



# Rural Credit Policy in Brazil: Agriculture, Environmental Protection, and Economic Development

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## ABOUT CPI

Climate Policy Initiative (CPI) is an analysis and advisory organization with deep expertise in finance and policy. Our mission is to help governments, businesses, and financial institutions drive economic growth while addressing climate change. CPI has six offices around the world in Brazil, India, Indonesia, Kenya, the United Kingdom, and the United States.

## KEYWORDS

Land use, rural credit, credit impact, sustainable agriculture, environment, deforestation, public policy opportunities

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## LIST OF ACRONYMS

**ABC Plan** – Agricultural Sector Plan for Climate Change Mitigation and Adaptation for the Consolidation of a Low-Carbon Economy (*Plano Setorial de Mitigação e de Adaptação às Mudanças Climáticas para a Consolidação de uma Economia de Baixa Emissão de Carbono na Agricultura*)

**ABC Program** – National Program for Low-Carbon Emissions in Agriculture (*Programa para Redução da Emissão de Gases de Efeito Estufa na Agricultura*)

**AFOLU** – Agriculture, Forestry and Other Land Use

**APP** – Permanent Preservation Areas (*Áreas de Preservação Permanente*)

**BCB** – Central Bank of Brazil (*Banco Central do Brasil*)

**BNDES** – Brazilian Development Bank (*Banco Nacional de Desenvolvimento Econômico e Social*)

**CAP** – Common Agricultural Policy

**CAR** – Rural Environmental Registry (*Cadastro Ambiental Rural*)

**CMN** – National Monetary Council (*Conselho Monetário Nacional*)

**CNPA** – National Agricultural Policy Council (*Conselho Nacional de Política Agrícola*)

**CPI** – Climate Policy Initiative

**CRA** – Environmental Reserve Quota (*Cota de Reserva Ambiental*)

**CSA** – Climate-Smart Agriculture

**FAO** – Food and Agriculture Organization of the United Nations

**FCO** – Midwestern Constitutional Fund (*Fundo Constitucional do Centro-Oeste*)

**FGRRural** – Investment Guarantee Fund (*Fundo Garantidor de Investimentos*)

**FINAME** – Fund for the Purchase of Industrial Machines and Equipment (*Fundo de Financiamento para Aquisição de Máquinas e Equipamentos Industriais*)

**FNO** – Northern Constitutional Fund (*Fundo Constitucional do Norte*)

**FNE** – Northeastern Constitutional Fund (*Fundo Constitucional do Nordeste*)

**FTRA** – Fund for Lands and Agricultural Reform (*Fundo de Terras e da Reforma Agrária*)

**FUNCAFÉ** – Fund for the Defense of the Coffee Industry (*Fundo de Defesa da Economia Cafeeira*)

**GHG** – Greenhouse Gas

**IBGE** – Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística*)

**INCRA** – National Institute for Colonization and Agrarian Reform (*Instituto Nacional de Colonização e Reforma Agrária*)

**INOVAGRO** – Program to Encourage Technological Innovation in Agricultural Production (*Programa de Incentivo à Inovação Tecnológica na Produção Agropecuária*)

**LCA** – Agricultural Credit Note (*Letra de Crédito Agrícola*)

**MAPA** – Ministry of Agriculture, Livestock, and Supply (*Ministério da Agricultura, Pecuária e Abastecimento*)

**MCR** – Rural Credit Manual (*Manual do Crédito Rural*)

**MDA** – Ministry of Agrarian Development (*Ministério do Desenvolvimento Agrário*)

**MDCR** – Rural Credit Data Matrix (*Matriz de Dados do Crédito Rural*)

**MODERAGRO** – Program for Modernization of Agriculture and Conservation of Natural Resources (*Programa de Modernização da Agricultura e Conservação de Recursos Naturais*)

**MODERFROTA** – Program for the Modernization of Agricultural Tractors and Related Accessories and Harvesters (*Programa de Modernização da Frota de Tratores Agrícolas e Implementos Associados e Colheitadeiras*)

**PAP** – Crop and Livestock Plan (*Plano Agrícola e Pecuário*)

**PCA** – Program for Construction and Expansion of Storage (*Programa para Construção e Ampliação de Armazéns*)

**PNMC** – National Policy on Climate Change (*Política Nacional sobre Mudança do Clima*)

**PRA** – Environmental Compliance Program (*Programa de Regularização Ambiental*)

**PROCAP AGRO** – Program for the Capitalization of Agriculture and Livestock Cooperatives (*Programa de Capitalização de Cooperativas Agropecuárias*)

**PRONAF** – National Plan for Family Farming (*Programa Nacional de Fortalecimento da Agricultura Familiar*)

**PRONAMP** – National Program to Support Medium-Sized Rural Producers (*Programa Nacional de Apoio ao Médio Produtor Rural*)

**PPCDAm** – Action Plan for Deforestation Prevention and Control in the Legal Amazon (*Plano de Ação para Prevenção e Controle do Desmatamento na Amazônia Legal*)

**PUC-Rio** – Pontifical Catholic University of Rio de Janeiro (*Pontifícia Universidade Católica do Rio de Janeiro*)

**R&D** – Research and Development

**RECOR** – Common Record of Rural Operations (*Registro Comum de Operações Rurais*)

**SICOR** – Rural Credit and PROAGRO Operations System (*Sistema de Operações do Crédito Rural e do PROAGRO*)

**SNCR** – National Rural Credit System (*Sistema Nacional de Crédito Rural*)

# EXECUTIVE SUMMARY

Brazil is a key player in global food supply, ecosystem services, and biodiversity conservation. The country is the globe's third-largest agricultural producer and its largest net exporter of food (FAO, 2016).<sup>1</sup> Tailored policies in financial services can contribute to modernizing and intensifying agriculture, leading to a more effective management of natural resources. Improvements in the rural credit policy can significantly contribute to the country's objectives of increasing agricultural production while simultaneously becoming more sustainable.

Brazil's abundance of already cleared lands provides an opportunity for the nation to expand agricultural production without further deforestation. If Brazil pursued its crop potential on already available lands – promoting conversion of pasture to cropland and increasing productivity – the nation's total production could nearly double without any further deforestation (i.e., without area expansion) (Antonaccio et al., 2018). Yet, to realize this potential, substantial capital expenditures and operational costs are required.

Since the 1960s, rural credit has been Brazil's primary agricultural policy. In 2019/20 the credit amount corresponds approximately to 30% of the country's total agricultural production in 2019,<sup>2</sup> R\$ 631 billion (MAPA, 2020). This sizable policy has great potential to serve as a mechanism for aligning Brazil's agricultural policy with its sustainability goals.

Recent research finds that Brazil can increase crop production by 79-105% and beef production by 27% without deforestation (Assunção and Bragança, 2019). However, to achieve significant gains in agricultural productivity, farmers will need to invest considerable resources to modernize their operations by purchasing farm equipment and spending more in fertilizer. Another recent study finds that rural credit alleviates producers' constraints, increasing both labor and land productivity and leading to intensified production and reduced pressures on deforestation (Assunção, Fernandes, Mikio and Souza, 2020). The productivity gains and the improvements in land use are found to be especially pronounced for credit directed to small farmers.

Government subsidies should foster the provision of public goods. Aligning the public financing of rural credit with environmental objectives reinforces the relationship between agriculture and forest protection and provides the economic justification for the government to direct resources to the agricultural sector.

The interdependence of the Brazil's agricultural sector and its forests is critical, and the delicate balance between the two must be pursued. In addition to the forests' role in mitigating climate change and sustaining biodiversity, they are a key determinant of Brazil's weather, especially for the rainfall patterns that are so important for crop production.

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<sup>1</sup> Net exports exclude food imports: Europe and the US have large food exports and imports, and thus their *net exports* (surplus) are smaller.

<sup>2</sup> For the 2020/21 agricultural year, the government earmarked roughly R\$ 236 billion for rural credit. Of this amount, R\$ 33 billion is directed to the National Plan for Family Farming (*Programa Nacional de Fortalecimento da Agricultura Familiar* – PRONAF) and the rest, R\$ 203.3 billion destined to medium and large producers. In the previous agricultural year (2019/20), R\$ 223 billion was earmarked, but in fact only R\$ 191 billion was given as credit lines. That means that 86% of what was budgeted was lent. In 2019/20 PRONAMP was the largest program with R\$ 33.12 billion, and loans related to PRONAF summed up to R\$ 28.9 billion.

Brazil's environmental protection can boost the country's economic success. As national and international concerns regarding forest conservation, climate change, and catastrophe risks increase, the expectation that Brazil will protect its environmental resources has grown as a central facet of international trade agreement negotiations, directly affecting Brazilian exports.

In this report, researchers from Climate Policy Initiative/Pontifical Catholic University of Rio de Janeiro (CPI/PUC-Rio) provide an in-depth analysis of Brazilian rural credit policy and discuss challenges and recent progress in public policy. The analysis benefits from years of research and discussions with policymakers, the private sector, and academic researchers. This report is organized in five chapters.

**Chapter 1 discusses the relationship among agricultural production, deforestation, and the need for effective finance.** Land use in Brazil has become more efficient over time. Despite more recent trends, Brazil has made considerable efforts to reduce deforestation. After peaking at more than 27,000 km<sup>2</sup>, there was an 80%<sup>3</sup> decrease in deforestation rates in the Amazon between 2004 and 2012 at the same time that the GDP of the agricultural sector of the region increased by 12.4%.<sup>4</sup> Recent research shows that the intensification of Brazilian agriculture is linked to the conversion of low-productivity pastureland to cropland and an associated reduction in deforestation pressures. Therefore, modernization has allowed the country to increase its agricultural production while decreasing the area expansion that leads to deforestation. If public policies and practices are further improved and better articulated to provide farmers with appropriate financial tools, these trends of intensification can be reinforced.

**Chapter 2 examines the structure of the rural credit system, looking into the fragmentation of financing rules and the credit distribution channels.** A multitude of rural credit funding sources and programs create a complex rural credit system for producers to navigate. There is a wide range of funding sources and programs, each with separate terms and conditions for providing credit to producers. The numbers change almost every year due to the creation and elimination of credit lines, but for the 2020/21 agricultural year, there are still 16 funding sources and 12 programs (Banco Central do Brasil, 2020a).<sup>5</sup> With banks and other financial institutions unevenly distributed throughout the country, this crowded field of funding sources and programs hinders producers in making financial decisions. The fragmentation of rural credit rules by geographical location, farm size, and farm revenues creates additional artificial variation in the availability of funds and loan conditions, which generates distortions and inefficiencies. The analysis brings relevant insight for public policy. A simplification of programs and funding sources can improve the efficiency of the rural credit system. Increasing transparency and reducing political interference in public policy can reduce distortions and increase efficiency.

3 For more information see the CPI/PUC-Rio Factsheet "Why Is Protecting the Amazon Important?" for a summary of conservation policy evaluations. The factsheet is available at: [bit.ly/3dKDiHr](https://bit.ly/3dKDiHr). CPI/PUC-Rio analysis uses deforestation data from PRODES/INPE available at: [bit.ly/2IWK1CQ](https://bit.ly/2IWK1CQ), and Municipal GDP of the agricultural sector data from SIDRA/IBGE available at: [sidra.ibge.gov.br/tabela/5938](https://sidra.ibge.gov.br/tabela/5938).

4 Data on yearly deforestation rates in the Amazon by the PRODES system available at INPE's Terrabrasilis platform: [bit.ly/3IMZSTj](https://bit.ly/3IMZSTj).

5 For more details, see appendix Description and Financing Conditions of Rural Credit Programs and Funding Sources.



Also, the reduction of excessive restrictions on the use of funds would allow producers to make a better allocation of resources. Besides that, expanding the rural credit planning horizon can make financing conditions more predictable for producers, helping with production decisions. Finally, encouraging the expansion of private sector participation in rural credit can stimulate competition and generate innovation in the rural financial sector.

**Chapter 3 presents the impact of rural credit on the real economy, land use, and deforestation.** It discusses the results of Assunção, Fernandes, Mikio and Souza (2020), a CPI/PUC-Rio paper in partnership with the Central Bank of Brazil (*Banco Central do Brasil*) that show evidence that an increase in rural credit lending leads to improvements in both land productivity and labor productivity. In terms of land use, an increase in rural credit leads to an expansion of crop area and a decrease in pasture area, with a positive impact on forested areas (reduced deforestation). Overall, the evidence suggests that credit restrictions modify production decisions and lead to inefficiencies in production. Rural credit fosters productive advances, places a ceiling on agricultural area expansion, and gives priority to productivity gains. When the analysis is disaggregated by credit lines, types of producer, and types of credit, it becomes clear that these impacts of greater agriculture intensification and improved land use are more profoundly associated with credit directed to small farmers.

**Chapter 4 examines Brazil's experience with credit and sustainability, including the ABC Plan and the alignment of credit with environmental protection.** This chapter discusses the integration of public goods and rural credit subsidies. First, it provides an overview of the strengths and implementation difficulties of the Agricultural Sector Plan for Climate Change Mitigation and Adaptation for the Consolidation of a Low-Carbon Economy (*Plano Setorial de Mitigação e de Adaptação às Mudanças Climáticas para a Consolidação de uma Economia de Baixa Emissão de Carbono na Agricultura* – ABC Plan). It also discusses potential routes for its improvement. Second, the report shows that the idea of using credit instruments to foster the protection of natural assets is not new to Brazil. In 2008, Resolution 3,545 from the National Monetary Council (*Conselho Monetário Nacional* – CMN) conditioned rural credit lending in municipalities in the Amazon biome on compliance with environmental rules and proven legitimacy of property titles. Assunção et al. (2019) calculate this resolution led to a 15% reduction in deforestation during the 2008-2011 period, suggesting that rural credit can be an effective tool for promoting conservation in Brazil. Two other CMN's resolutions (4,106/2012 and 4,226/2013) established an increase in credit limit related to the rural properties' environmental conditions. These are innovative and effective examples of combining credit provision with environmental features.

