Brazil Agriculture—Response and resilience of food security under dual shocks in 2020: Oil price collapse and the COVID-19 pandemic

By Isabelle Tsakok & Fatima Ezzahra Mengoub

Executive Summary

Brazil, an oil-exporting nation, was still struggling to recover from the depression which started around 2014/15 when it was hit by a quick succession of shocks: the COVID-19 pandemic and the oil price collapse. The global pandemic triggered major economic dislocations and contractions in foreign and domestic markets, which further exacerbated the fall in demand for oil, sending world prices tumbling further.

Poverty was already widespread in Brazil pre-pandemic. And despite recent progress, inequality is high, one of the highest in the world. So when disaster struck in early 2020, it was unsurprising that millions, especially in the two lower quintiles, suffered greater food insecurity while the upper quintile was barely hurt. The negative impact was also very uneven regionally: the poorer Northeast, the North and Center West suffered 8%-10% of income loss while the richer regions of the South and Southeast were least affected, with an income loss of 6%-7%.

Fortunately, the difficult recession and pandemic period was preceded by a decade or so—2002-14—of GDP growth and reduced income inequality. During this 'Golden Period', Brazil made substantial progress on reducing poverty and strengthening major programs of social transfers, in particular the Bolsa Escola and the Bolsa Familia programs, which invested in the human capital of poor children and young people. When the dual shocks struck in early 2020, these programs were scaled up to mitigate the adverse impact of increased unemployment and income loss.

In addition to these social transfers to the poor and vulnerable, Brazil has other sources of resilience. First, Brazil has a relatively large formal-sector workforce, which can draw on unemployment insurance and personal savings. Second, it has near-universal access to pensions and/or social security for the older population which is more vulnerable to COVID-19. Third, it has developed a robust institutional infrastructure for the delivery of emergency measures, notably its beneficiary registry, the Cadastro Unico, which has enabled the government to expand social transfers and emergency aid to the poor, who are mainly those working in the informal sector with unprotected jobs.

Brazil's resilience largely rests on three institutional pillars: (i) unemployment insurance for formal labor, the bulk of the workforce; (ii) pensions for the older population; and (iii) the Cadastro Unico for the poor who typically succeed in having only informal jobs.

Introduction

The year 2020 will go down in history as one of the darkest episodes for the global community since the Second World War. Oil prices plummeted by 85% between January 22, when the first human-to-human transmission of the coronavirus was announced, and the trough on April 21. This was a much steeper fall than at the height of the global financial crisis (price plunge of 70%), between late August to end December 2008, and steeper than the oil price slide from end June 2014 to mid-January 2016 (price plunge of 77%) (World Bank Group, June 2020). Lockdowns and other severe restrictions on transport, travel, tourism, and other socio-economic activities because of the pandemic exacerbated the demand collapse, weakening oil prices further. As a result of these multiple shocks, GDP contraction in the Latin America and the Caribbean (LAC) region is estimated at -7.2%, with GDP in Brazil falling by -8% (2020).

Brazil was hit by two major global shocks in early 2020: the oil price plunge of March-April, and the COVID-19 pandemic since late February. By the end of December 2020, Brazil had suffered an estimated 7.5 million COVID-19 cases, and around 191,000 deaths. In this turbulent year, there is little doubt that poverty and food insecurity have worsened. As of late January 2021, Brazil ranked third in the world in COVID-19 infections and deaths, after the United States and India.

So, the food security question addressed here is twofold: (i) What has been the government's response to these shocks, and in particular, how effective have they been in mitigating the negative impact on the food security of the poor and vulnerable? And (ii) what have been the main sources of resilience, if any, in terms of protecting food security in Brazil?

Brazil: GNI/Cap: USD 9,130 (Atlas method. 2019)

Brazil, an emerging world economy, presents two contrasting images, both impacting on food security: Brazil's positive image stems largely from its leadership[1] in addressing the challenge of decarbonization required to slow climate change. It distinguished itself by hosting

1. The President then was Fernando Collor de Mello. He was impeached on official misconduct in Fall 1992 and shortly after, resigned end December 1992. During the Paris Agreement, Dilma Vana Roussef was 36th President of Brazil, from Jan. 1, 2011 to Aug. 31, 2016, when she was impeached and removed from office.

the Rio de Janeiro Earth Summit on environment and development, June 3-14, 1992[2]. At this ambitious summit, the world community committed itself to reduce greenhouse gas (GHG) emissions to decelerate global warming[3]. The 2015 Paris Agreement followed up with national pledges (voluntary), hence called Nationally Determined Contributions (NDCs), in an effort to reduce emissions to limit global warming to well below 2°C, preferably below 1.5°C, compared to pre-industrial levels[4] (UNFCCC). Brazil's NDC was to reduce its net emissions by 37% by 2025 (compared to a reference year of 2005), and by 43% by 2030. Its objective is to achieve net-zero emissions in 2060 (Govt. of Brazil, Dec 14, 2020).

However, Brazil also has a negative image, stemming from perceptions of high levels of corruption within a framework of high income and wealth inequality. According to Transparency International (TI), Brazil has scored poorly since the index started in 1995, although there have been fluctuations.[5] Brazil's (TI) 2019 CPI score was 35 and its ranking was 106[6] (CPI). The Gini coefficient of income inequality for Brazil is the highest in Latin America: 0.539 (2018)[7] (Please see Annex table on key structural features of Brazil with impact on its food security). Brazil's high inequality is surpassed by South Africa, the most economically unequal country according to the World Bank, which has a Gini coefficient

of 0.63 (2014) (WDI)[8]. Like South Africa, high inequality in Brazil has its roots in centuries of colonial history of land allocation and labor exploitation.

Key features of agriculture: performance, potential and challenges

Relative socio-economic importance of oil & gas, primary agriculture and agri-business in a low-growth macro economy: Brazil's economy is dominated by services (63% of GDP) but industry (18%), including oil & gas (13%), and primary agriculture (around 4.5%) are also very important. When agroindustry is added to primary agriculture, the contribution of the combined agroindustry sector to GDP rises to around 25% (World Bank et al, 2013). Agricultural growth averaged 2.6% between 2007 and 2016, with agro-food exports contributing around 35%-40% of Brazil's total exports (OECD, Brazil, 2020). Over a slightly longer period, 2007-2018, the average annual agricultural growth rate was slightly higher at 2.8%. Whether the higher growth rates of 2017 and 2018 marked the beginning of a trend is still to be seen (UNCTAD). One concerning structural feature is, however, the low total factor productivity (TFP) growth of the entire economy for decades. For example, from 2002-2014, TFP grew by only 0.3% per year,[9] in contrast to other emerging economies including India, China, and Indonesia, where TFP growth accounted for more than half of their growth (WBG, June 2016). Economic recovery since the recession has been weak—growth of 1.35% in 2017-2018 and 1.1% in 2019—and then the pandemic hit in early 2020. Unemployment soared to 13.3% (for women, 14.9%) in June 2020 as the economy contracted by 9.7% in the second quarter. The poverty rate, at $5.50/day, averaged nearly 20% by 2018 (World Bank, Overview).

