50 Delgado, Sheyla A., et al (2017).
51 Silveira Neto, R. et al (2014).
52 Practices that can help reduce violence and crime include: hot-spot policing, problem-oriented policing, procedural justice practices, nurse-family partnerships for young and vulnerable mothers, socio-emotional learning programs delivered in school, drug courts for criminal offenders with a history of drug abuse, motivational interviewing and cognitive behavioral therapy for offenders to be released from prison.

Civil Police forces, and/or adopting problem--oriented policing or intelligence-led policing strategies, could reduce impunity by raising the clearance rate for homicides.[53] Police training could be improved through the elaboration and dissemination of investigative principles for violent crimes, along with standard protocols for collaboration between public security agencies and criminal-justice institutions.

3.180. Restructure the penitentiary system. The penitentiary system must be reformed to cope with organized crime and corruption in prisons, while creating more vacancies in the system and implementing alternative-sentencing policies. The number of inmates who are awaiting sentencing should be reduced, and prison sentences should prioritize serious and violent crimes.

3.181. Improve the governance of the justice system. A Ministry of Public Safety should be permanently established, with the capacity to coordinate a national public safety policy—largely financed by the federal government—on violence prevention, police management, criminal intelligence, drug policy, gun control, and private security surveillance. The government should create a National Public Safety School and a National Institute of Public Safety Studies at the Ministry of Public Safety. The System of Public Security needs to be fully regulated and implemented, along with the National System of Monitoring and Evaluation of Public Safety and Social Defense Policies, while the government should create a National Intelligence Council. The National Council of Justice is promoting organizational change and digital modernization, to increase the efficiency and effectiveness of the judicial system.

3.182. Promote the digital transformation in citizen security. The digital transformation can reinforce the effectiveness and efficiency of the institutional ecosystem on violence and crime prevention. Brazil has a National Public Security, Prison and Drugs Information System (SINESP), which has room for improvement on data standardization, collection, and analysis. Better integration of police databases would improve criminal investigation processes. The IADB has been working on the development of digital platforms to explore criminal and social information available online, as well of an online repository of best practices for crime reduction. These tools and their future updates will assist local governments to develop data-driven diagnostics and evidence-based plans to prevent crime. Dedicated software can help optimize police patrolling routes in criminal hotspots, drawing on existing geographical data on crime. Digitization can also reduce the time to judgment in court cases.

URBAN AND HOUSING

3.183. Brazil is one of the most populous and urbanized countries in the world. Urban areas are home to 85% of Brazil's estimated 211 million inhabitants (IBGE, 2020), account for 90% of GDP, and are the main centers of innovation. According to URBANET, Brazil has 31 medium-sized cities with populations between 300,000 and 1 million, 19 cities of between 1 and 5 million people, and two mega-cities (Rio de Janeiro and São Paulo) of more than 10 million people each.

3.184. Brazil's urbanization did not go hand in hand with progress in urban planning. The country's accelerated urbanization is a relatively recent phenomenon, set in motion by internal migrations over the past century. Only after the Constitution of 1988 were specific urban planning laws approved. In 2001, the Statute of Cities (Law No. 10,257) required all cities with a population of more than 20,000 to develop comprehensive master plans.

3.185. Brazil has a sizeable housing deficit. In

53 Coupe, R.T. (2014).

2019, Brazil's housing deficit affected an estimated 5.8 million households (FJP, 2020), comprising:

I. precarious households (improvised and rustic housing);
II. cohabitating households (two or more families living in the same dwelling); and
III. households facing an excessive rent burden (rent equal to or greater than 30% of household income).

Households headed by women account for a large and growing share of the housing deficit (60% in 2019, versus 54.3% in 2016). Furthermore, there is a clear connection between housing precariousness and socio-economic profile: in 2019, 72% of families with incomes of up to one minimum wage lived in precarious housing.

3.186. In recent years, public policy on housing has focused on large-scale construction. The "Minha Casa Minha Vida" program, replaced in 2021 by the "Casa Verde e Amarela" program, allowed the construction of new housing units, but mostly far from employment centers and services, thereby contributing to a costly urban spread in terms of infrastructure and transport needs. Inadequate social interventions also caused a lack of sustainability of the investment, as evidenced by high physical degradation and lack of appropriation by residents (notably, the default rate on certain contracts under "Minha Casa Minha Vida" reached 44.20% in April 2020). On the other hand, the "Minha Casa Minha Vida" program was a significant source of jobs, directly employing 3.5 million workers over a decade (equivalent to 390,000 jobs per year on average); and achieved remarkable progress in gender equity. Between 2011 and 2014, 823,100 low-income households benefitted from the program, 77% of which were headed by women.[54]

3.187. Urban segregation is acute. In 2019, over 5 million private households were estimated to be part of informal settlements (i.e., slums), equivalent to 7.8% of all households, and 60% above the level recorded in 2010. According to 2019 data from the Joao Pinheiro Foundation (FJP), more than 24 million urban households were considered qualitatively inadequate, because they presented one or more of the following:

I. shortcomings in urban infrastructure, such as: deficiencies in access to water (10.7 million households), sewage (4.9 million), garbage collection (550,000), and electricity (400,000);
II. building deficiencies, such as: inadequate water storage (9 million); excessive density (more than three residents per room) (1.8 million); deficient roofing (1 million) or flooring (69,000); the absence of an exclusive bathroom (360,000); and
III. inadequate property titles (3.5 million).

Access to community equipment and social services is also very limited: for example, 36% of households in informal settlements are more than 2 km away from health posts with inpatient and observation support (IBGE, 2020).

3.188. Housing inequality by income and race is significant. Almost 2 out of every 3 households with incomes up to three minimum wages live in inadequate housing (FJP 2020). The stark racial divide in access to water, sanitation, and solid-waste management infrastructure has important health implications. In 2018, 12.5% of the *preto* and *pardo* population lived in households without garbage collection, versus just 6% of *brancos*. Similar racial disparities were observed in households without access to piped water (17.9% versus 11.5%) or improved sanitation (42.8% versus 26.5%). Vulnerability increases even further when racial and gender disparities intersect. For example, excessive household density and absence of a washing machine are twice as prevalent among *preto* or *pardo* households as among *branco* households (7% versus 3.6%, and 44.8% versus 21%, respectively).[55]

54 Choice Institute 2019. Living far away: the MCMV program and the expansion of MRI; Valor Investe 2020. MCMV on with default and avalanche of lawsuits; Choice Institute 2020. Dehydrated after a decade, MCMV is a challenge for government.
55 IBGE 2019. Social Inequalities by Color or Race in Brazil.

3.189. The divide also has a regional component, with areas in the North and Northeast emerging as the most vulnerable. Among municipalities with more than 750,000 inhabitants, Belém (55.5%), Manaus (53.4%), and Salvador (41.8%) have the highest proportion of subnormal households; moreover, the highest prevalence of infrastructure inadequacy is found in Acre (80.5%), Amapá (68.2%), and Pernambuco (70.8%) (FJP, 2020).

3.190. Public policy has struggled to reverse the degradation of urban centers, including in historical areas. Physical degradation of infrastructure in city centers is also associated with social vulnerability, such as high prevalence of prostitution, drug use, or homelessness. A large stock of vacant properties (7.9 million across the country, of which 80% in urban areas) offers an opportunity to improve cities and mitigate the housing deficit.[56] However, certain urban renewal efforts have fostered gentrification and social exclusion (such as in the emblematic case of Pelourinho in Salvador) or focused on commercial and leisure developments to the expense of housing.

3.191. The quality of public spaces is poor. One indicator of this issue is urban violence: in Brazil, a woman experiences harassment on the street every 1.5 seconds, highlighting the poor safety of many public spaces; in 2020, 60% of the deaths of LGBT people occurred in public spaces, of which 72% at night. Despite advances in legislation, urban projects still fall short on lighting and visibility, urban signage, mixed use to promote living space, as well as the availability of surveillance and emergency services. A second indicator is the poor accessibility of public spaces to certain users, such as children and the elderly, people with disabilities, their families and caregivers. In evaluations of accessibility and walkability in 2019, Brazilian public spaces obtained an average score of 5.71, well below the minimum score indicating that walking is safe and comfortable (8). Street commerce is another challenge, in the absence of initiatives to combine orderly management of urban spaces with decent working conditions.[57] This problem is even more pronounced in the North region.

Policy Recommendations

3.192. Support integrated programs of neighborhood upgrades to tackle the qualitative housing deficit, climate change, improve disaster risk management, and foster socio-economic development. The paradigm for slum upgrades must shift from infrastructure-oriented to welfare-oriented interventions. Placing socio-economic impacts and demand-driven participation at the center of neighborhood improvement programs ensures empowerment, maintenance, and long-term sustainability. Infrastructure considerations must account for climate change, complex challenges around micro and macro drainage, access to water and sanitation, pavements, public lighting, and disaster risk management.

3.193. Implement programs for land titling and home improvements. Land titling in informal neighborhoods increases property values and household incomes. Formal deeds double the value of land[58] and prompt a rise in household income of between 20% and 32%,[59] as formality of tenure is a prerequisite to access many forms of social assistance. Microloans for home improvements do not require the house to be pledged as collateral, but safety of tenure plays an important role in the investment choices of families. Home improvement programs may consider a variety of

56 Source: Pesquisa Nacional por Amostra de Domicílios (PNAD) 2015/FJP 2015. Déficit Habitacional no Brasil.
57 Gloria Institute 2021. Watches of Violence; Gay Group of Bahia 2021. Observatory of Violent Deaths of LGBT in Brazil in 2020; Mobilize 2019. Calçadas do Brasil - Final Report, campaign 2019.
58 BM 2007. Social and Economic Impacts of Land Titling Programmes in Urban and Peri-Urban Areas: A Review of the Literature.
59 IPEA 2011. Direitos de propriedade e bem-estar: avaliação do impacto do programa de regularização na Quinta do Caju.

funding options, from full subsidies for the most vulnerable, to affordable micro-loans for families with a minimum capacity to pay.[60]

3.194. Support innovative tools to increase housing supply and tackle the quantitative housing deficit, urban decay, and urban poverty. The production of new housing units should shift from the highly subsidized model prevalent over the last 20 years (such as the 'Minha Casa Minha Vida' Program) to a more diversified, sustainable approach.[61] Potential options include:

I. support for social rental programs aimed at families who cannot afford to buy, or at those in temporary situations (students, young couples, highly mobile professionals);
II. promotion of subsidized rental housing ("housing as a social service") for the most vulnerable, such as dependent elderly and homeless people (see, for example, the Housing First projects for homeless people);[62]
III. retrofit programs to convert vacant or degraded units into housing, with or without use shift.

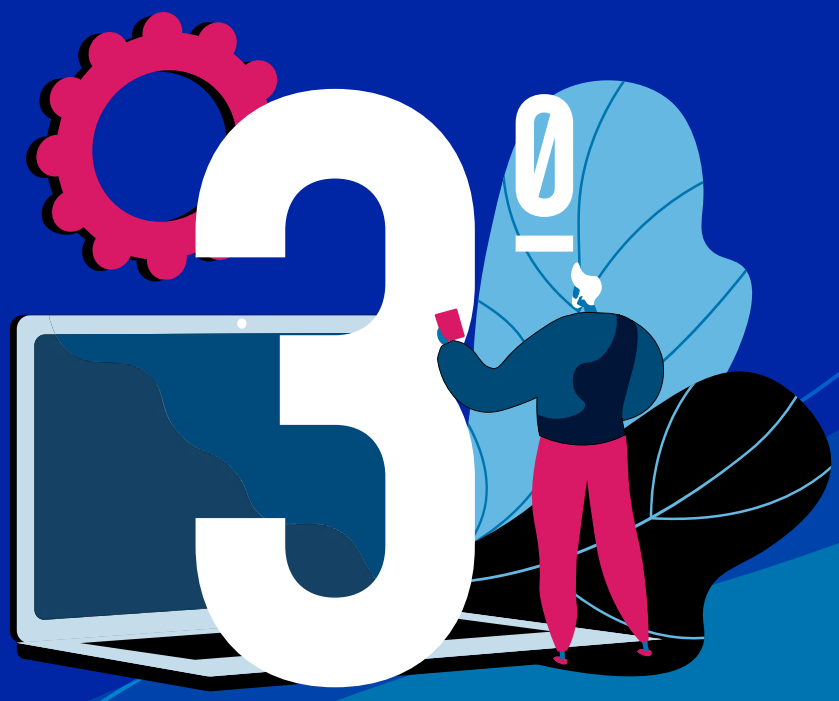
At a more structural level, broader access to affordable mortgage loans, achieved through regulatory reforms and strategies to attract the private sector down-market, may increase the supply of housing to low- and medium-to-low-income families.

3.195. Develop integrated urban renewal programs with high-quality public spaces and socially oriented interventions. To contain urban violence, especially against women and LGBT persons, public spaces need a greater focus on lighting and visibility, urban signage, mixed-use to promote lively areas, and the availability of emergency services. A new paradigm for public spaces should seek not only to reduce insecurity but also to improve functionality (e.g., through street width adjustments, urban furniture, and other design features) to guarantee accessibility and walkability to all. Historical heritage areas present specific challenges, as their public spaces are typically not inclusive and planning regulations are stricter.

3.196. Analyze alternative housing policies to complement traditional programs. Building new housing units is not the only means of addressing the housing deficit.[63] Investments in housing programs and the regularization of informal settlements have not fully addressed social exclusion and urban inequality in Brazil. The experience of other LAC countries suggests that the government could augment its efforts to manage the housing deficit by: (i) strengthening the rental sector, (ii) directly supporting incremental housing improvements, (iii) directly providing serviced land, and (iv) incentivizing private investment.[64]

3.197. Create financial mechanisms to incentivize private investment. Incentive mechanisms for housebuilding often involve the strategic use of urban-planning instruments and tax benefits. The government should consider revising land-use and occupancy laws, reducing interest rates, extending mortgage maturities, or developing other solutions tailored to local circumstances. LAC experience shows that private-sector-driven solutions are not always inclusive, and in some cases public resources are best-used to assist low-income households in constructing their own housing.[65] Guarantees in promoting access to credit to finance housing improvements for the low-income population may also play a role in attracting private investment.

60 Access to affordable micro-credit for home improvement will be a focus of the forthcoming HUD/IDB 'ProMorar Brazil's program.
61 Habitação de interesse social no Brasil: construindo novas oportunidades: panorama 2020 e foco em desafios prioritários, IDB 2021; How to improve access to housing for the low-income population?, IDB 2021
62 The municipality of Recife is implementing a pilot of the Housing First project, with IBD support.
63 See World Bank (2002), IDB (2012), and World Bank (2016), inter alia.
64 Rojas, 2018.
65 Ibid.



3 PILLAR

Fostering the digital transformation for Development

Recommendations to prepare Brazil for the digital transformation fall under seven policy areas: **(1) Promote innovation to boost growth; (2) Build the capacity of workers to utilize new technologies; (3) Develop adequate infrastructure for new technologies; (4) Facilitate entrepreneurship for a dynamic economy; (5) Leverage new technologies to boost productivity, (6) Improve quality of life and inclusion through new technologies, and (7) Use new technologies to improve the efficiency and transparency of the public sector.**

(1) Promote innovation to boost growth

Investment in innovation is riskier and takes longer than other types of investment. Innovation hinges on intangible components (R&D, design, know-how) and entails an indivisible sunk cost (a project's fixed costs do not depend on the size of the market, and if it does not succeed, the outcomes cannot be easily transferred to other sectors). Furthermore, the novelty of innovative projects and appropriability issues exacerbate information asymmetries between innovators and external financers, compounding challenges in access to finance.

3.198. Brazil is declining in the international rankings related to innovation. In the Global Innovation Index (GII)[1], Brazil's ranking declined from 47th out of 131 economies in 2011 to 57th out of 131 economies in 2021, placing it fourth among countries from the Latin American and Caribbean Region. The main weaknesses identified in the GII included: indicators related to market sophistication; difficulty with access to credit for financing innovation; lack of coordination between the public and private sectors; low levels of private investment in innovation and knowledge sharing; quality of human capital and technological infrastructure.

3.199. Public and private investments are necessary to boost innovation. Public investments in research and development are often useful catalysts for private-sector investments in innovation, as they can favorably adjust the risk-reward calculation that firms consider before financing innovation projects. Although investment on R&D as a proportion of GDP in Brazil (1.21% in 2019) is higher than in all other LAC countries, it still significantly lags developed countries (2.47% on average in the OECD in 2019). Furthermore, public expenditure on R&D in Brazil has been declining steadily from 0.70% of GDP in 2015 to 0.61% in 2018. Private investment in R&D as a percentage of GDP also decreased,[2] from 0.58% to 0.47% of GDP between 2014 and 2018.

3.200. The country is not efficient at converting investments into scientific publications and patents. In 2018, Brazil produced 3.76 citable documents per US$ million in R&D expenditures mainly financed by the government—about half as many as in China, and 75% of those produced in the US. In terms of patent applications per US$ million spent, Brazil only reached approximately 20% of the US level, and trailed regional peers such as Mexico and Argentina.

1 The Global Innovation Index (2020) is structured in seven pillars: (i) Institutions, (ii) Human capital and research, (iii) Infrastructure, (iv) Market development, (v) Business development, (vi) Production of knowledge and technology, and (vii) Creative production. Available at: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2020.pdf

2 PINTEC, 2020.

3.201. Firms struggle to access resources for financing innovation. According to the 2017 Innovation Survey (PINTEC), 89% of firms surveyed financed research, development, and other innovative activity (R&D+i) with their own resources, and only 7% reported using public resources; in the 2014 edition of the same survey, 84% of firms had reported using their own resources, while 15% had reported using public resources. The companies that reported not investing in innovation, despite having tried to do so, indicated the three main barriers as: the excessive risk of innovation, high cost, and lack of financing. Financial issues were cited much more often than those concerning the lack of qualified personnel, the regulatory framework, or difficulty cooperating with other actors.

3.202. R&D collaboration between the public and private sectors is very limited. Public research institutes face binding regulatory constraints, including extensive bureaucracy and overly complex hiring and procurement procedures. Brazil also has a very little in the way of shared research infrastructure, where the private and public sector can work together. Intellectual property (IP) issues further hinder cooperation, as a slow and burdensome patent processes and weak IP protections deter private investment in innovation. In terms of co-authorship of scientific articles between university and industry researchers, number of patents filed by university researchers, and revenue from IP licensing as a proportion of university R&D expenditure, Brazil significantly lags the US. Regarding co-authorship of scientific articles, university researchers in Brazil tend to have significantly fewer private industry researchers with whom they can collaborate (approximately 60,000 versus almost 960,000 in the US as of 2014). Moreover, most co-authored scientific articles from Brazilian universities involve foreign companies, with relatively few Brazilian firms participating. Regarding patents, most Brazilian universities still have relatively unsophisticated support systems for requesting them; researchers must often address legal and contractual issues themselves, which tends to disincentivize patenting.

Policy Recommendations

3.203. Enhance the efficiency of public investment in innovation. Public sector investments in innovation must be efficient and well-coordinated to ensure that they crowd-in the private sector. Public policies aimed at fostering science, innovation, and technology in manufacturing should consolidate the fragmented initiatives currently sponsored by the federal, state, and municipal governments (some of which have insufficient budgets) to gain scale and better address the needs of companies (particularly SMEs). Current programs to support research and innovation in new and early-stage firms often entail reporting requirements and response times that are not compatible with the speed necessary to innovate. Even firms that successfully complete innovative projects often face time-consuming requirements, as they grow and seek new sources of support to further develop their products.

3.204. Create new financial instruments for innovation. Startups and established companies need better access to private finance for innovation and technology adoption. New dedicated instruments, based on blending and other recent trends in innovation finance, could offer more agile underwriting and execution. In the case of investments for the bioeconomy and sustainable development in the Amazon region, for example, loans for innovation can be blended with donations to increase their attractiveness or packaged together with conditional loans to startups as recovery grants.

3.205. Use public procurement to increase investment in innovation. Thanks to New Framework for startups (the Marco Legal das Startups) and other improvements in regulation, public procurement—which is worth approximately 20% of GDP—can better be used to finance innovative solutions, potentially more effective and efficient than traditional purchases, facilitating the access of startups to the public procurement process.

3.206. Support innovation in specific value chains or clusters to achieve coordination and

scale. Focused programs can enhance the productivity of existing industries, with complementary investments in public and club goods, quality certifications, and sector-specific talent upgrade programs for MSMEs. Additionally, reforms should foster clusters and collaborative platforms that bring together startups, academia, manufacturing firms, and investors, such as those present in technology hubs including São Paulo, Campinas, Florianópolis, Recife, Curitiba, Belo Horizonte, São Carlos, Porto Alegre, São José dos Campos, Santa Rita do Sapucaí, Piracicaba.

3.207. Develop firm-level capacity for innovation. Policies designed to support productivity growth, facilitate technological adaptation, promote infrastructure investment, and as well as provide advisory, extension, and technical services, innovation vouchers, financial prototypes, and testing and commercialization support can increase firms' capacity for innovation. Foreign investment can generate positive technological spillover and enable firms to move into more sophisticated global value chains. Technical training and engineering courses should be aligned with market needs and reflect the latest technological developments.

3.208. Strengthen research capacity within the private sector. Ensuring that industry can collaborate with, and absorb knowledge from, academia requires long-term efforts to increase the number of researchers (which is significantly lower than in the US and other developed economies), by offering incentives to pursue STEM careers, advanced degrees, PhDs, and other research-oriented paths. In the nearer term, appropriate incentives within universities could encourage more academic researchers to form startups and spin-offs in their areas of expertise, or to undertake periodic work assignments within industry. In geographical clusters, or APLs, research institutes focusing on the areas of interest to those clusters could strengthen the pipeline of qualified researchers available to industry.

3.209. Improve technological transfer services within universities. Researchers currently need to independently manage the legal and contractual aspects of patents and IP, dedicating much of their scarce research time is to administrative processes. Thus, better support could incentivize researchers to pursue patents, licensing, or commercialization of IP.

(2) Build the capacity of citizens to utilize new technologies

Brazilian workers lack basic digital literacy skills necessary to use technology in their daily work and life. This is both a cause and a consequence of well-known weaknesses in basic education. It is a limit to productivity growth, since the labor force cannot swiftly adjust to changing business models or adopt modern technologies, further compounding long-standing skills mismatches between school curricula and labor demand.[3]

3.210. Brazil needs to strengthen its digital talent. Brazil ranked 51st out of 63 countries in the Global Digital Competitiveness Index,[4] and 82nd out of 108 countries in the Coursera Global Skills Report.[5] In the former report, Brazil ranked last in the "Talent" sub-category, and scored especially poorly on "Digital/Technological skills" (60th out of 63) and "Foreign highly skilled personnel" (59th out of 63).[6] In the latter report, Brazil scored relatively well in the "Technology" pillar (57th out of 108) but less well in the "Data Science" (84th out of 108) and "Business" pillars (93rd out of 108).[7]

3.211. Most Brazilian workers are not ready to benefit from, or contribute to, the new digital economy. In the World Economic Forum's 2020 Global Competitiveness Report, Brazil ranked only above Greece on the metric termed "update education curricula and expand investments in the skills needed for jobs in markets of tomorrow", with a score of 39.5 points out of 100. In addition, in a context of limited competition, entrepreneurs will typically display a weak drive to implement innovative solu-

3 IDB (2017).
4 IMD World Digital Competitiveness Ranking, 2021.
5 Global Skills Report, Coursera, 2021.
6 IMD World Digital Competitiveness Ranking, 2021
7 Global Skills Report, Coursera, 2021.

tions. Overall, the requirements for excelling in the digital economy have added a new layer to the existing skills deficiencies in the Brazilian labor market.

3.212. The supply of IT professionals is insufficient to meet labor market demand. Enrolment in STEM courses in Brazil only slightly outpaced the overall growth in higher education enrolment between 2010 and 2019.[8] After rising between 2010 and 2015, the number of STEM graduates has been declining since. A study by Softex in 2021 found that the supply of IT professionals was not sufficient to meet industry demand, potentially leading to as many as 400,000 unfilled vacancies in IT by the end of 2022. The Softex study also estimated that labor shortages in the IT sector could cost the industry as much as R$167 billion in lost revenue over the period 2021-2025, with negative implications for productivity. BRASSCOM expects that 420,000 new jobs will be created by 2024 that require varied technological skills.

3.213. Growing demand makes training the workforce a priority. INEP data shows that only 46,000 people complete technology-related training in Brazil every year. Such training still occurs, for the most part, through undergraduate courses that are not tied to specific vacancies, but rather offer extensive knowledge that qualifies graduates to fill several potential vacancies. This type of training forms professionals who are adaptable and can seize a variety of job opportunities, but takes a long time (higher education and technical courses last between two and six years) and cannot solve short-term deficits.

3.214. Low-skilled workers are at greater risk of being displaced by automation. The technology available as of 2017 could feasibly automate 50.7% of total employee time in Brazil that year (MGI, 2017). Even though demand for workers at all levels is expected to increase as the economy grows, fueled by productivity gains enabled by technological progress (MGI, 2018), high-skilled workers are likely to reap the gains of automation. The lower-skilled could instead experience wage pressure, given the larger supply of workers with similar skills, and face a greater risk of seeing their tasks automated.

3.215. Diversity is a challenge. The Brazilian digital economy features sizable gender and race gaps. 37% of professionals in the digital sector are women, versus 63% of men, and only 30% of those employed in the industry identify themselves as Afro-Brazilian or indigenous.[9] The proportion of women enrolled in STEM fields in higher education has only increased marginally in recent years, from 28% in 2010 to 30% in 2019, despite women making up 57% of all higher education students in the country. Gender imbalances vary across STEM fields, with women accounting for 66% of students in architecture and related disciplines, 50% in physical and life sciences, but only 14% in computer science and mathematics.

Policy recommendations

3.216. Offer scholarships for short digital training programs, such as coding bootcamps. In the context of growing demand for digital skills and the long duration of traditional education in science and technology, shorter and usually fee-paying courses in digital skills (often referred to as coding bootcamps) have become available. Given the high number of providers, the overall effectiveness of such programs, and labor market demand, promoting access and providing information for those with potential could help accelerate the digital transformation. As coding bootcamp providers note that applicants are not always ready for their programs, short remedial programs could be devised to better prepare participants. Moreover, female participation could be encouraged. In areas with reliable internet connectivity such programs could be integrated into school curricula, while successful digital literacy programs for older users (such as those developed in Australia or Israel) could be adapted to the Brazilian context.

8 Brazilian Higher Education and STEM Fields, IDRC, 2021.
9 BRAVA - Como o Brasil pode fomentar um ecossistema de profissionais digitais?

3.217. Develop mentorship opportunities, support networks, and role models for women interested in STEM careers. Counterintuitively, the evidence suggests that the proportion of women pursuing STEM careers is lower in countries with higher levels of gender equality. While the mechanism underlying this paradox is not fully understood, targeted initiatives focusing on mentorships and networks can be beneficial in all contexts.

3.218. Create new academic models better aligned with the private sector's skills requirements. This step would also help advance the country's gender and diversity agenda, since Brazilian women are traditionally underrepresented in technical careers. Facilitating the adoption of vocational content in secondary education could also help prepare youths for a changing economic environment (OECD, 2020).

3.219. Incentivize the development and utilization of online platforms that match workers with jobs. An MGI study estimates that such platforms, which also enable independent work, have the potential to help 21 million Brazilians (about 14.2% of the working-age population) find jobs aligned with their skillsets, and could thus add US$69 billion to the country's GDP (MGI, 2018).

3.220. Promote digital literacy programs for senior citizens and vulnerable populations. This is key to decreasing the digital divide in key populations. Given that the digital gap is focused on citizens over 60 years of age, people with low formal schooling and income below two minimum wages per month invest in improving their digital skills to enhance their use of public and private digital services.

(3) Develop infrastructure for new technologies

Closing the ICT infrastructure gap can have a major impact. A 10% increase in broadband access penetration in Brazil would lead to a 0.77% increase in GDP while benefiting all parts of the country, from high-income urban areas to low-income rural areas.[10]

3.221. The telecommunications infrastructure gap is wide. Brazil ranked 4th out of 26 countries in LAC on digital infrastructure in the IDB's 2020 Broadband Development Index (IDB, 2021). However, investments are heavily concentrated in major urban centers while rural connectivity remains a challenge, particularly in remote inland areas, the Amazon, and the Northeast. The "Crowdsource for Digital Connectivity in Brazil" (C2DB) project found that as of 2021, 19.7 million people, 26,800 schools, and 6,300 health facilities in Brazil had no broadband coverage.[11]

3.222. Internet coverage in Brazil has significantly expanded over the past decade. Between 2013 and 2018 the proportion of the country's population with access to internet grew from 50% to 72%. Nevertheless, this figure still lags OECD averages, and masks a very low access (below 50%) among Brazilians with lower educational levels. Moreover, the proliferation of mobile internet subscriptions, which tripled between 2012 and 2018, accounts for much of the increase in internet coverage during that period, while fixed-broadband subscriptions (42% of households) and access to computers/laptops/tablets (40% of households) grew more slowly, limiting the productive potential of the internet for many users. At the household level, survey respondents cited cost as the main obstacle to internet connectivity; however, at the individual level, cost was only the third most-cited obstacle (48% of respondents), after lack of computer skills (74%), and lack of interest (64%).

3.223. Disparities in access persist across the country. Brazil's vast size, complex topography, and unequal distribution of population and income across regions have deepened the digital divide. Increasing the penetration of fixed and mobile broadband by 10% would require investments of US$10.7 billion, while closing the gap with OECD countries would require US$21.8 billion (IDB, 2021). Private operators have room to grow, but they face financial pressure from relatively low margins (partly driven by the impact

10 Institute of Applied Economic Research. *Assessing the Effect of Telecommunications Investments on GDP.* 2017
11 IDB-Anatel C2DB Project.

of the pandemic) and the high cost of deploying 5G networks (FitchSolutions, 2021). Filling the investment gap in Brazil's telecommunications sector could result in a 6.5% increase in GDP, a 5.3% increase in productivity and the generation of 2.9 million direct jobs.