**Chapter 5 discusses the important steps the Brazilian banking system is taking towards a better alignment between finance and sustainable practices.** The 2020/21 Agricultural Plan (*Plano Safra*) included an increase of up to 10% in the working capital credit limit for producers who submit a validated Rural Environmental Registry (*Cadastro Ambiental Rural* – CAR), which is a first move for compliance with the Forest Code. Another important measure was to allow financing for the acquisition of Environmental Reserve Quotas (*Cotas de Reserva Ambiental* – CRA). In September 2020, the Central Bank of Brazil launched the Sustainability dimension of its Agenda BC#. Two initiatives should be highlighted: 1) the announcement of the “Green Bureau”, which will be associated with the rural credit information system and contain information on farmers’ sustainable practices; 2) the intention to boost incentives to move rural credit in a green direction. In this line, the Central Bank of Brazil signaled the possibility of continuing to increase contracting limits for rural credit operations that meet sustainability characteristics by up to 20% (Banco Central, 2020b). Potential next steps to advance this agenda are discussed in this chapter.

The Brazilian government has the opportunity to leverage current policies and ensure they become more efficient and meet relevant objectives. Improved access to rural credit enables farmers, especially small ones, to increase agricultural productivity, relieving the pressures driving deforestation. The current tight fiscal regime and declining interest rates imply that subsidies tend to decrease at the aggregate level. Therefore, it is important to target resources for maximizing their impact on Brazilian agriculture sector and meet socially desirable objectives.

# 1. AGRICULTURE, ENVIRONMENT, AND THE ROLE OF FINANCE

## 1.1 AGRICULTURE, LAND USE, AND DEFORESTATION

Brazil is a global leader in food production thanks to its significant natural resources, agricultural policy, innovation, and private investments. This chapter focuses on how financial and agricultural policies, especially rural credit, can play an important role in decoupling agricultural production and deforestation. Rural credit can provide a significant lever for improving the nation's agricultural production and, simultaneously, preserving Brazil's environment.

The Brazilian rural sector is historically one of the main pillars of the country's economy. Agribusiness currently accounts for 21% of the national GDP, approximately R\$ 1.55 trillion (CEPEA/USP, 2020). According to the 2017 Agricultural Census from the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística - IBGE), 15.1 million people work in rural establishments.

Agricultural land in Brazil is heavily concentrated. Approximately 4% of the farms comprise 63% of the farmland. By contrast, 65% of rural establishments account for 9% of farmland with areas corresponding to less than one fiscal module, which is the minimum area where agricultural activity can provide, in each municipality, subsistence and social and economic progress to families who invest all their workforce in it – as defined by the National Institute of Colonization and Land Reform (*Instituto Nacional de Colonização e Reforma Agrária* - INCRA).<sup>6</sup> This agricultural land distribution shows a strong duality in Brazilian agriculture: lagging subsistence farms coexisting in parallel to a vibrant, commercially oriented, and capitalized agricultural industry, which is reaching export markets with increasing success.

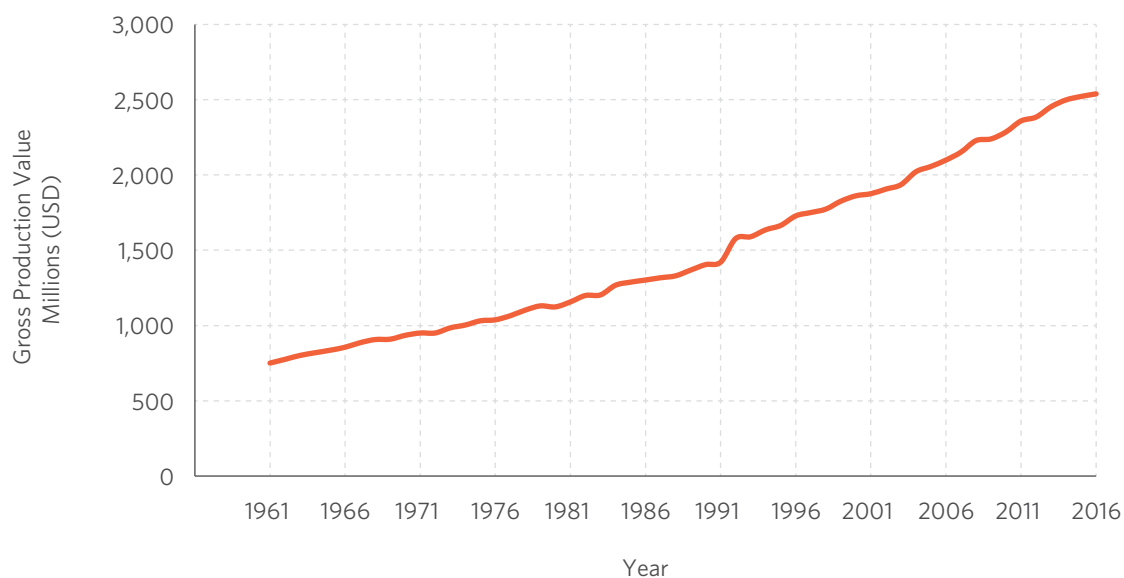
There is currently growing interest in how food and bioenergy production generate externalities for the environment and impact human health. In recent decades, the world has been able to continuously expand agriculture production at higher rates than population growth. Figure 1a shows agricultural gross production value in the 1961–2016 period. While the world population increased by 143% (from 3 billion to 7.3 billion people), the value of agricultural production increased fourfold (from US\$ 750 billion to US\$ 3 trillion).

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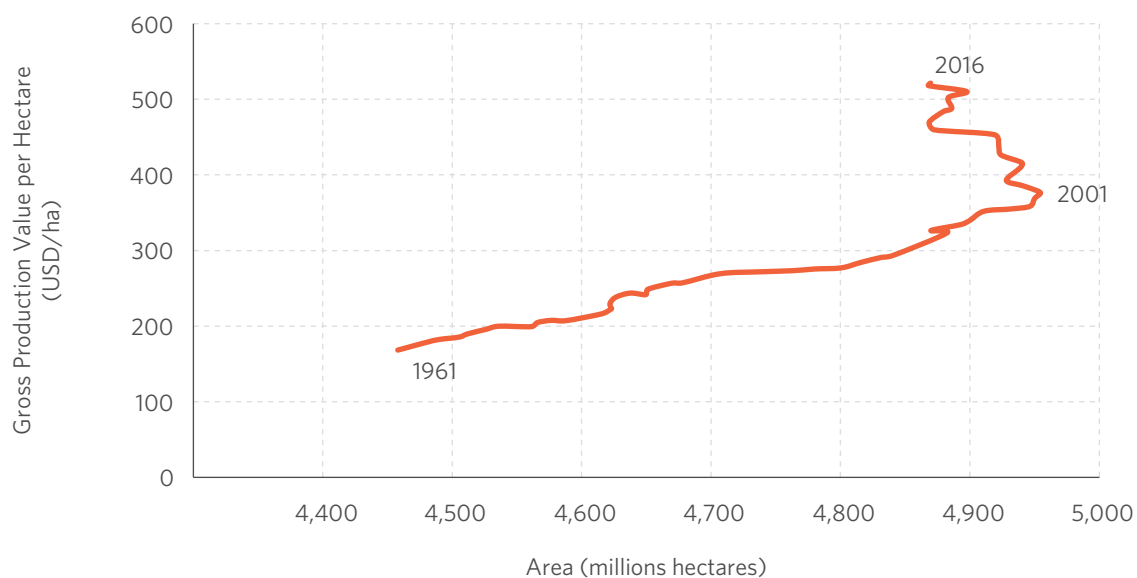
6 INCRA holds the National Rural Registration System (*Sistema Nacional de Cadastro Rural*).

**Figure 1.** Global Agricultural Trends, 1961-2016

**A. Agricultural Production**



**B. Agricultural Land Productivity and Area Expansion**



**Note:** 2004-2006 constant values (inflation adjusted by FAOSTAT).

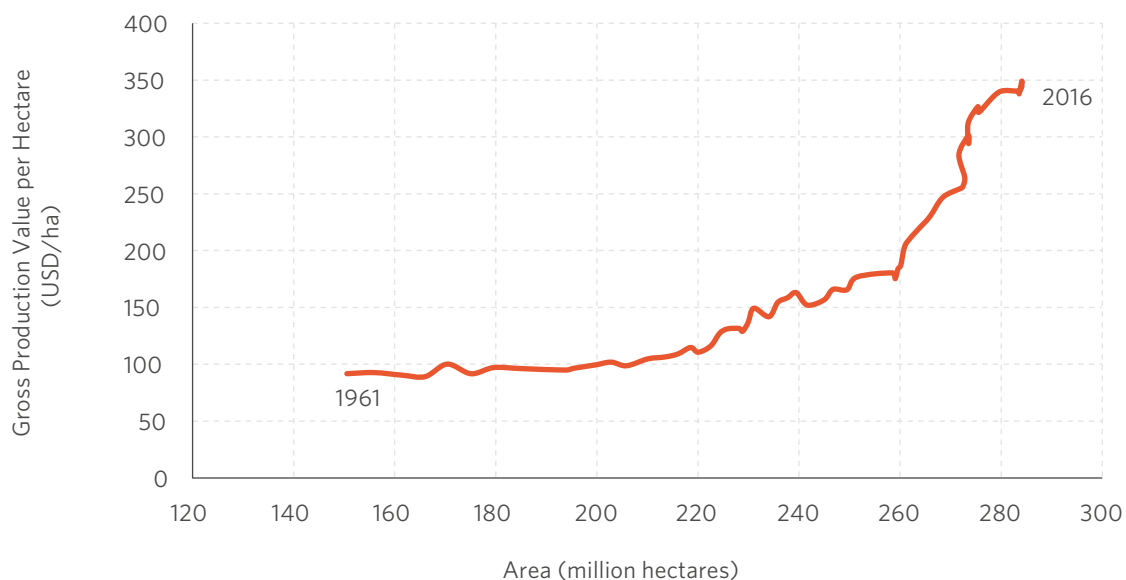
**Source:** Climate Policy Initiative with data from Food and Agriculture Organization of the United Nations (FAOSTAT)



The steady growth of agricultural production over this 55-year period masks an important change in the dynamics of this trend. Figure 1b reveals that until the end of the XX century, the increase in global food production, the increase in global food production was achieved through a combination of yield gains and area expansion. After 2000, however, the productivity gains started to occur with a reduction in agricultural land. The intensification of production helps to reduce the pressure for deforestation, which has become the dominant trend in agriculture since then.

Figure 2 shows the increase in agricultural productivity and area expansion in Brazil from 1961 to 2016. During this period, there was an increase in farmland along with productivity gains. However, in recent years, area expansion has decelerated, while land productivity – measured by the gross production value per hectare – increased.

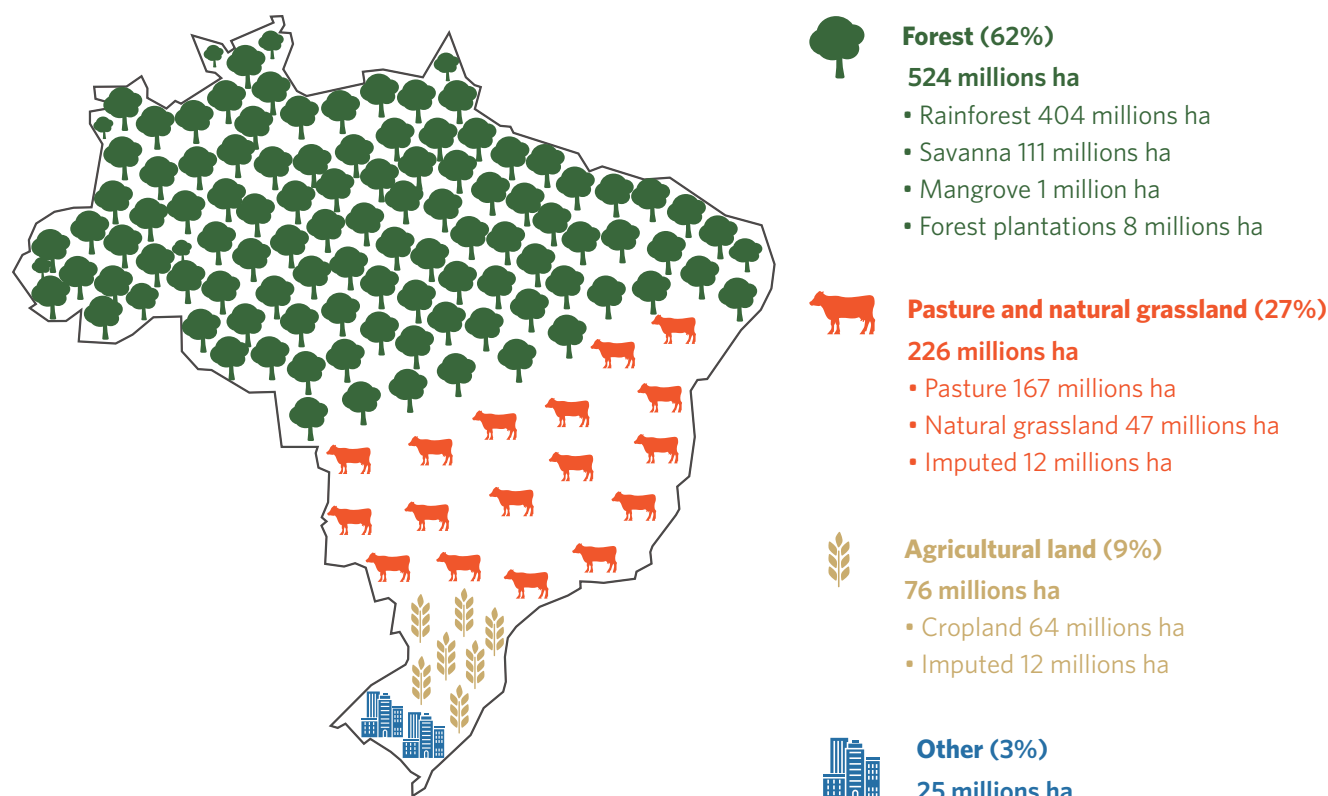
**Figure 2.** Productivity and Area Expansion in Brazil, 1961-2016



**Note:** 2004-2006 constant values (inflation adjusted by FAOSTAT).

**Source:** Climate Policy Initiative with data from Food and Agriculture Organization of the United Nations (FAOSTAT)

Brazil's history of land occupation prioritized territorial expansion. Beginning in the colonial period, the country's abundance of land and natural resources has guided occupation policies and land use. In addition to the broad potential for increasing agricultural productivity, the country has vast deforested areas available for the activity, with no need to clear more forest area. As Figure 3 highlights, more than half of Brazil's land (62%) remains covered in native forest (or other native vegetation). Pasture and natural grassland account for 27% of the area and activities of higher economic value, such as cultivated land and planted forests, occupy less than 10% of the country's land.