High TFP growth in Brazil's agriculture, an island of success: Despite the economy-wide lackluster

---

2. "The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner". Statement of the United Nations Framework Conference on Climate Change (UNFCC. 1992).

3. This conference has spawned, among others, the Convention on Biological Diversity (CBD), which has been of key importance with respect to policies and practices pertaining to biotechnology. It was signed during June 5, 1992-June 4, 1993. It became effective on Dec. 23, 1993.

4. The Intergovernmental Panel on Climate Change (IPCC) 5th Assessment report used 1850-1900 as the pre-industrial reference period.

5. For Brazil, the lowest score was 27 (1995); highest score was 43 (2012.) For a comparison: Least corrupt: ranking 1 and score 100 (Trading Economics).

6. The least corrupt countries were New Zealand and Denmark: ranks 1 & 2, with scores of 87. The most corrupt was Somalia: score 9. In total, 180 countries were surveyed (2019).

7. It is surpassed also by several sub-Saharan economies. Some country examples are Namibia at 0.59 (2015), Zambia at 0.571 (2015), Lesotho at 0.542 (2010), Mozambique at 0.54 (2014), and Botswana at 0.533 (2015): all in the neighborhood of South Africa (Index mundi).

8. The Republic of South Africa , Dept of Statistics (Statssa) lists per-capita expenditure Gini coefficient of 0.65 (2015). It states that South Africa is "known as one of the most unequal countries in the world". The World Bank states it is the most economically unequal country (CNN, May 2019). See http://www.statssa.gov.za/?p=12930&gclid=CjOKCQiA_qD_BRDiARIsANjZ2LAf1qjflmZT8I1w-42HAQ5gOH6gS_5_maVvodXwJxAhde28ixpQ2EAaAnaeEALw_wcB.

9. Even during the years of high growth of 2002-10, TFP growth per year was only 0.4% (World Bank, June 2016).

productivity and growth performance, TFP growth in agriculture stands out as an island of success. Since the 1970s, growth in TFP in agriculture averaged 3% per year, but from 1997-2014, there was a distinct acceleration in TFP growth to 4.3% per year. This growth acceleration however was achieved only by the most efficient farms, which are the largest (500+ ha) and the smallest (0-5 ha). Mid-size farms (20-200 ha) exhibited the lowest TFP growth. The majority of producers recorded TFP growth of only 1.74% (WBG, Sept 2017). Brazil has become the world's largest producer of sugar cane, coffee, tropical fruits, and frozen concentrated orange juice; is a major producer of cotton, cocoa, and tobacco; and supports the world's largest commercial cattle herd (see Annex table for the relative importance of pasture land). Next to the United States, Brazil is the world's largest exporter of soybeans (with China its largest importer), and the world's second largest producer of genetically modified crops: an estimated 97% of its soybeans; 88.9% of maize (corn); and 84% of cotton crops are GM (ISAAA, 2017).

Drivers of total factor productivity growth in dualistic agriculture: A distinctive feature of Brazilian agricultural performance is the coexistence of centers of high TFP growth with the mediocre to low total productivity and output growth of the majority. This coexistence parallels the continuing dualism of the sector: preliminary results from the 2017 Agricultural Census indicate that the historic inequality in land distribution persists. Some 91% of producers with less than 100 ha each occupy 20% of total land, while 1% of producers are the large establishments of 1000 + ha, which occupy 48% of the land (DelGrossi, May 2019). These preliminary results point to a possible increase in concentration in access to land.[10] Technological innovation, a major driver of productivity growth, is location-specific in Brazil: specific to the Cerrado[11] (Brazilian savannah) region of

the central-west macro-region.[12] In addition to increased expenditures on research and development (R&D) between 1970-1997, important drivers of TPF growth have included conducive policies, e.g. (i) concessional credit especially targeted at large scale agribusinesses; (ii) minimum price guarantees for major commodities; e.g. coffee, cotton, soybeans, wheat, milk, and honey (OECD, Brazil, 2020); (iii) contract farming and market access through cooperatives of labor-intensive small farms involved in livestock (chickens and pigs) and horticulture; (iv) trade liberalization introduced in the early 1990s; and (v) macroeconomic stabilization policies since 1994. Favorable international commodity prices have also helped[13].

Low TFP and output growth of the majority of farms largely due to inadequate public investment including R&D expenditure: The low TFP growth for the majority of farms, in particular mid-size farms, results from multiple constraints, which contribute to their inability to innovate and be more efficient. The major constraints include inadequate transport infrastructure and market connectivity; poor functioning of rental markets and land titling issues; and low quality rural extension and farmer education services. Even the expenditure on EMBRAPA[14], a major contributor to the high TFP growth of the largest farms, is inadequate for reaching the majority of farms, as Brazil spends a relatively small percentage on R&D innovation compared to OECD countries: spending on innovation is 40% of total spending on public goods and services compared to 60%-90% in OECD countries. Public spending on agricultural innovation is only 7.6% of total agriculture support in Brazil and this share is decreasing (WBG, Sept 2017).

A major challenge is how best to harmonize Brazil's environmental ambitions with growth as its crops and livestock are major sources of greenhouse-gas emissions: Brazil faces a classic conflict between short-term private benefits versus longer-term social costs. Agriculture (crop

---

10. Brazil had 5 million farms of which roughly 85% are smallholders and 15% are large commercial farms occupying 75% of the land under cultivation according to the Agricultural Census of 2006. Less than 4% of Brazil's agricultural area is irrigated (Assad et al, 2010); (Release of final data of Agricultural Census 2017 was in 2019. IBGE, 2019)

11. The Cerrado is a huge region which covers roughly more than 20% of Brazil. It is considered a biodiversity hotspot. This biodiversity has however, been threatened by the expansion of cattle ranching and crop cultivation, in particular soybeans. According to World Wild Life, if the natural vegetation of the Cerrado were to continue to change, the natural ecosystem could virtually disappear in the next three decades. The loss of forests and grasslands also has negative impacts on climate, leading to higher temperatures, reduced rainfall, prolonged droughts, and more frequent fires. Climate change in turn is forecast to decrease agricultural productivity by up to 17% nationwide (Accessed Dec 29, 2020). See https://www.worldwildlife.org/places/cerrado.