3.224. There are also quality and affordability problems. Brazil ranks 17th out of 26 LAC countries on penetration of mobile telephony (96.8 subscriptions per 100 inhabitants, versus the LAC average of 108.9) but features a competitive market with several established operators. The country ranks better on broadband services—sixth on mobile broadband, with 89.7 subscriptions per 100 inhabitants versus 64.2 in LAC; and eighth on fixed broadband, with 17.1 subscriptions per 100 inhabitants versus 13.6 in LAC (ITU, 2020). Internet bandwidth per user is much slower than the LAC average (29.2 Gbit/s versus 113.8, respectively). Affordability issues constrain the utilization of ICT, especially among those on low incomes. Brazil's average tariffs for mobile telephony, fixed broadband, and mobile broadband correspond to 1.4%, 2.5% and 1.4% of monthly average GNI per capita, respectively. Although these figures are lower than the LAC averages (3.5%, 9.0%, and 2.6%, respectively; ITU, 2021), they may not adequately reflect affordability constraints, given the country's large income disparities. Instead, IDB's 2020 Broadband Development Index (IDBA) presents accessibility indices which measure the affordability of fixed and mobile broadband for the 40% of the population on the lowest incomes (the higher the score, the lower the affordability). IDBA's accessibility indices for fixed and mobile broadband in Brazil are 14.48% and 5.04%, compared with OECD averages of 2.38% and 2.17%, respectively (IDBA, 2021). These findings show that affordability is a major barrier to accessing ICT services for low-income segments of the population and hinders digital inclusion.

3.225. Regional internet service providers (ISP) play a key role in narrowing the digital connectivity gap but suffer from limited access to credit. According to Anatel, regional ISPs account for 37% of the fixed-broadband market in the country. However, they struggle to access credit, and therefore to invest into network expansion.[12] Such shortage of credit can be explained by difficulties in evaluating the network assets that regional ISPs could pledge as collateral.

Policy recommendations

3.226. Promote investment in telecommunications infrastructure by improving the regulatory framework for private-sector involvement. It is critical to strengthen PPPs and concession schemes and to offer incentives (tax- and/or spectrum-related) to private operators to deploy advanced networks in rural and underserved areas. Complementary regulation should encourage the utilization of shared-infrastructure models and "green networks". Tenders for assigning radioelectric spectrum licenses for mobile communications could envision investment commitments by operators in underserved areas, instead of or in addition to payments for the licenses.

3.227. Encourage the affordable supply of value-added ICT services. Policies should encourage the migration to advanced networks, including 4.5G/LTE-A, 5G, and fiber-to-the-home; the deployment of submarine cables, which would increase available bandwidth and push down wholesale broadband prices; and the development of satellite networks (to connect remote areas where distance and vegetation do not allow for fiber-optics expansion), tower sites,[13] and data centers.

3.228. Strengthen the digital ecosystem. Relevant steps include reducing information asymmetries through data-based assessments of connectivity gaps; creating a secondary market and new regulations for spectrum, to ensure an efficient allocation of monetary incentives and spectrum resources; and modernizing the regulatory framework to bring it in line with technological developments.

12 https://teletime.com.br/05/06/2020/ao-bndes-mctic-pede-politica-de-credito-para-pequenas-de-telecom-e-radiodifusao/
13 There were 60,518 tower sites in Brazil in 2019; 31% were owned by the four largest mobile operators, and 69% by tower companies (TowerExchange, 2019).

Digital Infrastructure and Education

Access to digital information systems and connected devices is an increasingly important element of education quality. In Brazil, 25% of schools lack internet access. Among the schools that have internet connections, only 77.9% have high-speed internet, and just 50% use their internet connections for educational purposes. The government has provided funds to expand internet access among schools, but one-quarter of schools that received these resources were unable to find an appropriate local internet service provider.[1] Some students can also access educational content at home, though often only via smartphone, which diminishes the quality of the experience. In Brazil, 82.7% of households have internet access, among which 99.5% use smartphones while just 45.1% use computers.[2]

Among the countries that administered the 2018 PISA, Brazil had one of the largest disparities in internet access between students from vulnerable schools and students from privileged schools. Socioeconomic gaps also overlap with regional inequalities: in the less-developed north, only 55% of schools have access to high-speed internet. In addition, restrictions on access to school-owned devices, slow download speeds, and frequent technical problems further undermine the quality of internet-enabled education.

To improve in-person and online access to educational materials and services, the government will need to increase investment in sustainable, resilient, and accessible school-based internet infrastructure. The authorities most also help education departments establish public-private partnerships for internet-enabled education services, work to expand access to connected devices at home, especially among the most vulnerable students, and incentivize schools to provide high-quality online learning.

1 MegaEdu
2 PNAD/IBGE

3.229. Incentivize private-sector lending to telecoms operators for network development. The Fundo de Universalização dos Serviços de Telecomunicações (FUST) could offer low-cost, long-term guarantees to banking partners for lending in support of infrastructure investment by regional ISPs. Such guarantees could unlock an estimated US$2 billion of investment in broadband-network expansion over the next five years.

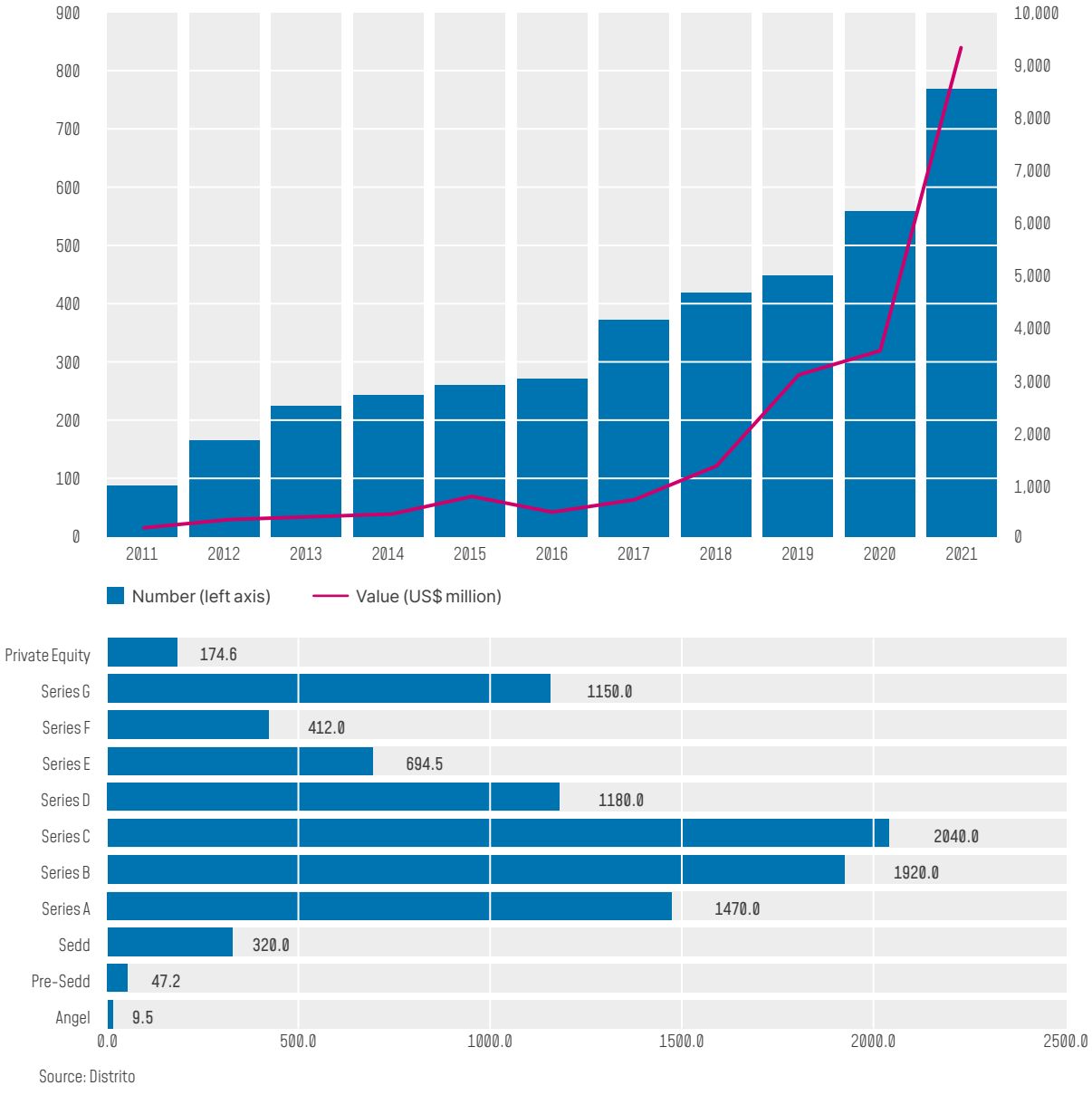
(4) Facilitate entrepreneurship for generating a dynamic economy

Entrepreneurship is essential to productivity growth in Brazil. Young, fast-growing, and innovative businesses are a key driver of both productivity growth and job creation, especially among SMEs and underserved populations, and can help address key social and environmental challenges.[14] *Between 2008 and 2011, fast-growing companies comprised just a small share of all firms in Brazil but were responsible for the majority of net job creation.* [15]

3.230. Brazil has one of the most dynamic innovation ecosystems in the region. Between 2011 and 2021, funding for startups in the country increased by a multiple of 64, from US$0.1 billion to US$9.4 billion[16]—implying a compounded annual growth rate of approximately 52%, and accounting for around 60% of all startup funding in LAC. Through the end of 2021, Brazil was also the base of more than half of all firms in LAC that had attained unicorn status—i.e., a company valuation of at least US$1 billion. However, 2021 saw the largest year-on-year growth in startup funding in Brazil for the decade, up 166% from 2020; a dip in early numbers for 2022 suggests that the levels achieved in 2021 may be unsustainable. Moreover, the growth rate in startup funding over the last decade

14 IDB, 2016.
15 https://endeavor.org.br/as-empresas-que-geraram-quase-50-dos-novos-empregos/.
16 Report Retrospectiva 2021, Distrito.

↓ FIGURE 3.12. Capital commitments to start-ups in Brazil



Source: Distrito

was slightly below the LAC average (approximately 60%), and masked certain persisting challenges in the startup ecosystem.

3.231. Startup investments are highly concentrated on a small number of firms, sectors, and geographical areas, and in late stages of the funding cycle. Although startup investments increased by a factor of 64 in Brazil between 2011 and 2021, the number of funding rounds only increased by a factor of nine, suggesting that larger individual rounds (whose average size grew around seven-fold during that period) drove the rise in overall funding. In 2021, the five largest investments made up approximately 27% of all investments for the year; and in 2020, 60% of all investments concentrated on just 10 firms. Pre-seed, seed, and angel rounds only totaled approximately US$236 million in 2021, less than 2.5% of total startup funding, with seed-stage funding representing a smaller proportion of total funding in 2021 (US$199 million out of US$9.4 billion) than it did in 2016. The most-funded sectors in 2021 were financial technology (fintech), retail technology (retailtech), and real

estate, which combined for 65% of all startup funding. [17] Health and education were fifth and sixth, respectively, in the investment ranking, although they account for the largest share of startups (11.5% and 9.4% respectively). Finally, funding was largely concentrated in startups within the Sao Paulo ecosystem, which hosts most of the 20 Brazilian firms that had unicorn status as of mid-2021. 3.6% of startups are in the North and 13.4% in the Northeast, but the two regions received only 0.3% and 4.7% of investments, respectively. In summary, although startup funding in Brazil has grown considerably over the past decade, it has largely benefitted a small number of Sao Paulo-based fintech, retailtech, and real estate firms in the late phases of their funding cycles.

3.232. Gender gaps stand out in the startup market. Early trends in opportunities for female-led startups have not been promising. In 2020, female founders represented only 4.7% of all founders of digital startups in the country,[18] implying low levels of representativeness, diversity, and opportunity within an ecosystem of 363 incubators and 57 accelerators.[19] Venture capital firms in the country are primarily led by men—74% of them do not have any female founders or board members, and only 3% count women among their founders.[20] Furthermore, in private equity and venture capital firms, the participation of women in management and senior roles is significantly lower than in other sectors of the economy. Even when startups led by female founders succeed in raising venture capital, they receive lower investments than those with male founders.[21]

3.233. Significant efforts are also needed to make the startup ecosystem more inclusive in terms of race. Although they are the majority of the population, non-white Brazilians account for only 27% of startup founders. Non-white founders also struggle to benefit from the abundance of investment sources in the country, since access to the funding community relies on referrals and introductions, and networks of non-white founders that could provide them are still nascent. Moreover, 71% of investors lack non-white founders on their teams, which may create a bias that explains why 76% of investors have the perception that they rarely, if ever, receive pitches from non-white entrepreneurs.

3.234. The regulatory changes introduced by the Marco Legal das Startups need to be implemented and reinforced. The Marco Legal das Startups became effective in August 2021, modernizing the regulatory environment for startups. The law created the conditions to simplify startup financing, including through new instruments and sources of financing; as well as to use public procurement as a potentially powerful source of funding for startups with innovative solutions to challenges of public interest. However, although the new law facilitates the participation of startups in public procurement, many startups remain unaware of the full extent of the opportunities available and are not actively positioning themselves to seize them.

3.235. Limited access to credit and sector-specific constraints inhibit investment. Financing is especially scarce in less-mature fields (e.g., agricultural technology, life sciences, the creative economy), where the ticket size of late-seed capital (typically between US$500,000 and US$1.5 million) is too large for non-institutional investors, such as angel investors and accelerators. Moreover, the seed stage presents large and often difficult-to-measure risks, discouraging risk-averse institutional investors who prefer mature venture capital and private equity segments in more developed fields (e.g., financial technology and e-commerce). High interest rates are also a key challenge for Brazilian startups: as self-funding does not always allow for rapid growth, and the search for external investments is extremely competitive, many entrepreneurs take out credit on a personal basis at an interest that can reach 400% or more per year.

17 Ibid, 2021.
18 Female Founders Report, B2Mamy, Endeavor y Distrito, 2021.
19 Anprotec, 2019.
20 Female Founders Report, B2Mamy, Endeavor y Distrito, 2021.
21 Ibid, 2021.

3.236. Mentorship opportunities and business networks are poorly developed, slowing down startup development. Many promising entrepreneurs lack the business-oriented mentorship necessary to face the foundational challenges of early-stage firms, when they are striving to prove their concept in the market and acquire their first clients. Technology startups often require specialized support, due to their initial cash-flow volatility and the intangible nature of their assets. Early-stage capital funds can provide hands-on support and mentorship to boost initial sales, enhance marketing strategies, strengthen governance structures, and improve resource planning. However, less-mature fields often lack a robust network of accelerators, investors, and mentors, compounding the challenges faced by entrepreneurs.

3.237. Brazil's innovation ecosystem remains relatively disconnected from the rest of the region. Weak regional connectivity limits the potential for co-investment and synergy gains among startups. While regional startups, especially from Argentina, have flourished in Brazil (e.g., Mercado Livre), Brazilian startups have room to further integrate into the regional market and yield substantial gains. Globally, the Brazilian ecosystem does have ties with the US and Israel but has few other extra-regional connections. International venture capital and private equity firms are active in Brazil, but Brazilian entrepreneurs have little exposure to other ecosystems, which may impact their competitiveness and potential for global expansion.

Policy Recommendations

3.238. Leverage new sources and instruments of financing to better support early-stage startups. Although Brazil has a well-developed network of angel investors, their involvement in early-stage startups has been very low in recent years. Match-funding arrangements could help crowd-in additional resources for early-stage startups from angel investors—as well as from crowdfunding, which has grown significantly as a source of financing for startups worldwide. Moreover, venture debt and blended finance solutions could be added to the mix of instruments available to startups, granting entrepreneurs more choice when addressing their financing needs.

3.239. Diversify investments to foster development. New and existing financing instruments could prioritize sectors and regions that are not already well funded but offer potential for sustainable development—such as the bioeconomy. Moreover, fostering greater geographical diversity in funding could help develop local solutions for the Amazon and the social and economic challenges of the North and Northeast.

3.240. Support the incubation and acceleration of startups. Efforts in this area are especially relevant after the phasing out of the Startup Brasil program, and the migration along the startup value chain of many established incubators and accelerators. Startups have been receiving less mentorship and guidance on issues ranging from operational management to modalities and timing of funding.

3.241. Strengthen the pipeline of founders from underrepresented groups. Specifically, programs could be developed to support women and afro-Brazilian founders in their startup journeys. Such programs could include the establishment of networks, mentorship, and funding support targeted to these groups.

3.242. Raise awareness of the benefits of new legal frameworks. For example, success stories from the first startups that participate in public procurement can be disseminated to increase knowledge of available opportunities.

3.243. Create open innovation financing instruments. Open innovation financing instruments could enable the public sector to engage the services of startups. These contractual forms tend to have low implementation costs and strong economic and social impacts. Creating open databases could serve as a starting point for open innovation programs in strategic areas such as smart-city technologies, health, education, mobility, security, and public-sector transparency.

3.244. Facilitate linkages and provide support services. Platforms, mentoring networks, and collaborative workspaces can strengthen the innovation ecosystem. These services are a vital complement to traditional intermediary institutions such as incubators and accelerators.

3.245. Reduce legal and administrative barriers. While startups would benefit from general improvements in the business climate, reducing the cost of opening and closing businesses would have an especially positive impact.

3.246. Increase international cooperation. Greater international cooperation would enable LAC countries to learn from each other and share best practices, while opening up markets and facilitating the development of transnational enterprises. The LAC startup community is young, but already displays greater communication and coordination than more traditional sectors. Regional cooperation could also help close funding gaps and attract new sources of investment.

(5) Leverage new technologies to boost productivity

New technologies can reduce productivity gaps in the Brazilian economy and enable firms to streamline operations, optimize processes, increase efficiency, reduce downtime, and anticipate problems. Agriculture can also benefit from new technologies to become more sustainable and productive.

3.247. Brazil's manufacturing sector has been shrinking over time. Until 2015 Brazil ranked among the world's 10 largest industrial producers, but uncertainty, supply bottlenecks, demand restrictions, and rising inflationary pressures have been hampering industrial production since (OECD, 2021c and CNI, 2021). The decline of manufacturing is undermining Brazil's competitiveness,[22] reducing the share of industrial products in its total exports,[23] and increasing its reliance on imports.[24] Brazil has become increasingly reliant on commodities, natural resource-based manufacturing, and low-productivity services. Manufacturing value-added in 2020 amounted to US$141.2 billion, a 4.3% decline since 2019 in constant 2015 US$ (WB, 2022). Notably, Brazil's manufacturing value-added in 2020 accounted for 1.05% of the world's total, the lowest share since 1997, and down from 1.37% in 2019 and 1.43% in 2018. Five segments drive Brazilian manufacturing: processed food and beverages; chemicals and chemical products; coke, refined petroleum products, and nuclear fuel; motor vehicles, trailers, and semitrailers; and machinery and equipment (UNIDO, 2022).

3.248. Industry 4.0 technologies have the potential to address major weaknesses in Brazilian manufacturing, including high production costs and poor logistics integration. Wages in Brazilian manufacturing are about 50% higher than the LAC average, and the cost of both container imports and exports are above the regional average. Automation could replace an estimated 66.0% of labor-hours in manufacturing in LAC and an estimated 50.7% in Brazil.[25] In the McKinsey Digital Manufacturing Global Expert Survey 2018, about 73% of surveyed Brazilian CEOs and entrepreneurs consider Industry 4.0 to be a high priority.

3.249. Brazil's policy framework does not facilitate technological uptake. Key challenges include: low levels of public investment in R&D; limited integration of ICT into government operations; and the limited role that digital technologies play in the government's overall development strategy.[26]

3.250. Underutilized digital technologies and high implementation costs constrain technological uptake in the manufacturing sector. As of 2016, only 58% of domestic companies were aware of the importance of digital technologies to industrial competitiveness, and less than half

22 Brazil fell from 48th in the World Economic Forum's Global Competitiveness Ranking in 2012, to 81st in 2016.
23 From 54% in 2003, to 36% in 2016.
24 From 15% in 2003, to 26% in 2016 (CNI, 2016).
25 McKinsey Global Institute, 2017.
26 World Economic Forum and INSEAD, 2016.

reported using them. Lack of awareness was particularly acute among SMEs and low-technology firms.[27] Overall, the share of Brazilian manufacturers that use Industry 4.0 technologies is lower than the OECD average. Barriers to adoption include: high implementation costs, unclear returns on investment, shortages of skilled workers, insufficient digital infrastructure, difficulty in identifying suitable technologies and partners, and lack of adequate financing (CNI, 2016). In addition, 66% of Brazilian companies cite high implementation costs as a key barrier to adopting digital technologies[28].

3.251. Poor adoption by MSMEs drives the gap between Brazil and developed countries in the use of digital technologies by firms.[29] Brazilian MSMEs do not typically use advanced digital technologies based on big data, artificial intelligence, or the internet of things. Despite the acceleration in digital transformation precipitated by the pandemic, a survey of over 2,000 micro and small firms in Brazil in 2021 showed that approximately one-third of them could be classified as Intermediate (30%) or Advanced (3%) in terms of digital maturity, while the vast majority were at Beginner or Basic level.[30] 81% of the firms surveyed used digital technologies to engage clients (mainly through social media or a website), but the majority reported not using cloud computing (56%) or cyber security tools (57%), and only 23% reported using data to inform business decisions. High costs emerged as the most significant barrier to the digital transformation, cited by 38% of firms, followed by: difficulty in finding qualified human resources (14%), difficulty in determining priority investments (13%), lack of a digitization strategy within the firm (11%), and lack of basic technology use within the firm upon which to construct the digital transformation (10%). According to IDC (2020), fostering digitalization of Brazilian SMEs could add US$9 billion to the country's GDP by 2024.[31]

3.252. Technology can increase agricultural productivity. A wave of innovation based on digital applications, automation, biotechnology, and the rapidly growing field of agricultural technology has created new opportunities for agricultural productivity growth.[32] Brazil is home to an estimated 200 agricultural technology firms—a number that has quadrupled over the last two year—many of which are incubated in universities.

3.253. Agricultural technology firms face significant challenges. Despite the growth in their number, agricultural technology firms make up just 2% of Brazil's startups, and more than 70% of them are based in the Southeast. Many technological innovations they build on originated from research carried out either by the Brazilian Agricultural Research Corporation (*Empresa Brasileira de Pesquisa Agropecuária*, EMBRAPA), or by public universities. Despite rising levels of funding and a growing number of acceleration programs, an estimated 80% of agricultural technology firms have difficulty attracting investment, and 42% are self-financed. Many of the technologies they develop can be used by farms of all sizes, but weak extension services and poor internet connectivity in rural areas slow down the uptake of innovation.

Policy recommendations

3.254. Carry out structural reforms that encourage competition and global integration. Greater trade openness can incentivize the adoption of efficient technologies not only by export-driven sectors, but also by the more domestically oriented manufacturing sector (Rodrik et al, 2017). Industry 4.0 technologies can especially benefit the aircraft and auto industries, while the subsectors with the highest export potential are expected to include paper products, motor vehicles and parts, ferrous metals, machinery, electricity, and chemicals (INTRACEN, 2022). Deeper integration into the global economy

27 CNI, 2016.
28 Ibid.
29 OECD Reviews of Digital Transformation: Going Digital in Brazil, OECD, 2020.
30 Maturidade Digital das MPEs Brasileiras, ABDI, 2021.
31 IDC (2020). 2020 Small Business Digital transformation – A Snapshot of Eight of the World's Leading Markets.
32 Vitón et al., 2017

and rising domestic competition (achievable, for example, by using public procurement to target domestically generated innovation) could boost Brazil's productivity and, together with upskilling initiatives, facilitate the shift of jobs towards more productive firms and activities. Boosting incentives for training institutions to focus on employability can also help to better align skills supply with market demand (OECD, 2020).

3.255. Accelerate the digital transformation with efforts tailored to the digital maturity of each firm. A tool for assessing the digital maturity of firms, adapted to the Brazilian context, could be applied to thousands of MSMEs, and allow for the design of initiatives proportionate to their level of maturity. The most mature SMEs could benefit from vouchers for digital extension services relevant to their sectors and objectives, while less digitally mature firms could receive free or subsidized online training courses or services targeted to their needs.

3.256. Reduce the fiscal burden on technology uptake. Reforms to boost the digital transformation in manufacturing should facilitate the adoption or adaptation of foreign technology by local firms. However, high taxes and import tariffs on ICT and advanced equipment undermine transformation efforts by firms. Moreover, the OECD recommends reducing the special tax on royalties and administrative and technical services provided by non-residents (CIDE), as well as simplifying the taxation of goods and services arising from new business models enabled by digitization (OECD, 2020).

3.257. Enable the adoption of Industry 4.0 technologies. The government should promote an enabling environment by investing in collaborative infrastructure, including specialized laboratories for R&D, and encouraging entrepreneurship.[33] Demonstration platforms could boost technological dissemination and encourage partnerships among key stakeholders. Innovation policies should reflect the importance of "leapfrogging" to close the gap with countries at more advanced stages of the digital transformation. The public sector should scale up existing programs to support startups and early-stage SMEs in ICT, and offer training and subsidies to encourage the use of ICT by firms and households. Accelerating the adoption of e-government technologies could also catalyze technological uptake in the private sector.

3.258. Promote the development of sustainable agricultural technologies. Creating more opportunities for interaction between private firms and public agencies, as well as the incubators and accelerators that bring ideas to fruition, can encourage innovative solutions. sustainable agricultural technologies have the potential to significantly contribute to Brazil's food security (per the criteria presented in IDBG's Food Security Sector Framework Document). In the context of the Russian invasion of Ukraine, indicated that Brazil is heavily dependent on agricultural inputs (i.e., fertilizers) imported from the conflict zone, which represents short-medium risks to the production of food for domestic consumption. This dependency can be reduced through the deployment of new technologies.

(6) Improve the quality of life and inclusion using new technologies[34]

New technologies can help improve the provision of public services and develop new services. Fintechs, in particular, offer major opportunities to increase financial inclusion, including through electronic payments, loans, and other digital services.

SMART CITIES

3.259. Most Brazilian cities do not have a municipal broadband network. Municipal broadband networks contribute to the development of intelligent cities. They allow for the installation of IoT sensors and the collection of data to monitor real-time events in public spaces, make informed decisions, and provide innovative services to citizens. Good connectivity, digital devices, and digital skills

33 For instance, Piracicaba, a small city in the state of São Paulo, has become a leading agtech center thanks to the cooperation of local industry players with universities, including ESALQ of São Paulo University (ranked seventh in the world for Agriculture Sciences by US News & World Report). 18% of all agtech startups in Brazil were created in the city. (Startup Genome, 2018).

34 Throughout the text we discuss the use of new technologies in different areas as health, education, citizen security, fiscal management among other sectors.

enhance government transactions, health services, education, and payments, thus increasing civic engagement and participation.[35]

3.260. Brazilian cities lack public policies, skills, and tools for data management. The digital transformation of cities has led to a major increase in the generation of urban data. In 2020, data analysis supported decision-making and the elaboration of public policies to respond to the health emergency caused by the COVID-19 pandemic. Despite widespread enthusiasm for digital solutions based on big data, cities are lagging in the adoption of data-analysis tools to respond to urban challenges and support evidence-based policies. The systematic collection, preparation, and analysis of big data from urban environments require specialized knowledge, technological tools, and professional experience. As an additional challenge, many valuable city-level databases include personal information on citizens, which must be managed with extreme care to protect their human rights and privacy.

Policy Recommendations

3.261. Develop policies and projects in support of smart cities. Brazilian cities can draw on best practices and digital technologies (such as IoT devices, 5G networks, and big data solutions) to respond to current and future urban challenges, improve the quality and efficiency of public management, and pursue an inclusive and sustainable urban development.

3.262. Expand municipal broadband connectivity. Cities would benefit from connected public buildings and Wi-Fi connectivity in public spaces, and from fostering opportunities to enhance the supply and accessibility of public services through digital channels.

3.263. Assist municipal authorities in developing and implementing data management policies for urban planning. Priority areas include: a strategy for open and secure data, the digitization of urban services, the sharing of knowledge and best practices on data protection and cybersecurity, and the establishment of dedicated teams within municipalities to manage and analyze urban data.

3.264. Build capacity among public officials on matters related to smart cities, data management, and urban development. Smart cities are a novel and multi-faceted field, and the relevant technologies evolve rapidly. Therefore, public officials need access to capacity-building programs in areas such as digital technologies, data management, and data privacy, as well as in the intersection of urban development with big data, artificial intelligence, machine learning, Geographic Information Systems (GIS), and cloud computing.

FINANCIAL INCLUSION

3.265. Financial inclusion in Brazil remains a challenge. The estimated finance gap for MSMEs in the formal sector is equivalent to 27% of GDP, and rises to 49% when including the informal sector (SME Finance Forum, 2018). Similarly, households in Brazil have less access to many types of financial services than those in comparator countries. As of 2017, only 9% of Brazilian families reported having had a loan in the previous year, and only 5% had a mortgage loan—below the averages for LAC (12% and 7%, respectively) and the OECD (17% and 27%, respectively). In addition, an estimated 45 million Brazilians—more than 20% of the population—have no access to financial services, but make annual transactions worth approximately US$200 billion (EIU, 2021). Although Brazil has the largest network of credit unions in LAC (847 entities managing more than US$65 billion in assets), they only reach 8% of the population, one of the lowest penetration rates in the region (WOCCU, 2020).

3.266. Lack of finance is widespread into different groups in Brazil (gender, regional, and size of companies considered). Access to credit for women in Brazil (7%) is also lower than in LAC-26 (11%) and the OECD (15%), and similar gaps exist in access to credit for the poor and those living in

35 In LAC, online procedures are 98% cheaper and 74% faster than face-to-face procedures, significantly improving service delivery and inclusivity of access. Roseth et al. (2018)

rural areas (Global Findex Database, 2017). Regarding the response to COVID-19, a survey carried out by SEBRAE shows that companies owned or led by afrodescendants are having more difficulties than those owned or led by white population in terms of resuming sales at the level prior to the pandemic. According to the survey, 70% of afrodescendants entrepreneurs are earning less than pre-COVID-19 times; this figure is 60% in the case of white entrepreneurs[36]. Finally, monitoring carried out by SEBRAE shows that women entrepreneurs who are afrodescendants are the most affected by the commercial restrictions of the pandemic and the group that has presented the most rejections when applying for a loan. Afrodescendants' women had the highest proportion of negative credit request (25%), compared to 17% of white women[37]. The North and Northeast regions account for 36% of the country's population, but for only 11% of loans and 18% of savings deposits (Fitch Solutions, 2020).

3.267. Several barriers hinder the insertion of Brazilian population in the financial markets. Structural challenges of financial inclusion derive from supply barriers, difficulty to access the financial system, the lack of banking infrastructure, risk perception by financial institutions, guarantee requirements, relatively low knowledge about existing financial products, and their suitability.