**Figure 3.** Land Use in Brazil, 2019

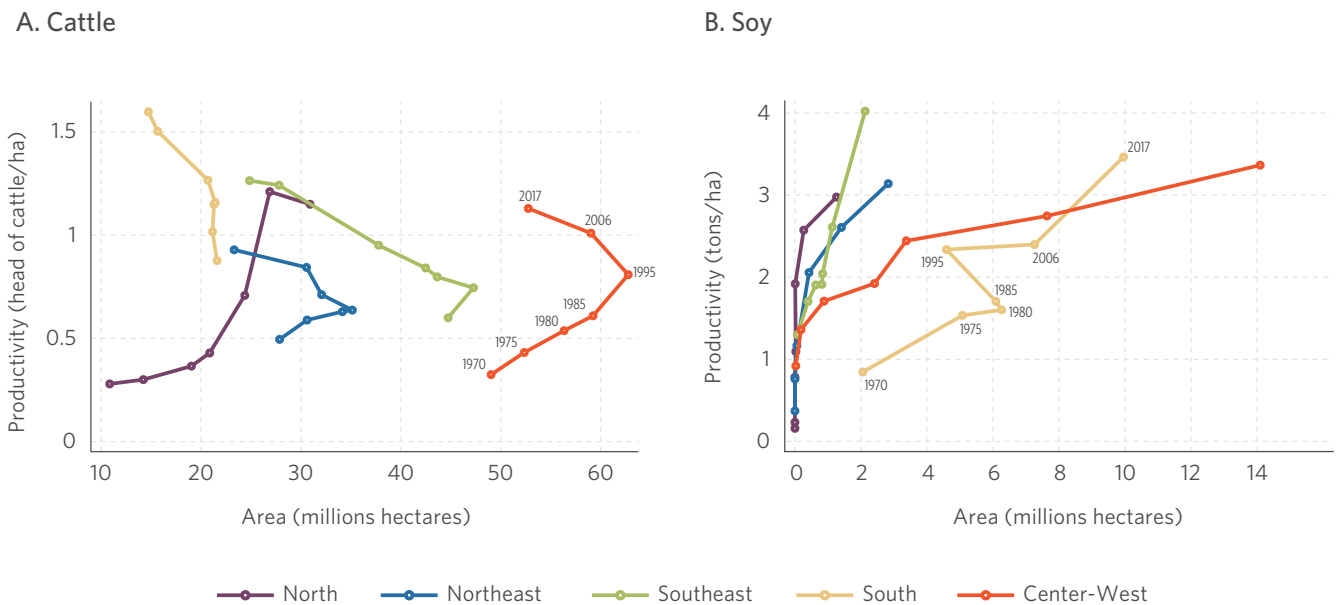
**Note:** Some of the areas are classified as "Mosaic of Agriculture and Pasture" in MapBiomass data. This category was divided between "Pasture and Non Forest Natural Formation" and "Agriculture" – denoted as "Imputed Area" in the legend.

**Source:** Climate Policy Initiative with data from MapBiomass (v.5.0)

The abundance of pasturelands shown in Figure 3 is primarily made up of degraded areas. These areas offer plenty of space to increase production, either by converting the pastures to crop use or through pasture intensification. Both practices would eliminate the need to clear new land. In fact, between 2004 and 2012, Brazil was able to reduce deforestation rates in the Amazon by 80% at the same time that the GDP of the agricultural sector of the region increased (Gandour, 2019). That means that developing sustainable food production practices in Brazil depends more on improving the allocation of land resources, rather than restricting productive activity.

The process of increasing productivity and replacing pastureland with cropland began in the context of the "Green Revolution" that has transformed agriculture globally. Brazilian agriculture has been modernizing and developing a tropical agriculture since the 1970s, primarily in the Cerrado (savanna) region. Figure 4 shows substantial productivity gains since 1970 (vertical axis) and changes in cattle and soy production areas (horizontal axis) for each Brazilian region. Productivity gains are measured by the number of heads of cattle per hectare<sup>7</sup> (Figure 4a) and in tons of harvested soy per hectare (Figure 4b).

<sup>7</sup> The measure of the number of heads per hectare, while limited, serves as a proxy for livestock farming productivity. It is the only measure available from the Agricultural Census (IBGE).

**Figure 4.** Patterns of Farming Growth (Livestock and Soy), 1970-2017

**Source:** Climate Policy Initiative with data from the Brazilian Institute of Geography and Statistics Agriculture Census (IBGE)

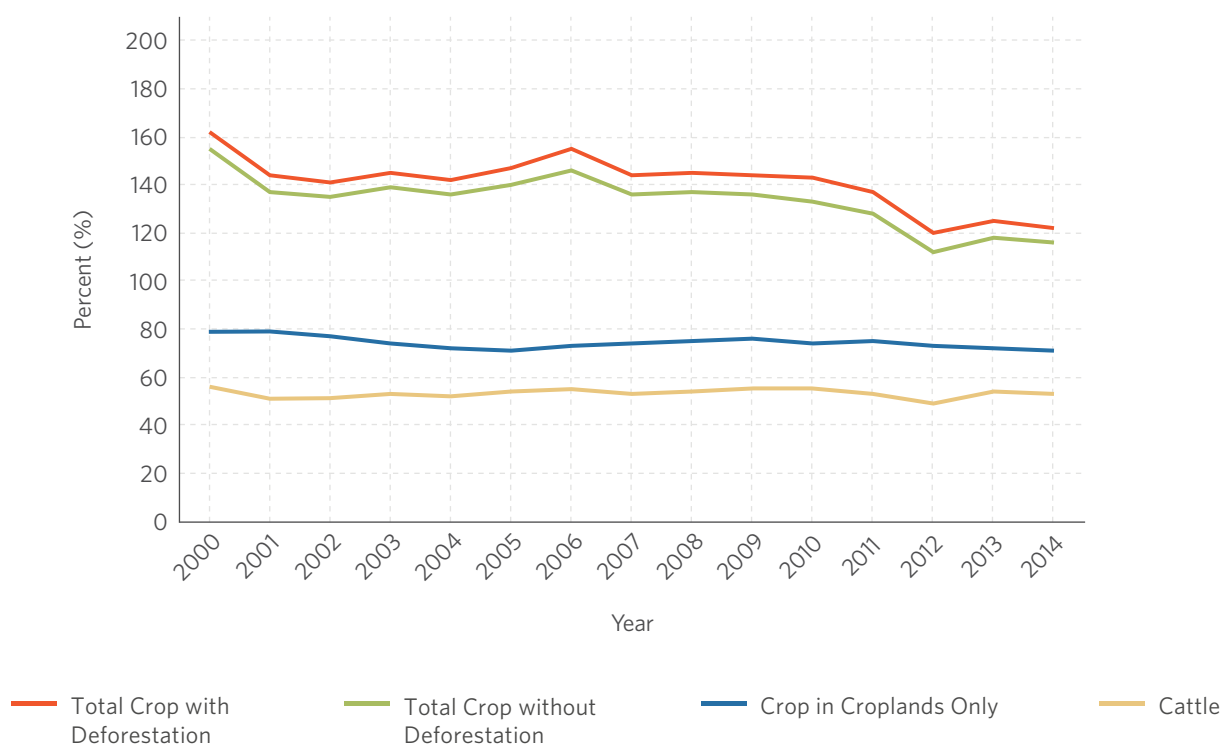
Figure 4a shows the Southeast region of Brazil experiencing a decrease in pasturelands since 1975. It also shows that since 1995 a decrease in pasture area has occurred in all but the Northern region. Figure 4b shows that, on the other hand, soy growth has been quite steady. Comparing area values on the horizontal axis of both figures, note that the areas associated with soy are a smaller order of magnitude compared to the areas of pasture. Also, it is interesting to note that, in 2017, livestock productivity differed from soy in that it varied greatly among regions, indicating inefficiencies in land use. If the farming industry addresses these productivity gaps, livestock production can be more similar across regions (Antonaccio et al., 2018).

Recent research has shown that Brazilian agriculture's modernization is linked to the conversion of low-productivity pastureland to cropland and a reduction in deforestation pressures. Exploring the adaptation of soybeans to Central Brazil, Assunção and Bragança (2015) found that technological innovations, such as the increase in fertilizer adoption and tractor use, were accompanied by changes in land use. Technological innovations induced the substitution of investments in forest clearings for investments in agricultural intensification. Thus, the soy boom in Cerrado, and the agricultural modernization that came along with it, attenuated pressure on native vegetation.

Assunção, Lipscomb, Mobarak, and Szerman (2016) show that the expansion of electrification had a similar effect in the 1960–2000 period. Gains in electricity access enabled farmers to expand their farming activities into grassland, alleviating deforestation pressures. Assunção, Pietracci, and Souza (2016) find similar evidence when analyzing a significant rise in sugarcane production in Mato Grosso do Sul. Finally, Assunção, Fernandes, Mikio, and Souza (2020), detailed in Chapter 3 of this report, show that rural credit has significant positive impacts on agricultural land and labor productivities, also relieving the pressures driving deforestation.

Brazil can achieve enormous agricultural gains without the need for deforestation. Figure 5 shows that the country has a huge potential to increase its agricultural productivity (Antonaccio et al., 2018). If the country were to pursue its crop potential on all available lands without deforestation by promoting the conversion of pasture to cropland and encouraging increased productivity through yield gains, particularly in pastureland, the realized gain would nearly double. By pursuing these strategies alone, Brazil can more than double crop productivity and increase cattle herds by 70%.

**Figure 5.** Potential for Productivity Gains from Different Land Use Strategies



**Source:** *Climate Policy Initiative (Antonaccio et al., 2018)*

Nevertheless, significant investments will be required to drive the changes needed to maximize production in Brazil. Farmers' inputs (labor, materials, and equipment) increase the efficiency of their crop and beef production. That means that efforts to eliminate inefficiencies will demand additional input and compel farmers to increase their operational costs and capital stocks to transition their production. The increase in the value of the farm equipment (capital stock) required to enable farmers to eliminate inefficiencies ranging from 48% to 52% of the current farm equipment value. At the same time, substantial increases in operational costs would also be required to maximize agricultural output. These increases range from 44% to 51% of the current operational costs (Assunção and Bragança, 2019).



## 1.2 BRAZIL'S PUBLIC POLICIES FOR AGRICULTURE AND LAND USE

A combination of public policies, price signals, and private investments transformed the agricultural sector profoundly during the past decades, allowing Brazil to shift from a net importer of food to the world's largest net exporter of food and to accelerate the process of agricultural modernization and sustainability. If public policies and practices are further improved and better articulated, these trends of intensification can be reinforced.

Four major policies that play an important role for more sustainable agricultural production are: (i) Action Plan for Deforestation Prevention and Control in the Legal Amazon (*Plano de Ação para Prevenção e Controle do Desmatamento na Amazônia Legal* – PPCDAm); (ii) the Forest Code; (iii) agricultural risk management instruments;<sup>8</sup> and (iv) rural credit programs, that will be detailed over the next chapters and are the focus of this report.

In 2004, Brazil enacted PPCDAm which marked the beginning of a novel approach towards combating deforestation in the Brazilian Amazon. This plan promoted greater integration of the Ministry of the Environment with other parts of the government and proposed innovative procedures for monitoring, environmental control, and territorial management. The most important of these tools was the satellite monitoring to target law enforcement activities in the Amazon. PPCDAm significantly contributed to curbing deforestation (Assunção, Gandour, Rocha, 2015; Assunção et al., 2019). In 2012, Brazil's new Forest Code was approved complementing the monitoring system with the preservation requirements of Legal Forest Reserve and Permanent Preservation Areas (*Áreas de Preservação Permanente* – APP) on private lands. As a result, the Code limits agricultural area expansion, and, ultimately, contributes to productivity gains. Linking the Forest Code to rural credit could leverage the potential of the Code to transform land use, which is discussed in detail in Chapters 4 and 5.

Under the Forest Code, rural producers must preserve or restore native vegetation on their lands to remain in compliance, which implies they are providing a public good. Therefore, directing public financial resources to the rural sector based on compliance with the Code could promote environmental preservation. Recent changes in *Plano Safra* have pointed in this direction. Treating rural producers as public good providers helps to justify rural credit subsidies from an economic point of view. The volume of rural credit resources can also help advance the Forest Code's implementation, not only by providing an important source of funding but also by driving private resources toward the Code's implementation. If access to rural credit continues to be expanded for those producers who meet the environmental requisites, there will be incentives for producers to use their own resources in actions that contribute to the implementation of the Forest Code.