12. EMBRAPA (Brazilian Agricultural Research Corporation) is credited with transforming the entire agriculture and economy of the Cerrado by introducing technologies used outside Brazil but adapting them to local conditions.

13. For example, soy bean prices increased by nearly 62% from Jan 1999-Dec 2018 (US BLS, March 2020). Also: Market Watch. Myra P. Saefong. Sept 18, 2020. "Why Soybean Prices may be headed for their highest prices in six years". See https://www.marketwatch.com/story/why-soybeans-may-be-headed-for-their-highest-price-in-6-years-11600450312.

14. EMBRAPA: Brazilian Agricultural Research Corporation. Portuguese: Empresa Brasileira de Pesquisa Agropecuária. It is a state-owned research corporation, affiliated with the Brazilian Ministry of Agriculture

and livestock) contributed 75% of Brazil's greenhouse-gas emissions (Assad et al, 2010); though this had been significantly lowered by 2014, as agriculture, land-use change, and forestry jointly contributed55.2% of GHG emissions[15] (Climate links, 2019). So, despite the substantial improvement, cattle ranching-cum-deforestation remains a major environmental concern. The reason is that deforestation for logging and cattle ranching is highly profitable—above 10% return—much higher than ranching in the traditional ranching areas (central and south Brazil, e.g. State of Mato Grosso), particularly when it is undertaken by professional and better capitalized ranchers (World Bank, 2004). The political economy of large landowners also explains the fact that, by 2020, Brazil was still heavily subsidizing the beef industry, especially Amazon-clearing cattle ranchers.[16] For the period 2008-2017, "for every $1 collected in taxes from the beef industry, only 0.20 cents effectively go back to society, the rest goes back to the producers in the form of various benefits" (Hofmeister, May 2020). Yet, the onset of climate change is already evident as patterns of precipitation have already changed and temperatures have risen by 0.5ºC. Northeast Brazil has suffered losses of up to 25% of its agricultural GDP during periods of severe drought. Droughts from 2004-2006 led to reductions of 65% in soybean crops, and 56% in cotton production in the state of Rio Grande do Sul (World Bank, Dec 2009). The Amazon Forest is also threatened. Under a scenario of a global temperature rise of 2ºC in the latter half of the twenty-first century, local temperature could rise by 4ºC. In that pessimistic scenario, which would entail increased frequency of extreme weather events, it is feared that parts of the rainforest could be transformed into savannahs.

Vulnerability of agriculture and economy as projected under two climate change scenarios: Overall, climate change is projected to have negative impacts on productivity and production growth by causing increased rainfall pattern variability and increased drought incidence, thus creating soil moisture deficits at critical phases of crop growth. The World Bank developed two scenarios: (i) optimistic scenario B2 with a temperature rise between 1.4ºC-3.8ºC; and pessimistic scenario A2

with a temperature rise between 2ºC-5.4ºC. (World Bank, Dec. 2009) With the baseline set at 2010, the likely impact on major crops[17] was simulated for 2030 and sometimes beyond (e.g. 2040, 2050, 2070). By 2100, under the pessimistic A2 scenario, rainfall in Northeastern Brazil is likely to fall by 15-20%, while flood frequency and intensity are likely to increase for Southeastern Brazil. All the scenarios simulated indicated that, by 2030, the South Region of Brazil, an economic powerhouse, could lose up to 5 million ha of its best agricultural land, while Brazil as a whole could lose around 11 million ha of agricultural land, due to climate change.

Government response to increasing resilience in agriculture to address the threat of climate change: In addressing the existential threat of climate change, the Ministry of Agriculture, Livestock and Food Supply (MAPA) developed the Sector Plan for Mitigation and Adaptation to Climate Change for the Consolidation of a Low Carbon Emissions Agriculture Economy (also known as the ABC Plan). A National Climate Change Plan[18] was finalized in December 2008 after online consultation with the public (World Bank, Dec 2009). The technologies which have proved effective in reducing emissions and increasing carbon sequestration in agriculture are: (1) recovery of degraded pasture land; (2) crop-livestock-forestry integrated systems; (3) no-tillage farming systems; (4) biological nitrogen fixation; (5) cultivated commercial forests; and (6) treatment of animal wastes. The livestock sector which occupies three quarters of all agricultural land[19] is, therefore, a major source of methane, a powerful greenhouse gas which traps 30 times more heat than carbon dioxide. Agriculture (crop and livestock) is estimated to contribute 35% of Brazil's GHG emissions[20]. Livestock rearing was responsible for 60% of the emissions from agriculture in 2014 and, given current production practices, emissions are projected to increase by 2.9% through 2025 (WBG, 2017)[21]. Progress

---

15. Agriculture (crops + livestock) contributes 32.6% to GHG and land-use change and deforestation (mainly due to clearing for livestock) another 22.6%; thus total is 32.6+22.6=55.2. In general, cattle livestock alone is responsible for 14.5% of GHG. In Brazil, cattle ranching in the Amazonia and deforestation are causally linked. (Mongabay, Oct. 2019)

16. The political-cum-economic power of large landowners and agri-business is well known in Brazil (Gozetto & Thomas, Aug 2014).

17. Major crops included in the scenario analyses are: soybean, cotton, rice, corn (maize), cassava, coffee, sugar cane, sunflower, and beans.

18. PNMC is the Portuguese acronym.

19. In 2006, agriculture occupied around 26% of Brazil's total land area (World Bank, Sept 2017). However, by the Census of 2017, it occupied 41% of Brazil's total land area (DEXTRA, Nov 5, 2019).

20. Second National Communication to the UNFCCC (2010). (WBG, Sept. 2017)

21. Countries were ranked by total carbon dioxide emissions and by total emissions per capita. According to the first method, the four biggest emitters were China, the United States, India, and the Russian Federation. According to the second method, the biggest emitters were Saudi Arabia, Kazakhstan, Australia, and the United States. Brazil is 20th by the second method (UCS, 2020). Brazil was listed as the fifth biggest emitter in the world in 2008 (World Bank, 2009).

on all these fronts (including livestock) is important as Brazil is ranked the 14th largest emitter of CO_2 from fossil fuels in the world (2018) (Union of Concerned Scientists, 2020). Since the 1990s, Brazil has emerged as a leader in new agricultural technologies, including low tillage farming and climate-smart agricultural practices. Several methods for reducing methane are being explored which include integrating farmland with grazing, and enriching pastures organically. Brazil has also successfully implemented programs of land regeneration and reforestation in several regions. The net deforestation rate of the Legal Amazon declined from around 27,000 km2 in 2004 to 5,000 km2 by 2014, (WBG, June 2016) but unfortunately, this progress is being reversed as the destruction of the rainforest in 2020 is estimated to have increased by 9% over 2019 under President Bolsonaro [22].