3.268. Fintechs can be a tool for enhancing financial inclusion. By increasing the use of digital technologies, fintechs find several innovative ways to improve customer service, raise capital, facilitate electronic payments and analyze large volumes of data. Thus, they manage to be more agile compared to traditional financial institutions, and adapt more quickly to the needs of the market (Hoder, Wagner, Sguerra & Bertol, 2016). More than 60% of fintech companies in LAC provide financial services to households or companies—such as electronic payments, loans, and other digital services—and more than 35% cater to underserved segments, including MSMEs and households. However, only 31% of fintechs in Brazil have a specific focus on financial inclusion, less than in Chile (32%), Mexico (32%), Peru (39%), and Colombia (42%). In this context, the pandemic and ensuing social-distancing measures have accelerated the adoption of digital financial tools, for which Brazilians are well positioned thanks the high penetration of mobile phones in the country.[38]

3.269. The Brazilian fintech market is the most developed in the region. Brazil hosts 31% of all fintechs in LAC, followed by Mexico (21%) and Colombia (11%). The main challenges for the Brazilian fintech sector are scalability and access to finance. Only 55% of Brazilian fintechs have received cross-border investment, a smaller share than in Argentina (61%), Mexico (63%), and Chile (72%)[39].

3.270. Policy focusses on the payments sector has made it attractive to Brazilian fintechs, and the PIX payment system has been a success. The payments space has undergone major change in recent years and witnessed the highest number of fintech entrants,[40] authorized on the basis of the regulatory framework that the Central Bank of Brazil (CBB) implemented in the early 2010s.[41] More recently, the CBB promoted the launch of PIX, a fast-payment system that allows for free payments between individuals and low charges for merchants. In little over a year since becoming active in November 2020, PIX has signed up 67% of adults in Brazil.[42] The mandatory participation of large banks in the scheme, and the central bank's dual role as infrastructure provider and rule setter, have been key ingredients of its success. PIX is an example of a centralized payment system that generates financial inclusion and formalization and reaches segments of the population that were not served by the traditional financial system.

36 Sebrae (2020).
37 EBC. Brazilian Communications Company.
38 Economist Intelligence Unit (2021)
39 IDB (2022). https://publications.iadb.org/es/fintech-en-america-latina-y-el-caribe-un-ecosistema-consolidado-para-la-recuperacion
40 Fintechlab (2020). *Radar Fintechlab 2020*.
41 As an example, see. BCB (2013). *Circular n. 3.682*.
42 Duarte et al. (2022). "Central banks, the monetary system and public payment infrastructures: lessons from Brazil's Pix". *BIS Bulletin*, n. 52.

Financial Inclusion with a Gender and Diversity Perspective

In Brazil, multidimensional inequalities affect access to finance and the use of credit products and services. Women, *indigenas*, *pretos*, *pardos*, persons with disabilities, and members of sexual and gender minorities face unique barriers that inhibit their participation in financial markets, with negative implications for their economic empowerment and social wellbeing.

Gender-disaggregated financial data are relatively scarce in Brazil. However, female-owned businesses are marginally more concentrated in the commercial sector than are their male-owned counterparts (36.6% versus 34.6%).[1] While 6.6% of male entrepreneurs report having requested loans to open or expand a business, the same is true for just 2.9% of women.[2] In the last quarter of 2020, 58% of all credit to micro-entrepreneurs was allocated to men, while 42% was allocated to women.[3]

Gender differences also affect the amount of financing obtained. In 2019, 70% of women were able to obtain loans through the financial system, compared to 60% of men, yet loans to men were in significantly greater amounts.[4] Over half of all loans to men exceeded R$30,000, and 30% exceeded R$60,000, whilst most loans to women were for amounts under R$30,000, and 29% were under R$10,000.[5]

Similar patterns are evident across other disadvantaged groups. While no racially disaggregated information is available on microenterprise ownership at the national level, a 2017 IDB report[6] found that in two Brazilian cities the share of microentrepreneurs with unsatisfied demand for credit was 44.6% among *pretos*, 35.1% among *pardos*, and 29.4% among *brancos*. Additional surveys found that firms owned or led by *pretos* and *pardos* had more difficulty than firms owned or led by *brancos* in returning their sales to pre-pandemic levels. As a result, 70% of *preto* and *pardo* entrepreneurs are earning less than they were before COVID-19, versus about 60% of *branco* entrepreneurs.[7] Female *preto* and *pardo* entrepreneurs were most severely affected by the commercial restrictions imposed during the pandemic, and this group had the highest rate of rejected loan applications at 25%, compared to a rate of 17 percent among *branco* women.[8]

Indigenas face especially severe credit constraints, as their households and businesses are often located in remote areas far from banking infrastructure. Many *indigena* communities suffer from elevated poverty rates and face information gaps and other challenges that limit their access to the financial system.[9] Brazil's Securities and Exchange Commission (CVM) has partnered with the OECD[10] to pilot initiatives aimed at expanding financial education and entrepreneurship among *indigena* communities by leveraging new technologies to overcome constraints and maximize positive social and environmental impacts.

Access to finance among persons with disabilities and members of sexual and gender minorities is less well studied but expanding the reach of financial services among these groups represents an opportunity to reinforce social resilience and address sources of exclusion and vulnerability. In 2010, about 24% of the Brazilian population reported some degree of physical or cognitive disability.[11] An estimated 13.6 million Brazilians are members of the LGBT community, the highest number in the LAC region, with an estimated spending power totaling US$107,000 million in 2018 (5.35% of GDP)[12]. These segments of the population face barriers to financial inclusion due to an elevated risk perception by financial institutions, higher guarantee requirements, and limited knowledge about existing financial products and their suitability. Alleviating these challenges could greatly expand financial access among two large, underserved communities.

1 Pesquisa Nacional por Amostras de Domicílio Contínua (PNADC) del Instituto Brasileiro de Geografia e Estadísticas (IBGE), 2019
2 Global Findex 2017
3 Central Bank of Brazil, series 26968 and 26969
4 For a discussion about access to credit and gender for SMEs see IDB (2022). Caracterização das MPMES brasileiras e os entraves do acesso ao credito sob a perspectiva de gênero.
5 Sebrae. 2019. Pesquisa "O Financiamento dos Pequenos Negócios".
6 BID, 2017, *Acesso ao crédito produtivo pelos microempreendedores afrodescendentes.* All racial affiliations were self-identified.
7 Servicio Brasileño de Apoyo a la Micro y Pequeña Empresa (Sebrae). 2020.
8 EBC. Brazilian Communications Company.
9 Fundación Microfinanzas BBVA
10 CVM and OECD
11 IBGE, 2010 census
12 https://www.larepublica.co/globoeconomia/la-comunidad-lgbt-movio-el-ano-pasado-us-253-000-millones-en-america-latina-2878418

3.271. The Brazilian venture capital ecosystem has been supporting the fintech sector. The impressive performance of the Brazilian venture capital (VC) ecosystem in recent years has showcased the opportunities for technology investment in the country.[43] VC investments in Brazil have been the highest in the region, followed by Mexico, Colombia, Chile, and Argentina.[44] In the first half of 2021, Brazilian startups received a combined US$5.2 billion of investments. Local venture capital tends to focus on early-stage firms, and average ticket size tends to be small. According to the Brazilian Association of Venture Capital, VC investments in Brazil in 2020 covered a variety of sectors, including fintech and insuretech (23%) healthtech (health technology) (11%), adtech and martech (advertising and marketing technology) (10%), and software (9%).[45]

3.272. Fintech regulation extends beyond payments. Crowdfunding, regulated by the Securities and Exchange Commission of Brazil (CVM) since 2017,[46] and fintech credit, regulated by the CBB since 2018,[47] have grown significantly[48] and evolved into important sources of funding for SMEs. The CVM has also defined the applicability of regulations on general investment advice and asset management to providers of automated investment-management services (so-called robo-advisors).[49] Furthermore, Brazil is a leader in the implementation of open finance, with relative success in terms of customer adoption.[50] Congress is considering a legislative proposal about regulation of virtual-asset service providers,[51] who operate in the cryptocurrency space, while the CBB is studying the implementation of a central bank digital currency (CBDC).[52]

3.273. Financial regulators have been proactive and well-coordinated in adopting mechanisms to foster innovation. The CBB, the CVM, and Superintendence of Private Insurance (SUSEP) have all created regulatory sandboxes for testing innovative services and solutions.[53] Furthermore, the CBB has developed an industry sandbox called LIFT Lab,[54] jointly with Fenasbac; as well as the *Laboratório de Inovações Financeiras*, a partnership between BID, ABDE, CVM and GIZ.[55]

Policy recommendations

3.274. Increase financial inclusion. The banking sector can take a more prominent role in microcredit. However, banks will need institutional support on funding, risk mitigation, and capacity building to assess and manage risks. Partnerships with smaller banks and credit unions could support better regional distribution of financial services, particularly in the North and Northeast. A faster and broader expansion of fintech companies should help close the gap in access for the unbanked. Digital banks are a natural fit for underserved segments of the population and young customers, with amplified effects on financial inclusion, and offer potential to expand SME lending. Finally, financial institutions will need support, through guaranteed schemes as well as capital and quasi-capital instruments.

3.275. Improve access to credit for SMEs owned by women and Afro-Brazilians. Globally, the rate of participation in entrepreneurship for women is equal to 80% of the rate for men;[56] in Brazil, however, less than 5% of start-ups in innovative sectors were founded exclusively by women,

43 Polymath Ventures (2020)
44 Association for Private Capital Investment in Latin America (2021)
45 Brazilian Association of Venture Capital (2021)
46 CVM (2017). *Instrução n. 588*.
47 CMN (2018). *Resolução n. 4.656*.
48 CVM (2022). *Crowdfunding de Investimento: Evolução do Mercado 2021*.
49 CVM (2021b). *Resolução n. 19*; CVM (2021a). *Resolução n. 21*.
50 Open Banking Brasil (2022). *Dados e estatísticas de desempenho e disponibilidade do Open Banking*.
51 Brasil (2021). *Projeto de Lei 4401/2021*.
52 BCB (2021). *BC apresenta diretrizes para o potencial desenvolvimento do real em formato digital*.
53 See IDB (2022). *FintechRegMap*.
54 https://www.liftlab.com.br/
55 https://labinovacaofinanceira.com/
56 Citigroup. *Women Entrepreneurs: Catalyzing Growth, Innovation, and Equality*. Citi GPS: Global Perspectives & Solutions, 2022

while 90% were founded exclusively by men.[57] Lack of incentives and difficult access to finance are major barriers to female participation in the innovation ecosystem, despite evidence that women-led businesses can be more profitable than those led by men when they enjoy equal access to finance.[58] Affirmative-action programs in the financial sector can improve access to credit for women and Afro-Brazilians to start or expand a business. This requires better and more-inclusive risk assessment policies, as well as a greater share of women in decision-making positions at investment companies. Increasing diversity among investors also has a positive effect on portfolio diversity. Women-led SMEs need support to overcome other structural bottlenecks that affect them disproportionately, such as in access to networking channels.

3.276. Support fintech companies to expand access to services for the unbanked. Supporting access to finance for fintech companies active in digital payments and loans, insurance, and crowdfunding can help mitigate their funding challenges and promote financial inclusion.

3.277. Reduce bias in the financial system. This goal can be pursued through improvement in four major areas:

- **I.** devising institutional guidelines or action plans on gender and diversity, incorporating a gender perspective on investment;
- **II.** disaggregating data by gender and other diversity factors, to better guide financial product design;
- **III.** developing training and knowledge-sharing campaigns on gender and diversity concepts, and the main barriers for diverse groups, and
- **IV.** designing new financial products suited to the needs of women and diverse groups to foster their access to credit and markets, improve productivity, and enhance technical knowledge.

Such instruments should consider financial and non-financial needs and features of the groups they target, from income and availability of collateral to financial literacy.

3.278. Regulation can improve on several fronts. Regulatory progress has already enhanced financial inclusion, but much remains to be done to ensure financial stability and asses the effects of recent reforms. First, it is important for the BCB to determine the impacts on competition and transparency from the implementation of PIX, and from the central bank's dual role in it. On the other hand, the development of a CBDC should be accompanied by an assessment of its effects on payments system, credit channels, and other financial infrastructure. The implementation of regulatory sandboxes has proved successful relative to similar initiatives in peer countries, but there is room to evaluate the institutional capacity of the three relevant regulators, while considering the consolidation of some of their activities. Moreover, although fintech might fall within the remit of more than one regulator, the growth of the ecosystem would benefit from an integrated innovation hub to foster regulatory dialogue with innovative players. Cryptoasset regulation should maintain a forward-looking stance, while taking into account the industrial organization of the sector, its extra-territorial nature, and the ensuing limitations to regulatory implementation and enforcement. Finally, better regulation of digital onboarding could foster financial inclusion.

(7) Use the technology to improve the efficiency and transparency of the public sector

Digital technology has enabled innovations in fiscal policy that are gradually supplanting traditional strategies and practices, both globally and in the LAC region. Technology has transformed tax inspections and audits, public expenditure targeting, public procurement management, integrated public financial management, public investment prioritization and execution, and fiscal transparency.[59]

57 Female Founders Report 2021: Liderança feminine e empreendimentos no ecossistema brasileiro de inovação
58 Citigroup. *Women Entrepreneurs: Catalyzing Growth, Innovation, and Equality.* Citi GPS: Global Perspectives & Solutions, 2022
59 Gupta, et al., 2017

3.279. Digitalization of public services can lead to substantial savings for the government and society. IDB (2022) study with the municipality of Sao Paulo found that after the digitalization, the cost of public service citizens and firms was reduced, on average, by 74%. In the case of the public administration, the unitary cost of a digital service after digitalization was 40% lower. After one year of the implementation of the digitalization program, the return on investment was R$27 per 1 R$.[60]

3.280. Digital technologies could increase indirect tax collection globally by an estimated 2% of GDP per year. In the future, digital tools could help reveal and tax the wealth hidden in tax heavens, which is estimated to amount to 10% of global GDP.[61] A recent study revealed that electronic invoicing has increased tax collection in five of the seven LAC countries that have implemented it, including countrywide in Argentina, Ecuador, Mexico, and Uruguay, as well as in the Brazilian state of São Paulo.[62] In Brazil, the Electronic Fiscal Invoice (*Nota Fiscal Electrônica*) has reduced the VAT evasion rate from 32% to 25%, while promoting private-sector development and reducing informality.[63] Halving the "digitization gap" between advanced and developing countries could increase VAT collection in the latter group by about 1.7% of GDP. Worldwide, big data analytics could help recover approximately 20% of the public revenue lost to tax evasion.[64]

3.281. Digital technologies can enhance public expenditure efficiency. The introduction of e-procurement systems in India and Indonesia has improved the quality of roads and increased compliance with project-execution timelines.[65] Similarly, the use of e-procurement systems in Paraguay has reduced the final prices of goods purchased by the government by about 20%.[66] In Argentina, the Identification System for Tax and Social Information (*Sistema de Identificación de Información Tributaria y Social*, SINTyS) uses cloud computing to record and update data on individuals and businesses in real time, enabling the government to more efficiently target spending, reduce tax evasion, and control informality. The SINTyS generated approximately US$120 million in fiscal savings between 2014 and 2015.[67]

3.282. Digital technologies can make the public sector more transparent. According to the OECD (2014), e-government technologies can foster more open and inclusive government processes, encourage the engagement of citizens, the private sector, and civil society in the policy process and in the design and implementation of public services, and create a data-driven culture in the public sector.

3.283. Digital technologies can reduce the length, complexity, and cost of administrative procedures. E-government technologies allow for process automation, simplification, and remote access, generating efficiency gains in both the public and private sectors. Computerized administrative processes and digital recordkeeping can reduce corruption, improve transparency, increase the accuracy of public records, and facilitate data analysis.

3.284. The federal government has made progress on digitization. At the federal level, Brazil was ranked among the top 20 countries in the world in the United Nations online services sub-index (UN, 2020),[68] and reached seventh place out of 198 in the World Bank's digital government maturity index, which measures progress on the digital government agenda (World Bank, 2021).[69] The Digital Government Strategy (EGD), published in April 2020, set out a goal of digitizing 100% of federal government services by the end

60 IDB, 2022 – Benefçios Econômicos da transformação Digital de Serviços Públicos – o caso da Cidade de São Paulo.
61 FMI, 2018; Slemrod et al., 2017; Pomeranz, 2015; Almunia and López Rodríguez, 2018; Best et al., 2015.
62 Barreix y Zambrano, 2018.
63 Cunningham, Davis, and Dohrmann, 2018.
64 Ibid.
65 Lewis-Faupel et al., 2016.
66 DNCP, undated.
67 Pessino, 2017.
68 United Nations (2020).
69 World Bank (2021).

of 2022. As of May 2022, over 75% of such services were available in digital format, and more than 118 million Brazilians (56% of the population) had registered on the government's digital services platform Gov.Br. The Secretariat of Digital Government within the Ministry of Economy reported annual savings of R$4.5 billion between 2019 and 2021 from the digitization of government procedures.[70]

3.285. The pandemic has accelerated the digital transformation of state governments, but progress has been uneven. In 2019, only 4% of state services were digitized, and only 31% of states reported that the service most frequently used by their citizens during the previous year was available in an entirely digital format.[71] As of 2022, digital services account for 61% of all state services in Rio Grande do Sul, 25% in Bahia and Sao Paulo, and 7% in Alagoas and Ceará. The Group for Digital Transformation of state governments, established in 2019, created an index measuring digital-services maturity at state level, which in 2021 ranked 11 states as "regular" or "poor".[72] An IDB study conducted with GTD in September 2020 found that: 40% of states had a digital transformation strategy approved or in design; 20% had a dedicated cybersecurity team; 25% had an interoperability platform; 25% had a cloud service contracting strategy; and 27% used artificial intelligence.[73]

3.286. Municipalities are lagging on digitization. During the pandemic, a national survey found that the digital services offered by Brazilian municipalities were the least known by the public. Moreover, there was no rigorous analysis of progress in digital government at the municipal level. That said, municipalities such as São Paulo,[74] Porto Alegre, and Belo Horizonte stood out for their advances. To promote the municipal digital transition, in April 2022 the federal government, with support from the IDB, launched a digital government platform for municipalities, with a self-diagnostic tool and a module to structure investment projects.[75]

3.287. Cybersecurity is a concern. In February 2020 the federal government published its National Cybersecurity Strategy, which marked an important regulatory advance. However, the 2020 Cybersecurity Report found that coordination, operational, and talent challenges remain in both the public and private sectors. Moreover, most state governments do not have a cybersecurity strategy or cyber-emergency response centers (CERT). According to an IBM study, cyberattacks cost Brazilian companies an average of R$5.88 million per year.

Policy Recommendations

3.288. Adopt digital technologies to support fiscal policymaking and management. On the revenue side, digital technologies have the potential to reduce tax fraud and evasion, and to simplify and facilitate tax compliance. Digital technologies can compile detailed and reliable information about taxpayers and their transactions more quickly, at a lower cost, and in a format that is more conducive to analysis than would be possible using traditional forms of tax administration.[76] Various OECD and LAC countries already use data science and artificial intelligence to obtain real-time financial and tax information, establish transactional relationships, and identify and estimate risks of tax fraud.[77] Electronic invoices and other electronic fiscal documents

70 www.gov.br
71 CETIC (2020).
72 ABEP (2021)
73 IDB (2021a)
74 IDB (2022)
75 https://plataforma.rede.gov.br/
76 OCDE 2016; Seco and Muñoz 2018.
77 E.g., the UK's Connect system collects and analyzes data from over 40 databases and sources of information, including social networks.

could allow Brazil's tax administration to prepare pre-filled returns for VAT, as it already does for income tax.[78] Mobile connectivity can let taxpayers make inquiries and complete transactions with the tax administration and prepare, fill, and monitor their tax returns, as well as support the work of tax inspectors on the ground. Application program interface (API) technologies can help businesses connect their information management systems directly to the tax administration, adding flexibility and reducing compliance costs. Blockchain technology can reduce tax fraud along territorial frontiers, increase the efficiency of the customs administration, and improve payroll taxation.[79]

3.289. Use digital technologies to strengthen expenditure management. Applications that make greater use of the public financial information generated by the Integrated Financial Administration System for the Federal Government (*Sistema Integrado de Administração Financeira do Governo Federal*, SIAF) could enhance the efficiency of budget preparation, execution, and auditing. Big dta analytics could improve public investment planning and prioritization, by helping better to align policy priorities with the demands and needs of the population.

3.290. Draw on digital technologies to improve public financial management. Big data analytics could generate valuable information to guide budget allocation, optimize cash management, and improve financial programming. Increasing the use of SIAF data, and integrating it into expenditure and statistical databases, could enable agencies to use automated diagnostics, visualizations, and forecasts to improve financial planning, strengthen cash and debt management, and enhance fiscal risk assessments.[80]

3.291. Utilize digital technologies to enhance public procurement. Big data analytics and data science have increased the efficiency of public procurement in the states of Rio Grande do Sul and Amazonas, which use information from electronic invoices to set reference prices in public tenders. This strategy has accelerated the procurement process and saved approximately 23% on the value of purchases in Amazonas alone. In addition, blockchain technology could improve the efficiency, security, and transparency of transactions at various stages of public procurement.[81]

3.292. Promote digital technologies to improve social programs. Digital biometric identification can improve the targeting of social programs and reduce leakages, by facilitating beneficiary cross-checking and verification by multiple agencies.[82] Integrated beneficiary databases can be used to coordinate multidimensional interventions tailored to individual households.

3.293. Support digital transformation at the subnational level. The Brasil Mais Digital Program has already approved support operations in the states of Ceará, Alagoas, and Sao Paulo, and is in advanced talks with other states including Mato Grosso, Bahia, and Paraiba. Municipalities will benefit from the implementation of the Rede Gov Br Platform, and from partnerships with national and/or regional development banks. The latter institutions have the potential to finance the relatively small projects that are usually key to the digital agenda of municipalities, but which the IDB is not best placed to support directly.

3.294. Strengthen national cybersecurity policy and operations. This entails reviewing their governance and coordination model, emphasizing digital education, and building capacity at both the federal and subnational levels of government.

78 E.g., Chile's Internal Revenue Service uses Form 29 to improve fiscal control and facilitate tax compliance for more than 700,000 taxpayers.

79 Ainsworth and Viitasaari, 2017. A blockchain-based system has been proposed to strengthen VAT collection in the EU, and a similar system could be applied in Brazil. Singapore has partnered with IBM to apply blockchain to the customs service.

80 E.g., Singapore's FI@Gov system is based on a similar principle.

81 In the US, the General Services Administration and Federal Acquisition Service piloted the blockchain-based FASt Lane system to buy materials and IT services, reducing processing times by about 90%. In Mexico, procurement data is published under Open Contracting Data Standards.

82 In India, the implementation of payments via smartcards using biometric identification and authentication reduced leakages by about 40%, expanded access to social programs by 17%, and made payments timelier and more predictable (Muralidharan, Niehaus, and Sukhtankar, 2016).

4º PILLAR

Incorporating green growth into the country's development model

Recommendations for placing green growth at the center of Brazil's development model fall under four policy areas: **(1)** Foster adaptation and climate resilience; **(2)** Build sustainable, resilient, and inclusive infrastructure; **(3)** Promote sustainability in the bioeconomy, agriculture and tourism; and **(4)** Channel financial resources to the green economy.

(1) Foster adaptation and climate resilience

Brazil can promote socio-economic prosperity in parallel with the conservation and sustainable use of its natural assets. Climate change is a developmental challenge—not just an environmental one—which jeopardizes the achievement of key development goals and the viability of infrastructural assets essential to future prosperity. Increasingly frequent and severe extreme events, and the acceleration in slow-onset trends—such as rises in temperatures and sea levels, and glacier retreat—will take a toll on development and compromise socio-economic progress. Adaptation and climate resilience are the only possible strategies to protect assets from current and expected climate risks.

3.295. **Brazil's current climate targets and policies are inconsistent with the Paris Agreement's goal of limiting temperature increase to 1.5°C above pre-industrial levels.** Deforestation, agriculture, and the energy sector are the main drivers of Brazil's greenhouse gases (GHG) emissions.[1] The country submitted its Nationally Determined Contribution (NDC) in 2022, committing to reducing GHG emissions by 37% from 2005 levels by 2025, but it has not finalized its Long-Term Strategy. Brazil's climate commitments and policies are in line with the Paris Agreement, yet the implement has not been satisfactory.

3.296. **Brazil is home to unique ecosystems with global significance that will be adversely affected by climate change, including the Amazon, the Cerrado, and the Pantanal.** The deforestation of the Cerrado savannah causes local warming due to the resulting increase in energy balance and evapotranspiration. Historical land-cover change, and climate change have had a strong impact on biodiversity in this region, causing the extinction of 657 plant species. Lower rainfall in the Cerrado has affected the main water supply reserve for major cities in central Brazil, leading to a water crisis in 2016/17 and hampering hydropower generation (IPCC, 2022). In the Brazilian Amazon, deforestation to clear agricultural land is the main cause of tree mortality. Almost half the surface of the Amazon has experienced extreme dryness during the warm phases of the El Niño-Southern Oscillation (ENSO),[2] which can contribute to large forest fires. Diminished vegetation cover following wildfires, combined with tree mortality, can reduce long-term water infiltration, increase soil erosion and flash flooding, and release sediments that degrade drinking--water quality. Higher temperatures and lower rainfall are expected to deepen the water deficit in the Pantanal wetland, which houses the largest floodplains on the planet. The projected impacts of climate change include profound changes in

1 Climate Action Tracker. 2022.
2 The ENSO is a recurring climate pattern involving changes in the temperature of waters in the central and eastern tropical Pacific Ocean.

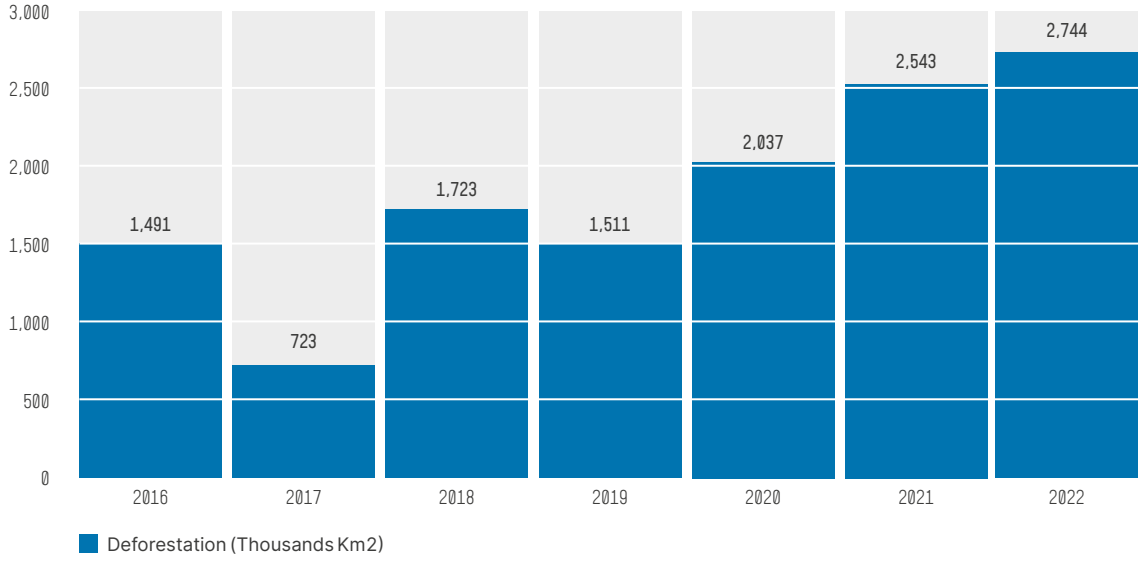
the dynamics of annual flooding for the swamp wetland, severely affecting biodiversity, ecosystem services such as flood protection, and water security (IPCC, 2022).

3.297. The effects of climate change will be most severe on the agriculture, forestry, and energy sectors. Key specialty crops, such as coffee and cocoa, are drought-sensitive and rain-dependent, and therefore vulnerable to higher temperatures and changes in rainfall patterns. Reduced water availability is likely to slash yields, while the map of areas suitable for agriculture is expected to change due to diminished soil moisture. The livestock industry is also highly vulnerable to the impact of rising temperatures on animals, and of reduced water availability for them (World Bank, 2021; Muñoz Castillo, et al., 2020). The expected decrease in rainfall and change in seasonal rainfall patterns are likely to shrink the potential for hydropower generation, while increasing the potential loss of revenue from overbuilt and underfed hydropower facilities. Soaring evaporation from water storage facilities will also increase production costs. For example, following drought events in 2016 and 2017, hydropower plants on the São Francisco River operated at average capacity of only 23% and 17%, respectively (IPCC, 2022).

3.298. Deforestation is the main hazard for a green economy. According to data from the Institute for Space Research (INPE), the number of deforestation alerts in Brazil in the first five months of 2022 was the highest since 2016. In the same period, a surface 2,744.41 km^2 was placed under deforestation alert. The surface deforested in 2022 is already equivalent to 21% of the total recorded in 2021. At current pace, an estimated 15,000 km^2 of forest will be destroyed in 2022—a historical record.

3.299. Watershed degradation threatens the country's water and energy security. Degradation of the Atlantic Forest in southeast Brazil—largely driven by urbanization, cattle raising, and agriculture—has led to decreased water quality and irregular flow patterns in the region's rivers, jeopardizing water supply for about 70% of Brazil's population (Calmon, Oliveira, and Biderman 2019). Furthermore, loss and degradation of the Amazon contribute to droughts in the most populous areas of Brazil, as "flying rivers" of moisture originating from the forest are disrupted due to changing landscapes (Marengo et al., 2018). These trends also affect Brazil's energy security: deforestation and climate change decrease dry-season hydropower throughout the nation's largest dam network by an estimated 7% (Arias et al. 2020). As about two-thirds of Brazil's

FIGURE 3.13. Deforestation (Thousands of km2) – January – May 2022



Source: INPE

electricity derives from hydropower, this is a major risk to future energy supply (EIA, 2021).