The importance of appropriate financial services for the agricultural sector is increasing. The intensification of agriculture is associated with the expansion of crop area over pastures. Livestock farming is generally more resilient than crops when facing climate variations and unforeseen events. These changes significantly alter the risk profile of a business. A recent CPI/PUC-Rio report analyzes risk management instruments and policies in Brazil (Assunção and Souza, 2020). The fourth policy, rural credit, will be discussed in-depth in the next Chapters.

<sup>8</sup> For more details on agricultural risk management in Brazil, see CPI/PUC-Rio's report "Risk Management in Brazilian Agriculture: Instruments, Public Policy, and Perspectives" available at: [bit.ly/3pILttv](http://bit.ly/3pILttv).

## 2. THE STRUCTURE OF RURAL CREDIT

### 2.1 THE BRAZILIAN NATIONAL RURAL CREDIT SYSTEM

Rural credit is Brazil's primary agricultural policy as it is the primary source of financing for agribusiness. For the 2020/21 agricultural year, the government earmarked roughly R\$ 236 billion for rural credit, which represents approximately 37% of the country's total agricultural production in 2019 (estimated at R\$ 631 billion).<sup>9</sup> Subsidized rural credit is the main instrument used to direct resources to the agricultural sector. Government subsidies generate interest rates lower than private market rates. In the 2020/21 agricultural year, the Agricultural Plan (*Plano Safra*) established interest rates for government-controlled credit ranging from 2.75%-7.5% depending on the credit line, the size of the producer, and the loan's destination (working capital, investment, trade, or industrialization).

The aim of agricultural policy has long been to help farmers navigate hardships and uncertainties. Producers often must pay upfront costs, which cannot be recovered until after the harvest. If farmers get good weather and overcome natural risks, they are still susceptible to price risks when they bring their production to the market. Access to appropriate financial services, therefore, can increase agricultural productivity by allowing farmers to make better production decisions and to manage their risks. In Brazil, however, the complexity of the rural credit system and the scarcity of insurance instruments often add to farmers' financial challenges.

The current rural credit system is based on an outdated structure, created in the 1960s, when Brazil was a net importer of food. In 1965, Law 4,829/1965 established the National Rural Credit System (*Sistema Nacional de Crédito Rural* – SNCR). Since 1991, Law 8,171 established the National Agricultural Policy Council (*Conselho Nacional de Política Agrícola* – CNPA),<sup>10</sup> linked to the Ministry of Agriculture, Livestock, and Supply (*Ministério Agricultura, Pecuária e Abastecimento* – MAPA), with a mandate to prepare the *Plano Safra*. This agricultural plan is announced annually and regulates funding sources, the amounts allocated to each credit line, and the main financial conditions for obtaining loans for the next agricultural year. The specific conditions for rural credit lines in *Plano Safra* are subject to approval by the CMN and are registered annually in the Rural Credit Manual (*Manual de Crédito Rural* – MCR) by Central Bank of Brazil (Banco Central, 2020a).

Until the 2019/20 agricultural year, the government launched two plans for rural producers: (i) Crop and Livestock Plan (*Plano Agrícola e Pecuário* – PAP), directed to medium and large producers; and (ii) National Plan for Family Farming (*Programa Nacional de Fortalecimento da Agricultura Familiar* – PRONAF), directed to small producers. For the 2020/21 agricultural year, these two plans were unified under a single *Plano Safra* launched by MAPA, with the PRONAF credit lines being an important part of this plan.

<sup>9</sup> MAPA, "Plano Safra 2020/21", available at: [bit.ly/2KfNqG](https://bit.ly/2KfNqG)

<sup>10</sup> Brazilian Law 8,171/1991 contains a list of goals for the agricultural sector, including references to environmental protection and restoration of natural resources.

This chapter identifies the key features, opportunities, and challenges of Brazil's rural credit policy. It includes (a) an overview of the complexity of rural credit funding sources and programs; (b) an analysis of rural credit distribution channels, which cause differences in financing opportunities for producers; and (c) a discussion about how the fragmentation of rural credit rules results in an artificial variation in credit access and loan conditions.

## 2.2 THE COMPLEXITY OF RURAL CREDIT FUNDING SOURCES AND PROGRAMS

Each year, MAPA announces the federal government's agriculture planning measures, such as public investment, rural credit, agricultural zoning, rural insurance, product commercialization, and special social development programs. In the case of rural credit, the *Plano Safra* is released annually and regulates funding sources, the amounts allocated to each credit line, and the main financial conditions for working capital, investment, and commercialization.

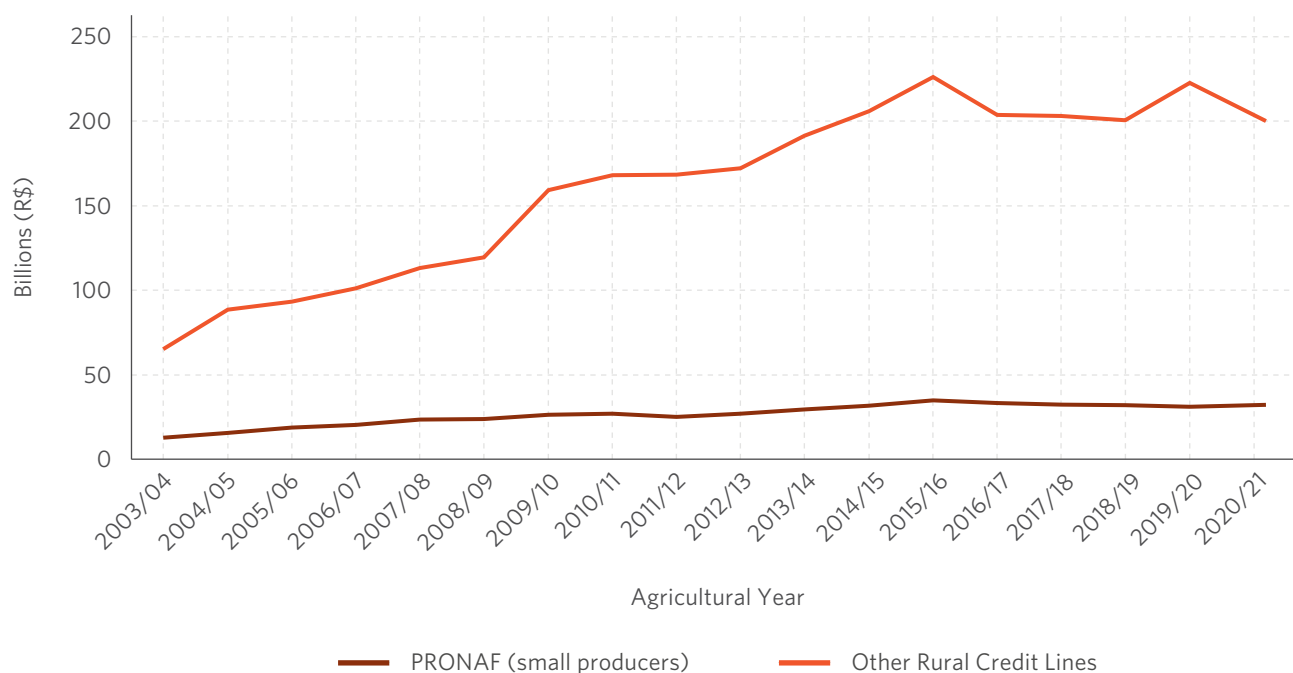
The government offers the lowest interest rates in the scope of the PRONAF program, which is directed towards small farmers. Until 2016, PRONAF was elaborated by the Ministry of Agrarian Development (*Ministério do Desenvolvimento Agrário* – MDA). After the elimination of MDA, PRONAF was developed by the Special Office of Family Farming and Agricultural Development (*Secretaria Especial da Agricultura Familiar e do Desenvolvimento Agrário*). Currently, PRONAF is administered by the Office of Family Farming and Cooperativism (*Secretaria da Agricultura Familiar e Cooperativismo*) at MAPA.

The PRONAF budget for the 2020/21 agricultural year is R\$ 33 billion with subsidized interest rates ranging from 2.75%-4%. The program is divided into dozens of subprograms, each one with a specific target, such as PRONAF for Women (PRONAF *Mulher*), PRONAF for Young Adults (PRONAF *Jovem*), and PRONAF Agroecology (PRONAF *Agroecologia*).<sup>11</sup>

The other credit lines in *Plano Safra* correspond to R\$ 203.3 billion for the 2020/21 agricultural year and are directed mainly to medium and large producers. These credit lines offer special credit limits and interest rates ranging from 4.5%-7.5% under different programs. The main program is the National Program to Support Medium Producers (*Programa Nacional de Apoio ao Médio Produtor Rural* – PRONAMP), for which R\$ 33.2 billion was allocated in the 2020/21 agricultural year.

Figure 6 shows the evolution of the available credit amount for PRONAF (focused on small farmers) and other credit lines (dedicated to medium and large producers and until the 2019/20 agricultural year was established under PAP), adjusted for inflation. The sum of both represents the total funding allocated to rural credit. While overall there has been a steady total growth in rural credit (except for the recent period of economic crisis), there is considerable variation in the available lines of credit, as shown below.

11 Throughout this report all PRONAF subprograms are identified under the PRONAF acronym.

**Figure 6.** Credit Available for PRONAF and Other Credit Lines, 2003-2021

**Note:** July 1, 2020 constant values (inflation adjusted by IPCA).

**Source:** Climate Policy Initiative with data from Central Bank of Brazil

The multitude of rural credit funding sources and programs creates a complex system for producers to navigate to receive financial support. There is a wide range of funding sources and programs in Brazil, each with its own terms and conditions for providing credit to producers (for more details, see appendix **Rural Credit Programs and Funding Sources: Description and Financing Conditions**). Even though the number of funding sources and programs declined in the 2020/21 agricultural year compared to previous years, there are still 16 funding sources and 12 programs, each with its own funding conditions. These numbers change almost every year due to the creation and elimination of credit lines and the fluctuating levels of available funding. With banks and financial institutions unevenly distributed throughout the country, as will be shown below, this crowded field of credit lines hinders producers in making their financial decisions.

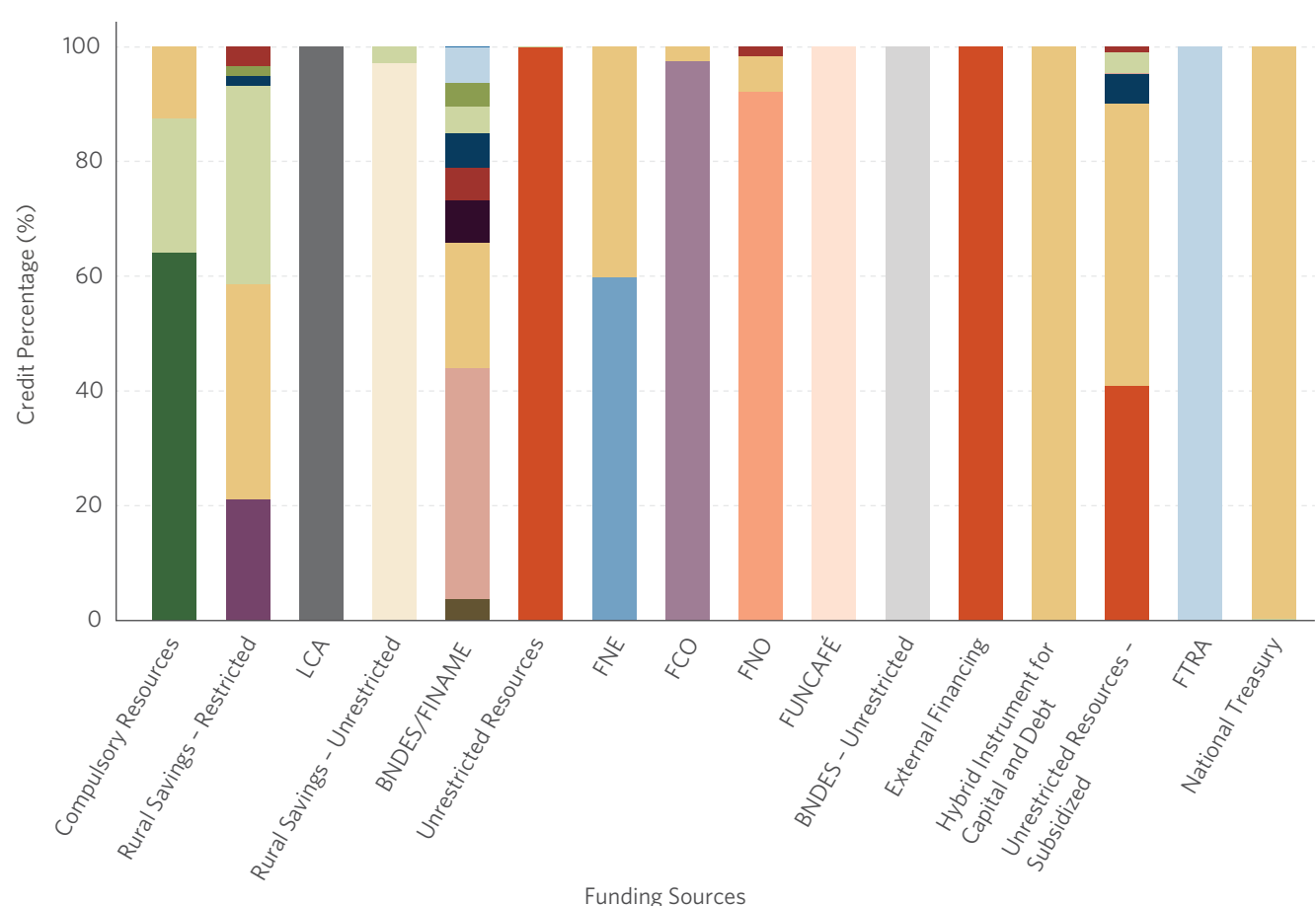
The resources to provide credit originate with a funding source (e.g., banking deposits, taxes, or specific funds oriented to finance the rural sector). Programs are credit lines that target specific objectives and producers. Loans linked to specific credit programs follow that program's rules concerning borrower eligibility, interest rates, credit limits, destination, and other conditions. If a loan is not linked to a specific program, it follows the rules of the funding source. Figure 7 shows the allocation of funding sources for each credit program. In this report, a credit line refers to loans with a given set of financing conditions. Therefore, a credit line can be a rural credit program or it can refer to a funding source (in the case of loans that follow the rules of the funding source and are not linked to a specific program).