Meeting the challenge of reconciling environmental and growth objectives lies in achieving sustainable total factor productivity (TFP) growth by the majority: Brazil's struggle for environmental stewardship while developing the economic potential of its vast resource base is on-going, as it is under constant commercial pressure from large-scale farmers, ranchers, and smallholders. Large-scale farming and agri-business are primarily responsible for making Brazil's agriculture a powerhouse. An estimated 51.3 million ha (2018) are under biotech crops, making Brazil the largest biotech soybean and second-largest corn exporter after the United States (ISAAA)[23]. For the 2018/19 crop season, the GMO adoption rate (%) was high for these major crops: e.g. soybeans at 97.5%; cotton at 89.8%; 90.7% for first crop corn and 84.8% for second crop corn (USDA, 2020)[24]. The increased food output has also reduced the level and volatility of prices, thus benefitting all, in particular the increasing urban population.[25] The commercial pressure for more output will continue with ongoing urbanization and income growth. To successfully respond to this pressure while expanding the hard-won progress made on the environmental front, crop agriculture and livestock must vastly increase, broaden, and sustain TFP growth.

22. BBC. Nov 30, 2020. "Brazil's Amazon: deforestation surges to a 12-year high". https://www.bbc.com/news/world-latin-america-55130304.

23. International Service for the Acquisition of Agri-Biotech Applications (ISAAA) 2018.

24. In June 2017, Brazil's National Biosafety Technical Commission (CNTBio) approved the commercial use of the first GM Bt sugarcane developed by the Brazilian Centro de Tecnologia Canavieira (CTC) (ISAAA) 2017.

25. Brazil's population is more urban than rural: around 87% urban in 2019, up from around 46% in 1960. Urban growth averaged 5% per year in the 1960s, and has fallen to around 1% in the 2000s (World Bank). See https://data.worldbank.org/indicator/SP.URB.GROW?locations=BR.

Fortunately, there is a substantial margin of productivity growth to exploit as the majority of farms recorded a TPF growth rate of only 1.74% per year, whereas the overall sector TFP growth rate averaged 4%[26] (2001-09). However, broadening the productivity base and farm profitability in an environmentally responsible way would require substantial and sustained public investments in agricultural R&D, extension services, and farmer education; and more effective partnerships between EMBRAPA and private institutions. Other problems undermining productivity growth include land tenure requirements and poorly functioning land rental markets; deficiencies in agro-logistics—transport along the supply chain and storage; access to credit, which is riddled with rules and subsidies which favor a small group at the expense of the majority; and high protection on imported capital and intermediary goods, which significantly increases the cost of agricultural inputs and slows the importation of advanced technology.

Poverty, inequality and social services for the poor and vulnerable in Brazil

Much progress in reducing poverty and inequality in the early 2000s is being reversed as GDP growth has stalled: As in the field of environmental stewardship, Brazil has succeeded in significantly reducing poverty and inequality, especially from 2003 to 2013. Between 2001 and 2013, 24.6 million escaped poverty. At BRL140/per capita/per month,[27] (the administrative poverty level used in the Bolsa Familia Program (BFP)), the poverty rate was reduced from 25% (2001) to 11% (2013) and 7.4% (2014). The rural poverty rate was much higher than the urban rate, although the difference between them was nearly halved from 30.3 percentage points in 2001 to 16.3 percentage points in 2013. Afro-descendants constitute the majority of the poor, though indigenous peoples have the highest extreme poverty rates. The Gini coefficient of household incomes also fell from 0.59 to 0.53 (2001-13), a major step forward though inequality is still very high (WBG, June 2016).

26. TFP growth shows considerable variability across regions and farm sizes. For example, the lowest TFP growth registered for farms in the 20-100 ha class size is 1.14% per year, followed by farms in the 100-500 ha class size at 1.29% per year (WBG, Sept. 2017).

27. Exchange rate: 1 USD=5.353 BRL (Feb 04, 2021). Of course, it has fluctuated; e.g., Dec 01, 2020: 1 USD=5.312 BRL; Jan 04, 2021: 1USD=5.143 BRL (Brazilian Real).

Unfortunately, annual GDP growth (%) declined during the outer years: from 4.5% (2006-10) to 2.4% (2011-14) to contractions of -3.8% in 2015 and -3.6% in 2016. Such contractions pushed the unemployment rate to 13.7% in 2017. Poverty increased to 9.7% (2016) and real wages fell 2.3% in 2016 (WBG, May 2017).

Major channels facilitating achievements in shared prosperity in the early 2000s: After having regained macro-economic stability in the late 1990s, Brazil was well-positioned to benefit from the long commodity boom (2003/04-09/10) in agriculture, precious metals, and energy. As a major commodity producer, Brazil's export and import values more than quadrupled (2000-11), representing an annual growth rate of 15% in nominal US dollar terms (WBG, June 2016). This boom was translated into a fiscal windfall through increased social contributions by commodity exporters, increased corporate income taxes and indirect tax revenues. Government thus had the fiscal space needed to finance its inclusive policies to benefit the lower 40% (B40). The boom created formal-sector jobs, thus reducing unemployment from 11% to 5% in 2010 despite the global financial crisis and recession of 2008. Gaining formal-sector jobs was the main way out of poverty as labor earnings represent the major portion of household earnings of the B40. Government spending on education, health, and pensions all increased by 1.1% to 1.4% of GDP (2002-2014). In addition, there was also increased international liquidity and an expansion of targeted credit which drove down interest rates. Expanded liquidity financed increased household consumption. This sustained and substantial reduction in poverty and inequality was the first in Brazil's over 500-year history. This expansionary period has been widely referred to as the 'Golden Decade'.