3.300. The transition to a green economy will affect the fossil fuel industry and the related tax revenue. The energy transition, spurred by the Paris Agreement and technological change, is expected to affect future demand for fossil fuels produced in LAC, and may increase the risk of stranded assets—i.e., natural resources left in the ground, or physical assets devalued or retired before the end of their expected useful life. In Brazil, the oil and gas production chain accounted for R$304 billion (about 4.1% of GDP) in tax revenue in 2019, and for more than R$2 trillion (US$425.5 billion) between 2009 and 2021.[3] IDB estimates suggest that between 66% and 81% of the proven, probable, and possible oil reserves in LAC cannot be exploited if the world is to meet the Paris Agreement targets. This would reduce tax revenues in the region by between US$1.3 trillion and US$2.6 trillion by 2035, affecting Venezuela, Brazil, and Mexico the most.[4]

3.301. Brazil can be a leader in the carbon market. Brazil could become a leader in carbon off-setting and CO2 removal, thanks to its 50 million hectares of available reforestable land. Between 2020 and 2030, the voluntary carbon market could grow by a factor of 50, making forest conservation and reforestation very profitable to Brazil.[5] However, regulation in this area is still nascent and Brazil lacks a clear tax regime for the carbon market, whereby firms may purchase, sell, and intermediate emission rights subject to differentiated tax treatment.[6]

3.302. There are risks in the transition for a green economy. The recent conflict between Russia and Ukraine show that the energy transition process, associated with implementation of the Paris Agreement and technological change, is expected to affect future demand for fossil fuels produced in Latin America and the Caribbean and may increase the risks of stranded assets assets—which include resources left in the ground or physical assets that are devalued or retired before the end of their expected useful life—on the energy and other fossil fuel-related sectors. Economic losses are likely to arise in the financial sector as the economic system transitions away from fossil fuels. In the Latin America and Caribbean region estimates by the IDB suggest that about 66% to 81% of the proven, probable, and possible oil reserves cannot be exploited if the world is to meet the Paris Agreement targets. Such reduction would lead to a drop in tax revenues of USD 1.3 trillion to USD 2.6 trillion by 2035. In the region, the most affected countries by far would be Venezuela, Brazil and Mexico. [7] In addition, regulatory and market trends emerging from a low-carbon transition could also impact directly and indirectly several economic sectors. For instance, the European Union´s potential banning of the import of deforestation-linked commodities could put Brazil at the edge of this risk as the country is currently a key exporter of agricultural and livestock products to the EU and worldwide.

3.303. Green jobs: A risk and an opportunity. The green transition also contains a social dimension in terms of employment. According to International Labour Office (ILO), a growing number of green jobs will be created as the world moves toward a low-carbon and more sustainable economy. ILO (2022) shows that 2.3 million people have in recent years found new jobs in the renewable energy sector alone, and the potential for job growth in the sector is huge. Employment in alternative energies may rise to 2.1 million in wind and 6.3 million in solar power by 2030. Yet, the positive impact on the creation of jobs may dominate, some workers will lose their jobs as workers in the fossil fuel industry

3 Instituto Brasileiro de Petróleo e Gás -IBP (2022). Arrecadação com participações governamentais e tributos. URL: https://www.ibp.org.br/observatorio-do-setor/arrecadacao-com-participacoes-governamentais-e-tributos/#:~:text=Entre%202009%20e%202021%2C%20o,de%2070%25%20do%20montante%20total.

4 Solano-Rodríguez et al (2019). Implication of climate targets on oil production and fiscal revenues in Latin American and the Caribbean. URL: https://publications.iadb.org/publications/english/document/Implications_of_Climate_Targets_on_Oil_Production_and_Fiscal_Revenues_in_Latin_America_and_the_Caribbean_en.pdf

5 FAPESP. 2022.

6 International Bar Association. 2022.

7 Solano-Rodríguez et al (2019). Implication of climate targets on oil production and fiscal revenues in Latin American and the Caribbean.URL: https://publications.iadb.org/publications/english/document/Implications_of_Climate_Targets_on_Oil_Production_and_Fiscal_Revenues_in_Latin_America_and_the_Caribbean_en.pdf

or packaging. Policies should be adopted to reduce the impact on workers during the transition to a greener economy.

3.304. Government subsidies artificially depress energy prices in LAC. Governments in the region spend 1% of GDP per year subsidizing energy consumption, through tax subsidies and direct expenditures.[8] Low prices for fossil fuels can hinder the adoption of electric vehicles, renewable energy, and energy-efficiency measures by households and businesses. Rate reductions or direct transfers to contain the price of fossil fuels do not account for the costs and externalities from burning them. Finally, energy subsidies are an inefficient way to deliver social protection. On average, for every US$10 spent on energy subsidies across LAC, only US$1 reaches the poorest 20% of households[9].

Policy Recommendations

3.305. Curb deforestation rates. The government needs to enact a coherent set of incentives, based on a careful and transparent assessment of potential policy trade-offs, as well as negotiation and agreement with all stakeholders on feasible mutual commitments. Exclusive reliance on command--and-control policy instruments could give way to a more nuanced framework, combining voluntary or market-led action, economic incentives (e.g., extension, directed credit, and subsidies), and enforcement on forest protection.

3.306. Prioritize land repurposing. The public sector could partner with key agro-industry players (anchor companies, input suppliers, agricultural cooperatives and processing companies, off-takers), agriculture- and climate-focused funds, and agricultural technology firms to provide the know-how and financial resources to promote the reforestation and repurposing of land, in an economically appealing and environmentally sustainable manner.

3.307. Mitigate risks from the green transition. It is critical that energy, climate, and fiscal plans are aligned in support of an orderly transition that is consistent with the green growth agenda. Such transition requires a considerable adjustment of public investment in favor of climate mitigation and adaptation actions, as well as changes in the behavior of consumers, companies, and governments leading to the partial or total abandonment of technologies and goods with the highest carbon footprint. Promote job training for easing the transition from emission-intensive industries to greener jobs.

3.308. Develop the carbon market. Brazil should better define its position and legislation on carbon trade. The government should strengthen institutional and legal frameworks for forest protection, while promoting green-power certifications and carbon pricing. A growing number of firms in Brazil are showing an interest in certifying that the power they use comes from renewable energy sources: 5 million "International standard RE Certificates" were issued in 2020, and the number could reach 20 million in 2022. Approving the carbon market regulation set out in Bill No. 528 of 2021, which has been under discussion in the House of Representatives since 2021, would be a step in the right direction. The Bill aims to regulate the Brazilian market for reducing Emissions predicted by the law that established the National Climate Change Policy (Law 12.187/09).

3.309. Adopt a green taxation system. Taxation can be a powerful instrument for protecting the environment and promoting sustainability. Certain states have adopted environmental criteria to transfer revenue from the consumption tax (ICMS) to municipalities.[10] In turn, municipalities can introduce environmental criteria in the calculation of the Generic Value Plan[11] by considering differentiated tax rates or benefits for soil usage. Other valuable measures include conducting ex ante assessments of the economic, redistributive, and

8 IMF (2015).
9 IADB (2017).
10 Oliveira and Valim (2018)
11 Planta Genérica de Valores: A legal instrument setting the financial value of land and buildings, on which property taxes are levied.

environmental impacts of additional tax benefits for climate change mitigation, as well as research of relevant design options (coverage, eligibility, calibration, cost, funding, and impact-assessment methodology). Brazil pioneered ecological fiscal transfer mechanisms through the adoption of the ICMS Ecological[12] (an ecological value-added tax), but it can do more to reconcile taxation with the objectives of environmental legislation. One item ripe for improvement is the Rural Property Tax *(Imposto sobre a Propriedade Territorial Rural,* ITR), which is set too low, relies on self-declaration, and presents monitoring challenges. These inefficiencies have a significant impact in the Amazon, where deforesting public land and keeping properties in an unproductive state are practices commonly used to facilitate land transactions. On the expenditure side, public budgeting needs measures to mitigate and adapt to climate change. Public investment management and private investment promotion ought to prioritize sustainable infrastructure projects, through instruments such as *debêntures incentivadas.* Moreover, public procurement should include environmental requirements.

3.310. Propose a green fiscal policy. Public finances would benefit from having mechanisms in place to diversify risks and to build financial buffers, as well as from broader governance and risk management capacity within the remit of finance ministries. Fiscal policy should address the distributional impacts of the ecological transition on the affected economic sectors and workers, through fiscal, public investment, and spending management tools. Finally, fiscal policy can establish incentive frameworks, propose public investments, and implement regulatory reforms that reduce barriers to private investment in the green economy. Other fiscal policies to mitigate the impacts of climate change include:

I. building a strategic fiscal planning for climate change;
II. incorporating the assessment of extreme climate events and transition risks in the fiscal framework;
III. green markers for the budget;
IV. inclusion of environmental criteria in public investment management; and
V. green public procurement.[13]

3.311. Reduce fossil fuel subsidies. Energy subsidies are inefficient at protecting the welfare of poor households but increases in energy price increases can have a major impact on them, highlighting the importance of evaluating potential compensatory transfers. A proposed carbon-tax agenda for Brazil could include the assessment of economic, redistributive, and environmental impacts from higher effective rates on carbon, as well as design options for carbon taxation (coverage, sectorial and social compensatory measures, tax rate, use of collected resources, and evaluation methodology).

3.312. Foster private investment in mitigation, adaptation, and nature-based solutions. "Nature positive" investments (e.g., developing rewards for ecosystem services at the national and sub-national levels) can help reverse nature loss and promote its protection and regeneration, while supporting indigenous people, gender equality, and diversity. Scaling up climate-smart agriculture, zero-carbon farming, and supply-chain decarbonization can bring environmental as well as financial gains, from trading in carbon credits and payments for environmental services. Boosting nature finance (e.g., the Conservation Trust Funds, and the Amazon Bioeconomy Initiative Funds), combined with the development of markets for blue and green bonds, private green-finance initiatives, and voluntary carbon markets, can catalyze the flow of private funds to the bioeconomy (IETA-IDB, 2021). Natural capital can develop into a new asset class on the capital markets and be converted into financial capital, such as through debt-for-climate swap schemes.

3.313. Support Development Financial Institutions (DFIs) in managing climate risks. DFIs and subnational DFIs should mainstream climate

12 Adopted in a number of states, ICMS Ecological compensates municipalities for land-use restrictions and opportunity costs imposed by protected areas (May, Gebara, Conti, and Lima, 2012).
13 IADB (2021).

risks and sustainability into their operations by supporting the development of green, social and sustainable frameworks, carbon emission calculators and other relevant tools to support a green/sustainable transition.

(2) Build a sustainable, resilient and inclusive infrastructure

Low-carbon, resilient infrastructure offers a US$ 1.3 trillion opportunity for green investments in Brazil across climate-smart transportation, water and waste management, buildings, and energy efficiency.[14] *However, high income inequality makes it essential that the affordability of infrastructural services for end-users is at the top of the policymaking agenda. By building a sustainable infrastructure the country can shape a carbon lock-in, create climate resilience, protect and enhance natural capital, and promote inclusion and equity.*

3.314. Resilient infrastructure is crucial for Brazil. Brazilians are increasingly vulnerable to the impacts of climate change, in the form of extreme events such as floods, droughts, heat waves, and rainstorms. The cost of responding to such events has been estimated at US$34 billion between 1995 and 2017.[15] In this context, the construction of climate-resilient and sustainable infrastructure is more relevant than ever with the potential to create more than two million jobs.

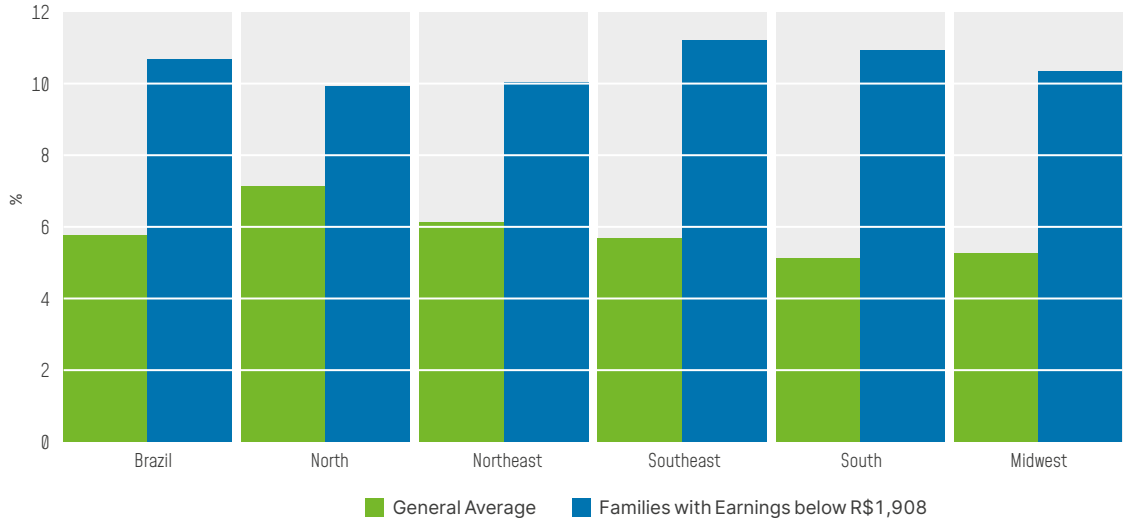
3.315. Climate and resilient infrastructure represent an opportunity for Brazil. There is an opportunity to drive future investment with climate smart and sustainability considerations. As climate and sustainability become priority topics in the policy agenda, the country can take advantage of this momentum to enhance the structuring and financing of infrastructure assets. In Brazil, investment opportunities in sustainable infrastructure amount to up to US$660 billion over the next 20 years and could create over two million jobs.[16]

3.316. Brazil's infrastructure investments do not typically incorporate sustainability principles, or climate change mitigation and adaptation measures. This is due to the long-term complexity of infrastructure investments, their interconnectedness, social impacts, externalities, and policy challenges. The issue is more acute for city-level investments. The mobilization of resources for structuring low-carbon infrastructure interventions (financial feasibility assessments, as well as technical, environmental, and social pre-investment studies) can push resource-strapped municipalities to focus on sustainable, low-carbon infrastructure, which enhances productivity and economic growth rates while strengthening resilience against climate risks. Sustainable, low-carbon, and inclusive infrastructure is also essential to achieving a wide range of sustainable development goals. [17]

3.317. Disparities in access to affordable infrastructure perpetuate poverty and inequality. Expanding access to low-cost, high-quality public services poses a major challenge in Brazil and many other developing countries. The latest Development in the Americas report (DIA, 2020) cited the need to move beyond the "era of structures and concrete" and towards the "service era." The report posits that infrastructure should be seen not only through a lens of investment in physical assets, but also through one of user-centered service delivery. In this regard, affordability is a key challenge. Expenses on infrastructural services make up an important share of the income of Brazilian families. According to the latest IBGE Household Budget Survey (POF) for 2017–2018, 5.6% of the average monthly household income is allocated to spending on electricity, domestic gas, water and sewage, and urban transportation. However, this percentage is almost twice as high for the low-income population, reaching 10.6% for families with an average monthly income of up to R$1,908.

14 https://www.climatebonds.net/resources/press-releases/2021/07/potencial-de-investimento-verde-no-brasil-chega-us-13-trilh%C3%A3o
15 Ibid.
16 Carbon Trust, 2020. Sustainable investment Opportunities in Brazil.
17 One example would be the attempt of the BNDES to mainstream sustainability elements in their PPP pipeline.

FIGURE 3.14. Participation of Infrastructure Service Expenses on the Average Monthly and Family Income



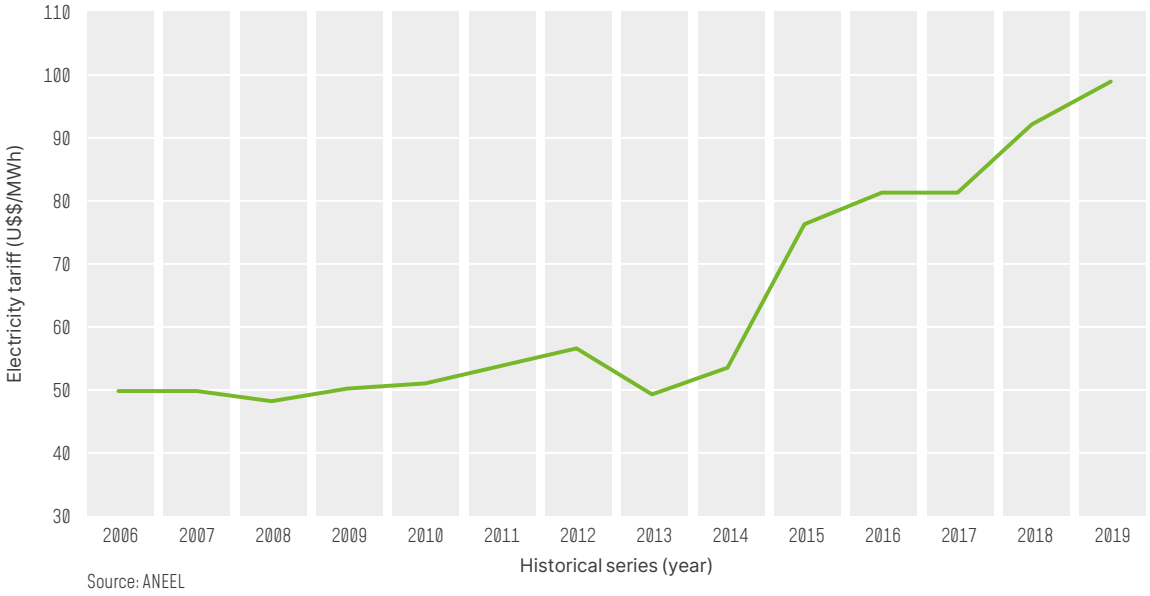
Source: Family Budget Survey - IBGE (2017-2018)
Note: Infrastructure service expenses include spending on electricity, domestic gas, water and sewage, and urban transportation.

ENERGY

3.318. The availability of energy on the best possible terms of quality, security, opportunity, and price is fundamental to sustainable economic development. However, electricity in Brazil is expensive, affecting economic competitiveness and job creation compared to peers.

3.319. Taxes and charges make up about half the cost of electricity for end-users. 49.1% of electricity tariff costs derive from nine different taxes and 10 sectoral charges. The largest tax is the ICMS[18] at state level, which accounts for 21% of the national average electricity bill, while federal taxes (IRPJ, PIS, COFINS and CSLL)[19] add up to approximately 15% of the bill. The largest sectoral charge (10% of the bill) is the so-

FIGURE 3.15. Evolution of electricity tariff in Brazil (MWh)



Source: ANEEL

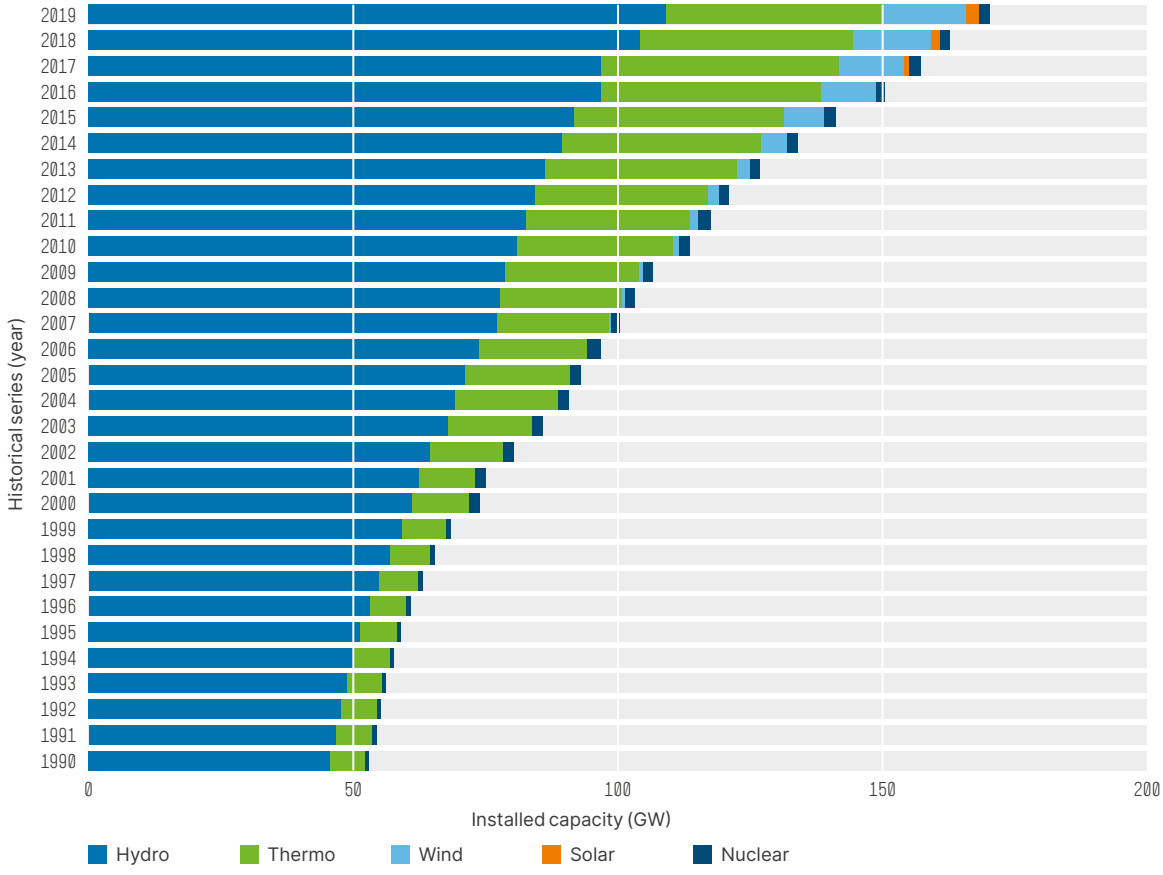
18 Imposto de Circulação de Mercadorias e Serviços (Tax on the Circulation of Goods and Services
19 IRPJ, Imposto da Renda das Pessoas Jurídicas; PIS, Programa de Integração Social; COFINS, Contribuição para Financiamento da Seguridade Social; e CSLL, Contribuição Social sobre o Lucro Líquido

-called CDE (Energy Development Account),[20] which was recently adjusted by 34% and will raise R$32 billion in 2022, with an average tariff impact of 4%.[21]

3.320. Brazil's electricity production relies heavily on hydropower generation, which is vulnerable to climate change. In 2000, hydropower accounted for 83% of Brazil's installed capacity and 87% of electricity production; as of 2021, it still represented about 63% of both installed power and gross electricity production, well above other renewable sources. Generation from wind (9.2%), biomass (9%), and solar (3%)[22] remains significantly below its potential, although the growth in production from variable renewable energy resources (mainly wind and solar) has accelerated in recent years. Climate change and ecosystem degradation impact Brazil's energy security: impacts of deforestation and climate change have been modeled to decrease dry season hydropower throughout the nation's largest dam network by 7% (Arias et al. 2020). As about two-thirds of Brazil's electricity supply is sourced from hydropower, this represents a major challenge for sustaining future energy supply (EIA 2021).

3.321. Limited exchange capacity between the four subsystems (North, Northeast, Southeast/Midwest, and South) within the National Integrated System (*Sistema Interligado Nacional*, SIN) complicates the distribution and optimization

↓ **FIGURE 3.16.** Historical evolution of electricity installed capacity by source (%)



Source: Energy Dossier 2022. Brazil a focus on electricity sector (IDB, 2022)

20 The CDE funds various public programs and policies, including: the Tariff Discounts, the Fuel Consumption Account, the Electric Energy Social Tariff, the Light for All Program, and purchases of National Mineral Coal. CDE beneficiaries range from low-income rural consumers to renewable-energy producers, small distributors, electrification cooperatives, and producers of mineral coal.

21 Evolution of the electricity tariffs and formulation of public policies (Instituto Acende Brasil - PwC, 2020)

22 Statistical Yearbook of Electricity 2021 (EPE, 2022)

of electricity from renewable energy sources.[23] Interconnection between subsystems could optimize the use of energy resources available in the SIN. It would assist in managing seasonal patterns across hydrographic basins, as well as intraday adjustments between variable renewable sources such as wind and solar. In addition to making supply more secure, better interconnection would have a positive impact on price formation, allowing for the export of surplus energy from lower-cost to higher-cost subsystems. Despite efforts to increase transmission capacity between the SIN subsystems,[24] the drought of 2021 and ensuing drop in hydropower generation highlighted its persisting limitations.[25]

3.322. Brazil should analyze the expansion of distributed generation. In 2020, for the first time, solar distributed generation (DG) surpassed the growth of all centralized sources (large-scale power plants). Solar photovoltaic distributed generation is leading the growth of the energy matrix in Brazil. Solar PV is leading the way in terms of capacity and number of facilities. In addition, solar DG has led to the creation of 328,000 jobs in the past 10 years.[26] The government's Energy Research Company (EPE) expects installed DG capacity to hit 37GW by 2031, or 7% of the national load. According to EPE, this would be divided among 4 million generating units, where solar energy will be responsible for 91.3%, followed by thermal (7.4%), wind (0.9%) and hydroelectricity (0.5%). Yet, this expansion has been causing a dispute between distributors and DG. Besides the high final electricity tariffs, the high availability of renewable sources, and a solid legal framework, the extremely favorable credit compensation model to DG has encourage its expansion. According to the distributors, while they have to pay for fixed and variable costs incorporated in their tariffs, while the distributed generator continues to use the network, these costs are transferred to other consumers through tariff increases.

3.323. The advance of the renewable energy faces own unique challenges. Wind is the most competitive source of non-hydropower renewable energy in Brazil, but delays in the construction of transmission lines affect generation capacity. Solar is growing in Brazil and not yet competitive with other renewable sources, although the rapidly falling cost of solar generation creates an opportunity to expand capacity.[27] The annual internal rates of return for some biogas and hydroelectric projects can be higher than solar PV. [28] Brazil's strict local-content rules discourage investment in solar equipment. Due to high taxes and production costs, Brazilian solar panels are 40% more expensive than those imported from China. The use of the network by DG has been a source of concern, given that while distributors have fixed and variable costs incorporated in their tariffs, distributed generators use the network without paying the same fees and these costs are transferred to other consumers, increasing their tariffs. The high availability of renewable sources, the extremely favorable credit compensation model to DG, and a legal framework for DG published in 2022 (although uncertain in terms of long-term remuneration), has encouraged DG expansion. However, there are some hurdles to overcome, including more clarity on long term remuneration, qualified personnel and risks on supply chain availability and logistics.[29]

3.324. The Brazilian electricity system is poorly digitized. This issue hampers the efficiency gains that digitization allows for, such as: lower O&M costs; enhanced power plants and network efficiency; reduced unplanned outages and downtime; extended operational lifetime of assets; smart demand

23 Recent water scarcity, especially in the Southeast and South regions, has prompted a greater need for electricity exchange between subsystems, and for the use of thermal resources to balance generation and demand in each subsystem. Therefore, transmission reinforcements are necessary to expand interconnection capacity between subsystems (PDE-2031. EPE, 2022).

24 Installed transmission capacity has been gradually increasing in Brazil over the years, reaching around 160,000 km in 2020.

25 This situation shows, for example, the necessity to reduce the restrictions on the flow of hydraulic and/or renewable surpluses that occur mainly in the transition between the wet and dry periods of the North Region, when there is a possibility of high availability of water resources, concomitant with high factors of renewable capacity in the Northeast Region (PDE-2031. EPE, 2022)

26 https://app.bnamericas.com/report/section/all/content/xxzvjrr1r-geracao-distribuida-no-brasil

27 EPE (2017). By 2026, it is expected that deployment costs will fall by 30% to 40% from their 2017 levels.

28 https://app.bnamericas.com/report/section/all/content/xxzvjrr1r-geracao-distribuida-no-brasil

29 Source: BnAmericas https://app.bnamericas.com/report/section/all/content/xxzvjrr1r-geracao-distribuida-no-brasil

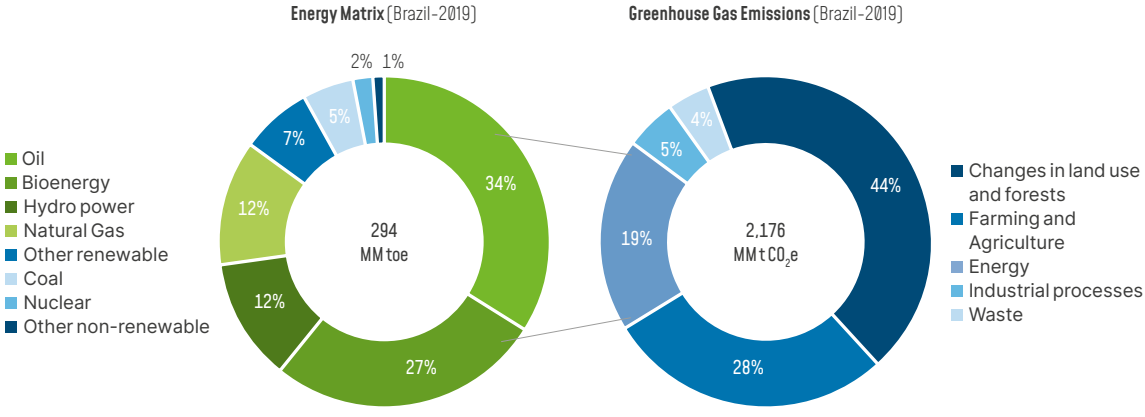
response; greater integration of variable renewable energy resources, new technologies (e.g., electromobility and energy storage), and small-scale distributed electricity. The International Energy Agency (IEA) estimates[30] that digitization could save around 5% of O&M costs, improve power plants and network efficiency by up to 5%, and extend the operational lifetime of assets by five years. Although Brazil is a leader in LAC in innovation in the power sector, its progress has focused exclusively on generation, with the adoption of advanced analytics, drones, and other technologies.[31] Conversely, electricity transmission and distribution are less digitized in Brazil than in most peer countries. However, the COVID-19 pandemic helped to accelerate the digital transformation in power distribution companies. It is expected that the market will continue to move towards digital channels for customer service, grid optimization, and business models for leveraging distributed renewable energy (RE). In customer service, digital channels were used for billing, payments, and mobile applications. Upcoming changes in electricity regulations shall also drive greater adoption of storage solutions, the emergence of energy service providers and aggregators, and the creation of new business models.[32]

3.325. Around 850,000 consumers, concentrated in the North, use radial electrical systems not connected to the SIN and supplied by thermal power plants. The supply of electricity to these isolated consumers is costly and has significant socio-environmental implications. The subsidy to thermal generation for isolated systems, which grew by 41.1% from 2021 to 2022, currently amounts to R$12 billion and is the largest component of the CDE charge. Moreover, while average power loss in the SIN is approximately 19%, it amounts to 30% in isolated systems—a rate that has increased by more than 5% over the last six years.[33]

3.326. Agriculture and cattle ranching account for 72% of Brazil's GHG emissions. The energy sector is responsible for 76% of global GHG emissions, but only for 19% in Brazil, largely because renewable sources make up 44% of the country's energy matrix.