The current *Plano Safra* has increased its focus on small and medium producers. The plan prioritizes extending subsidized resources to small and medium producers, who are more in need of public support to finance both production and investments in technologies.



Compared to the previous period, the volume of funds made available in the 2020/21 agricultural year increased by R\$ 1.78 billion in PRONAF and by R\$ 6.64 billion in PRONAMP. There is also an increase in investment resources for the Program to Encourage Technological Innovation in Agricultural Production (*Programa de Incentivo à Inovação Tecnológica na Produção Agropecuária* – INOVAGRO) and the Program for Modernization of Agriculture and Conservation of Natural Resources (*Programa de Modernização da Agricultura e Conservação de Recursos Naturais* – MODERAGRO), which have synergies with the actions of the ABC Program in innovation, the adoption of technologies, and the recovery of degraded areas. INOVAGRO has R\$ 2 billion and MODERAGRO R\$ 1.45 billion. In addition, the financing conditions for both programs were similar to those of ABC.

**Figure 7.** Distribution of Funding Sources by Rural Credit Program, Agricultural Year 2019/20



#### Loans with Program Rules

ABC	PCA
FUNCAFÉ	PRONAF
INOVAGRO	PRONAMP
MODERAGRO	PROCAP-AGRO
MODERFROTA	Other Programs

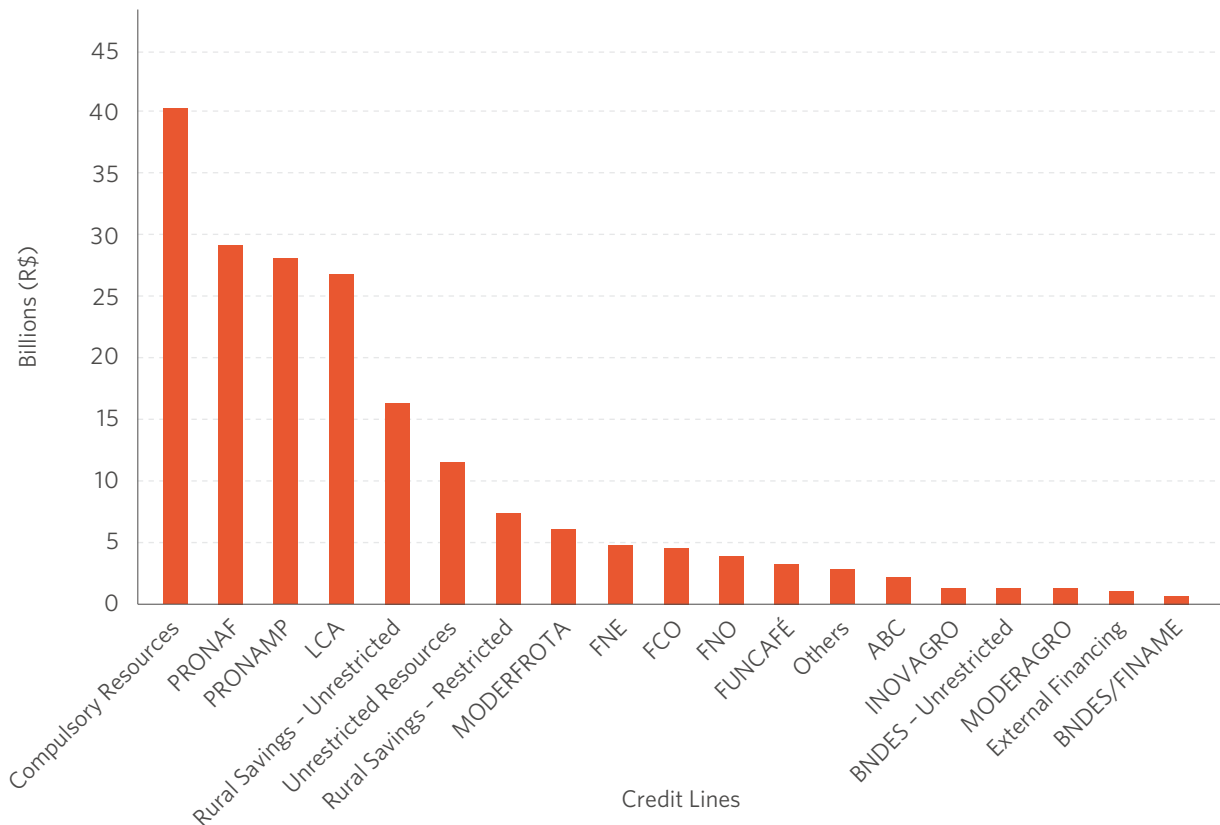
#### Loans with Funding Source Rules

BNDES - Unrestricted	LCA
FCO	Compulsory Resources
FNE	Rural Savings - Restricted
FNO	Rural Savings - Unrestricted
BNDES/FINAME	Other Funding Sources

**Source:** Climate Policy Initiative with data from Central Bank of Brazil

The two main funding sources for rural credit are Compulsory Resources (*Recursos Obrigatórios*), which is 27.5% of bank deposits in checking accounts, and Rural Savings (*Poupança Rural*), which is a savings account modality in selected public banks and cooperatives that directs 59% of deposits to finance the rural sector. Financial institutions are required to allocate a fraction of these funds to credit programs such as PRONAF (for family farmers) and PRONAMP (for medium producers).<sup>12</sup> Figure 8 shows the different credit lines for the agricultural year of 2019/20. Credit from Agricultural Credit Note (*Letras de Crédito Agrícola* – LCA) has reached R\$ 26.7 billion due to a sharp increase in recent years. Four other relevant credit lines are: (i) Compulsory Resources loans following the rules of funding source without link to a specific program (R\$ 40.29 billion); (ii) PRONAF program (R\$ 29 billion); (iii) PRONAMP program (R\$ 27.9 billion); and, (iv) Rural Savings founding source without link to a specific program (R\$ 7.4 billion).

**Figure 8.** Loan Amounts by Credit Line, Agricultural Year 2019/20

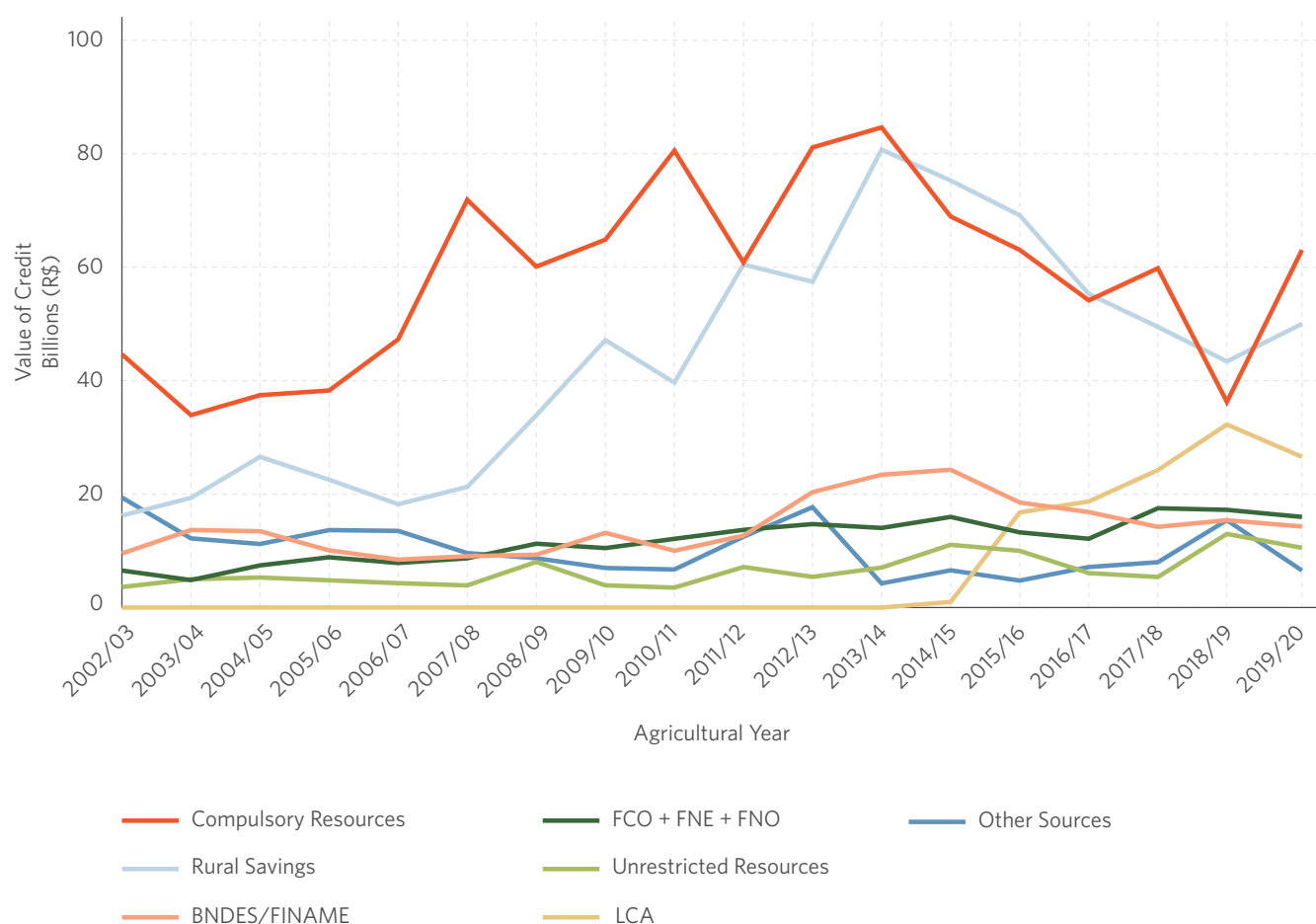


**Source:** Climate Policy Initiative with data from Central Bank of Brazil

The availability of funding per source usually fluctuates dramatically from year to year, affecting the total amount of resources available to each financial institution. Figure 9 shows the total funding available for rural credit by funding source.<sup>13</sup> Different funding sources follow independent and, sometimes, inverse paths over time (e.g., Rural Savings and Compulsory Resources in the agricultural year 2015/16). With producers exposed to different financial institutions based on their locations (see discussion of Figure 12 below), financial terms offered to them may vary considerably.

<sup>12</sup> Rural Savings – Restricted and Compulsory Resources funded 4% and 19% of the loans in the 2019/20 agricultural years, respectively.

<sup>13</sup> Even though R\$ 222.7 billion was announced for PAP and R\$ 31.2 billion was announced for PRONAF for the 2019/20 agricultural year, the actual total amount of rural credit loans in both plans combine was R\$ 191.8 billion in that agricultural year according to SICOR data.

**Figure 9.** Total Loan Amount by Funding Source, 2002-2020

**Note:** July 1, 2020 constant values (inflation adjusted by IPCA).

**Source:** Climate Policy Initiative with data from Central Bank of Brazil

The LCA became an important funding source for rural credit in recent years. It is a type of bond that can be offered by all financial institutions in Brazil, and it is attractive to investors because it is exempt from income taxes. When bank clients invest in the LCA, 35% of the invested value is directed to finance rural credit. Rural credit contracts with LCA resources can have restricted or unrestricted interest rates. In 2014/15, LCA comprised less than 1% of what was applied in rural credit. In 2015/16, its participation reached 8% of all resources, and the growth trend has been maintained since. In 2019/20, the bond was responsible for 14% of all resources provided by rural credit.

The Constitutional Funds were created to help the development of the North, Northeast, and Midwest, the least developed regions of Brazil. The Northern Constitutional Fund (*Fundo Constitucional do Norte, FNO*), the Northeastern Constitutional Fund (*Fundo Constitucional do Nordeste, FNE*) and the Midwestern Constitutional Fund (*Fundo Constitucional do Centro-Oeste, FCO*) serve as special sources for regional development. These funds are operated exclusively by public banks. The resources of the Constitutional Funds come from 3% of government income taxes and manufactured goods taxes, but the amount is small when compared to the other funding sources for rural credit. Together, the three funds accounted for about 7% of total rural credit lending in the 2019/20 agricultural year. FNE and FNO

distributed R\$ 12.3 billion in rural credit to producers who live in less productive regions, corresponding to 6% of rural credit. Therefore, producers who are most likely in need of subsidized credit are precisely those who receive lower amounts.