Social services, in particular the Bolsa Escola (BEP) and the Bolsa Familia (BFP) programs reduce extreme poverty among children and invest in their human capital: For the extreme poor, social transfers have been the major channel of poverty reduction. Between 2004-2013, 62% of the reduction in extreme poverty was due to these social transfers. Started in 1995[28], BEPs are conditional cash transfers (CCT) in that they require the recipient households to send their children (aged 7-14) to school. By 1999, there were 60 programs in various municipalities. By 2003, they were implemented in almost all of Brazil's

5,561 municipalities, covering 8.6 million children from 5.06 million families (de Janvry et al, Dec 2005). In 2003, under President Luiz Inácio Lula da Silva[29], several other federal cash transfer programs and the BEPs were brought together under a single federal program, the Bolsa Familia. The requirements on recipient families of the nationwide BFP include: (i) children aged 6-15 must enroll in school and attend at least 85% of the classes; (ii) children under 7 years old must visit health clinics, have their growth monitored and their vaccinations updated; and (iii) pregnant women must undergo pre-natal care. These programs have been credited with an estimated 58% fall in extreme poverty, or a reduction of 30% in overall poverty—equivalent to 8.13 million people—and 41% decline in the Gini coefficient from an average of 0.59 during 1992-2002 to around 0.52 in 2015. By December 2018, these transfers were reaching an estimated 14.2 million families or 46.9 million beneficiaries, equivalent to almost 25% of the total population (World Bank, Aug 2019). In addition to CCTs, there was an expansion of access to health services through the Sistema Único de Saúde (SUS); and to other social and rural pensions (Benefício de Prestação Continuada (BPC)). Infrastructure also improved—access to water, sanitation, and electricity. Infant mortality was reduced by 63% between 1995 and 2015 (World Bank, May 2017).

A succession of shocks like no other—early impact, President Bolsonaro's response, rising domestic food prices, and national resilience

Onslaught of dual shocks in 2020 on a weakened economy since 2015: Previously, oil and commodity prices had plunged in 2014—by 50% between June and December[30]. Brazil was still recovering from the 2014-16 domestic crisis as economic growth averaged slightly above 1% per year from 2017-19, when in early 2020 the COVID-19 pandemic hit with commodity—oil and

28. The first one was started at the municipal level in Campinas in the Federal District of Brasilia.

29. President Lula da Silva in office: Jan 1, 2003 to Jan 1, 2011 (during the "Golden Decade").

30.The West Texas Intermediate (WTI) price (US $ per barrel) fell from $95 (June 2014) to $55 (Dec 2014); Brent prices from $109 to $60 over the same period (Arezki and Blanchard, Jan 13, 2015).

metals—prices plunging. In March 2020, crude oil prices averaged $ 32/barrel[31], representing a 50% decline compared to January. In April, prices reached historic lows as lockdowns due to the pandemic further curtailed transport and travel (which account for around two-thirds of oil demand) (World Bank, April 2020).

The skeptical response of President Jair Bolsonaro despite the devastating impact of the pandemic: Similar to President Trump's response to the pandemic in early 2020, President Jair Bolsonaro sought to downplay the seriousness of COVID-19 (Human Rights Watch, April 2020). Similar to the United States, the lack of a national, coherent strategy to combat COVID-19 exacted a heavy toll in terms of infections and deaths. The first case of COVID-19 in Brazil was reported on Feb 25, 2020. By the end of December 2020, Brazil had suffered an estimated 7.5 million COVID-19 cases, and around 191,000 deaths. By mid-January 2021, nearly 8.5 million cases and more than 209,000 deaths had been reported (JHU, Coronavirus Resource Center). Even before the pandemic, 52% of Brazilians were economically vulnerable, meaning they were either poor (living on less than $5.50/day at 2011 prices), or at risk of falling into poverty because they were in precarious and unprotected jobs. This vulnerable population is mostly urban and young, including more than 7 out of 10 Brazilian children and young people (under 15 years old). The unemployment rate increased from around 10% in 2012 to 13% in 2020; for young people, the rate rose from around 15% to 30% during the same period. The fall in labor income hurt more sharply the young (20-24 years old) and those with low education. Low level of savings among Brazilians also increased their vulnerability: only 32% of individuals declared saving in the previous year, compared to 37% in countries with similar GDP/cap; and 48% in the world. About one in five Brazilians live in sub-standard housing—high density slums, which make them particularly exposed to the virus (Cereda et al, July 2020). The pandemic spread rapidly into rural areas including the Amazon, especially in some rural states where economic inequality is the highest (e.g. in the semi-arid Northeast), including traditional and indigenous peoples, and forest communities with poor access to healthcare. By mid-January 2021, the situation in the state of Amazonas had reached alarming levels (Phillips, Jan14, 2021). The pandemic is far from being under control in Brazil, especially as President Jair Bolsonaro is skeptical of the threat posed.

Rising food prices have exacerbated the food insecurity of millions heavily dependent on basic foods: A major area of concern has been the continuous rise in basic food prices, in particular of beans, rice and soy cooking oil, and even milk and milk products, fruit and vegetables. From January through September 2020, the monthly rate of price increase was 17.98% for rice, 4.31% for black beans, 27.5% for soy oil, and 4.17% for milk and milk products (USDA, Nov 2020). In response, Brazil removed tariffs on rice (September), and corn, soybeans, soy oil, and meal (October) from non-Mercosur countries.[32] In addition to the widespread dislocations triggered by the pandemic, two factors contributed to this food price inflation. Due to the pandemic, consumers stocked up more on daily necessities for fear of empty shelves. In addition, from January to September, Brazil's agri-food exports (e.g. soybeans, beef, sugar, orange juice, and coffee) rose by 12% in dollar terms (compared to the same period in 2019) while imports fell by almost 3%. The sharp devaluation of the BRL by the end of March also boosted exports and constrained imports.[33]

Social insurance and protection programs strengthen resilience in a battered nation: Brazil's experience to date is an important reminder that resilience requires a fiscal system capable of funding effective systems of social insurance and protection for all. During this crisis, the unemployment insurance system and two emergency programs have been strengthened. The latter were: (i) the BFP which added 1.2 million families from the waiting list, increasing the total coverage to 14.3 million families; (ii) the Emergency Aid (Auxilio Emergencial, AE), a cash transfer program of BRL 600/day (equivalent to $7.40/day in 2011 dollars) from March to December 2020 (The Economist, Dec 19, 2020), which targeted informal unemployed workers in low-income households as well as BFP beneficiaries, was expected to benefit some 53-68 million workers. These expanded relief programs substantially assist the two lower quintiles primarily. Unemployment insurance protects the formally employed in all quintiles, buffering 30% of average income reduction (Cereda et al, July 2020).

---

31. Bbl: Barrel of oil or 42 gallons of oil.

32. Mercosur countries are: Argentina, Brazil, Paraguay, Uruguay and Venezuela. These countries created a customs union in 1991, by the Treaty of Asuncion.