3.327. The power sector can help reduce emissions across the economy. Considering its relatively advantage from its cleaner energy matrix, Brazil's power sector can contribute significantly to reducing emissions in other sectors, such as transportation, and to achieving the decarboniza-

↓ **FIGURE 3.17.** Brazilian Energy matrix vs GHG Emissions in Brazil



Source: Observatorio do Clima (climate observatory). 2021[5] / Observatorio do Clima (climate observatory) – Energy Transition Program (CEBRI-EPE-IDB), 2021

30 Digitization & Energy (IEA, 2017)
31 Gap Analysis and Opportunities for Innovation in the Energy Sector in LAC (IDB, 2020)
32 "CCEE, Frost & Sullivan, July 2021.
33 Power losses and quality indicators (e.g., frequency and duration of interruptions) are correlated. High energy losses affect the quality of supply, and therefore the economic development of isolated areas.

tion objectives to which the country has committed under the Paris Agreement.[34]

Policy Recommendations

3.328. Continue efforts to diversify the electricity matrix towards renewable sources. This includes a further expansion of solar, wind, and biomass generation, and the gradual introduction of new technologies such as offshore wind, floating solar PV, and battery energy-storage systems.

3.329. Recover and/or increase the efficiency of existing hydroelectric power plants. More than half the country's hydroelectric plants are more than 30 years old;16 considering that the estimated useful life of the electrical and mechanical equipment of such plants is between 20 and 30 years, the potential to modernize the Brazilian hydroelectric infrastructure is significant.[35] Such modernization, which would require an estimated US$15 billion of investment,[36] would improve system flexibility and energy security, offering additional capacity in times of drought and a more-efficient integration of variable renewable energy resources, such as solar or wind. Continued fiscal and regulatory incentives can encourage the use of renewable energy combined with battery storage, especially for isolated systems in the North and off-grid agribusiness facilities.[37]

3.330. Improve the water and energy security. Nature Based solutions (NBS) offer cost-effective approaches to improve the long-term performance of water and energy systems across the country. Restoring forests and wetlands in watersheds upstream of cities and hydroelectric facilities can address issues of water quantity (through smoothing the peaks and valleys of seasonal water flows) and quality (through reducing sedimentation and pollution) (Browder et al. 2019; Filoso et al. 2017).

3.331. Rethink electrical pricing and tariff structures, rationalizing taxes, charges, and subsidies. Electrical pricing and tariff structures need to be reformed to relieve pressure on end-users and enhance transparency, including by contractually separating capacity from energy production and rationalizing cross-subsidies and levies.

3.332. Improve the flexibility of SIN and power--transfer capability between subsystems. This requires investment in digitization of the transmission infrastructure, the introduction of technologies such as flexible AC transmission systems (FACTS) and battery energy storage system, and new bidding processes to expand interconnections.

3.333. Promote Regional Integration. Deeper electrical interconnection between Brazil and its neighbors would improve the reliability of SIN and optimize the use of renewable energy resources available in Southern Cone countries. Experience from Brazil's water crisis in 2021 confirms that energy integration helps mitigate electricity shortages, ensuring supply from neighboring countries with different seasonal features. In 2021 Brazil imported more than 6,000 GWh from Argentina and Uruguay, the equivalent of a power plant producing 750 MW per month on average.[38] In recent years, there has been renewed interest in Brazil for regional electrical integration projects, including:

I. potential integration with the Arco Norte (Guyana, French Guyana, and Suriname);
II. interconnection and/or a shared hydroelectric power plant with Bolivia;
III. two shared hydroelectric plants with Argentina; and
IV. the reinforcement and expansion of existing electrical interconnections with Argentina, Paraguay, and Uruguay, within the framework of the Electrical Interconnection System of the Southern Countries (SIESUR).[39]

34 Energy Transition Program (CEBRI-EPE-IDB), Trends and Uncertainties of the Energy Transition in the Brazilian case, 2021.
35 According to the PDE-2031, the modernization and repowering of existing hydroelectric plants could increase their capacity to up to 11GW, covering the expected electricity demand until 2031.
36 Modernization of hydropower in Latin America and the Caribbean: Investment needs and challenges (IDB, 2020)
37 Frost & Sullivan, July 2021.
38 PDE-2031 (EPE, 2022)
39 According to recent analysis by the IDB, the potential economic benefit to Brazil from increased exchange of electricity with its neighbors could approach US$250 million.

3.334. Modernize and digitalize the electrical network. The power sector shows clear and inexorable trends: a global transition toward variable renewable energy sources, small-scale distributed generation, storage technologies, and electric mobility; greater awareness and knowledge among consumers, who demand new value-added electrical services and more information about them; and a push toward modernization and digitization in the distribution segment, for example in advanced metering and automated infrastructure, which requires investment that, while significant, should not compromise the financial viability of distribution companies. Measures that can help improve the viability of electricity distribution include: the adoption of a low-voltage binomial tariff, location and time signaling for consumers who generate their own energy, and the separation of electricity trading and distribution services.

3.335. Enhance the resilience and efficiency of isolated systems. Relevant steps include: promoting hybrid production among independent power producers (IPPs), combining diesel with renewable sources and battery-energy storage; expand investment to accelerate the connection of isolated areas to SIN; and facilitate the development of renewable and hybrid generation to be considered in future bidding rounds for energy supply, by offering economic feasibility assessments, technical support hubs, financing facilities, and public relations incentives.[40]

3.336. Build on the energy transition to achieve carbon neutrality by 2050 and become a global leader in low-carbon solutions. Brazil could be one of the lowest-cost producers of green hydrogen by 2050, due to its largely renewables-based electricity supply. Similarly, the country is set to be a global leader in bioenergy, with biofuels such as ethanol and biodiesel playing an important role in transport and electricity generation, and can develop know-how in advanced biofuels (e.g., cellulosic ethanol, hydrogenated diesel, biokerosene, renewable bunker) and biogas/biomethane. However, regulatory development and planning are critical to ensuring that technological options are assessed based on their value-add for society, that adequate coordination exists between the public and private sectors, and that the country is prepared for both the opportunities and the risks of the energy transition.

3.337. Develop the offshore wind industry. To make the most of this long-term opportunity, the country needs skilled and well-trained personnel—estimates suggest that each MW produced from offshore wind requires two trained workers—and appropriate standards of health and safety.[41] Brazil can benefit from its experienced oil and gas industry workforce which, with relevant training, could transfer its skills and knowledge to the offshore wind industry.[42]

3.338. Follow and support shifts in the power sector. Historically a regulated market, power generation is shifting toward the free market,[43] which has become the main driver for the expansion of renewable-energy generation. Moreover, increased appetite for distributed generation (e.g., solar panels installed in homes and businesses) reduces demand from SIN.[44] Transparent rules and updated standards can support a smooth shift in power demand and allow renewable energy companies to move from supplying power to services, such as: supply of RECs, electric-vehicle charging, energy management, smart-home and smart-city services, energy storage, insurance, and installation of home appliances.[45]

WATER RESOURCES

3.339. Brazil's surface water resources are abundant, accounting for 12% of the world's total, but

40 Mobilizing Clean Energy Investments for Brazil. Brazil Deep-Dive Project (WEF-EPE-IDB, 2022)
41 Global Wind Organization and Global Wind Energy Council, 2020.
42 Technical skills native to the oil and gas industry that are in-demand on wind projects include: geotechnical engineering, marine engineering, surveying, installation management, and offshore construction. Airswift, 2020.
43 The free power market is expected to continue growing, due to an increasing number of SMEs opting to exit the regulated market to lower their electricity costs. Brazil is expected to start a progressive transition towards a fully liberalized retail power market from 2024 (Per the Provisional Measure (MP) 465/2019). Power consumers with loads <0.5 MW will be allowed to purchase power from any agent on the market. Currently this only applies to consumers with loads <1 MW. CCEE, Frost & Sullivan, July 2021.
44 BNAmericas. Slight reduction in power consumption, 2022
45 Frost & Sullivan, July 2021.

unevenly distributed across the country. Although annual rainfall in Brazil is 1,760 mm on average, it varies from less than 500 mm in the semi-arid region of the Northeast to more than 3,000 mm in the Amazon (ANA, 2020). Almost 80% of the country's surface water is in the Amazon basin where, on the other hand, population density and water demand are low. Conversely, the semi-arid region of northeastern Brazil has only 4% of the country's water resources, while accounting for 18% of its territory and 30% of the population (World Bank, 2021).

3.340. Similarly, groundwater is plentiful in absolute terms, but its availability varies greatly across regions. Although recent estimates place the number of wells in Brazil at 2.4 million, only 326,000 were recorded in the Groundwater Information System (SIAGAS) as of 2020. The Integrated Groundwater Monitoring Network (RIMAS) monitors 23 aquifers (ANA, 2020). By 2050, climate change will have reduced the recharge of aquifers in the Northeast by an estimated 70% relative to 2010 levels, and by between 30% and 70% for aquifers in the east of the country. Estimates for other regions are more encouraging, with relative recharge levels rising by between 30% and 100% (Hirata & Conicelli, 2012).

3.341. In 2019, the main water uses in Brazil were irrigation (66.1%), animal use (11.6%), drinking-water supply (11.4%), industry (9.7%), mining (0.9%), and hydropower (0.3%) (ANA, 2022). Water demand has been growing in the country with an estimated increase of approximately 80% in total water withdrawals over the past two decades. Withdrawals are expected to grow by another 23% by 2030, and consumption by 29%. The largest increases in consumption by 2030 are forecast to involve industry (+51%), mining (55%), irrigation (+30%), and animal use (24%).

3.342. Growing water demand, stemming from demographic growth and water-intensive economic activity, has contributed to rising water stress in recent years. The issue is most critical in the Southeast and the South, where rice irrigation demands high levels of water extraction. The situation is also difficult in the Northeast, where water demand is considerable relative to the available supply. Increasingly frequent and severe droughts have been occurring throughout the country, with the worst ones recently recorded in the states of Paraná, São Paulo, Mato Grosso do Sul, Minas Gerais, Rio de Janeiro, Espírito Santo, Goiás, Tocantins, and parts of Bahia (ANA, 2020).

3.343. Water quality is an important factor in determining the availability of water resources. Water quality—which ANA defines in terms of biochemical demand for oxygen (BOD), total phosphorus, and water quality index (IQA)—is good in 71% of monitored water bodies (UN Water, 2022). The worst BOD levels were recorded in Rio de Janeiro, Belo Horizonte, and São Paulo. Phosphorus in surface water mainly derives from fertilizers, animal manure, and domestic or industrial effluents. Finally, the worst IQA values were observed in large cities, highlighting the challenges from poor sanitation, and the need for better infrastructure to control water pollution in urban areas (ANA, 2020). Sediments from deforestation due to agricultural expansion also affect water quality and, in turn, its availability. Such sediments contain organic carbon precursors for the formation of carcinogenic trihalomethanes during drinking-water chlorination, as well as chromium, mercury, selenium, and other toxic trace metals (IPCC, 2022).

3.344. Brazil has made efforts to integrate water security in policy decisions. The National Water Security Plan (PNSH), launched in 2019, has defined an investment program for strategic water infrastructure based on regional priorities, with the objectives of securing water supply and reducing the risk of extreme flood and drought events (Government of Brazil, 2020; ANA, 2019). The PNSH adopts a standardized Water Security Index, which facilitates communication and coordination at the watershed, regional, state, and municipal levels, but does not address the institutional capacity constraints to such coordination. The PNSH focuses largely on grey infrastructure (reservoirs and water conveyance systems), missing an opportunity to better integrate nature-based solutions (NBS) into an adaptation strategy for a range of future scenarios.

3.345. The management of water resources faces several key challenges.[46] Water-resource plans at the national, state, and local levels are poorly coordinated and rarely implemented. The borders of municipal, state, and federal jurisdictions do not match hydrological boundaries, complicating the definition of an appropriate functional scale. Administrative divisions between ministries and public agencies undermine policy consistency across water-resource management, agriculture, energy, environmental licensing, sanitation, and land use. Insufficient data on water access and quality affects decisions on the allocation of resources. Watershed committees have robust deliberative powers but limited implementation capacity. Cities lack contingency plans for coping with the effects of extreme climate events (e.g., droughts and floods) resulting from climate change. Limited coordination among government agencies across sectors and administrative levels, and weak collaboration with watershed committees and the private sector, undermine the overall efficiency of water management.

3.346. Coordination among levels of government can be improved. Responsibility for water-related policies and tasks is fragmented across national ministries and public agencies, as well as local and regional authorities. The National Council on Water Resources (CNRH) was meant to enhance coordination between the federal and state levels but has not fully done so yet. Decisions at the federal and state levels are not mutually reinforcing, cross-sectoral coordination is generally poor, and ministerial representation is not sufficient to achieve consensus on strategic issues. The mismatch between the administrative borders of municipalities, regions, and states and hydrographic boundaries hampers water policy and duplicates efforts at the subnational level, paving the way for lack of cooperation, transparency, and participation. (OECD, 2015). Isolated development in certain sectors, such as agriculture, can affect other sectors, such as hydropower, especially in basins where competition for access to water is intensifying.

3.347. Constraints to institutional capacity affect water management, especially at the state, basin, and municipal levels. While ANA has a high level of capacity, with qualified personnel and adequate funding, the main issues concern capacity for monitoring and evaluation, coordination, and budgeting at the state level. Needs and priorities vary by state: in the Amazon, for example, staffing and funding are insufficient, while in other states certain stakeholders struggle to participate effectively in discussions on water management.

3.348. Transboundary waters are vital in Brazil, as more than 60% of the country's territory sits within drainage areas of transboundary basins. Brazil shares water resources with 10 neighboring countries, including 83 watersheds and 11 transboundary aquifers mainly located around the Amazon and Plata basins. Major treaties regulate the use of transboundary waters in the region,[47] but their implementation suffers from inconsistency in the relevant national policies, plans, and practices.

Policy Recommendations

3.349. Build capacity at all levels of government. Improved capacity to monitor the quantity, quality, and use of groundwater is essential to water-security planning at different institutional, sectoral, and geographical levels (national, state, basin and municipal). Greater capacity is also needed to map and process information and data for water-resource management, and for supporting the design and implementation of water-security plans by basin authorities, operators, and cities, with a focus on managing droughts and floods exacerbated by climate change.

3.350. Modernize the use of information. Tools and methodologies to collect information and support decision-making (e.g., water balances, early warning systems, basin-level studies of climate) can be improved, along with information-exchange mechanisms across levels of government. The

46 OECD, 2015.

47 E.g., the Treaty of the Plata Basin, the Amazon Cooperation Treaty, the Agreement on the Guarani Aquifer, the Paraguay-Paraná Waterway Agreement, the Itaipu Treaty, and agreements concerning the Uruguay River, the Mirim Lagoons, and the Quaraí and Apa Lagoons.

acquisition and processing of information based on remote sensing can complement field information in areas of difficult access, a major value-add considering the continental dimensions of the country and its bio-geography.

3.351. Promote analytical studies and multisectoral master plans. Good planning involves accounting for water demand to effectively manage water security and defining nexus investments that reconcile different sources of demand while improving adaptive capacity—e.g., multipurpose projects and combined water solutions. Master plans should incorporate principles of the circular economy, with investment at the urban and basin levels focusing on loss reduction, reuse, aquifer recharge, and sustainable drainage infrastructure. Investment in the conservation of critical areas and water sources, as well as the promotion nature-based solutions, are paramount to the country's water security.

3.352. Enhance knowledge of eco-hydrological systems. This could help combine traditional water infrastructure with nature-based solutions that provide greater efficiency, reliability, and cost-effectiveness in the provision of water-security services.

3.353. Improve water quality through safe sanitation, afforestation, and erosion protection. At the institutional level, the federal CNRH and the subnational State Councils for Water Resources (CERHs) need stronger coordination capacity. At the same time, state- and basin-level authorities have room to improve various aspects of water-resource management (e.g., technical quality, transparency, and public participation), and to facilitate and encourage adaptation to climate change.

3.354. Promote coordination mechanisms and legal tools for the management of transboundary basins. This would help increase the sustainability and climate resilience of basins that host global "hot spots" for ecosystem services and biodiversity, such as the Amazon, the Cerrado, and the Pantanal), while creating new opportunities for regional integration.

3.355. Assess the sustainability and resilience of water management in light of the Paris Agreement commitments. Brazil is highly relevant to global negotiations on climate change, both due to its ecosystem and its role as a global commodity producer. Given the implications of its water footprint, the country should propose compensation schemes for water-related externalities generated by global value chains.

WATER SUPPLY AND SANITATION

3.356. There are significant challenges in the water supply sector. Nearly 35 million Brazilians do not have access to treated water and nearly 100 million Brazilians do not have sewage collection/residential sanitation (TrataBrasil, 2019).[48] Water supply is uneven and varies widely between regions, municipalities, or even in different districts. Water losses are significant and are on the rise, 38.3% of the treated water does not reach final consumers. Water losses in some states can be as high as 69% (Amazonas), 66% (Amapá), and 60% (Maranhão) (by comparison, water losses in Mexico are 24% and 35% in Peru). The lack of investment means an aging infrastructure that is more prone to waste (Agencia Brasil, 2019). Water is key to pull women out of poverty (BRK Ambiental, 2018).

3.357. Quality is also a challenge. According to PLANSAB (2019), more than 37% of the population receives a low-quality drinking-water supply, due to lack of internal plumbing, water that is not safe to drink, or irregular service. In 2020, the SNIS recorded 67,600 water-supply outages affecting 152.4 million residences, and 195,600 systematic interruptions affecting 172.0 million residences. According to the Information System for Monitoring the Quality of Water for Human Consumption (Sisagua), in 2017, the share of samples from the public water supply contaminated by Escherichia coli was above the legal limit in 6% of Brazilian municipalities. Additionally, Sisagua received more than 219,000 complaints about the color of the water coming from public pipes, and more than 200,000

48 84% of the population have potable water and only 52% have sewage coverage. More than 34 million people don't have access to drinking water. BNAmericas Intelligence Series. Opening the Floodgates to Private Investment in Brazil's Water Sector. January 2021.

complaints regarding its odor or taste. Finally, only 77% of Brazilian municipalities had taken steps to monitor the quality of water for human consumption, with the North and Northeast macro-regions recording the most precarious indicators.

3.358. Access to sanitation is poor across the country. According to SNIS (2020), only 59.2% of municipalities in Brazil have a public sewage system; the remaining 40.8% use alternative solutions, such as septic tanks, rudimentary tanks, open pits, or direct discharge into water bodies. Sewage networks cover 55.0% of the total population (114.6 million people) and 63.2% of the urban population (112.4 million people), with the highest regional coverage recorded in the Southeast (80.5%) and the lowest in the North (13.1%). Countrywide, only 79.8% of the sewage collected is treated, with regional treatment rates lowest in the Northeast (76.0%) and highest in the Centre-West, (94.3%). 901,300 sewage leakages were recorded in 2020, of which 74.2% in the Southeast (MDR, 2021).

3.359. Water and sanitation demand major investments. According to IADB estimates, the investment required through 2030 to close the infrastructure gap amounts to US$36.7 billion with regard to access to safe water, and to $67.5 billion with regard to access to safe sanitation (Brichetti et al., 2021).

3.360. Brazil approved a new regulatory framework for the sector. Law No. 14.026 of July 15, 2020 updated the legal framework for basic sanitation, setting the goal of achieving universal access to it by 2033. The new law eliminates the option of establishing sanitation contracts between municipalities and SOEs without bidding; allows states to collectively contract services for groups of small municipalities; grants the National Agency of Water and Basic Sanitation (ANA) the power to draw up sectoral rules and service standards; and makes it possible for the private sector to play a more active role in water and sanitation.

3.361. The new regulatory framework aims to increase private-sector participation. The new le-

Advances in the regulation of the Water and Sanitation sector

In 2020, the government approved a new legal framework for water and sanitation, marking an important step towards the goal of ensuring universal water and sewage services by 2033 and enabling greater private investments in sanitation services. The National Agency for Water and Sanitation (ANA) regulates the water and sanitation sector and is responsible for implementing the National Water Resources Policy. The agency is also empowered to edit reference standards for regulating public water and sanitation services. These standards are to be instituted progressively and should promote adequate service coverage. Parameters will be established to monitor compliance with coverage targets, quality indicators, and water-potability standards, as well as cost-limiting criteria for user payments.

According to the law, the rules should also stimulate cooperation between federal entities, enable the adoption of processes tailored to specific local conditions, encourage the regionalization of service provision, contribute to the technical and financial viability of services, and leverage economies of scale and efficiency gains to expand services. The new law prohibits so-called program contracts for the provision of public water and sanitation services, which previously enabled mayors and governors to establish partnerships with state-owned enterprises without a bidding process. Henceforth, such contracts must be open to competing bids from public and private service providers. Finally, under the new law the rules may also be applied to cooperation agreements signed by blocks of municipalities for the collective contracting of sanitation services.

gal framework for sanitation services has renewed the interest of private companies in the sector. The public and private sectors can cooperate in water and sanitation on the basis of three main models: concessions, Private Public Partnerships (PPPs), and service outsourcing. Success stories of services operated by private firms, alone or in partnership with the public sector, have already been emerging (ABCON SINDCON, 2021). The share of private firms in the sector is expected to grow from 6% in 2020 to 40% by 2033.[49]

3.362. Water losses are significant. According to the Thematic Diagnosis of Water and Sewage Services - Overview (MDR, 2021), the rate of loss in water distribution in Brazil is 40.1%—i.e., for every 100 liters distributed by service providers, only 59.9 are available for use by consumers. The rate of loss has been growing recently after plateauing between 2012 and 2015, when it was under 37.0%. Losses vary by region, showcasing geographical and socioeconomic inequalities that affect the quality of service.

3.363. The sector should improve its energy efficiency. SNIS has recorded a steady growth in the electricity costs borne by water and sanitation service providers, which reached R$7.4 billion in 2020. Electricity is the second-largest expense item for the sector (15.7% of total costs), trailing only personnel (both in-house and external) which accounts for 58.0%. However, there are indications that providers are not on track to meet the operational efficiency goals proposed in PLANSAB (2019).

3.364. Productivity in the water and sanitation sector is suboptimal. The sector spent an average of R$3.98 per m3 of water produced in 2020, 2.3% more than in 2019, while the average tariff was R$4.25/m3, 1.4% lower than in 2019. Across the 26 Brazilian states and the Federal District, 11 states recorded average total expenses above the average tariff: six states in the North (Amazonas, Rondônia, Acre, Amapá, Pará, and Roraima), and five in the Northeast (Sergipe, Paraíba, Alagoas, Maranhão, and Piauí) (MDR, 2021). Average expenditures above the average tariff are a sign of potential difficulty in maintaining the viability of services, and may compromise their quality (MDR, 2021).

3.365. Innovation and digitization may help increase productivity. While some of the sector's problems can only be solved through institutional reform or large investments in infrastructure, innovation and digital transformation can address certain challenges. The public procurement of innovative solutions (PPI) could help greatly, ensuring competition and transparency in efficient procurement processes (IADB,2021). In recent years, Brazil has launched several national programs to promote innovation. Major steps forward include: the creation of the Legal Framework for Startups, with a new PPI instrument that can foster innovation in the public sector; auditing authorities have taken a greater interest in innovation and launched initiatives in this space, such as the innovation laboratory of the Federal Court of Auditors; and public water and sanitation companies have made progress in open innovation and technological research. However, the country's innovation system still has deficiencies and regional asymmetries, adding to the challenges of the digital transformation (IADB, 2021).

Policy recommendations

3.366. Enhance the financial viability of services and operators. New technologies can reduce water losses and improve energy efficiency, while the rehabilitation, improvement, and maintenance of existing basic sanitation infrastructure—with intensive use of labor to support job creation—can enhance its viability. A stronger strategic framework and national public policy for basic sanitation can further promote efficiency and sustainability in the sector.

3.367. Address institutional and regulatory bottlenecks. The institutional reinforcement of service providers and relevant public authorities can improve the sustainability of infrastructure and sanitation services. Promoting efforts to build institutional capacity for project structuring, particularly at the state level, will be important. Equally relevant

49 BNAmericas. Spotlight: The growing private sector participation in Brazil's sanitation industry. Nov. 2021.

is improving coordination among agencies involved in the project lifecycle. Transparency, accountability, and oversight of the process and of potential investors early in the project cycle will be key to mitigating integrity issues at later stages. Overall, the regulatory and business environments for PPPs and concessions will be crucial to attracting first-class sponsors, in a context of global competition.

3.368. Accelerate innovation and digital transformation. More innovation and digitization among public agencies and service providers can help build more efficient, effective, and cyber-secure infrastructure services.

3.369. Incentivize the participation of the private sector in sanitation services, especially in the form of technology transfer and financing. The capital markets can mobilize additional sources of financing for projects in the pipeline. In June 2021, Brazil's lower house approved a bill extending tax breaks for infrastructure financing through debentures, which raised R$253.4 billion.[50]

DRAINAGE

3.370. Incorporating green solutions into urban infrastructure fosters resilience to flooding and heat-island effects and improves quality of life for urban residents. Brazilian cities have grown rapidly in recent decades: the country's urban population rate rose from 65% of the total population in 1980 to over 87% in 2020 and is still growing at about 1% per year (World Bank, 2021). Several patterns throughout the country attest to increasing urbanization: for example, large cities expand to capture smaller cities on their periphery, creating sprawling metropolitan areas that often lack strategic regional planning (WRI Brazil, 2021). As Brazil's cities continue to grow, integrating nature-based solutions into urban planning can enhance connectivity, increase resilience to natural disasters, improve urban public health, and augment economic productivity (Juno and Virsilas, 2019). Rapid urban expansion in Brazil has led to settlement patterns that put many residents at risk of natural disasters, such as flooding and landslides.

3.371. Drought and flooding are the most common natural hazards, with severe impacts in urban areas. Poor drainage systems, vast impermeable surfaces, and informal settlements in riverine flood zones contribute to increasing flood risk in Brazilian cities. One study estimates that 83 cities, accounting for 22% of the Brazilian population, are exposed to high risk of flooding (Rasch, 2016); other estimates that 7.1 million urban residents live in areas at high risk of flooding or landslides (Alves, 2021), with the latter posing a major threat to those living in informal settlements on steep slopes in many cities (Mendes et al., 2018; AP, 2010). These patterns of urban expansion, combined with climate change, can cause extreme flooding events, such as those that occurred in Belo Horizonte in 2020 (Cuppucini, 2020). Between 1995 and 2017, an estimated US$37 billion was spent in response to these hazards in urban areas nationwide (S2ID, 2017). Floods account for more than 65% of natural hazards in the last decade, and heavy rainfall, which triggered flash floods and landslides, was responsible for 74% of deaths from natural disasters between 1991 and 2010 (Government of Brazil, 2020). Between 1900 and 2020, 80 major floods were recorded in the country, affecting almost 12 million people and causing damages for US$6 trillion (UCL, 2022). On the other hand, Brazil experienced 18 major droughts over the same period, affecting nearly 80 million people and causing an estimated R$111 trillion in damages (UCL, 2022). Notably, a drought in 2014 reduced water volume in São Paulo's largest water supply systems to just 5% of capacity (IPCC, 2022).

3.372. A large share of the population is exposed to floods. As of 2020, the SNIS classified 1,279 municipalities (23.0% of the total) as subject to mass movements and floods from critical hydrological events, exposing two million households in urban areas to flooding risk. In the same year, 22,200

50 ANBIMA, 2022. Mercado de capitais encerra 2021 com R$ 596 bilhões in issuances. As of 2021, Chile (US$17.8bn) and Brazil (US$11.7bn) were home to the largest green, social and sustainability bond markets in LAC. Brazil is the region's largest green bond market, at US$10.3bn in cumulative issuance (Climate Bond Initiative, 2021). The new Foreign Exchange Law, set to come into force in December 2022, is expected to increase and diversify investors in the country. The law has multiple benefits, including allowing for contracts in foreign currency.

episodes of flooding in urban areas left 218,400 people homeless and/or displaced, including 84,900 people (38.9% of the total) in the North. The rate of mortality associated with floods is estimated at 0.26 deaths per 100,000 inhabitants countrywide, with a peak of 0.94 in the South.

3.373. Many Brazilian cities have insufficient drainage. 45.3% of municipalities have an exclusive drainage system, 12.0% have a unit system (i.e., mixed with sanitary sewage), 21.3% have a combined system (i.e., part exclusive, part unit), 5.8% use a different system, and more than 15% have no drainage system (MDR, 2021). Moreover, regular preventative maintenance is lacking; in 2020, 1,206 municipalities (29.4% of the total) did not carry out any work on their drainage systems (MDR, 2021). According to PLANSAB (2019), it is difficult to define objectives for urban drainage performance, due to gaps in the available data and the lack of a meaningful indicator for quality of service. The targets proposed by PLANSAB are: reducing the number of municipalities that experience floods in urban areas; and reducing the number of households at risk of flooding.

3.374. Widespread technical shortcomings affect drainage quality. Brazil lacks national technical standards for drainage systems and rainwater management, as well as a fully standardized terminology for the sector. Most service providers do not have information systems, databases, or mechanisms for systematic data collection, and often have incomplete knowledge of the infrastructure installed in the municipalities where they operate. In 2020, only 714 municipalities (17.4%) had a drainage master plan, and 1,430 (34.8%) had a technical record of works. In the same year, 1,332 municipalities (32.4%) had mapped out their areas at risk, with higher percentages in the Southeast and the South; 1,184 municipalities (28.8%) monitored hydrological data, while only 620 municipalities (15.1%) had adopted hydrological risk-alert systems (MDR, 2021). As of 2020, the SNIS had identified only 205 municipalities with rainwater damping reservoirs, 302 municipalities with linear parks, and 602 municipalities with urban public roads featuring natural drainage solutions (MDR, 2021).

3.375. Governance of the drainage sector is weak. Considering the services delivered by municipal authorities and other government bodies, SOEs, and public-private partnerships, the public sector is involved in the provision of drainage services in 99.9% of Brazilian municipalities. Only in 1.7% of municipalities are drainage services regulated by an appropriate entity. In addition, only 24 municipalities charge for drainage services, and just 12 do so via a dedicated fee. Among the municipalities that do not charge for drainage, 48.9% pay for it out of the general budget, 4.5% use other resources, 3.6% use other sources associated with the general budget of the municipality, and 43.0% do not have a clearly identified source of funds for the provision of such services. In 2020, 7.7% of municipalities recorded a surplus on the provision of drainage services (i.e., their dedicated revenues exceeded their expenses), 46.9% reported a deficit, and 36.1% broke even (MDR, 2021).

Policy recommendations

3.376. Promote the planning in the sector. Such planning should aim to reconcile urban expansion with the preservation of flows in river basins, by implementing new systems as well as maintaining and upgrading existing ones. Useful planning and management tools include: drainage master plans, master plans for land use and occupation, hydrological data-monitoring and risk-alert systems, and a cadastral system for infrastructure.