Loans that come from unrestricted resources represent a smaller part of rural credit. In the 2019/20 agricultural year, it was responsible for 6% of total rural credit resources. Loans from unrestricted resources have their conditions defined between the bank and the producer and can be used to finance all activities in the rural sector. The basic interest rate in the Brazilian economy set by the Central Bank (Selic rate), that reached 26.5% in 2003 and was still above 14% as recent as 2015/16, has been falling considerably. In 2019, credit from unrestricted resources available to large producers with very low-risk profiles had interest rates as low as 6.5%. This year, despite a Selic rate at 2% – the lowest level in history – due to the uncertainties related to the Covid-19 pandemic, public and private banks have been raising interest rates on loans to the agribusiness sector. The same producers are obtaining loans with interest rates between 6.9 and 10%.<sup>14, 15</sup>

The volatility inherent in annual plans brings uncertainty to producers and impacts allocative decisions in the sector, possibly affecting investment and production. Expanding the rural credit planning horizon to three or five years, rather than annually, would make operations more predictable and improve the system's efficiency.

Another relevant aspect are the current excessive restrictions on the use of funds. Under the current regulations, there are limits on funding for technical assistance or the investment necessary for legal compliance (e.g., reforestation Legal Reserves). There should be gains for policy effectiveness if the regulations provide incentives for the efficient use of funds.

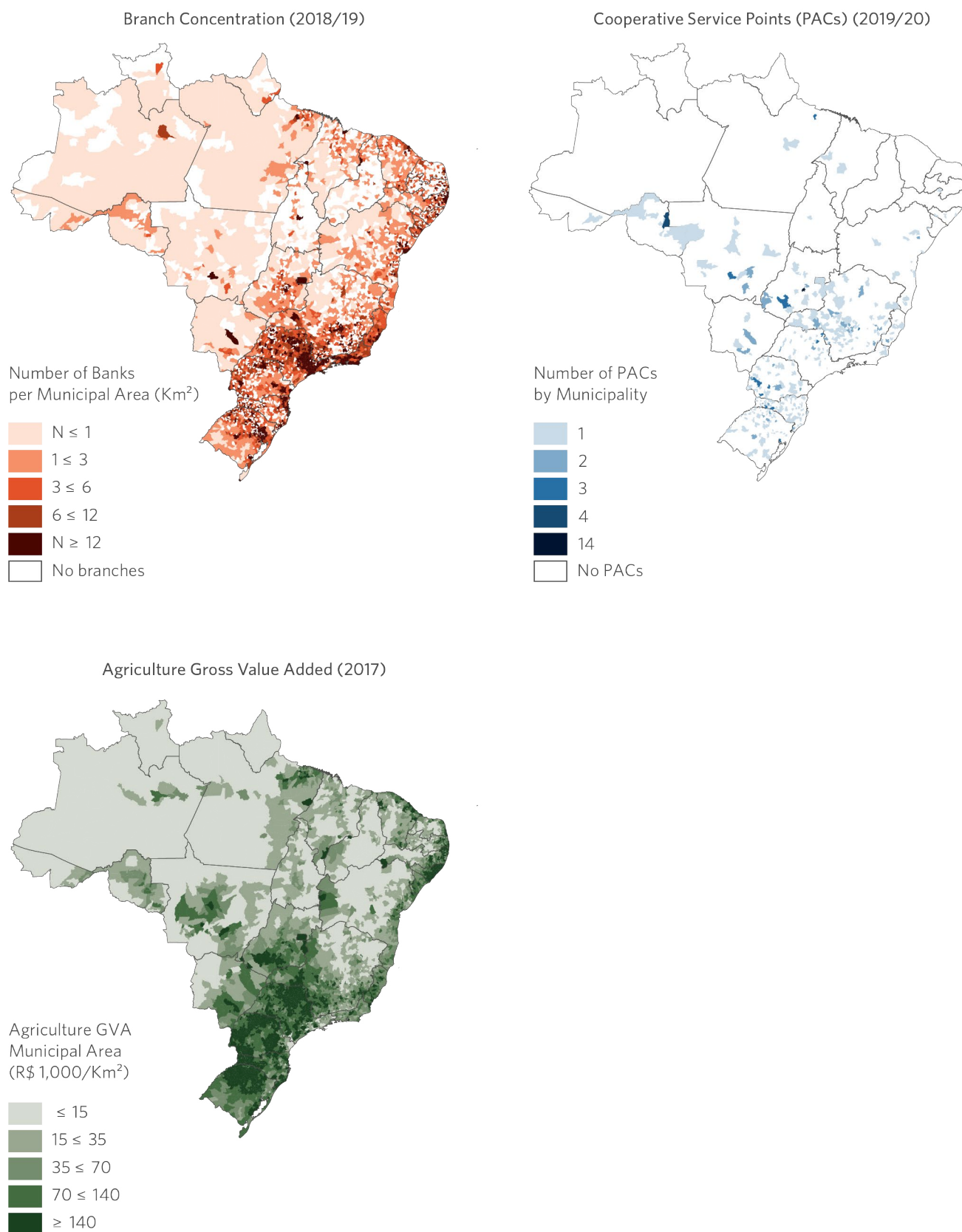
## 2.3 RURAL CREDIT DISTRIBUTION CHANNELS

In Brazil, bank branches are strongly concentrated in the most developed regions. The geographical distribution of bank branches, credit cooperatives, and agriculture in Brazil is shown in Figure 10. The Southeast and the South feature the majority of bank branches as well as states' capital cities, which alone contain 33% of all branches. Credit cooperatives have more penetration outside the main cities, but they also are highly concentrated in the South and Southeast regions. The significant variations in credit distribution channels imply that rural producer financial needs may not be fulfilled. There are very few bank branches and cooperatives in the Northern and Northeastern regions, which hampers access to credit for local producers. Hence, in places with smaller agricultural output and subject to more acute credit needs, the banking network does not provide enough opportunities for farmers.

14 UDOP, "Sobem os juros em operações de crédito rural" (2020), available at: [bit.ly/3kIZALL](https://bit.ly/3kIZALL). Canal Rural, "Crédito rural: Banco do Brasil reduz taxas de juros de recursos livres" (2020), available at: [bit.ly/2ITbm9Q](https://bit.ly/2ITbm9Q)

15 Valor Econômico, "Crédito rural a juros livres ganha cada vez mais competitividade" (2020), available at: [glo.bo/35MJJaO4](https://glo.bo/35MJJaO4)

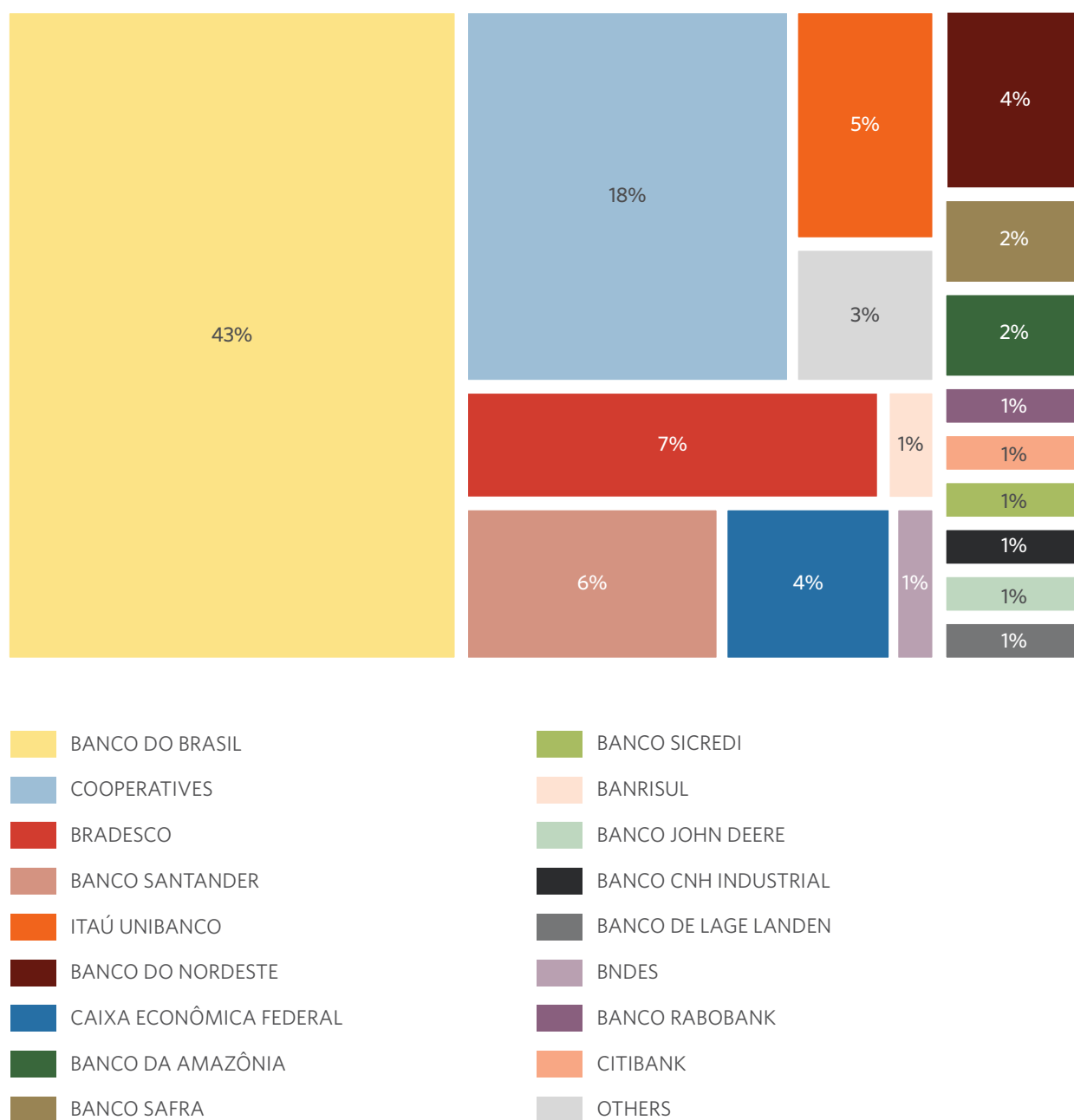


**Figure 10.** Bank Branches, Credit Cooperatives, and Agriculture in Brazil

**Source:** Climate Policy Initiative with data from Central Bank of Brazil and Brazilian Institute of Geography and Statistics (IBGE)

The rural credit distribution system is also heavily concentrated in a few banks, as shown in Figure 11. The *Banco do Brasil* is responsible for 43% of all credit provided in 2019/20. The three largest private banks in the country, Bradesco, Santander, and Itaú, contribute 7%, 6%, and 5% of all credit provided, respectively. This means that the combination of these four banks is responsible for more than 60% of all rural credit provided in the country.

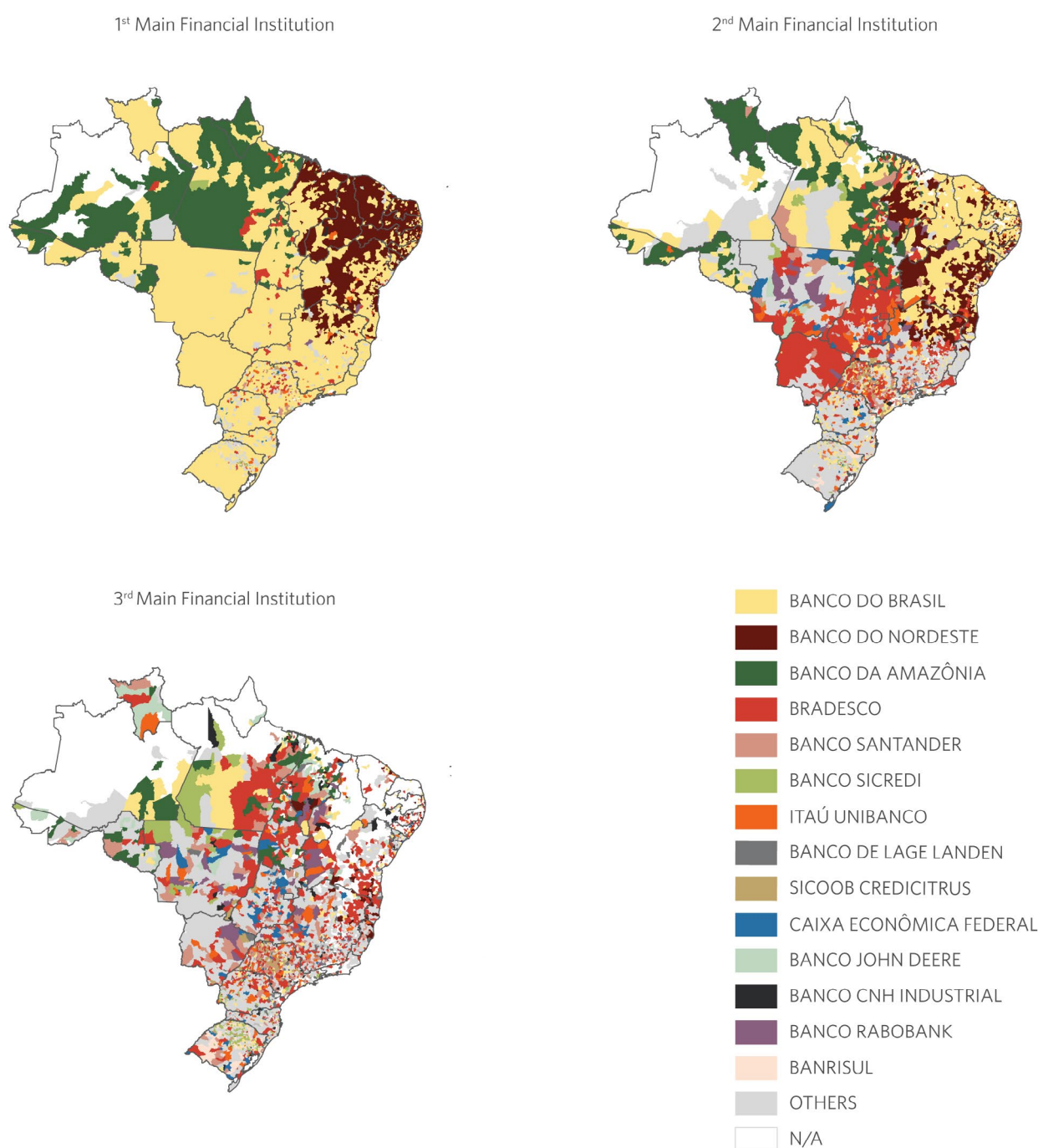
**Figure 11.** Financial Institutions Market Share in Rural Credit, 2019/20



**Source:** Climate Policy Initiative with data from Central Bank of Brazil

The importance of different financial institutions in credit lending varies considerably across regions. Figure 12 shows the first, second, and third main providers of rural credit for each municipality. *Banco do Brasil* is the leading credit provider for most of the Southern, Southeastern, and Midwestern regions. While the *Banco da Amazônia* and *Banco do Nordeste* are not large lenders considering the country as a whole, they dominate the credit system in the Northern and Northeastern regions, respectively. Promoting greater competition among financial institutions and tools for larger participation by private banks can improve the efficiency of the distribution system.