33. The BRL was 4=1USD on Jan 1, 2020; 5.15=1 USD end March 2020; and 5.5=1 USD by end June 2020 (USDA, Nov 2020).

Conclusion:
Main implications for
food security, income,
and poverty during a crisis

The full extent of the damage to Brazil from COVID-19 will depend on the duration of the pandemic and the availability of expanded social transfers, both of which were still unknown as of early January 2021. Micro-simulation analysis undertaken in mid-2020 indicated that the social transfer measures undertaken substantially buffered the shocks to household incomes and therefore food security. Due to the AE, poverty is expected to decrease for 2020. Without these transfers, the situation would have been catastrophic for the poor. For example, income loss by the second quintile would be by 14.9%, and third quintile by 13.9%. The lowest and fourth quintiles would suffer income shocks approaching -9%. The fifth and richest quintile would not be much affected, losing -4.6% of income. The richest quintile includes highly skilled workers who can tele-work and most public sector workers (there was no short-term public sector job retrenchment) (Cereda et al, July 2020).

As pointed out by Snowden (2019), pandemics are not random events: "COVID-19 flared up and spread because it is suited to the society we have … every society produces its own specific vulnerabilities … Of all the issues raised by COVID-19, the most important is preparedness." Brazil's response was hobbled by President Bolsonaro's skeptical response to the seriousness of the pandemic. The weaknesses of Brazil's public health system were laid bare. Despite these obstacles, Brazil was prepared in other ways. It had already developed a nationwide system of social transfers. It was then able to mobilize them and expand their reach in 2020. These expanded transfers enabled the poor and vulnerable to mitigate the blow, including from higher food price inflation. Brazil's institutions for identifying and reaching the poor thus played a pivotal role in Brazil's preparedness and therefore resilience in the face of the 2020 disasters. For the longer term, preparedness should include efforts to promote broad-based productivity growth of agriculture and agri-business.

The challenge ahead is for government to be able to move on three fronts simultaneously: (i) maintain the fiscal space required to fund effective social transfers while (ii) defeating the pandemic, and (iii) investing in broad-based productivity and job-creating growth throughout the economy. In sum, for resilience and food security post COVID-19, the government's fiscal ability to fund effective social transfers and public health systems must be complemented with measures to invest in and promote productive and job-generating growth capable of thriving despite the rigors of climate change.

Annex: Key structural features with impact on food security in Brazil

GDP per capita (constant 2010 US$)	**11 122 (2019)**
Gini index (World Bank estimate)	**53** (2018)
GNI per capita, Atlas method (current US$)	**9 130** (2019)
Labor force participation (%)	**50%** (2019)
Population, total	**206 163 058** (2019)
Urban/rural population ratio	**7** (2019)
Poverty headcount ratio at $3.20 a day (2011 PPP) (% of population)	**8.8** (2018)
Poverty headcount ratio at $5.50 a day (2011 PPP) (% of population)	**20.0** (2018)
Poverty headcount ratio at $1.90 a day (2011 PPP) (% of population)	**3.9** (2018)
Inflation, consumer prices (annual %)	**8.7** (2018)
Agricultural land[34] (% of land area)	**28%** (2018)
Cropland[35] (% of land area)	**7.6%** (2018)
Agriculture, Forestry and fishing value added (% GDP)	**4.40%** (2016)
Number of undernourished people in million	****
Prevalence of undernourishment (%)	‹2.5

Source: WDI and FAO database, 2021

---

34. Land used for cultivation of crops and animal husbandry.

35. Land used for cultivation of crops. The total of areas of arable land (temporary crops) and permanent crops.

Bibliography

- Arezki, Rabah and Olivier Blanchard. Jan 13, 2015. "The 2014 oil price slump: Seven key questions". Vox Eu CPR. (Accessed Jan 21 2021). https://voxeu.org/article/2014-oil-price-slump-seven-key-questions
- Assad, Eduardo (EMBRAPA) et al. 2010. "Impacts of climate change on Brazilian agriculture: Refocusing impact assessment to 2050" Inception Report, # 68774. https://openknowledge.worldbank.org/bitstream/handle/10986/12475/687740ESW0P11800Agriculture0to02050.pdf?sequence=1&isAllowed=y
- Cereda, Fabio et al. July 31, 2020. "COVID-19, Labor Market Shocks, and Poverty in Brazil—A Microsimulation Analysis." Poverty and Equity Global Practice, World Bank. https://openknowledge.worldbank.org/bitstream/handle/10986/34372/COVID-19-Labor-Market-Shocks-and-Poverty-in-Brazil-A-Microsimulation-Analysis.pdf?sequence=1&isAllowed=y
- Climate links. April 2019. Greenhouse gas emissions factsheet: Brazil. https://www.climatelinks.org/resources/greenhouse-gas-emissions-factsheet-brazil
- CNN. Scott, Katy and CNN Graphics, Henrik Peterson. May 10, 2019. "South Africa is the world's most unequal country. 25 years of freedom have failed to bridge the divide". https://www.cnn.com/2019/05/07/africa/south-africa-elections-inequality-intl/index.html#:~:text=In%20fact%2C%20despite%2025%20years,according%20to%20the%20World%20Bank.&text=The%20gap%20between%20rich%20and,exist%2C%20the%20World%20Bank%20found.
- Corruptions Perception Index. (CPI) Wikipedia. (Last updated Jan 05, 2021). https://en.wikipedia.org/wiki/Corruption_Perceptions_Index
- de Carvalho, Carolina Abreu et al. Oct 12, 2020. "How is Brazil facing the crisis of Food and Nutrition Security, during the COVID-19 pandemic?" Public Health Nutrition, Oct 12:1 -4. (Accessed Jan 22, 2021). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7642956/
- de Janvry, Alain et al. Dec 2005. Brazil's Bolsa Escola Program :The Role of Local Governance in Decentralized Implementation. Social Safety Net Primer Series. World Bank. SP Discussion Paper, # 0542. https://openknowledge.worldbank.org/bitstream/handle/10986/20383/905060NWP0P132085319B00PUBLIC000542.pdf?sequence=1&isAllowed=y
- DelGrossi, Mauro Eduardo. May 2019. "2017 Brazilian Agricultural Census: Research Agenda" Working Paper, Brasilia. https://advance.sagepub.com/articles/preprint/2017_BRAZILIAN_AGRICULTURAL_CENSUS_RESEARCH_AGENDA/8187152/1
- DEXTRA International. Nov 05, 2019. "Agriculture occupies 41% of Brazil's total land area". http://www.dextrainternational.com/agriculture-occupies-41-of-brazils-total-land-area/#:~:text=Brazil%20has%20a%20total%20land,of%20Brazil's%20total%20land%20area.
- Government of Brazil. "Brazil submits its Nationally Determined Contribution under the Paris Agreement". Press Release N 157. Dec 14, 2020. (Accessed Jan 09, 2021). https://www.gov.br/mre/en/contact-us/press-area/press-releases/brazil-submits-its-nationally-determined-contribution-under-the-paris-agreement#:~:text=The%20NDC%20is%20Brazil's%20main,emissions%20by%2043%25%20in%202030.
- Gozetto, Andrea and Clive S Thomas. August 2014. "Interest groups in Brazil: A new era and its challenges". Journal of Public Affairs 14 (3-4). (Accessed Jan 07, 2021) https://www.researchgate.net/publication/265417314_Interest_groups_in_Brazil_A_new_era_and_its_challenges
- Hofmeister, Naira. (Translated by Maya Johnson). May 26, 2020. "Brazilian taxpayers subsidizing Amazon-clearing cattle ranches, study shows." Mongabay. (Accessed Jan 07, 2021). https://news.mongabay.com/2020/05/brazilian-taxpayers-subsidizing-amazon-clearing-cattle-ranches-study-shows/
- Human Rights Watch. April 10, 2020. "Bolsonaro Sabotages Anti-COVID-19 Efforts—President Flouts Health Authorities' Advice, Undermine Access to Information." (Accessed Jan 20, 2021). https://www.hrw.org/news/2020/04/10/brazil-bolsonaro-sabotages-anti-covid-19-efforts