3.377. Improve the quality of drainage. Green infrastructure, compensatory techniques, and flow damping can help enhance the sustainability of drainage and revitalize river basins, while carefully assessed technological solutions can improve the planning, regulation, delivery, and supervision of drainage services. Urban stormwater drainage and management need appropriate revenue models, incentives, and subsidies, combined with viable and effective collection systems, as well as broader organizational frameworks that draw on international best practice. The mapping of areas at high hydrological risk must continue, while implementing transparent participatory mechanisms is key to

democratic and sustainable drainage management. Finally, priority interventions must focus on municipalities suffering from critical flood problems.

SOLID WASTE MANAGEMENT

3.378. Waste management and recycling is set to become a multibillion-dollar market in Brazil, with major financial and public-health benefits. The combined size of the sanitation and waste-management markets is expected to grow from US$4 billion in 2021 to US$10 billion in 2031. Public, private, and civil-society participants (including informal collectors) should cooperate to improve efficiency in waste collection, sorting, and treatment to increase reuse and recycling rates and to promote the circular economy through reverse logistics, i.e., the reuse, recycling, treatment, and final disposal of waste. Waste-collection associations and cooperatives, which collect more than a third of recyclable waste in Brazil, will play a key role. Waste can also be used to generate energy, opening up a new income stream.

3.379. Waste management has room for progress in the country. Brazil produces 79 million tons of municipal solid waste (MSW) per year, but 47% of municipalities dispose of it improperly. Collection rates are highest in the southern regions (between 50% and 60%), and lowest in the Center-West (30%), North (12%), and Northeast (11%) regions.[51] The National Solid Waste Policy (PNRS) defines the prevention of waste generation as a priority for good MSW management, followed by reduction, reuse, and recycling. However, on a per capita basis, MSW generation has been increasing[52] in recent years, reaching 1.04 kg/inhabitant-day. The organic fraction makes up 45.3% of Brazil's MSW; recyclable waste accounts for 33.6% of the total, divided across plastics (16.8%), paper and cardboard (10.4%), glass (2.7%), metals (2.3%), and multilayer packaging (1.4%).

3.380. Regional inequalities persist in waste collection. MSW collection in Brazil is largely conventional or mixed—i.e., without source separation—which limits the potential for MSW recovery. 83% of households are served by door-to-door solid-waste collection, 8.1% are served by curbside schemes, while the remainder do not benefit from regular collection services. As a result, approximately 7.2 million tons of MSW were not collected in 2018. The quality of services varies across regions. In 2018, the coverage of collection services was highest in the Southeast, at 96.2% of the population, followed by the Center-West at almost 93%; and lowest in the North, at 83.6%.[53] Finally, the South region includes the largest number of municipalities that offer collection services, followed by the Southeast, while numbers are much lower in the rest of the country.

3.381. The rate of waste recovery is low. In 2018, only 2.2% of the dry waste[54] and 0.2% of the organic waste collected were recovered.[55] Waste-to-energy initiatives mainly focus on the recovery biogas from landfills, co-processing in cement plants, and bio-digestion of specific waste streams. The PNRS aims to involve recyclers in "shared responsibility"[56] efforts, but the notion of paying for selective-collection services is relatively new in Brazil, and the municipalities that do pay for such services are mostly in the Southeast and the South. Multiple factors influence the economic viability of recovery activity, including the territorial distribution of recycling providers and facilities which, once again, tend to concentrate in the Southeast and the South.

3.382. Waste disposal is often inadequate. Disposal in sanitary landfills remains the most common (accounting for 59.5% of all MSW, or approximately 119,000 tons/day), followed by inadequate disposal in controlled and dump sites (more than 40% of MSW, or 80,000 tons/day). 54% of municipalities in the North, Northeast, and

51 Frost & Sullivan. Brazilian Municipal Waste Management Services Growth Opportunities. Jan. 2022.
52 This analysis focuses on MSW, including domestic waste, as defined by Law No. 12,305/2010, which differentiates "waste" from "rejects" (*rejeitos*). Waste comprises potentially recyclable components (dry and organic); rejects are solid waste that can only undergo environmentally appropriate final disposal.
53 Average MSW collection rate in LAC: 95% in urban areas, 75% in rural areas.
54 The share is higher for certain packaging components, such as: steel cans, 47.10%; aluminum cans, 97.40%; paper and cardboard, 66.90%; multilayer containers, 42.70%; plastics, 22.10%; and glass, 25.80%.
55 SNIS - Sistema Nacional de Informações sobre Saneamento
56 The notion of shared responsibility embedded in the PNRS is central to the reverse-logistics system, making the generator responsible for the destination of the product after consumption, and ensuring the return of recyclables to the productive chain.

Center-West regions inadequately dispose of a significant proportion of their MSW.

3.383. Institutional capacity in the sector is weak. Cooperation and mutual assistance initiatives are fundamental to improving the management of MSW services, which most municipalities struggle with. Consortia or other forms of cooperation between states can help achieve stronger institutional capacity. The Ministry of the Environment has supported states and municipalities in the establishment of public consortia for solid-waste management.

3.384. Waste-management planning has vast room for improvement. The Solid Waste Management Plans are planning and management tools that, per the PNRS, municipalities must prepare in order to access federal financial resources related to solid-waste management. The share of municipalities that had developed such plans rose[57] from 33% in 2013 to 55% in 2017. 1,810 out of 3,469 municipalities had a Solid Waste Management Plan that year, and 267 had an interurban plan. States are also legally required to draw up their own State Plans for Solid Waste (PERS), but the South region was the only one where all states had done so as of 2020.

3.385. The financial viability of waste management must improve. According to the SNIS, as of 2018 only 47% of municipalities charged for the collection and final disposal of household solid waste. The means of collecting such charges were, in order of preference:

I. a fee attached to the property tax (IPTU);
II. a fee attached to the water bill;
III. fare on a specific ticket;
IV. others; and
V. fee.

Waste-collection services are often loss-making, and municipalities usually resort to federal financial aid. The new legal framework for sanitation set out in Law No. 14.026 calls for collection mechanisms that ensure the financial viability of waste management. This is especially relevant because Brazilian municipalities often struggle to ensure compliance among taxpayers.

3.386. The extraction of energy from waste should be developed. In 2020, the federal government allowed for the inclusion of energy produced from MSW in auctions for the purchase of electricity from new generation projects, starting from 2021. The expected duration of the supply contracts from such auctions ranges from 15 to 25 years. In 2018, Brazil captured an estimated 4.2 billion Nm^3 of biogas, but only 9% of it was used for electricity generation. Moreover, the methane recoverable from all the organic waste generated in the country in 2018 could have supplied 49 million homes. The recovery of energy from MSW is increasing, including through landfill biogas (LFG) recovery initiatives (as 2015, 17 municipalities were capturing biogas from landfills for energy generation). Waste-derived fuels (CDR) have significant potential in the cement industry, where they could replace imported and more-polluting petroleum coke. Waste-incineration projects, in cases where other forms of final disposal are not technically or economically feasible, are still in early stages, but could attract investment within a more dependable legal and regulatory framework.

Policy recommendations

3.387. Implement the National Plan for Solid Waste (PLANARES). Launched by the Ministry of Environment in 2022, the plan aims to develop viable systems for the recovery of dry recyclables, linked to environmental education and the reinforcement of waste-picker cooperatives and associations; increase the recovery of organic waste; enable the use of energy from waste; and ensure that the final disposal of waste is environmentally sound.

3.388. Enhance planning, institutional capacity, and logistics. Relevant measures include: (a) support for the development, monitoring, and implementation of state and municipal plans, validating their effectiveness and making adjustments where needed; (b) preparation of regional studies and inter-municipal arrangements; (c) modernization and improvement of municipal enforcement of tariff

57 Profile of Brazilian Municipalities (MUNIC).

collection; and (d) promotion of separate collection of dry recyclables, organic fraction, and rejects.

TRANSPORT

3.389. Investment in transport is crucial to Brazil's productivity and competitiveness. Growth in productivity, trade, and competitiveness are related to the efficiency of logistics corridors, the quality of the road network, and the accessibility of roads and waterways. Brazil has 1.7 million km of roads, 29,817 km of railroads, 64 ports, 44 airports, 27,500 km of waterways and navigable rivers, and urban transport systems for the 86.6% of the country's population that lives in cities. Roads mobilize 58.3% of domestic cargo, and 85% of companies in the country's 20 major industries[58] depend on the road network. However, only 14% of the road network is paved, and only 38% of it is in good or very good condition. These shortcomings affect 36.5% of the population (77.6 million people) and constrain growth in 15 major industries.

3.390. Brazil's transportation matrix is overdependent on road transport.[59] Trade flows rely on a poor-quality, congested road network—especially in the north and northwest of the country—that cannot meet the needs of supply chains and causes delays.[60] Despite their extensive network,[61] railways face interoperability challenges and struggle to attract private financing. Brazil has a number of large port terminals, but dredging restrictions and limited operational capacity thwart their efficiency.[62]Waterway development would have strategic value, but requires significant investment to become a cost-effective option for supply chains in the country. In addition, there are limitations in the infrastructure and operation of several airports.[63]

3.391. The digital transformation of the transport sector is far from complete. Although progress towards digitization has been occurring within the Infrastructure Ministry,[64] as well as in logistics, safety, and mobility services,[65] the digital maturity of Brazilian transport companies remains below world average, particularly among firms active in logistics and supply chain.[66]

3.392. Transportation is responsible for a significant proportion of Brazil's emissions. Transportation generates approximately a quarter of Brazil's total carbon emissions from human activities and more than 40% of emissions in large cities (IPCC, 2018). The country increased its CO2 emissions by 18% between 2008 and 2018 (BP Statistical Review of World Energy, 2019), with transportation accounting for 57.7% of them in 2020.[67] Reducing carbon emissions from transportation is a major challenge, given the growing demand for transport and the resulting need for infrastructure in both urban and rural areas. Brazil makes relatively little use of less-polluting fuels and alternative energy sources and relies heavily on road transport. About 65% of domestic freight is transported by truck, but the trucking industry is marred by excess supply, low profit margins, and limited economic and technical regulation.[68] Thus, drastically reducing emissions requires new technologies and a push for modal and infrastructural changes.

3.393. Brazil remains dependent on fossil fuels. In 2019, fossil fuels accounted for more than 50% of

58 These include textiles, shoes, chemicals, cement, metals, aircraft, motors, heavy machinery and equipment, and the agricultural chains of coffee, soybeans, wheat, rice, corn, sugarcane, cocoa, citrus, and beef.
59 Ministerio da Infrastrutura, 2021. Plano Nacional de Logística, 2035.
60 Fitch Solutions, 2022.
61 At 29,850km, Brazil's railway network is among the longest in the world and, like the road network, mostly concentrated in the southern and coastal region. Fitch Solutions, 2022.
62 Restrictions placed on foreign investment have also discouraged international terminal operators from entering the country. Fitch Solutions, 2022.
63 Fitch Solutions, 2022.
64 Between 2019 and 2021, the Infrastructure Ministry digitalized 100% of its public services and developed 53 digital projects, including the Transit Portal, portals for the National Agencies for Roads and Waterways Transport, Digital Transit Payments, InfraBR & Safe Boarding for cargo, and an electronic driving license and vehicle registration.
65 Such as speed and traffic control, artificial intelligence algorithms applied to road safety, Mobility as a Service apps (MaaS), e-parking, digital marketplaces to buy transport services, electronic ticketing, online checking across transport modes, digital marketing, cargo tracking and e-booking, traffic surveys based on data intelligence analysis, as well as apps on road maintenance and social distance developed by the IDB.
66 McKinsey, 2019
67 Balanço Energético Nacional – EPE/MME in Ministerio da Infrastrutura 2022
68 EPL, 2015; EMIS, 2018.

the country's total energy consumption. Reducing greenhouse gas emissions from hard-to-decarbonize sectors—such as transport and heavy industry—is key to meeting Brazil's commitments under the Paris Agreement, which include becoming carbon neutral by 2050. The industrial and transport sectors account for the majority of Brazil's final energy consumption, with shares of 31% and 33%, respectively. The main non-renewable sources in the industrial sector's energy consumption mix are: coal and its derivatives (15% of total sectoral energy consumption), petroleum products (13%), and natural gas (11%). Moreover, 78% of the energy consumed by the transport sector comes from non-renewable sources—specifically, diesel (46% of total sectoral energy consumption) and gasoline (32%).[69]

3.394. Brazil has many avenues to promote green growth in the transportation sector. For example, Brazil is cementing its position as a regional hub for the production of electric vehicles (EVs), which it could advantageously export across LAC thanks to Mercosur and other free-trade agreements. However, Brazil can do much more to encourage EV purchases among individual and commercial buyers, as current incentives comprise solely certain tax exemptions at the federal and state levels.[70] Separately, the country needs to enhance the resilience of its transportation infrastructure, which is increasingly threatened by climate and environmental disruption. Notably, floods and landslides caused nearly US$1 billion in damages to Brazil's transportation infrastructure between 2011 and 2016.[71]

3.395. Transportation infrastructure can have a major impact on natural capital, both directly and indirectly. For example, expanding or improving a road network can prompt changes in land use in adjacent areas, leading to deforestation or degradation, with downstream impacts on other ecosystem services. An analysis of the indirect impacts on land use from a proposed road between Pucallpa, Peru and Cruzeiro do Sul, Brazil suggested that the expected conversion of natural vegetation to other types of cultivation would lead to a 1,000% increase in sedimentation of drinking water for certain downstream communities.[72]

Policy Recommendations

3.396. Invest in the transportation sector. Brazil's transport development requires increased public investment and private long-term financing to expand and maintain the road network, modernize logistics services, improve multimodal integration, and generate demand for and financial incentives to public transport systems.

3.397. Adopt a green growth strategy. Such a strategy should include:

I. action plans aligned with the Paris Agreement, setting out specific goals for each transport mode;
II. emission targets in 17 major cities to promote hybrid and electrified urban transport, across both public fleets and private vehicles;
III. sustainable urban mobility plans in prioritized cities;
IV. a 4.0-SURE Roads Program, with net-zero targets for both the construction and operational phases;[73]
V. R&D on sustainable fuels in aviation, maritime and waterways transport,
VI. urban land regulation for sustainable mobility; and
VII. green bonds and other innovative financial sources and business models.

3.398. Support logistics corridors and multimodal transport. Transport infrastructure will be a growth area in Brazil's infrastructure market, due to major investments planned under recent

69 The segments of difficult decarbonization are those that, for technical or economic reasons, have limited prospects of replacing fossil fuels with less--polluting sources of energy. This definition mainly applies to transport and heavy industry.
70 Fitch Solutions, 2021.
71 World Bank. 2019. "Improving Climate Resilience of Federal Road Network in Brazil." Washington, DC: World Bank. doi:10.1596/32189; World Bank. 2016. "Damage Report: Material Damages and Losses Due to Natural Disasters in Brazil, 1995–2014." Working Paper No. 111703, (in Portuguese)". Brasilia.
72 Mandle, L., R. Griffin, J. Goldstein, R.M. Acevedo-Daunas, A. Camhi, M.H. Lemay, E. Rauer, and V. Peterson. 2016. "Natural Capital & Roads: Managing Dependencies and Impacts on Ecosystem Services for Sustainable Road Investments." IDB.
https://publications.iadb.org/en/publication/17173/natural-capital-and-roads-managingdependencies- and-impacts-ecosystem-services.
73 4.0- SURE Roads combine sustainable materials and standards, with innovations on digitization and resilience to climate change.

concessions, and a large-scale pipeline of future concessions.[74] Supporting the structuring and development of strategic transport and logistics projects, with private participation, can have a significant developmental impact. A robust pipeline of road infrastructure investment and concession projects has the potential to improve the quality and capacity of road assets, increasing road safety and climate resilience.

3.399. Accelerate the digital transformation. Road connectivity is key to improve logistic efficiency, monitoring of cargo, and adoption of smart technologies. Relevant steps include:

I. modernizing technologies across logistics infrastructure and services;
II. developing technology pilots to reduce operational costs, and modernizing quality standards in transport and mobility infrastructure;
III. promoting national and international integration of transport modes and markets; and,
IV. improving efficiency in public spending, planning, project appraisal, and governance of infrastructure and services, to promote fiscal sustainability, a reduction in transport-related inequalities, and targeted social opportunities.

3.400. Enhance the resilience of the transport sector. Managing forests to reduce landscape risk near roads can be up to 16 times more cost-effective than repairing damaged road networks. Restoring and protecting coastal ecosystems, such as reefs and tidal wetlands, can reduce flooding and erosion affecting coastal highways and railways.[75]. In Belém, for example, each 20 km stretch of mangrove forest provides infrastructure protection benefits worth between US$100 million and US$250 million, including for roads and ports.[76]

3.401. Increase the participation of the private sector in railways development. The private sector can be instrumental in mitigating the country's dependency on road transport, especially through railways development. Multilateral institutions can also have a strategic role in supporting railway projects, whose financing has historically been constrained by technical and operational risk factors.

3.402. Advance the electrification of public and private transport. Brazil should promote regulatory and fiscal incentives to scale the electrification of public-transport systems and the deployment of electric vehicles for cargo transportation and private use. Multilateral institutions can assist the country in deploying consistent incentives, and support relevant financing to the private sector.

3.403. Develop multimodal transportation systems to reduce logistics costs. The federal and subnational governments should develop strategic transportation plans that integrate different transportation modes, support regional value chains, and coordinate policies across jurisdictions.[77]

3.404. Modernize and expand rail infrastructure. The National Logistics and Transportation Plan *(Plano Nacional de Logística e Transportes,* PNLT) estimates that doubling Brazil's rail network by 2030 would increase the transportation sector's energy efficiency by 38%, reduce fuel consumption by 41%, and cut CO2 emissions by 32%.

3.405. Upgrade port and airport infrastructure and improve operational efficiency. Port operations should be streamlined, and infrastructure upgraded to service larger vessels in strategic terminals. Stronger connections between ports and domestic rail, road, and waterway networks would reduce logistics costs and enhance transportation efficiency. Better access to ports in the North could reduce transportation times to some of Brazil's main external markets, including Euro-

74 Fitch Solutions, 2022
75 WEBB, Bret M. et al. White Paper: Nature-Based Solutions for Coastal Highway Resilience. Federal Highway Administration (US), 2018.
76 Menéndez, P., I.J. Losada, S. Torres-Ortega, S. Narayan, and M.W. Beck. 2020. "The Global Flood Protection Benefits of Mangroves." Scientific Reports 10 (1): 4404. doi:10.1038/s41598-020-61136-6.
77 A study on the main logistics corridors, routes, and destinations for some export-oriented commodities, recently conducted by the Ministry of Transport, Ports and Civil Aviation (FGV, 2018), can help prioritize investments. Maintenance and operation of highways can be transferred to the private sector (FGV, 2018).

pe, by almost a week.[78] Addressing airport capacity constraints will require a combination of infrastructure upgrades and operational improvements, including the use of concessions.

GREEN CITIES

3.406. Few cities have a plan for the transition to a zero-carbon economy. According to the SEEG 2021 report, Brazil is the world's sixth-largest GHG emitter, contributing 3.2% of global GHG emissions. In terms of road traffic, the country is the world's eighth most-congested overall, with São Paulo placed fifth on the Global Traffic Scorecard's ranking of most-congested cities. Uncontrolled urban expansion increases the need for mobility infrastructure, but the country lacks integrated planning for land use and transportation (IADB & UKSip, 2021). Six cities[79] have published their climate action plans, but most do not have a climate planning tool, and data about the contribution of cities to GHG emissions is incomplete.

3.407. Brazilian cities are vulnerable to climate change. According to the Brazilian Panel on Climate Change (PBMC, 2013b), most of the Northeast, the northwest of Minas Gerais, and the metropolitan regions of São Paulo, Rio de Janeiro, Belo Horizonte, Salvador, Brasilia, and Manaus are the areas most susceptible to the adverse effects of climate change, and where extreme weather events will concentrate by the end of the century. The growth of large cities in Brazil has been rapid and disorderly, and lack of housing has led to the occupation of areas at risk (PBMC, 2018).

3.408. Climate-related risks affect buildings, infrastructure, and people in Brazilian cities. In 2010 (IBGE, 2018), 8.27 million people lived in areas at risk across 872 municipalities,[80] most of which were located on the country's east coast. Among the 20 municipalities with the largest at-risk population, the issue is most critical in Salvador, where 1.2 million people (45.5% of the total population) lived in areas at risk, and in São Paulo, where the figure was 674,000 (6% of the total population).

3.409. Urban concentration in metropolitan regions and large and medium-sized cities contributes to Brazil's environmental challenges. Many cities must contend with rapid urbanization, inefficient planning, and growing car ownership.[81] Common challenges include the prevalence of low-density, high-value land in downtown areas, poor accessibility, car dependency, and uncontrolled non-contiguous sprawl. Low-income residents are forced to move toward the peripheries, where they face longer and more expensive commutes by public transport.[82] Traffic jams in São Paulo alone cost an estimated R$156.2 billion per year.[83] Measures towards low-carbon cities could prompt the creation of 4.5 million new jobs and a 35% reduction in GHG emissions by 2030, and of 1.5 million jobs and an 88% reduction in GHG emissions by 2050.[84] Cities should prioritize natural processes and holistic urban management to minimize environmental impacts from urbanization, while protecting their people and physical heritage from adverse climate effects.

3.410. Most Brazilian cities do not have climate-change adaptation plans or urban planning strategies, and do not include climate considerations in urban development projects. Cities struggle to mobilize public and private investments for projects focused on urban climate adaptation and resilience, which could greatly support climate-change mitigation efforts. Resilient infrastructure can reduce urban vulnerability by improving drinking-water supply, sanitary sewage, street cleaning, urban solid-waste management, and drainage and management of urban rainwater.

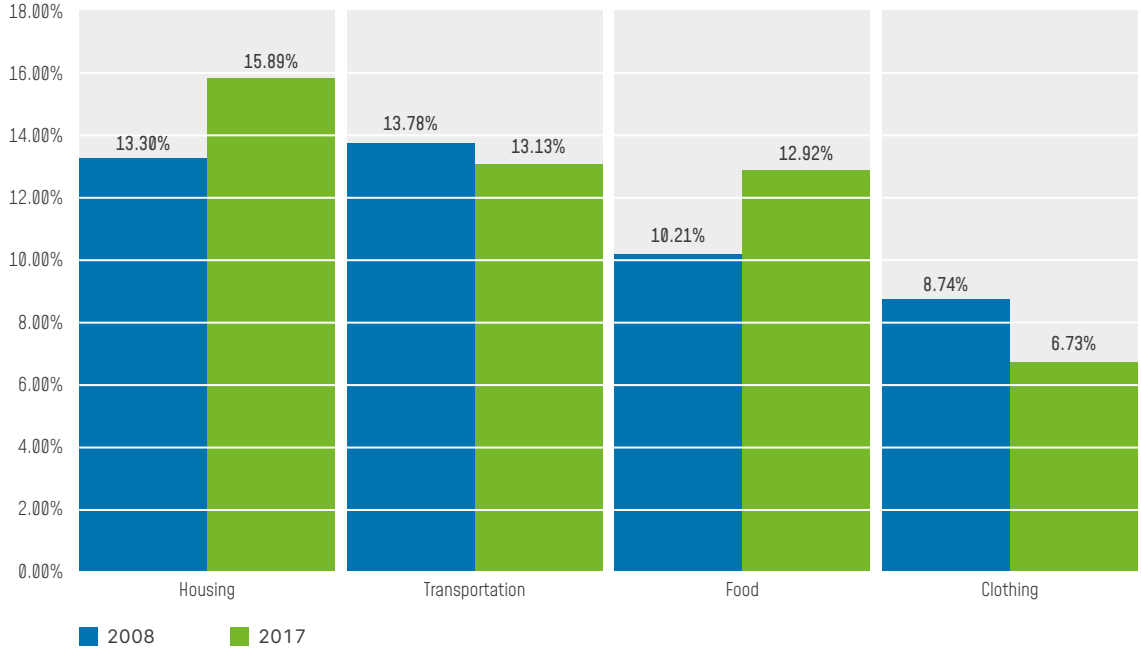
78 ANTAQ, 2017.
79 São Paulo, Río de Janeiro, Salvador, Curitiba, Recife, and Fortaleza have published climate action plans.
80 CEMADEN (National Center for Natural Disaster Monitoring and Alerts) monitors 958 municipalities for natural disasters (IBGE, 2018).
81 Between 2003 and 2014, the urban population in major Brazilian cities increased by 21.3%, while the number of automobiles increased by 116% (Associação Nacional de Transportes Públicos, 2016).
82 CNI, 2012. Cidades: mobilidade, habitação e escala – um chamado à ação.
83 Haddad, E.A. and Vieira, R.S., 2015. Mobilidade, acessibilidade e produtividade: nota sobre a valoração econômica do tempo de viagem na região metropolitana de São Paulo. Núcleo de Economia Regional e Urbana, Universidade de São Paulo.
84 Coalition for Urban Transformation, 2021, *Seizing the Urban Opportunity*.

3.411. Current urban mobility policies do not contribute to a green development model. Urban mobility challenges, caused by growing demand on transport networks and the deteriorating quality of public transportation, are significant. In most Brazilian cities, public policy favors private transportation—and particularly the use of cars and motorcycles—thus hindering sustainable urban mobility. Uncontrolled urban sprawl, and particularly the expansion of low-income suburbs, increase congestion and extend commuting times. Although all cities with a population of more than 20,000 (a total of 3,065 cities) are legally required to devise a mobility plan, as of 2016 only 171 cities (9% of the total) had done so,[85] due to limited technical and institutional capacity.[86]As of 2019, due to inadequate urban planning and engineering, 3,653 municipalities (45.3% of all municipalities in the country) had been affected by floods in the previous five years, with the highest concentration in the Southern region (64.2 percent) and the lowest in the Northeast region (34.3 percent).

3.412. Shortcomings in transport infrastructure take a heavy toll on citizens and the environment. CPI (2018) shows that the prevalence of motorized individual transport has a detrimental impact on air quality and road safety. Notably, Brazil has the highest annual number of motor accident victims in the world. The country should adopt policies that incentivize a change in behavior by freight and passenger operators, as well as by their users, to promote more-efficient, low-carbon transport systems; improve access to mobility services; strengthen energy security; reduce urban pollution; and improve the health and quality of life of the population.

3.413. Enhancing the social inclusivity of public transport can contribute to reducing inequalities and poverty. Safe and reliable transport connects people with social services, jobs, and opportunities, contributing to poverty reduction and sustainable development (UN, 2015).[87] In Brazil, however, only 11.7% of municipalities operate intercity transport services with fleets accessible to people with

FIGURE 3.18. Distribution of the household expenditure in urban areas



Source: CPI (2018) and PNAD – IPEA (2021)

85 Ministério das Cidades, 2017.
86 Nassar, 2018.
87 Mobility is a social right under Brazil's Federal Constitution. Access to safe, accessible, and sustainable transport for all, with special attention to the needs of women, children, elderly, people with disabilities and vulnerable groups, is a sustainable development goal (SDG -11).

disabilities. Relative to the averages for the overall population, Afro-Brazilians live farther from both motorized and active transport systems,[88] pay more in fares, and face overcrowding and lack of transit options; in addition, 91% of Afro-Brazilian women live farther from medium/high-capacity stations, and cannot access services suited to their mobility needs.[89] Access to basic transport services on rural roads is associated with poverty reduction, particularly in agricultural municipalities.[90] To help reduce inequalities and poverty, public transport policies need to adjust benchmarks of quality, coverage, safety, social accessibility, and affordability to the needs of women, persons with disabilities, the elderly, and vulnerable groups, and ensure the economic viability of the related investments.

3.414. Deaths from diseases caused by atmospheric, chemical, and soil contamination are on the rise, especially among vulnerable populations. Air pollution—driven by increasing motorization, lack of public transport, and obsolete regulation—kills approximately 51,000 Brazilians per year (WRI, 2021).[91] The country does not consistently monitor air quality, adopts permissive baselines relative to WHO recommendations, and does not enforce penalties when air quality parameters are disregarded.

Policy Recommendations

3.415. Reduce GHG emissions through the sustainable integration of urban planning with green mobility systems and buildings. Urban infrastructure investments should aim to alleviate vehicle congestion through good density planning. Integrating housing and transportation planning through transit-oriented development (TOD)[92] can reduce travel times. Experience shows that successful TOD strategies can:

I. promote the efficient use of urban land around transit stations;
II. be a powerful financing and planning tool for transit-related investments;
III. help governments fund high-quality local infrastructure without major effects on public debt;
IV. promote a pedestrian-friendly environment, through transit riding, walking and bicycle travel; and
V. reduce traffic congestion, improving air quality and reducing GHG.[93]

Overall, such projects promote efficient, compact, vibrant, walkable, and mixed-used neighborhoods.

3.416. Develop low-carbon cities, setting goals for urban decarbonization. Key actions include:

I. adopting ecological urban design to promote safe, non-motorized, emission-free public transport, discouraging the use of private vehicles and promoting road safety;
II. promoting TOD strategies to coordinate density planning, mobility interventions, and infrastructure development, thereby reducing private-vehicle trips[94] to the benefit of public transport;
III. creating public green spaces for carbon capture, efficient drainage, and mitigation of heat-island effects, reducing health risk and urban inequalities; and
IV. encouraging the efficient use of energy, water, and construction material in buildings, prioritizing renewable energy sources and low-energy materials.[95]

The Amazon region needs tailored interventions, to facilitate sustainable models of urban development that are compatible with the region's natural and cultural context.

88 In one-third of state capitals, more than 90% of the population lives far from a bicycle lane.
89 Data covering Sao Paulo, Rio de Janeiro, Curitiba, and Fortaleza (Bittencourt, Gianotty and Marques, 2020), and surveys from The Color of Mobility Program (ITDP, 2021). Afro-Brazilian women are also vulnerable to gender-based violence on public transportation. Sao Paulo, Curitiba, and Uberlandia have successful examples of social access to transport.
90 Access to infrastructure and poverty in Brazil; empirical research (Medeiros, Hermeto, Oliveira, 2020)
91 The State of Air Quality in Brazil: https://wribrasil.org.br/pt/publicacoes/o-estado-da-qualidade-do-ar-no-brasil.
92 TOD is an urban development model that maximizes residential, commercial, and recreational spaces within walking distance of public transport. It seeks to increase the number of public-transport users, reduce private-vehicle use, and promote sustainable urban growth (IADB, 2020, from Cervero et al., 2002).
93 "Transit Oriented Development: how to make cities more compact, connected and coordinated" (IADB, 2020); and World Bank, 2015. Financing Transit-Oriented Development with Land Values: Adapting land value capture in developing countries.
94 Integrating mixed land use in urban planning with the promotion of electric and emission-free non-motorized vehicles can effectively reduce transport-related emissions (IADB, 2020).
95 Vamos construir verde? Guia prático para edificações, espaços públicos e canteiros sustentáveis no Brasil – Let's build green? A practical guide for sustainable buildings, public spaces and building sites in Brazil (IADB, 2020).