**Figure 12.** Primary Rural Credit Providers by Municipality, 2018



**Note:** The main financial institutions are defined as those that lend the most credit in a municipality.

**Source:** Climate Policy Initiative with data from Central Bank of Brazil

Credit cooperatives can also be effective institutions for promoting financial access and distributing agricultural credit among small farmers. The loans provided by cooperatives in Brazil account for 18% of the total amount borrowed by producers in the 2019/20 agricultural year. Credit cooperatives – with locations and activities closer to small borrowers compared to traditional distribution channels for rural credit (e.g., banks and other financial institutions) – are able to reduce asymmetric information and transaction costs for producers (Assunção, Costa, and Souza, 2020).

The tangled web of multiple resources and programs makes the operation of the rural credit system very costly. The availability and distribution of credit are subject to a complex set of rules, making administering and using the programs complicated. Furthermore, the uneven and complex geographic distribution of banks and cooperatives offering rural credit in Brazil generates artificial differences in access to credit and conditions of financing, exacerbating producers' uncertainty. Simplification of programs and funding source rules can reduce the system's management costs.

As documented in this Section, the current rural credit distribution channels are heavily focused on the public sector at the municipal level, with predominant participation of the *Banco do Brasil*, *Banco do Nordeste*, and *Banco da Amazônia*. The structure of sources of funding and programs favor public banks, but public subsidies do not necessarily need to be handled by public institutions. There are examples of private actors allocating public funds, including in the case of credit. Encouraging the expansion of private sector participation in the provision of rural credit could stimulate competition and generate innovation in the rural financial sector. A more significant participation of private banks in rural credit could increase the efficiency of the system and release public resources to other areas.

## 2.4 THE FRAGMENTATION OF RURAL CREDIT RULES

This chapter highlights the pronounced differences in financing opportunities for rural producers caused by fragmented rules of rural credit, categorized by (i) geographical location, (ii) farm size, and (iii) farm revenue. These additional artificial variations in credit access and loan conditions generate further distortions and inefficiencies.

As mentioned previously, the Constitutional Funds are restricted to specific regions, creating a geographic discontinuity in the availability of credit. Producers who live outside of the targeted regions miss out, while their peers within these regions have credit access. However, these funds also create a geographic discontinuity between municipalities within each targeted region.

The financial limit of the rural credit that farmers are able to access depends on the size of their farms and the classification of their municipality (see Table 1). For example, in the North, a medium non-exporting producer in a low or medium-income municipality (regardless of dynamism classification) has a R\$ 25 million credit limit, which is 32% more than the same producer in other locations in the same region. Regarding investment loans, a medium II producer (a category recently specified for medium properties) in the Northeast can borrow 85% of their investment costs, while a similar producer in high income area can only borrow 70%.

**Table 1.** Loan Conditions for the Constitutional Funds by Region, Loan Destination, and Producer Size, 2020

FINANCING CONDITIONS		CONSTITUTIONAL FUNDS FOR FINANCING									
		NORTHEAST			NORTH				MIDWEST		
Financial Limit in Fixed Investment		Semi-arid regions; Integrated Development Region; Forestry; Science, Technology and Innovation; the São Francisco River Basin Revitalization Program	Middle and Low Income (all economic dynamism)	High Income (all economic dynamism)	Middle and Low income; Forestry; Science, Technology and Innovation	Border Regions	States with Less Economic Dynamism (Amapá and Roraima)	High Income	Border Regions, Municipalities in Integrated Development Region of Goiás State and Microregions of Medium Income and Low Dynamism	Other Municipalities and the Federal District	
	Mini/Micro	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Small		95%	90%			95%	90%		95%	90%
	Small-Medium			80%				90%			
	Medium I	95%	85%	80%	95%	90%	85%	90%	80%	70%	
	Medium II	85%	75%	70%	-	-	-	-	-	-	-
	Large	50%	50%	50%	95%	90%	80%	70%	80%	70%	60%
Financial Limit for Non-associated Working Capital (R\$)		Semi-arid Regions, Low Income Municipalities, or Municipalities in Integrated Development Region		Other Locations		Middle and Low income Municipalities (all dynamics); States of Acre, Amapá and Roraima; Border Regions*		Other Locations*			
		Non-Exporters	Exporters	Non-Exporters	Exporters	Non-exporter Companies	Exporter Companies	Non-exporter Companies	Exporter Companies		
	Mini/Micro	300.000	610.000	250.000	460.000	-	-	-	-		
	Small	3 million	5.5 million	2.3 million	3.8 million	-	-	-	-		
	Small-Medium	12 million	25.6 million	10 million	19 million	10 million	12.8 million	7.8 million	9.5 million		
	Medium	30 million	176 million	25 million	132 million	25 million	88 million	19 million	66 million		
	Medium II/ Large	50 million	200 million	40 million	150 million	30 million	100 million	24 million	75 million		

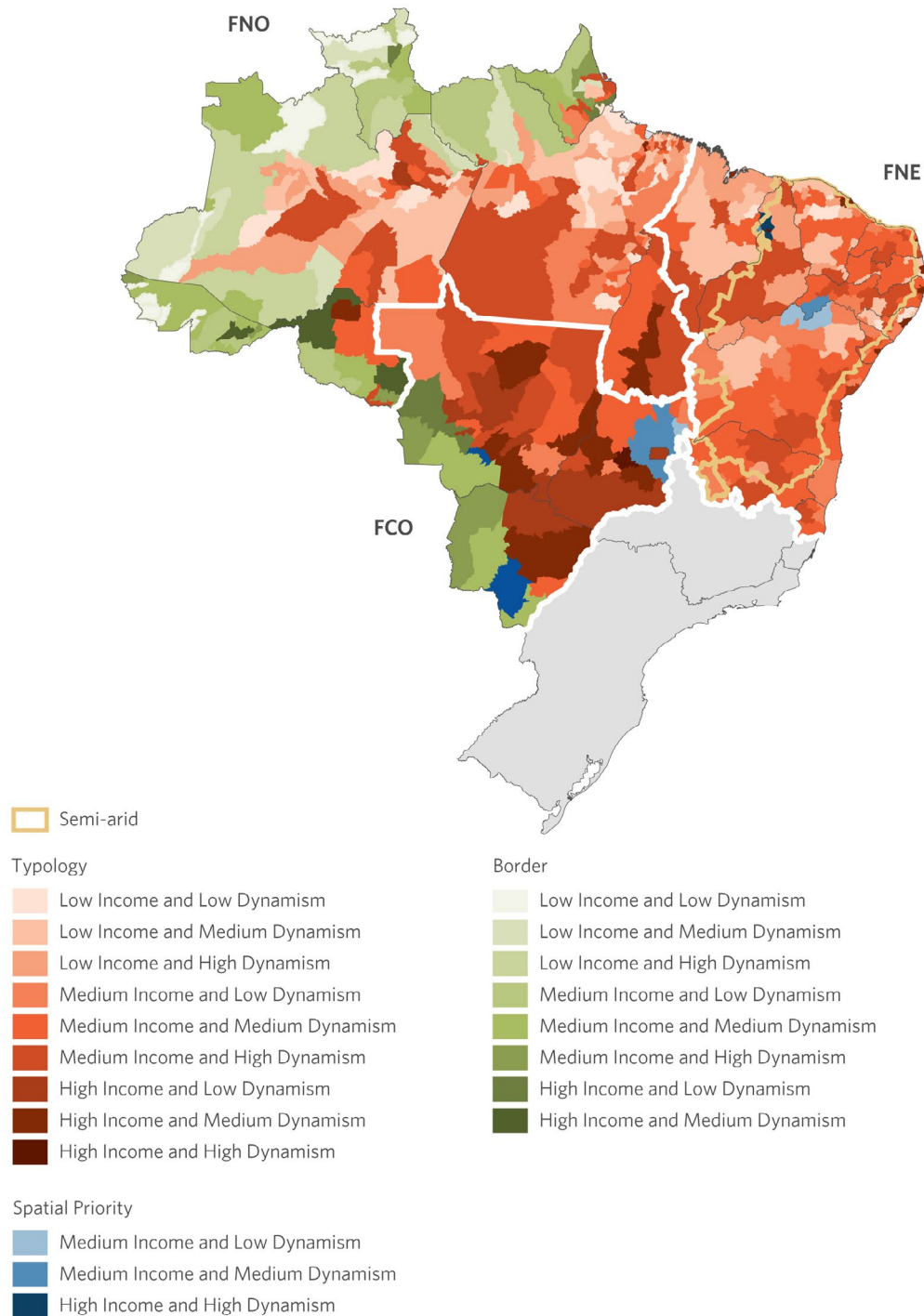
\*Valid only for FNO Amazônia Sustentável that encompasses R\$ 4.8 billion of the R\$ 7.7 billion foreseen for FNO.

**Note:** The plan for each Constitutional Fund includes the classification of covered municipalities according to the type of income (high, medium, and low) and economic dynamism (high, medium, and low) defined by the National Policy for Regional Development (updated by Decree No. 9,810/2019) of the Ministry of Regional Development.

**Source:** Climate Policy Initiative with data from Banco da Amazônia, Banco do Nordeste, and Banco do Brasil

Figure 13 shows how these differences between geographically close but different beneficiaries end up imposing very different financing limits. Table 1 also demonstrates how the classification of municipalities by the Constitutional Funds' rules introduce roadblocks to credit access and varying financial terms for producers depending on the specific municipality where their farms are located.

**Figure 13.** Constitutional Funds Classification of Municipalities by Type of Income, 2020



**Note:** The plan for each Constitutional Fund includes the classification of covered municipalities according to the type of income (high, medium, and low) and economic dynamism (high, medium, and low) defined by the National Policy for Regional Development (updated by Decree No. 9,810/2019) of the Ministry of Regional Development.

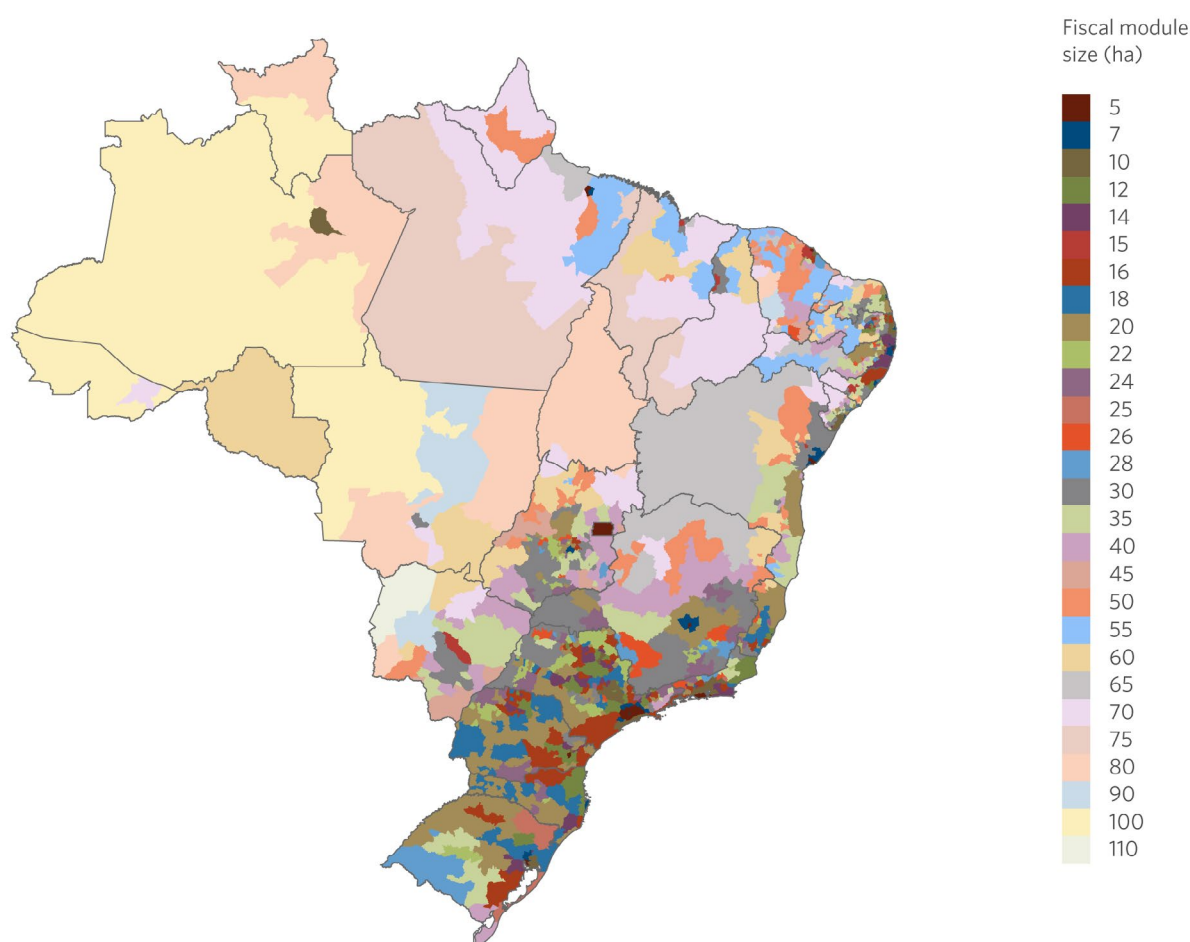
**Source:** Climate Policy Initiative with data from Banco da Amazônia, Banco do Nordeste, and Banco do Brasil



Another source of distortions in access to rural credit is the use of an outdated farm size measurement, known as the fiscal module (*módulo fiscal*), as a standard for policies. The fiscal module unit originated in the 1980s. It is defined by INCRA as “the minimum area where agricultural activity can provide, in each municipality, subsistence and social and economic progress to the families who invest their workforce.” Across the nation, the size of fiscal modules from five hectares to 110 hectares, according to the most prevalent land uses in each location.<sup>16</sup> Even though technology and farming practices have substantially improved productivity over the past 40 years, transforming unfertile areas to productive farms, the size of each municipality’s fiscal module has stayed the same.