- Johns Hopkins University & Medicine. Coronavirus Resource Center. (Accessed Dec 26, 2020) https://coronavirus.jhu.edu/data/new-cases ; (and accessed Jan 18, 2021). https://coronavirus.jhu.edu/data/new-cases
- IBGE. Instituto Brasileiro de Geografia e Estatistica. Census of Agriculture 2017. Publications: Final results. 2019. https://www.ibge.gov.br/en/statistics/economic/agriculture-forestry-and-fishing/21929-2017-2017-censo-agropecuario-en.html?=&t=publicacoes
- Index Mundi. Gini Index. (World Bank estimate.) Country Ranking. (Accessed Dec 27, 2020). https://www.indexmundi.com/facts/indicators/SI.POV.GINI/rankings
- ISAAA. 2017. Brazil Biotech Country: Facts and Trends. https://www.isaaa.org/resources/publications/biotech_country_facts_and_trends/download/Facts%20and%20Trends%20-%20Brazil.pdf
- ISAAA. June 14, 2017. "Brazil approves GM sugarcane for commercial use." (Accessed Jan 14, 2021) isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=15510#:~:text=On%20June%208%2C%202017%2C%20Brazil,de%20Tecnologia%20Canavieira%20(CTC).
- ISAAA. June 2018. "Brazil is the second largest producer of biotech crops in the world." (Accessed Jan 14, 2021) https://www.isaaa.org/resources/publications/biotech_country_facts_and_trends/download/Facts%20and%20Trends%20-%20Brazil.pdf
- KFF Global Health Tracker (information date Dec 26, 2020)
- https://www.kff.org/global-health-policy/fact-sheet/coronavirus-tracker/?gclid=CjwKCAiA25v_BRBNEiwAZb4-ZXM7G-0k3A3LkZIdA9c2tkDnkeaQOQZtOK1R-6M-LIGIts-si7J7IBoCt_wQAvD_BwE
- The Economist. São Gonçalo. Dec 19, 2020. "Brazil faces hard spending choices in 2021". https://www.economist.com/the-americas/2020/12/19/brazil-faces-hard-spending-choices-in-2021
- Mongabay. Oct. 03, 2019. "Brazilian beef industry plays outsized role in tropical carbon emissions: report" by Zoe Sullivan. (Accessed Feb 23, 2021) https://news.mongabay.com/2019/10/brazilian-beef-industry-plays-outsized-role-in-tropical-carbon-emissions-report/
- OECD. Brazil. Agricultural Policy, Monitoring and Evaluation. 2020. (Accessed Jan 01, 2021) https://www.oecd-ilibrary.org/sites/8f4be872-en/index.html?itemId=/content/component/8f4be872-en
- Phillips, Tom in Rio de Janeiro. Jan 14, 2021. "Covid eruption in Brazil's largest state leaves health workers begging for help". The Guardian. (Accessed on Jan 24, 2021). https://www.theguardian.com/world/2021/jan/14/brazil-manaus-amazonas-covid-coronavirus
- Prager, Alicia. March 19, 2019. "Brazil's key deforestation drivers: pasture, cropland, land speculation". Mongabay Business Series. (Accessed Jan 12, 2021). https://news.mongabay.com/2019/03/brazils-key-deforestation-drivers-pasture-cropland-land-speculation/
- Snowden, Frank M. 2019. Epidemics and Society: From the Black Death to the Present. Yale University Press.
- Statistica. Brazil: Share of economic sectors in the Gross Domestic Product (GDP), from 2009 to 2019. https://www.statista.com/statistics/254407/share-of-economic-sectors-in-the-gdp-in-brazil/
- Statistica: Brazil: Distribution of employment by economic sector (2010-2020). https://www.statista.com/statistics/271042/employment-by-economic-sector-in-brazil/
- The Economist. December 16, 2020 edition. São Gonçalo. Dec 19. 2020. "Brazil faces hard-spending choices in 2021: The poor received huge welfare payments during the pandemic. These may soon dry up". https://www.economist.com/the-americas/2020/12/19/brazil-faces-hard-spending-choices-in-2021
- Trading Economics. Brazil Corruption Index, 1995-2019. https://tradingeconomics.com/brazil/corruption-index
- Transparency International : CPI 2019 Global Highlights. (Accessed Jan 11. 2021). https://www.transparency.org/en/news/cpi-2019-global-highlights
- UNDP: Brazil—Climate Change Adaptation. 2010. Accessed Jan 07, 2021. https://www.adaptation-undp.org/explore/latin-america-and-caribbean/brazil
- UNFCCC. The Paris Agreement. (Accessed Jan 09, 2021). https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