3.417. Improve technical assistance and financing for the implementation of low-carbon strategies. Urban and land-use planning strategies can incorporate sustainability and low-carbon criteria, through efforts that include:

I. calculating GHG emissions at city level;
II. establishing climate-change mitigation goals aligned with national commitments; and
III. identifying opportunities and strategies for low-carbon urban development.

3.418. Implement effective mobility plans. The National Urban Mobility Policy *(Política Nacional de Mobilidade Urbana*, PNMU) establishes principles, guidelines, and tools to help cities create urban mobility plans. The PNMU encourages cities to integrate different transportation modes, prioritize public transit and non-motorized transportation options, and focus on equity in public spaces and public participation. Transportation interventions should be coordinated with other urban development policies, particularly around land use, to facilitate planned urban expansion and maximize the use of transportation systems.

3.419. Support integrated urban development and mobility strategies based on the TOD model. International practice shows that successful TOD projects need:

I. governance mechanisms to overcome institutional barriers and facilitate coordination between public and private stakeholder;
II. appropriate legal and regulatory frameworks;
III. the integration of spatial and public-transit planning with land management;
IV. economic and fiscal instruments to mobilize resources;
V. integrated policies for sustainable urban development; and
VI. modelling of the potential environmental, social, and economic impacts of the projects.

The TOD model offers a suitable platform for both public and private investment and helps identify revenue options beyond transit fares and passenger growth. It thus enables land-value capture and greater financial viability.

3.420. Adopt new technologies to improve transportation efficiency. Modern technologies such as drones and vehicle sensors can enhance control over freight movement and logistics. Intelligent transportation systems (ITS) technologies can transmit traffic information to control centers in real time, enhance the safety and efficiency of public transportation, improve oversight and risk management in urban rail systems, and increase the capacity of port terminals through vessel-traffic management systems and radio-frequency identification systems, inter alia. Maximizing the value of ITS technologies will require developing the infrastructure (e.g., charging terminals) to facilitate the adoption of new transport solutions (e.g., electric vehicles).

3.421. Promote a more resilient urban environment. Urban development needs to be set within environmental boundaries, through planning and management models that rely on natural capital to improve resilience.[96] Relevant measures include:

I. promoting adaptive urban planning solutions that incorporate disaster-risk management and a climate-change focus, and combine urban ecosystems and natural capital[97] with other risk-management instruments;
II. encouraging ecological design, green infrastructure, nature-based solutions, and the supply of public green areas to prevent and mitigate natural disasters;
III. incorporating urban resilience into infrastructure planning at the subnational level; and
IV. prioritizing protection and emergency responses in areas with vulnerable populations and critical infrastructure.

3.422. Reduce atmospheric, water, acoustic, and soil contamination.[98] Emissions regulation, driving restrictions, and green infrastructure are ef-

96 Natural capital and ecosystem services mitigate natural disasters. Coastal vegetation reduces the effects of tsunamis, hurricanes, floods, and other natural disasters; it also reduces erosion from heavy rains and serves as a water filter that retains sediments from forest fires (IADB, 2021).

97 Natural capital is the stock of assets that includes minerals, soil, air, water, and all living beings from which humans obtain ecosystem services, and which make human life possible. http://www.thebiodiversityconsultancy.com/es/approaches/natural-capital/.

98 Joint actions with the Environment and Biodiversity, Water and Sanitation, and Transport sectors.

fective tools to mitigate pollution. Recommended measures include:

I. adopting integrated planning and management of land use and mobility to reduce the use of private vehicles;[99]
II. preventing the contamination of aquifers and watersheds, through optimal solid-waste treatment as well as natural drainage systems and green infrastructure that reduce impermeable surfaces;
III. combining regulatory measures with technological innovation, data analysis, and green infrastructure to reduce contamination levels; and
IV. strengthening the monitoring of contaminants.

(3) Promote a sustainable economy: Bioeconomy, Agriculture, Mining and Tourism

Brazil can manage its natural resources in a sustainable and economically beneficial way, while improving living standards in the country's least-developed areas. By fostering sustainable economic activity, Brazil can both reduce poverty and inequality, and protect the environment. Achieving these objectives will require investment, innovation, planning, and systemic change across several sectors.

3.423. The bioeconomy comprises any economic activity based on the use of natural renewable biological resources, from both land and water, to obtain food, materials, and energy, while ensuring the availability of resources for future generations. The bioeconomy reinforces connections between the primary sector, manufacturing, and services, contributing to broad economic development.

3.424. The bioeconomy can help accelerate the green transition while creating high-quality employment opportunities. Brazil's vast biodiversity and abundant agricultural resources offer a solid foundation for the development of biological products and industries, with high-value applications across several sectors. Realizing this potential requires a coordinated effort to discover natural properties with economic value and invent or acquire technologies and processes to transform biomass into products of commercial value. In other words, transforming the emerging sectors of the bioeconomy into engines of sustainable growth will require scientific research and technological innovation.

3.425. Developing the bioeconomy faces major challenges. First, logistical constraints are significant. Although road transport provides capillarity and agility to value chains, it is one of the least-efficient modalities in terms of GHG per transported cargo. Furthermore, in a country of continental dimensions and with a poor-quality road network, dependency on road-based logistics is a risk. The enforcement of environmental legislation is inadequate, with rules routinely circumvented or ignored.[100]

3.426. The Amazon region can strongly benefit from the development of the bioeconomy. Despite their natural wealth and diversity, the nine Brazilian states that make up the Legal Amazon[101] account for less than 9% of national GDP,[102] and the region underperforms the rest of the country on many social indicators. The Human Development Index (HDI) of the Legal Amazon falls consistently below the national average on all three of its dimensions—income, longevity, and education—while 90% of municipalities in the region rank as medium, low, or very low on the HDI scale.[103] 40% of the region's population is poor, a much higher share than in the rest of the country.[104] In this context, the bioeconomy represents an environmentally friendly path to development.

99 The regulation and monitoring of emissions from these vehicles can also be strengthened.
100 3° Mapa de Impacto - Relatório Ambiental
101 The Legal Amazon officially encompasses the seven states of the North Region (Acre, Amapá, Amazonas, Pará, Rondônia, Roraima, and Tocantins), as well as most of Mato Grosso in the Center-West region, and the western part of Maranhão in the Northeast.
102 Santos, D., et al., *"Fatos da Amazônia 2021"*, Amazonia 2030 Project, March 2021.
103 *Atlas do Desenvolvimento Humano*
104 In addition, the Legal Amazon is highly vulnerable to climate change because of its direct exposure to climate risks, its high sensitivity to such risks, and its low adaptive capacity. Existing literature exposes how global warming may induce a higher frequency of extreme climate events and fires, directly impacting forests and agricultural productivity. In parallel, changes in land-use linked to unsustainable practices in agriculture and other land-use are a primary cause of forest loss, exacerbating the problem. Climate vulnerabilities and the spread of unsustainable land-use in turn contributes to aggravate conditions for the local population, particularly the most vulnerable, potentially adding to the already significant deficiencies observed in their basic needs.

3.427. Brazil will benefit from a national strategy for the bioeconomy. Successful strategies for the bioeconomy require an institutional structure for the promotion and development of private businesses that, by sustainably tapping the potential of biodiversity, create new products and processes and enhance economic diversification. Public policies targeted to productive sectors, training programs, and efforts to better organize value chains can foster bio-businesses active in perennial agriculture, agroforestry, aquaculture, forestry plantation, non-timber natural forest products (NTFPs), nature tourism, and ecosystem services.[105]

3.428. A weak institutional environment hinders the development of the bioeconomy. Brazil suffers from a lack of systems and tools for the valuation of assets that produce carbon sequestration, reduce GHG emissions, and mitigate vulnerability to climate risks. This shortcoming diminishes the capacity to attract private investment to activities that protect natural capital. Current legal and governance frameworks tend to distort the true cost of unsustainable use of forests and land, and fail to assign a tangible value to conservation, climate mitigation, or increased climate resilience.

3.429. The supply of funding to the bioeconomy is limited. Bio-businesses are typically MSMEs and too small to access the capital markets. In general, MSMEs in Brazil also have less access to bank credit than larger firms and remain dependent on other sources of financing such as family savings, cashflow from current operations, trade finance, advance payments, or loans against product. In the Amazon, the issue is compounded by the scarcity of financial institutions and tighter credit conditions;[106] as of 2019, the share of credit transactions involving firms in the Legal Amazon was 3% of the national total.[107] Moreover, bioeconomy businesses tend to have several features that enhance the credit risk attached to them, namely:

I. they are often in the early stages of development, have low incomes, and are located in less-developed areas;
II. depend on small enterprises or producers in their value chain who have little or no independent funding;[108]
III. lack traditional collateral;
IV. have payback models that may increase transaction costs and risk levels;
V. operate in volatile markets; and
VI. have little or no track record to help assess their profitability, biodiversity impacts, or contribution to mitigating climate and environmental risks.

3.430. The bioeconomy suffers from a lack of standardized frameworks to monitor biodiversity and climate vulnerability.[109] A lack of data, measurement systems, taxonomies, and accounting systems to evaluate natural capital and forest assets undermines awareness of the bioeconomy's contribution to climate-change mitigation and adaptation. As a result, the benefits from a sustainable use of resources, which reduces GHG emissions and enhances climate resilience, are not properly understood or considered[110] by either public or private actors. Measuring and reporting systems, metrics, and indicators are key to building credibility for the bioeconomy.

3.431. Capacity issues compound the poor awareness of the market opportunities for the bioeconomy. Key shortcomings include: a dearth of specialist knowledge about resilience-enhan-

105 There are some attempts in this direction. The existing Action Plan on Science, Technology, and Innovation in Bioeconomy, which was approved in 2018 (PACTI Bioeconomia). PACTI Bioeconomia focuses on five thematic areas: the valorization of biomass, processing and biorefineries, bioproducts, the creation of a bioeconomy observatory, and the creation of a National Bioeconomy Committee. Following the PACTI Bioeconomia, the MCTI launched the Productive Chains of Bioeconomy program in 2020, investing approximately US$1 million in projects related to four priority value chains: açaí, cupuaçu, pirarucu, and licuri. The Ministry of Agriculture also launched a program in support of the development of new technological solutions in the production chains related to agriculture, livestock, and aquaculture in 2020 (National Bio-input Program). And, in addition, a national biofuels policy (RenovaBio) was also launched in 2020.

106 Nature Services. Unlocking Private Capital by Valuing Bioeconomy Products and Services with Climate Mitigation and Adaptation Results in the Amazon. 2021.

107 Pamplona, L. et al., *"Potencial da bioeconomia para o desenvolvimento sustentável da Amazônia e possibilidades para a atuação do BNDES"*, BNDES, December 2021.

108 Rubino, M. et al., Biodiversity and Business in Latin America, Chapter 4: Financing Needs, IFC, 2000.

109 IPCC (2019), Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems: Summary for Policy Makers.

110 Financial Times, ESG investors wake up to biodiversity risk, 2020.

cing investments, the basic properties of natural materials, and the production and marketing of innovative products or business models; insufficient alignment with international standards and norms; inadequate access to markets; insufficient logistical capacity; and limited use of certifications.

3.432. The bioeconomy can foster regional integration in the Amazon basin. Opportunities for the development of bioeconomy products, processes, and services are available to firms in nine countries across the Amazon basin, many of whom will be facing similar challenges. Each country may also benefit from sharing experience and best practices in policy and regulatory reforms to support the bioeconomy.

Policy Recommendations

3.433. Enact targeted policies to support the bioeconomy. Relevant measures include:

I. grants for basic research;
II. subsidies or credits for R&D;
III. support for the development of prototypes and proof-of-concepts that aim to solve social or industrial challenges, or to replace fossil fuel-based products;
IV. Seed capital for bioeconomy startups;
V. a focused program of public procurement for bio-based products; and/or,
VI. the provision of catalytic public goods, such as research infrastructure, specialized equipment, biorefineries, or support services.

Moreover, a number of initiatives could support the ecosystem for research and innovation in the bioeconomy, such as:

I. legal and regulatory change to improve the business climate for the bioeconomy;
II. efforts to attract, develop, and retain specialized talent; and
III. the promotion of angel and venture-capital investment in the sector.

3.434. Accelerate the productive transformation of the bioeconomy. Regulatory reforms are needed in a number of areas including processes to import biological materials (i.e., cells, tissues, DNA, antibodies, enzymes, virus, viral plasmids, and reagents); intellectual property regulation; the tax system; and the mechanisms for reducing CO2 emissions. Moreover, supporting the provision of public goods such as biorefineries, specialized equipment, and other research infrastructure and services could stimulate advances across several value chains, increasing the value-added of their products, and preserving key sources of biomass.

3.435. Promote innovation and research to create sustainable business opportunities. Brazil lacks incentives for investment into climate-change mitigation and adaptation projects, such as the development of climate-resistant crop varieties or sustainable-forestry value chains. Appropriate policies can promote the responsible exploitation of biodiversity-based products and strengthen the market for them. Measures that promote sustainable value chains for biodiversity-derived products are especially important in the Amazon area, which includes some of Brazil's least-developed regions.[111]

3.436. Use public policy to incentivize sustainable production methods. The Rural Credit Program can improve the quality of agricultural investment. In the North region, which largely overlaps with the Amazon, the government should support integrated production systems that avoid deforestation and maintain or enhance biodiversity, improve resilience to climate change, and support the sustainable development of the bioeconomy. In addition, tax instruments, such as an ecological ICMS and the rural property tax, can be used to incentivize sustainable practices.[112]

AGRICULTURE

3.437. Agri-business is one of the most dynamic sectors of the Brazilian economy. Brazil is the fourth-largest agricultural producer in the world, the main producer of coffee, sugarcane, and citrus, and the second-largest producer of soybean, beef, and poultry. Agriculture (including ranching)

111 PPCDam, 2004.
112 CPI, 2018.

uses 28.7% of Brazil's 8.5 million km2 of territory, accounts for 22% of its GDP, and is a major source of income, employment, and foreign exchange. The agricultural sector, however, features a glaring dichotomy. Most of its dynamism stems from the large-scale production of export commodities in the South, Southeast, and Center-West regions. In contrast, family farming is marred by low productivity and a high incidence of poverty, especially in the Northeast and North regions. Small-scale agriculture accounts for 85% of agricultural production units and up to 70% of output for some of the country's staple foods, employing three-quarters of the farm labor force. However, it only generates one-third of total agricultural income.

3.438. Ensuring that the agricultural sector maintains its competitiveness and positive contribution to the overall economy requires dealing with environmental, climate and social related risks and challenges. These challenges include, inter alia, poor infrastructure, demographic changes in rural areas, social and regional disparities, overall environmental sustainability of the sector in its use of natural resources, and climate change. The model of increasing production through "frontier expansion" is outdated and increasingly out-of-step with markets and societal demands. It not only falls short of sustainability standards, but also faces increased production risks as deforestation and forest fragmentation alter regional climate (Butt et al., 2011; Spracklen et al., 2018). Many studies have pointed to sector-specific proposals to address this (Cohn et al., 2014; Gibbs et al., 2015; Nepstad et al., 2014), but Brazil still lacks a long term, integrated approach to reconcile its production goals with environmental conservation.

3.439. The agricultural sector must become more sustainable. Agriculture and ranching are the bedrock of the Brazilian economy,[113] but unsustainable practices threaten their long-term stability. Agriculture and ranching are the primary drivers of ecosystem degradation and deforestation in Brazil, particularly in the Amazon, Atlantic Forest, and Cerrado ecoregions.[114] Over the last 35 years, 64 million hectares throughout the country were deforested and converted to pastureland.[115] The conversion of native forests to grow crops is also a major driver of ecosystem loss: soy production, for example, contributed to nearly 22 million hectares of forest loss in the Amazon and Cerrado regions between 2006 and 2017.[116] These rapid shifts in land use are not only a threat to biodiversity and natural habitats in globally important ecoregions, but also economically unsustainable. Ecosystem services—such as microclimate stability, soil fertility, water availability, and pollination—underpin land productivity. As a driving force of ecosystem degradation, Brazil's ranching sector is undermining the natural capital it depends on for long-term success. More than half of Brazil's 173 million hectares of pastureland are classified as degraded, and nearly a quarter as severely degraded. Degradation causes a drop in carrying capacity and production per unit-area and is a major liability to the sustainability of the sector.[117]

3.440. Agricultural production is marked by inequalities. Brazil features, on the one hand, a modern and prosperous commercial farming model which is largely mechanized, focused on export crops, and linked to an extensive chain of related activities: from the production of agricultural inputs (e.g., machinery, agrochemicals, and biotechnologies), to the transformation of raw commodities into higher-value products. On the other hand, a small-scale, family-based, and often subsistence-focused agriculture uses rudimentary production techniques, is barely mechanized, but employs about 70% of the rural workforce (Agri-

113 Romiero, V., A.C. Barros, A. Bassi, A. Lucena, A. Szklo, B. Pinheiro, B. Cunha, et al. 2020. "A New Economy for a New Era: Elements for Building a More Efficient and Resilient Economy in Brazil. Working Paper." São Paulo, Brasil: WRI Brasil. https://wribrasil.org.br/sites/default/files/wribrasil_neweconomyforanewera_en.pdf.

114 GFW. 2021. "Brazil Deforestation Rates & Statistics." Global Forest Watch. 2021. https://www.globalforestwatch.org/dashboards/country/BRA?category=forest-change.

115 Feltran-Barbieri, R., and J.G. Féreas. 2021. "Degraded Pastures in Brazil: Improving Livestock Production and Forest Restoration." Royal Society Open Science 8 (7): 201854. doi:10.1098/rsos.201854.

116 Asher, C. 2019. "Brazil Soy Trade Linked to Widespread Deforestation, Carbon Emissions." Mongabay Environmental News. April 3, 2019. https://news.mongabay.com/2019/04/brazil-soy-tradelinked-to-widespread-deforestation-carbon-emissions/.

117 Feltran-Barbieri, R., and J.G. Féres. 2021. "Degraded Pastures in Brazil: Improving Livestock Production and Forest Restoration." Royal Society Open Science 8 (7): 201854. doi:10.1098/rsos.201854.

cultural Census, 2017). The challenge lies in fostering productivity and more developed value chains among family farmers, particularly where their number is highest and their productivity lowest.

3.441. The great challenge is to implement a more efficient and socially inclusive model of agriculture, with a sustainable approach of integrated management (crop-livestock-forestry). Such a model would make possible to maintain the development of the agricultural sector, while reducing emissions, adapting to further impacts of climate change and reducing ecosystem degradation. In this sense, the main national policy for meeting the climate goals in the agricultural sector is the ABC+ Plan (Sectoral Plan for Climate Change Mitigation and Adaptation for the Consolidation of a Low-Carbon Economy in Agriculture, 2nd stage). The plan's main instruments to achieve NDC's goals are recovering 15 million hectares of degraded pastures, expanding the use of no-till farming by 8 million hectares, and increasing the crop-livestock-forestry integration (ILPF) systems by five million hectares (MAPA, 2012). In its second stage, the original targets were maintained, and new technologies were included, such as bio inputs, irrigated systems and intensive finishing of cattle aiming to reach 5 million individuals, using the confinement or semi-confinement technique, characteristic of tropical agriculture. For the recovery of degraded areas, the plan foresees 4 million hectares recovered in commercial production areas of wood, fibers, food, bioenergy, and non-wood forest products. (MAPA, 2021).

3.442. The business case for improving the environmental performance of agriculture is increasingly clear. International markets demand deforestation-free products that meet multiple sustainability criteria (Lambin et al., 2018). In response, traders, meatpackers, and animal-feed producers have made voluntary commitments to source deforestation-free commodities within the frameworks of the Consumer Goods Forum (CGF, 2019), the Tropical Forest Alliance (TFA, 2020, 2019), the New York Declaration on Forests (NYDF, 2019), the Amsterdam Declaration Partnership (AD-Partnership, 2015), and the Soy and Beef Moratoriums, among others. There is increasingly broad agreement in Brazil that the country cannot continue to sacrifice its natural environment to meet short-term targets of economic and agricultural growth (Pinto et al., 2017; Strassburg et al., 2014).

3.443. Production and productivity gains over the past decades largely resulted from investment in R&D and technology adoption. Technologies that made it possible to grow crops on tropical soils, the genetic improvement of plants and animals, integrated pest-management methods, mechanization, and the ability to harvest various crops multiple times a year from the same plot of land have led to extraordinary productivity growth. Between 1961 and 2012, the agricultural production index grew by more than eight times, while the population increased by 2.5 times. Data from FAO shows that while cultivated land shrank by 1.91% in Brazil between 1975 and 2005, land productivity soared by 84.7%. Between 1997 and 2015, the total factor productivity (TFP) of Brazilian agriculture grew by 4.3% per year—twice as much as in the US, the world's largest agricultural producer (Gasques et al., 2016). The impressive growth rate of TFP in agriculture, and its sharp acceleration since 1997, stem from:

I. a constant increase in agricultural research expenditures between 1970 and 1997;
II. favorable agricultural credit policies and incentives; and
III. macroeconomic stabilization policies enacted since 1994 (Brigatte and Teixeira, 2011; Arias et al, 2017).

3.444. Low-carbon production systems are unaffordable for small producers, and the relevant agricultural extension services (ATER) are limited. Farmers need training and technical assistance to adopt innovative practices. Empirical evidence indicates that access to credit boosts the productivity and income of small-scale agricultural producers, as well as their propensity to invest and sell more, while reducing environmental impacts and vulnerability to climate risk (Sekyi, 2020). Although the guiding principle of the ABC+

Plan is the integration of environmental criteria into credit lines and financing policies for technical assistance (MAPA, 2021), small and family producers struggle to access the resources they need.

3.445. Access to ATER is low and unequal, both by region and type of producer. ATER in Brazil is regulated by Law No. 12,188/10, which established the National Policy for Technical Assistance and Rural Extension (PNATER), and the National Program for Technical Assistance and Rural Extension in Family Agriculture and Agrarian Reform (PRONATER). The law defines ATER as a "non-formal education service, of a continuing nature in rural areas, which promotes processes of management, production, processing and commercialization of agricultural and non-agricultural activities and services, including agro-extractive, forestry and artisanal activities" (Brazil, 2010). ATER is delivered by government agencies (mainly at the state level), private companies, and civil-society organizations to individual farmers, farmer groups, cooperatives, and associations. Data from the latest Agricultural Census in 2017 shows that only 18% of the approximately 3.9 million family farmers in Brazil received ATER. Regional differences are notable, as the share ranges from 9% in the North and 14% in the Northeast, to 47% in the South (IPEA 2019).

3.446. Rural extension services are overstretched. The number of families supported by each technician is generally very high (more than 120 families per technician), which prevents adequate follow-up. In most cases, assistance visits are quick and infrequent. The situation is especially critical in the North region, due to the vast distances to be covered as a result of low population density, and the poor state of communication infrastructure. These limitations are common to both public and private ATER services, although they are more pronounced for the former. At the national level, 57% of farmers receive public extension services and 43% receive private services (IPEA, 2019). In the North and Northeast, public ATER serves approximately 70% of the farmers who request it. At the national level, credit was obtained by 43.6% of farmers who received extension services, but only by 7.4% of those who did not (IPEA, 2019). Rural development and the ensuing gains in productivity depend on the intensity and quality of ATER, which allows for the adoption of technological innovations and for technical and organizational follow-up on rural properties. In Brazil, and particularly in the North and Northeast, poor access to ATER and shortcomings in its quality are an obstacle to achieving better results.

3.447. ATER alone cannot cover all the needs of farmers. ATER services cannot fully reinforce the capacity of farmers, particularly small ones, in the following areas:

I. access to finance;
II. access to public services;
III. the ability to adopt practices that ensure climate-change resiliency and sustainable productivity;
IV. access to markets;
V. compliance with health and environmental standards; and
VI. ability to meet the needs of vulnerable groups such as women, the young, and traditional communities.

3.448. ATER professionals need training and knowledge development. This is a priority for technicians from public and private ATER agencies and should focus on technological innovations that improve agricultural systems, foster climate-change adaptation, and promote the sustainable intensification of production. In addition, ATER professionals need appropriate methodologies and tools to work with women, the young, and traditional communities. Distance-learning courses are an option to be considered.

3.449. Agricultural activity is linked to deforestation, both legal and illegal, in several ways. One connection stem from the sluggishness of the Rural Environmental Cadastre (CAR).[118] Lan-

118 The CAR refers both to a geo-referenced database, maintained by the states in coordination with the federal government, and the process of registering a holding in the database, on the basis on geo-referenced data about the holding and about mandatory native vegetation areas. The registration of each holding must be performed by an accredited professional or firm and validated by the relevant state environmental agency.

downers who wish to expand activities on their plots in a lawful manner frequently fail to do so due to the government's slowness in granting the relevant licenses. Thus, landowners often deforest before having obtained a license, which is illegal. Only about 1% of the CAR has been fully implemented since its inception (Costa et al, 2022),[119] and an enormous backlog threatens the viability of the Forest Code. Moreover, agricultural expansion on public land and the related illegal deforestation are largely unchecked, especially in the Amazon. The solution to these challenges lies in greater public sector capacity to ensure timely environmental licensing for private land, as well as the integrity of public land outside of protected or indigenous areas.

3.450. Agricultural health is an important challenge for Brazil. Issues in agricultural health exacerbate constraints to productivity growth and market access. Intensive tropical agriculture, practiced across diverse local ecosystems in a context of large-scale international trade, is exposed to risk from agricultural diseases and pests, and maintaining sanitary standards is a constant challenge. Over the last ten years, Brazil has suffered substantial agricultural losses from at least 35 new pests. Another 500 quarantined pests, many of which are present in neighboring countries, may cause significant damage.[120] The 2005 outbreak of foot-and-mouth disease in the state of Mato Grosso do Sul caused the loss of 78,000 head of cattle, cut beef prices by 15%, blocked beef exports to more than 30 countries, and reduced their volume by over 40%. Between 2012 and 2013, an outbreak of cotton bollworm *(Helicoverpa armigera)* damaged cotton and soybean production in the states of Mato Grosso and Bahia, raised costs by 10% due to the increased need for insecticides, and inflicted losses of US$800 million in 2013 alone.[121]

Policy Recommendations

3.451. Highlight the central role of the Brazilian agricultural sector in achieving climate goals, reducing deforestation, and increasing income generation. According to EMBRAPA (2018), the main tools to improve the agricultural sector's contribution to sustainable growth include:

I. expanding the offering of technical and rural extension to small and medium-sized producers;
II. reducing the energy input of agricultural production systems, and replace fossil carbon sources with renewable sources;
III. implementing animal and plant production systems that consider regional characteristics and use resources rationally;
IV. improving access to social capital to facilitate the adoption of environmentally sustainable technologies and practices;
V. expanding credit and mechanisms for rewarding rural producers for their environmental services, focusing on reducing GHG emissions and improving water availability.

Furthermore, while illegal logging, mining, urban expansion, and infrastructure development play an important role in deforestation in the Amazon (Diniz et al., 2019), the expansion of the agricultural frontier has been a major driver, and especially the conversion of forests into pastures and crops (Rivero, Sergio et al., 2009). Therefore, reducing deforestation requires action across several dimensions, such as: establishing and enforcing legal mandates to protect forests; expanding legally protected areas; strengthening information systems for monitoring deforestation; expanding land regularization; raising public awareness of the importance of forests for the environment and the climate; and creating incentives for farmers and rural communities to avoid deforestation.

3.452. Build a new form of ATER that combines face-to-face and digital modalities. Face-to-face activities, limited to the minimum necessary, should be complemented by remote or digital activities. Access to and use of digital tools are growing in rural areas, although connectivity remains an issue, especially in the North and Northeast regions.

119 Full implementation meawns that all steps, from registration to validation and vegetation recovery plan, have been fulfilled.
120 Martin Neto et al., 2016.
121 Pomari-Fernandes et al., 2015

3.453. Scale new technologies for the benefit of small family farmers in the North and Northeast. The strong development of agtech firms points to their relevance, but their services need to be extended to small family producers in less-developed regions, in coordination with ATER services. Agtechs can contribute in areas such as innovation in production systems, data analysis and technological support for decision-making, climate and market information, logistics information, storage and transport, digital certification, and online markets and food stores.

3.454. Expand the role of farmers' organizations as providers of ATER. Producer organizations and cooperatives, particularly in the South, have been increasingly providing direct technical advice to their members. This trend has shown positive results, particularly to solve production issues. It is still very limited in the North and Northeast, but has the potential to become more widespread, as a complement to the services of public and private ATER providers.

3.455. Invest in training in rural areas. The low level of education of many farmers, and their lack of access to technical assistance and rural extension, hamper the adoption of new technologies. Improvement in the training of young people in technical institutes and rural education establishments (such as agricultural family schools) can contribute to the integration of new practices and technological innovations in agricultural production.

3.456. Enhance access to export markets. Efforts should continue to improve animal health and traceability, while good environmental performance may facilitate trade agreements and market access (OECD,2021). In particular, investments to increase product traceability (focusing on origin, quality, nutritional value, and safety) will create a closer connection between producers, investors, and consumers. Investment in transportation infrastructure is also required to meet growing demand and lower the cost of freight, a significant component of the "Custo Brasil".

3.457. Strengthen the agricultural health system. The government should invest in agricultural health institutions and programs, and support research into sustainable methods of controlling pests and diseases in plants and animals. Reducing the risk of introducing new pests, which can inflict major economic losses and jeopardize access to export markets, will be especially important.

MINING

3.458. There are challenges for a sustainable mining. Small-scale alluvial mining is one of the main causes of deforestation in the Amazon and is associated with important impacts on indigenous and Afro-descendant communities in the region. With low levels of formalization, this activity is challenging to monitor and control. This generates serious social and environmental impacts and contributes to a significant fiscal loss.

Policy Recommendations

3.459. Improve the sector governance. In the context of the improving the management capacities of the Amazonian territory, it could be useful to analyze and review mining concession policies and address professional or corporate mining as an option to integrate this sector into the sustainable development of the region. Indeed, considering the gold reserves of the Amazonian territory and the difficulty of controlling its informal extraction, it is critical to reinforce formalization and concession policies with a long-term conservation approach. To achieve this, it is essential to create a framework of institutional or corporate responsibility for the environmental and social conservation status of a concession, including territories not exploited at the mining level, but are close or nearby mining/extraction activity.