- Union of Concerned Scientists. 2020. Each Country's Share of CO2 Emissions (2018). (Accessed Feb 07, 2021) https://www.ucsusa.org/resources/each-countrys-share-co2-emissions?PHPSESSID=9eb1c0774d0b8b5b0c8c321ab3b73d9c
- US Bureau of labor Statistics. Ralph Mondesir. March 2020. "A historical look at soybean price increases: What happened since year 2000?" Beyond The Numbers. Vol. 9. # 4. https://www.bls.gov/opub/btn/volume-9/a-historical-look-at-soybean-price-increases-what-happened-since-the-year-2000.htm
- USDA. Feb 03, 2020. Brazil Agricultural Technology Manual. Foreign Agricultural Service. (Accessed Jan 14, 2021) https://www.fas.usda.gov/data/brazil-agricultural-biotechnology-annual-3#:~:text=During%20the%202018%2F2019%20crop,percent%20for%20sec
- USDA. Nov 09, 2020. Agricultural Prices Stoke Inflation. Report No. : BR 2020-0051. (Accessed Feb. 07, 2020) https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Agricultural%20Prices%20Stoke%20Inflation_Brasilia_Brazil_11-07-2020
- Wikipedia. 2020 Brazil rainforest wildfires. (Accessed Jan 13, 2021. Last updated Dec 07, 2020) https://en.wikipedia.org/wiki/2020_Brazil_rainforest_wildfires
- World Bank. March 2001. Brazil: An Assessment of the Bolsa Escola Programs. Report # 20208-BR. https://openknowledge.worldbank.org/bitstream/handle/10986/15705/multi0page.pdf?sequence=1&isAllowed=y
- World Bank Working Paper # 22. Margulis, Sergio. 2004. Causes of Deforestation of the Brazilian Amazon. Report # 27715. https://openknowledge.worldbank.org/bitstream/handle/10986/15060/277150PAPER0wbwp0no1022.pdf?sequence=1&isAllowed=y
- World Bank. Dec. 2009. Brazil: Country Note on Climate Change Aspects of Agriculture. Note # 53784. https://openknowledge.worldbank.org/bitstream/handle/10986/9468/537850BRI0Clim10Box345626B01PUBLIC1.pdf?sequence=1&isAllowed=y
- World Bank & EMBRAPA et al. 2013. Impact of Climate Change on Brazilian Agriculture. Report # 68774. http://documents1.worldbank.org/curated/en/379021468224390590/pdf/687740Revised00LIC00web0brasil02030.pdf
- World Bank Group. Development Research Group Environment and Energy Team. Dec 2014. A "Delphi Exercise" as a Tool in Amazon Rainforest Valuation. WPS # 7143. https://openknowledge.worldbank.org/bitstream/handle/10986/21139/WPS7143.pdf?sequence=1&isAllowed=y
- World Bank. Brazil: Overview (updated Nov.18, 2020). https://www.worldbank.org/en/country/brazil/overview
- World Bank. WDI. GNI/Cap. Atlas method. Current dollars. 2019. https://data.worldbank.org/indicator/NY.GNP.PCAP.CD
- World Bank. WDI. Gini index. https://data.worldbank.org/indicator/SI.POV.GINI?locations=BR
- World Bank Group (WBG). June 2016. Brazil: Systematic Country Diagnostic—Retaking the Path to Inclusion, Growth and Sustainability. Report # 106569. https://openknowledge.worldbank.org/bitstream/handle/10986/23954/106569.pdf?sequence=8&isAllowed=y
- World Bank Group (WBG). May 16, 2017. The Federative Republic of Brazil: Country Partnership Framework for the Period FY 18-23. Report # 113259-BR. http://documents1.worldbank.org/curated/en/148141498229092629/pdf/20170619-Brazil-CPF-draft-for-Board-with-CLR-Acknowledgement-Box-06202017.pdf
- World Bank Group (WBG). Arias, Diego, Pedro Abel Vieira (EMBRAPA), Elisio Contini (EMBRAPA), Barbara Farinelli, and Michael Morris. Sept 2017. Agricultural Productivity Growth in Brazil: Recent Trends and Future Prospects. Brazil Productivity Growth Flagship Report. https://openknowledge.worldbank.org/bitstream/handle/10986/32202/Agriculture-Productivity-Growth-in-Brazil-Recent-Trends-and-Future-Prospects.pdf?sequence=1&isAllowed=y
- World Bank. Aug 29, 2019. Federative Republic of Brazil: Second Bolsa Familia Project –Implementation Completion and Results Report. Report # ICR 00004579. http://documents1.worldbank.org/curated/en/578141568314136393/pdf/Brazil-Second-Bolsa-Familia-Project.pdf
- World Bank. April 2020. Commodity Markets Outlook: Implications of COVID-19 for Commodities. https://openknowledge.worldbank.org/bitstream/handle/10986/33624/CMO-April-2020.pdf?sequence=9&isAllowed=y
- World Bank Group (WBG). June 2020. Global Economic Prospects. https://openknowledge.worldbank.org/handle/10986/33748

About the authors
Isabelle Tsakok

Isabelle Tsakok is an adjunct professor at SIPA and a Senior Fellow at the Policy Center for the New South, previously known as OCP Policy Center, who focuses on rural development, agricultural economics, policy analysis, food security and poverty reduction. She holds a PhD in Economics. Dr. Tsakok has worked on development issues for over twenty-five years, first as World Bank staff and since retirement as a consultant. She has specialized in policy analysis, program and project formulation and evaluation, research and training activities in agriculture, agro-business, rural development and poverty reduction. She has worked in most regions of the developing world: Africa, Asia - South, Southeast and East, North Africa and the Middle East and Latin America.

Fatima Ezzahra Mengoub

Fatima Ezzahra Mengoub is an economist at the Policy Center for the News South. She specializes in agricultural economics and works on several issues related to agricultural growth analysis, economic structural change, inter and intra-regional agricultural trade, natural resource management and food security. She has published various articles on the role of agricultural investment, agricultural value chains, productivity and technological change in agriculture and water management. She has also taught macroeconomics and microeconomics at the Hassan II Institute of Agronomy and Veterinary Sciences (IAV) and the School of Governance and Economics (EGE). She holds an engineering degree in agricultural economics from the Hassan II Institute of Agronomy and Veterinary Sciences and is preparing a doctoral thesis on the impact of technological changes induced by irrigation on agricultural growth in Morocco.

The views expressed in this publication are those of the author.

About the Policy Center for the New South

The Policy Center for the New South: A public good for strengthening public policy. The Policy Center for the New South (PCNS) is a Moroccan think tank tasked with the mission of contributing to the improvement of international, economic and social public policies that challenge Morocco and Africa as integral parts of the Global South.

The PCNS advocates the concept of an open, responsible and proactive « new South »; a South that defines its own narratives, as well as the mental maps around the Mediterranean and South Atlantic basins, within the framework of an open relationship with the rest of the world. Through its work, the think tank aims to support the development of public policies in Africa and to give experts from the South a voice in the geopolitical developments that concern them. This positioning, based on dialogue and partnerships, consists in cultivating African expertise and excellence, capable of contributing to the diagnosis and solutions to African challenges.