TOURISM

3.460. Building a sustainable tourism industry in Brazil will require overcoming multiple challenges related to institutional capacity and managerial expertise. Tourism management boards, espe-

cially in the northern and northeastern states, lack the experience necessary to strengthen local competitiveness while adapting to the effects of climate change. In many cases, tourism plans and policies are limited, partial, or nonexistent. In a recent survey, policymakers in five of the seven northern states describe their capacity to mitigate the social and environmental consequences of tourism and to manage climate vulnerability and disaster risk as "regular." Authorities in only one state reported working in partnership with other organizations and institutions to strengthen crisis mitigation and disaster management. Of these five states, four have strategic tourism plans that run through 2025, but none of those plans incorporate specific measures related to climate change, crisis and disaster management, or other key elements of the 2030 Agenda. Three states have management plans for crises and natural disasters in general, but these plans do not deal specifically with tourism and are not used by tourism management boards in their strategic planning. In interviews, management boards cite a high or medium probability of natural disasters occurring in the region, including floods, fires, and deforestation, in addition to economic crises (Sagi, 2022a). Similar patterns are evident in the northeast region.

3.461. Tourism management boards and other public institutions and participatory governance mechanisms lack a culture of monitoring and accountability. As they do not oversee the performance of strategic plans through clearly defined indicators, these bodies do not have the capacity for continuous learning. Tourism surveys are conducted on a sporadic and unsystematic basis (Sagi, 2022a), and inadequate data to inform decision-making was an especially acute challenge during the Covid-19 crisis. Other fundamental competences related to sustainable tourism and international competitiveness are weak or absent, including the capacity to form partnerships with the private sector and to secure project financing from public or private sources. Tourism boards and other public institutions rate their social communication, public relations, and social engagement capacities as "regular" (Sagi, 2022a).

3.462. Transparency is also limited in the tourism sector. Public sector actions are often opaque, and participatory governance mechanisms must be strengthened to ensure the responsiveness of public policies to local interests and preferences. The planning instruments and decision-making records of public institutions are not published on their websites. In half of the states, tourism firms and industry associations play only a nominal role in the elaboration and monitoring of tourism policies, though in the other half the private sector is much more actively engaged. Tourism and environmental civil society associations also tend to be highly engaged in the policy process, though the participation of tourism councils varies widely from state to state (Sagi, 2022a).

Policy Recommendations

3.463. Build institutional capacity to develop and manage sustainable tourism. The authorities should design public policies to strengthen knowledge collection, crisis and disaster management, and climate-change mitigation and adaptation among tourism stakeholders in the public sector, the private sector, and society civil. Creating planning instruments and monitoring systems for the rapid analysis of data from diverse sources would support informed decision-making by ensuring that policymakers have access to timely and comprehensive information. Consistent, systematic training of the public, private, and civil-society stakeholders responsible for the territorial management of tourism is vital. This training should cover areas such as partnerships, fundraising, crisis and disaster management, market intelligence, and techniques for monitoring the economic, social, and environmental impacts of tourism. Holding regular industry events and discussions can allow for open discussion to inform improvements in public policies, while building online platforms for information management will help ensure transparency and strengthen oversight.

3.464. Improve logistics, sanitation, and telecommunications infrastructure. Tourism centers in remote areas can explore alternative service modali-

ties that obviate the need for large, fixed investments that can come at a high fiscal cost and entail a large social and environmental footprint. Partnerships with research and technology institutes, universities, and private companies can bring modern technologies to these regions, especially the north, allowing for a lighter and more flexible approach to improving service quality. Transportation systems and access routes are an essential element of tourism and adopting new practices and systems can improve the quality of tourism-related travel. For example, creating scenic routes and circuits with viewpoints and informative multilingual signage can alleviate congestion on main transit arteries while providing a more appealing travel experience. The tax revenue generated by the tourism sector can also help to finance the implementation and maintenance of vital infrastructure in underserved areas.

3.465. Adopt a tourism model based on high service quality and sustainability. Improved market intelligence can shed light on the main obstacles to competitiveness and sustainability in the north and northeast regions. Leveraging new technologies and a diverse array of analytical tools can help identify opportunities for innovation, especially the development of more sustainable products based on biodiversity and local production, while expanding awareness pf the social, environmental and economic relevance of the tourism sector. Utilizing websites, social networks, mobile applications, and other platforms can enhance the quality and sustainability of the tourism experience while generating benefits for local firms and communities. These technologies are also critical to support effective data management and monitor the various impacts of tourism activity. Access to financing and innovative project models could reduce bureaucratic costs and reinforce financial sustainability via the systematic qualification of entrepreneurs and managers. In addition, creating specific financing mechanisms and incentives for sustainable tourism projects—including ESG investments by non-tourism-related firms—could complement other sustainability measures. Specific segments such as rural tourism, gastronomic tourism, community-based tourism, and ecotourism should be treated as development priorities.

3.466. Improve the use of technology in the tourism sector. Encouraging the use of digital intermediation platforms, digitizing management processes, facilitating technological uptake by SMEs, promoting the digital marketing of destinations, encouraging digital tourism entrepreneurship, and using devices and applications to increase quality of the visitor experience could accelerate the growth of Brazil's tourism sector. Establishing and improving channels of communication with tourists, continually updating information about the destination, and making reliable data available to tourists and tourism firms could reduce information asymmetry and contribute to a more positive tourism experience.

3.467. Reorient tourism to strengthen communities and local businesses. Policymakers and destination mangers should prioritize approaches to tourism development that support vulnerable populations. In addition to leveraging the trend towards more responsible tourism practices, encouraging the engagement of SMEs in the tourism sector can magnify the local benefits of tourism development.

3.468. Invest in nature-based solutions. This includes the adoption of more sustainable approaches by firms and destinations, including financial and non-financial incentive programs to promote environmentally responsible tourism, the implementation of circular-economy projects linked to tourism, and efforts to embed environmental consciousness along the tourism value chain. Capturing the value of biodiversity and ecosystem services through tourism, monitoring and reporting CO2 emissions from tourism operations, and accelerating the decarbonization of tourism operations can increase the sustainability of the tourism sector while enabling it to contribute more effectively to climate-change mitigation and adaptation.

(4) Channel financial resources for the green economy

Boosting growth and development together with the adoption of policies to greener the economy will require several investments. A successful transition demands a deep economic transformation, requiring the mobili-

zation of private finance on a large scale (IMF, 2021). The financial sector can be an important driver of the Brazilian transition to a green economy.[122]

3.469. Green and Sustainable Finance potential in Brazil. Brazil has an estimated USD1.3 trillion green investment need till 2030 for energy, transport, buildings, waste and industrial energy efficiency, based on its climate commitments set out in the Nationally Determined Contribution (NDC)[123]. The majority of this investment is required in renewable energy and urban infrastructure, including public transport, water and waste.[124] and bioeconomy. A preliminary study done by the IDB regarding investment opportunities for agroforestry value chains, aquaculture, timber and non-timber products and ecosystem restoration shows that there are more than 62,000 companies with investment opportunities for more than US$1 billion in bio-business in the Brazilian Amazon. 98% of these businesses are through producers and small and medium-sized companies also favoring a huge potential for economic recovery for the region. Not to mention several other opportunities and unaccounted for chains – such as ecotourism or the service sector. The Financial Sector has a fundamental role in inducing the productive sector towards the Green Economy. In both its role as a financial intermediator – through credit operations – as well as an institutional investor and insurer the financial sector will play a significant role in the transformation of the economy. Yet, there are challenges related to socio-environmental analysis, monitoring, rating and valuation models.

3.470. Brazil's financial sector is among the more advanced in LAC in terms of incorporating social and environmental principles. Brazilian financial regulation has long reflected such principles, and the country's public and private financial institutions are regional leaders in addressing social and environmental risks (Frisari et al,2019). Brazil's financial regulations, most of which are issued by the central bank, evince a substantial awareness of the potential financial impact of climate change and other social and environmental issues. Since 2014, the implementation of mandatory Social and Environmental Responsibility Policies (SERP) has enabled financial institutions to identify and quantify risks while also disseminating risk-related information to the financial system via the central bank, which provides a structure for risk monitoring. Brazilian regulation provides specific criteria for assessing high-risk activities and requires institutions to record the cost of social and environmental damage over a period of at least five years. In addition, regulated institutions must assess the potential negative social and environmental impacts of new products and services, along with associated reputational risks.

3.471. Sustainability was adopted as the fifth pillar of the 2020 Central Bank Agenda, integrating the promotion of sustainable finance and the provision of social and environmental market information into the central bank's institutional mandate to support risk management and financial stability.[125] The agenda calls for the active management of social and environmental risks, including climate risks, and the promotion of sustainable finance practices, including investments in clean energy, low-carbon agriculture, improved waste management, and resource efficiency. Several regulatory bodies also address social and environmental issues, and in 2018 the Superintendency of Private Pension Funds (PREVIC) and the National Monetary Council (CMN) revised Resolution 3792, which governs investment practices and disclosure by pension schemes, to include ESG criteria.

3.472. There are self-regulatory bodies and private sector initiatives. Not only are regulators

122 The Amazon initiative is an opportunity to the country to finance a green economy. The IDB initiative has been already approved and is in the process of being implemented, a t the request of the 8 Amazon countries, including Brazil.

123 See also Brazil's National Green Growth Plan and the role of the Inter-ministerial Committee on Climate Change and Green Growth in the creation and consolidation of green criteria, taking into consideration the characteristics of each region of Brazil and all its biomes. Brazil's Green Monitor provides an overview of current initiatives.

124 Davidson, K., Gunawan, N., Ambrosano, J., and Souza L (2020). "Green Infrastructure Investment Opportunities: Brazil 2019." IDB. https://doi.org/10.18235/0002638

125 www.faidnbmnnnibpcajpcglclefindmkaj/https://www.bcb.gov.br/content/about/legislation_norms_docs/BCB_Disclosure-GRSAC-Report.pdf

playing a relevant role in the international arena, but also private financial institutions. The Brazilian Federation of Banks (FEBRABAN[126]) supports the UN Environment Finance Initiative and more than 50 institutions such as asset owners, investment managers, and service providers are signatories of the UN backed Principles of Responsible Investments (PRI). The Brazilian insurance market, under the leadership of the National Confederation of Insurance Companies (Confederação Nacional das Empresas de Seguros Gerais, Previdência Privada e Vida, Saúde Suplementar e Capitalização, CNseg) has committed to promote the Principles for Sustainable Insurance (PSI). Finally, five of the major Brazilian banks have committed to the Equator Principles. Banco Bradesco and Itaú Unibanco were among the earliest banks to sign up, followed by Banco do Brasil, Banco Votorantim and CAIXA. This level of engagement by Brazilian banks reaffirms the strong concern and business risk for a better management of socio-environmental risks.

3.473. Capital markets can promote sustainability by offering thematic bond products, including green bonds, which are designed to mobilize large amounts of private capital to finance projects with positive social and environmental impacts. Latin America's thematic bond market has grown considerably since its inception in 2014, though the region accounts for just 4% of the US$3 trillion global thematic bond market and 2% of the US$2 trillion global green bond market. Nevertheless, the rapid growth of this market segment has attracted additional scrutiny from investors, regulators, and standards agencies. Issuances in local currency are on average five times smaller than hard-currency issuances denominated in Swiss francs, euros, yen, or US dollars. In the local-currency market, the average issuance volume is US$80 million[127] for thematic bonds and US$54 million for green bonds. Hard-currency issuances account for less than 40% of all issuances but 75% of issuances in the regional thematic and green-bond markets.

3.474. Thematic bond issuances by sovereigns and other public entities will be critical to support the green transition. Issuances by the public sector can enhance market liquidity and mobilize local and international private sector investment. Public entities are increasingly looking to the global debt market to finance climate mitigation and adaptation projects and achieve their NDC targets. Brazil is the LAC region's largest green bond market, representing about 36% of all issuances, and it is the second largest thematic bond market, with 27% of all issuances. However, issuances by the public sector are marginal, representing just 8% and 4% of the green and thematic bond markets, respectively. Thus far, only two public entities, BDMG and BNDES, have issued thematic bonds. Private financial and non-financial corporates dominate the market, accounting for 92% of green bonds and 96% of thematic bonds. By contrast, governments in other LAC countries are deeply involved in the thematic bond market, with issuance shares ranging from 24% to 80%.

3.475. Private and public sector issuers in Brazil, especially sovereign, development banks, government-back entities face several financial and non-financial barriers to access capital markets. The main barriers issuers encounter are

I. eligible green project pipeline identification,
II. high-upfront costs for green issuances including the cost for framework development and the cost for pre-issuance external reviews and inter-agency coordination,
III. costs for transparent and standardized reporting,
IV. costs for external verification post-issuance,
V. development of a coherent and credible institutional green strategy of the issuer in line with the climate and sustainability pledges of the government, and
VI. the uncertainty about the benefits of the issuance (e.g. the resulting premium[128], or the diversification of the investor base).

126 FEBRABAN represents 122 banks which accounts for 93% of shareholder's equity and 97% of the total assets of the national banking system in Brazil retrieved from https://www.febraban.org.br.
127 All issuance volumes are calculated as USD equivalents.
128 A lower cost of capital for the issuer is called greenium, meaning that a green bond issuance is cheaper for the issuer than a comparable plain vanilla issuance.

Addressing these barriers, will support the development of the market with evolving high-quality standards.

3.476. A green bond framework is costly for public issuers. Unlike traditional bonds, issuing a green bond requires the establishment of a comprehensive green bond framework defining which project categories are eligible to be financed and what outcomes will be reported. Creating this framework requires intra-institutional coordination and a clear chain of responsibility. Implicitly, the green bond framework and the issuance of green bonds create new responsibilities for public regulators, and external support may be required to overcome institutional capacity constraints and independently verify the soundness of the framework. Pre-issuance external reviews can be carried out according to the Green Bond Principles for a Second-Party Opinion and/or verified against the Climate Bonds Standard (CBS), depending on the eligible project categories, the availability of verification standards for particular sectors, and the perceived value of such verification for investors. The upfront costs for developing and verifying a green bond framework often exceed the budget envelopes of public agencies, which may also lack a full appreciation for the benefits of such a framework. Once established, the verified framework will remain valid for several years and can allow for multiple issuances during that time.

3.477. Transparent and standardized reporting and external verification post-issuance can entail significant costs. Assessing the use of bond proceeds and their environmental impacts requires appropriate institutional arrangements, collaboration, and monitoring and reporting systems. For example, during Chile's first sovereign issuance of a green bond, the Ministry of Finance and the Ministry of Environment collaboratively reported on the amounts disbursed, the projects financed, and the environmental impacts achieved. These reporting requirements remain in place for the lifetime of the bond, and monitoring systems must be institutionalized to guard against the turnover of ministry staff. Further resources may be needed if the data reported by the issuer are verified externally.

3.478. The identification of green projects can pose challenges. Despite a strong demand for green bonds from investors, the recurrent oversubscription of recent issuances indicates that the supply of such bonds is insufficient.[129] A binding constraint on the supply of green bonds is a lack of identified, well-prepared, and bankable green projects to be financed or refinanced. Investment-grade ratings and access to the institutional investor pool may also pose challenges, as pension funds and other institutional investors often require investment-grade assets to buy into a bond in the hard-currency market. Issuers who lack an investment-grade rating cannot access these investors, which tends to make their bonds less attractive and reduce their price.

3.479. The institutional embeddedness of the issuer's environmental strategy can influence a green bond's perceived credibility. Investors increasingly want to ensure that their thematic bond investments are consistent with the government's long-term sustainability commitments. As public issuers integrate their issuances into a coherent sustainability strategy, they present their green bonds as part of a wider plan to achieve overarching environmental policy goals. The issuance of green bonds goes beyond financing individual projects and becomes part of an integrated sustainability strategy, generating greater engagement between investors and issuers as their financial and policy objectives align. Sovereign green bonds in particular offer a financial vehicle for achieving the NDCs, and explicitly linking the bond issuance to the NDCs can signal policymakers' commitment to the low-carbon transition, which helps reduce the cost of capital for green projects by attracting new investors and mobilizing private capital for sustainable development.[130]

129 Climate Bonds Initiative. 2021. "Green Bond Pricing in the Primary Market: H1 2021".
130 Climate Bonds Initiative. 2018. "Sovereign Green Bonds Briefing".

3.480. To reduce the risk of greenwashing and promote transparency, several national and international authorities have provided clear definitions for green bond projects. The European Union has led these efforts though the establishment of the European Green Bond Standard (EU GBS), a classification system for environmentally sustainable economic activities based on the EU Taxonomy for Sustainable Activities. The definitions presented in the EU GBS are used by firms, investors, and policymakers, where they provide a common basis for investment planning and prioritization, investor protection, and monitoring and reporting.[131] However, emerging-market issuers may have difficulty adhering to these standards, as the EU GBS has sophisticated data requirements for establishing baselines and benchmarks. In contexts where international standards cannot be applied directly, national definitions should reflect country-specific challenges while retaining as much consistency with international guidelines as possible.[132] To facilitate a common understanding of sustainable activities across markets, the EU launched the International Platform on Sustainable Finance (IPSF), which provides a platform for dialogue and coordination on the development of standards and definitions across a wide range of diverse contexts.[133]

3.481. Evolving green finance taxonomies. To overcome the risk of greenwashing and promote transparency, several national and international taxonomies provide green bond project definitions. For instance, the European Union has been leading such efforts though the establishment of its European Green Bond Standard (EU GBS), a classification system for environmentally sustainable economic activities based on the EU Taxonomy for Sustainable Activities. The EU GBS provides definitions on environmentally sustainable activities to companies, investors, and policy makers, it is expected to create security for investors, protect private investors from green washing, help companies to plan the transition, mitigate market fragmentation and help shift investments towards where they are most needed.[134] However, emerging market issuers face challenges when it comes to adhering to these standards: the EU GBS is more sophisticated, and emerging markets might not have the sectoral data density for instance for baselines and benchmarks yet to adhere to the EU GBS. Therefore, as country develop their green bond taxonomies, these should reflect county-specific challenges while trying to remain consistent with international guidelines and standards. To facilitate common understanding of sustainable activities across markets, the EU launched its International Platform on Sustainable Finance (IPSF), an initiative to align taxonomies through dialogue and coordination on development of taxonomies, while recognizing participating countries' particular context.[135]

Policy Recommendations

3.482. Promote the green financing. The sector should incorporate the socio-environmental analysis policies and processes to all layers of financing, taking into consideration the type of operation and client. Monitoring the effectiveness of institutions' socio-environmental policies and processes. Improving of tools that facilitate the process of socio-environmental risk analysis. Development of a qualitative rating of ESG aspects that are analyzed in parallel with economic-financial aspects and that can be applied by managers. Incorporation of stock prices through insertion into a valuation model. Development of probability scenarios, in which analyses of share price sensitivity to ESG aspects are incorporated into the recommendations of analysts for management. Adoption of the Corporate Sustainability Index (CSI) portfolio, as a benchmark for responsible investments in order to define

131 OECD. 2021. "Scaling up Green, Social, Sustainability and Sustainability-linked Bond Issuances in Developing Countries"
132 The IDB Green Bond Transparency Platform is an initiative to bring transparency to the market.
133 Ibid.
134 OECD. 2021. "Scaling up Green, Social, Sustainability and Sustainability-linked Bond Issuances in Developing Countries"
135 Ibid.

niche investment products or as a methodological basis for analyzing companies in the portfolio. Increase the importance of socio-environmental risk analysis in pension funds through precise mandates with active management generating demand within the industry for integration of socio-environmental risks. Build tools that facilitate the process of socio-environmental risk analysis. Fund managers face a number of challenges—including data gaps, risk of corporate greenwashing, multiple disclosure standards, and a lack of globally accepted taxonomies—in implementing investment strategies that support the transition (IMF,2021).

3.483. Develop technical assistance programs and appropriate regulations. Technical assistance is necessary to implement successful investment projects and manage operational risks, and the use of blended financing could help foster sustainable development.[136] Regulatory reforms are also necessary in Brazil, which still lacks thematic awards and other specific incentives for green lending.[137]

3.484. Build a global climate-information architecture. To facilitate assessments of transition-related risks and opportunities in the corporate sector by portfolio managers, investors, and financial authorities, and to prevent greenwashing and foster climate finance markets, policymakers should urgently seek consensus on a global climate-information architecture (IMF, 2021). Such an architecture should include a harmonized and consistent set of climate-related disclosure standards, coupled with high-quality, reliable, and comparable data on climate-related indicators, including forward-looking metrics underpinned by verification, audits, and other mechanisms. Globally agreed-upon principles for sustainable financing, along with standard definitions and best practices, can help align investment flows with climate goals. These principles, definitions, and practices must be clearly laid out yet sufficiently adaptable to meet the unique needs of developing countries and emerging markets. In an absence of a global taxonomy, the country should issue its own taxonomy.

3.485. Analyze the impact of fiscal incentives. Policymakers have a range of fiscal policy options for channeling investment toward the green transition, both on the revenue and expenditure sides of the budget. For example, climate-oriented funds in retirement plans or life insurance products could be accorded favorable tax treatment (IMF,2021).

3.486. Establish a pipeline of sustainable projects. Brazil must develop a clearly defined pipeline of environmentally responsible investment opportunities consistent with the government's commitment to low-carbon development. In line with their institutional mandates, national and sub-national development banks in Brazil can provide a pipeline of green projects.[138] Furthermore, the authorities can implement policies to foster an enabling environment for green-project development at scale according to international standards.

3.487. Use credit-enhancement instruments, such as partial guarantees, to develop a multi-tranche sovereign green bond. Tranches that benefit from a partial guarantee have higher credit ratings and can be made accessible to a wider range of investors. The benefit of the guarantee is that they need not be disbursed if no default event occurs. The guarantee carries an annual fee, which the issuer pays to the guaranteeing institution, as well as a one-time set-up cost for financial and legal structuring. The benefits of the guarantee—including higher demand, potential lower interest rate costs, and inclusion in investment-grade indexes and in the investment portfolios of institutional investors—must be balanced against these initial and recurring costs.[139]

136 FGV (2018).

137 IFC and Sustainable Banking Network, 2016, "Greening the Banking System – Experiences from the Sustainable Banking Network (SBN) (Input paper for the G20 Green Finance Study Group)"

138 The joint Hub Latam Initiative https://latamprojectshub.org/ by BNDES, Banobras, Alide, and IDB implements a consistent and comparable framework for information on the financial, institutional, social, environmental, and climate sustainability of infrastructure projects.

139 Providing proof of concept, Ecuador issued the world's first Sovereign Social Bond in 2020. This bond was backed by a guarantee from the IDB and attracted substantial international investor interest. The issuance was for US$400 million to finance Ecuador's social housing program 'Casa para todos' (a house for all'). The bond benefited from a US$300 million partial credit guarantee. See: IDB. 2020. "5 Key Point of Ecuador's Sovereign Social Bonds".

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Annex

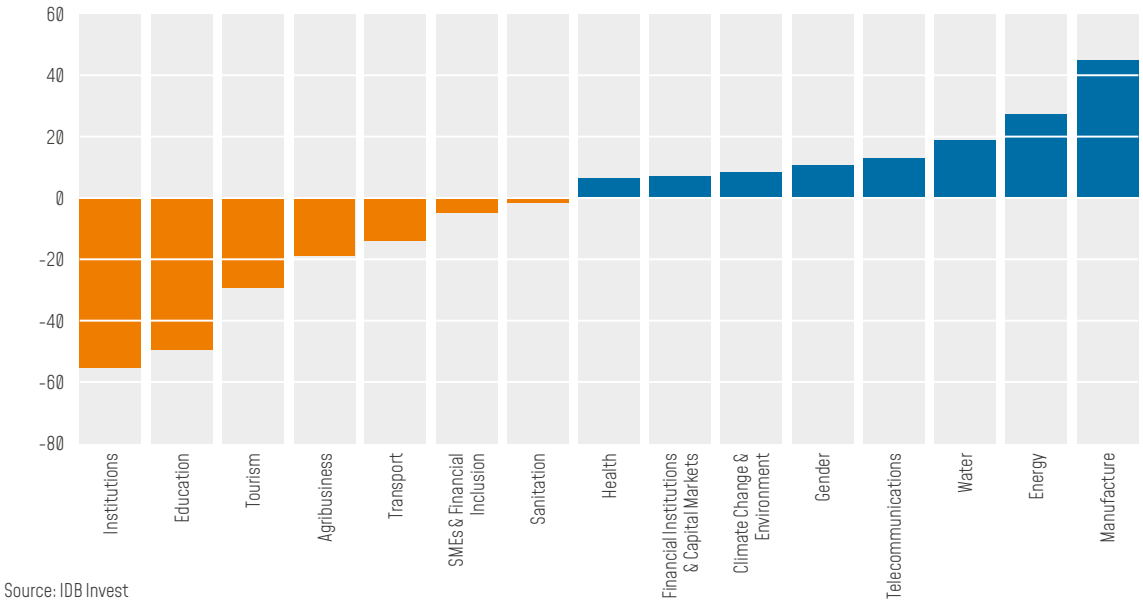
Annex 1 - The Use of Parsimonious Prioritization Methodologies

Prioritizing development challenges requires a combination of quantitative and qualitative assessments about the country. Methodologies designed to shed light on the relative importance of the various bottlenecks can contribute to this task, but they cannot replace broader assessments based on multiple analytical sources and even on subjective judgement. Ultimately, prioritization of development bottlenecks amounts to the construction of an evidence-based narrative for policy action in which the proposed measures are structured around a few key broad areas of interventions. These areas, in turn, branch out to specific policies that reinforce each other in a logically consistent plan to promote development effectively. This document performs a battery of parsimonious prioritization methodologies available in the literature as a step in the construction of the diagnostics and narrative for policy action.

Hausmann et. al. (2005) growth diagnostics approach aims at identifying the most binding constraints by asking what factors keeps growth weak: inadequate returns to investment, inadequate private returns appropriability, or inadequate access to finance. In the Brazilian case, this methodology indicates that the low level of domestic savings constitutes a binding constraint. Hausmann et al. (2005) associate the problem with restrictions on the access to external finance. They state that improving the efficiency of public spending could be a solution, since it would allow for higher public savings and a lower tax burden. Hausmann (2008) further points out that domestic savings are the binding constraint on growth and argues that the source of the problem is fiscal.

Acevedo et. al. (2019) extends Borenzsztein et. al. (2014) exploiting cross country sectoral information to identify econometrically the development gaps of a given country, focusing on the potential contribution of the private sector to address the development gaps. In the case of Brazil, the methodology indicates that the most severe gaps are in institutions, education and tourism. However, there are also negative gaps in agribusiness, transport and financial inclusion.

FIGURE A1 – Development gaps (Acevedo et, al. (2019)



Source: IDB Invest

Izquierdo et. al. (2016) provides another prioritization methodology by classifying the countries in clusters according to their income level. Then the authors evaluate and compare the impact that closing development gaps in different areas would have on the probability of transitioning towards a higher income cluster. The methodology tries to find which reforms would be necessary to a country jump for a highest cluster of development and analyze the interactions among different determinants of productivity. Differently than other methodologies, the methodology analyzes the impact of the sector on the probability of jumping for a higher level of income. In this sense, the importance of the sector is not necessarily linked to the size of the gap in the sector.

The results for Brazil suggest that infrastructure, capital markets, and health are the main areas to focus so that Brazil could transition to the next cluster. The exercise also shows that transitioning towards a higher income cluster would require very large investments or policy efforts; in order to reach a cluster transition probability of 75%, infrastructure needs to increase by 1.75 standard deviations while the capital markets and health indicators require an increase of 1 standard deviation.

TABLE A.1. Priorities for productivity and Income (PPI) – Brazil

Sector	Main Priorities
Infrastructure	1st Priority
Capital Markets	2nd Priority
Health	3rd priority

The results of the methodologies taken collectively inform the narrative for development challenges put forth in this document. They also provide direct support for some of its elements. For example, the importance of infrastructure and social issues like health and education are covered by pillars 1, 2, and 4 while the importance of a fiscally sound and efficient State is also covered by pillar 1. Notwithstanding this, there are additional elements not flagged by the methodologies which are included in the dis-

cussion of the pillars as they are also deemed critical development bottlenecks. In addition, there is a whole pillar (pillar 3) which focuses on bottlenecks related to the digital transformation, which with the exception of the challenge on financial inclusion is not well captured by the methodologies.

Annex 2 - Knowledge Gaps

The CDC brings a discussion about the challenges and gives policy recommendations for the country based on strong evidence displayed in the economic literature. The pillars are discussed so that the country can achieve a sustainable and inclusive growth. Yet, during the CDC process, it was observed that the IDB group analytical agenda presents some knowledge gaps. These are key areas across the pillars that lack strong evidence to implement effective public policies. Providing knowledge is key for public policy-takers, the private sector and civil society to implement solutions to the country's critical problems, and to foster public debate and achieve the sustainable development goals. The table below shows major themes that will shape the analytical agenda in the coming years. This agenda will assist the country to reach its development goals.

↓ **TABLE A.2.** Knowledge Gaps

Pillar 1. Promoting a Resilient Recovery	
The geopolitical context and Brazil's economic integration	The objective of the research would be to determine the roles Brazil could plausibly assume within the global as well as the regional (LAC) context and assess leadership potentials for Brazil in the region through its natural resource's potential, via productivity improvements or via technological leadership.
Federalism and local governments	The main goal would be to determine the various ways in which Brazil may change its federalism and incentive more cooperation. The study should analyze models of a more cooperative type of federation across the world and focus on building a tax reform that will boost the capacity of local governments to finance effective public policies.
Fiscal Policy	The study would analyze the main challenges for monetary and fiscal policy in Brazil. The analysis should focus especially on fiscal rules and improvements in the coordination between fiscal and monetary policies to build a sustainable dynamic for public debt.
Pillar 2. Adopting a new social agenda for inclusive growth	
Demographic and societal changes	The study would analyze the roles youth could possibly play in Brazil for the coming years. Determine the various ways in which an aging society, the middle class, and social services could impact pensions and public spending in Brazil. The text would verify the main trends of demographic changes for Brazil in the future, what policies have been used in other countries to adapt to an aging society and how could aging affect public spending in the coming years and the different roles for civil society and the middle class in the future of Brazil.
Pillar 3. Fostering the digital Transformation for Development	
Digitalization	The study would assess what might be future contexts for financial inclusion in Brazil. The main goal would be to identify plausible fintech opportunities for the country. The study would analyze how are other countries innovating on new business, especially industry 4.0 and what Brazil can learn and apply from them. In addition, Brazil should explore the use of technology for improving social policies especially education and health.
Pillar 4. Incorporating green growth into the country's development model	
The Amazon, deforestation, renewable resources, and Climate Finance	Brazil needs a deep analysis about the Amazonian deforestation and its impact on agriculture, food security, water security and energy security (electricity generation). In addition, there is no analysis about the potential of carbon markets for Brazil. A deeper study about the opportunities in energy transition (e.g., green hydrogen) is needed.

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