Adjacent or nearby municipalities frequently have very different fiscal module sizes. Figure 14 shows how fiscal module sizes vary by municipality. For instance, one fiscal module in the municipalities of Capão do Leão or in Pedro Osório (in the State of Rio Grande do Sul) corresponds to 16 hectares. These two municipalities share a border with Arroio Grande, which has a fiscal module of 40 hectares. An even more extreme example is the case of Manaus (in the State of Amazonas), where the fiscal module consists of 10 hectares, while some of its adjacent municipalities have fiscal modules of 80 hectares and 100 hectares.

**Figure 14.** Fiscal Module per Municipality, 2018

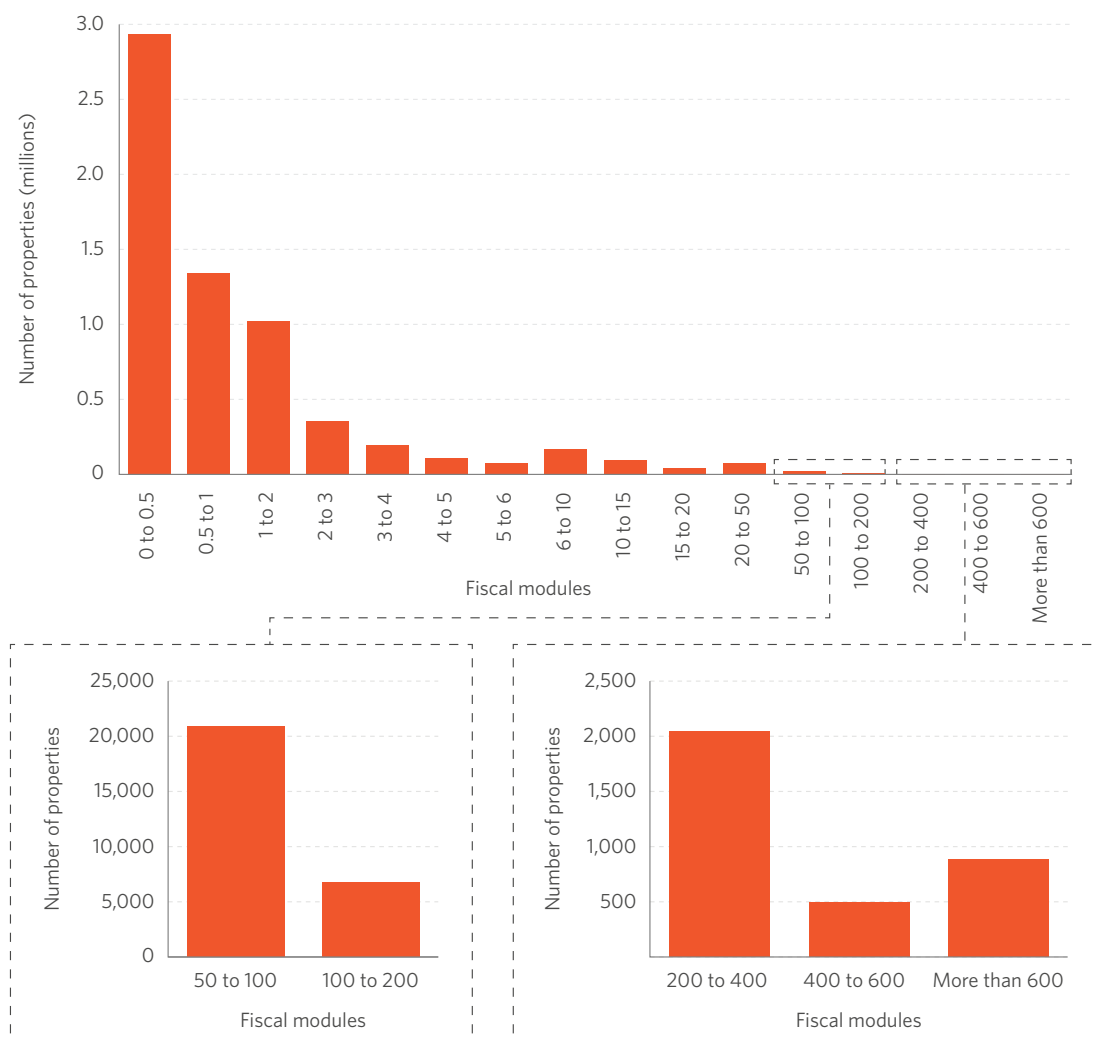


**Source:** Climate Policy Initiative with data from National Institute for Colonization and Agrarian Reform (INCRA)

<sup>16</sup> The calculations of a fiscal module considers (a) the prevalent type of land exploration in the municipality (fruit, vegetables and animal production, permanent crop, temporary crop, livestock, or forestry); (b) the income obtained from the prevalent exploration; (c) other existing types of production in the municipality that, although not predominant, are significant in terms of income or area used; and (d) the concept of “family ownership,” defined by Brazilian law 4,504/64.

The impact of this variation on the ability of rural producers to access credit is substantial. Even though the fiscal module standard is outdated, PRONAF still uses it to determine eligibility for its resources. PRONAF's goal is to assist land reform settlements and family farmers. However, by using the outdated fiscal module standard, it makes it more difficult for PRONAF to ensure it reaches small farmers across municipalities equally. For example, to be eligible for PRONAF, producers can only have up to four fiscal modules of land (contiguous or not). As a result of this requirement and the variations in fiscal module sizes, it is not uncommon for producers with the same amount of land in different municipalities to be classified differently. In one municipality, a producer might be seen as a small farmer, while in a different municipality, a similar farmer with the same farm size might be classified as a medium or even large property owner and miss out on accessing rural credit. Figure 15 shows the total number of rural properties by fiscal module. The vast majority of farms (91%) are four fiscal modules or fewer, yet this only represents 29% of Brazil's total farmland. As a result, according to Rural Credit and PROAGRO Operations System (*Sistema de Operações do Crédito Rural e do PROAGRO - SICOR*) data, PRONAF's 1.4 million contracts issued in agricultural year 2019/20 represented 73% of total rural credit contracts that year but only 15% of rural credit volume and 18% of agricultural land with access to credit.

**Figure 15.** Total Number of Rural Properties by Fiscal Module, 2018



**Source:** Climate Policy Initiative with data from National Institute for Colonization and Agrarian Reform (INCRA)

Access to rural credit is also influenced by farm revenue criteria, which also distorts credit access. All three Constitutional Funds supply credit based on the criteria related to producers' revenue, defined as annual gross agricultural revenue. Table 2 illustrates how farm revenue criteria have shifted significantly over time, reflecting the relationship between producer revenue and farm size classification between 2001 and 2020. For example, in 2001, small farms were classified as those making between R\$ 40,000 – R\$ 80,000. By 2020, the small classification had shifted to R\$ 360,000 – R\$ 4.8 million. In addition, a new classification, small-medium properties, was added in 2011. This new classification has shifted some farms that were formerly classified as large or medium properties into the small-medium classification and allowed them to access more favorable terms. For example, a farm that made R\$ 2.5 million in 2010 would have been classified as a large. However, in 2011, with the same revenue level, the farm would have been classified as small-medium and could access credit at much more favorable interest rates and credit limits. In 2020 a new change was made to the FNE alone, adding a category for medium properties (Medium II), pushing the classification of large properties even further. In 2020, for the FNE, only a property with revenue above R\$ 300 million is considered large.

These frequent changes in rural credit programs' rules and eligibility criteria may reflect political gamesmanship where some groups of producers are favored over others, further exacerbating the inefficiencies in the rural credit system (see Assunção and Souza, 2018). Political issues can, therefore, amplify the distortions in rural credit. These factors create obstacles to transparency in the system as a whole and generate uncertainty for producers, potentially causing underinvestment and reduced agricultural productivity. A public policy with greater transparency and less political interference has the potential to bring higher returns for society.

**Table 2.** Classification of Rural Property Size in the Constitutional Funds for Financing, 2001–2020

YEAR	MINI	SMALL	SMALL - MEDIUM	MEDIUM	MEDIUM II*	LARGE
2001	< R\$ 40,000	R\$ 40,000 - 80,000	-	R\$ 80,000 - 500,000	-	> R\$ 500,000
2002	< R\$ 40,000	R\$ 40,000 - 80,000	-	R\$ 80,000 - 500,000	-	> R\$ 500,000
2003	< R\$ 80,000	R\$ 80,000 - 160,000	-	R\$ 160,000 - 1 million	-	> R\$ 1 million
2004	< R\$ 80,000	R\$ 80,000 - 160,000	-	R\$ 160,000 - 1 million	-	> R\$ 1 million
2005	< R\$ 80,000	R\$ 80,000 - 160,000	-	R\$ 160,000 - 1 million	-	> R\$ 1 million
2006	< R\$ 80,000	R\$ 80,000 - 160,000	-	R\$ 160,000 - 1 million	-	> R\$ 1 million
2007	< R\$ 110,000	R\$ 110,000 - 220,000	-	R\$ 220,000 - 1.4 million	-	> R\$ 1.4 million
2008	< R\$ 150,000	R\$ 150,000 - 300,000	-	R\$ 300,000 - 1.9 million	-	> R\$ 1.9 million
2009	< R\$ 150,000	R\$ 150,000 - 300,000	-	R\$ 300,000 - 1.9 million	-	> R\$ 1.9 million
2010	< R\$ 150,000	R\$ 150,000 - 300,000	-	R\$ 300,000 - 1.9 million	-	> R\$ 1.9 million
2011	< R\$ 240,000	R\$ 240,000 - 2.4 million	R\$ 2.4 - 16 million	R\$ 16 - 90 million	-	> R\$ 90 million
2012	< R\$ 360,000	R\$ 360,000 - 3.6 million	R\$ 3.6 - 16 million	R\$ 16 - 90 million	-	> R\$ 90 million
2013	< R\$ 360,000	R\$ 360,000 - 3.6 million	R\$ 3.6 - 16 million	R\$ 16 - 90 million	-	> R\$ 90 million
2014	< R\$ 360,000	R\$ 360,000 - 3.6 million	R\$ 3.6 - 16 million	R\$ 16 - 90 million	-	> R\$ 90 million
2015	< R\$ 360,000	R\$ 360,000 - 3.6 million	R\$ 3.6 - 16 million	R\$ 16 - 90 million	-	> R\$ 90 million
2016	< R\$ 360,000	R\$ 360,000 - 3.6 million	R\$ 3.6 - 16 million	R\$ 16 - 90 million	-	> R\$ 90 million
2017	< R\$ 360,000	R\$ 360,000 - 3.6 million	R\$ 3.6 - 16 million	R\$ 16 - 90 million	-	> R\$ 90 million
2018	< R\$ 360,000	R\$ 360,000 - 4.8 million	R\$ 4.8 - 16 million	R\$ 16 - 90 million	-	> R\$ 90 million
2019	< R\$ 360,000	R\$ 360,000 - 4.8 million	R\$ 4.8 - 16 million	R\$ 16 - 90 million	-	> R\$ 90 million
2020	< R\$ 360,000	R\$ 360,000 - 4.8 million	R\$ 4.8 - 16 million	R\$ 16 - 90 million	R\$ 90 - 300 million	> R\$ 90 million/ > R\$ 300 million*

\*The Medium II category was created exclusively by FNE for producers with gross income between R\$ 90 and 300 million, thus large producers are those with gross income above this limit. For other funds, FNO and FCO, the large category remained for all producers with gross income above R\$ 90 million.

**Source:** Climate Policy Initiative with data from Banco da Amazônia, Banco do Nordeste, and Banco do Brasil

The role of rural credit in financing rural producers is essential to Brazil's agricultural economy. It allows producers to face upfront costs and make investments. Rural credit funding and programs in Brazil are characterized by considerable variety, complexity, and unpredictability in the financial conditions of the credit lines. Amounts of lines of credit and their rules, fluctuate considerably from year to year, making it difficult for producers to predict the availability of credit. Programs often are created and then discontinued. As a result, it is difficult for both producers and financial institutions to determine which funds are the most appropriate in each case. These elements of the system end up generating artificial variations in the availability of resources not associated with the productive potential or needs of the sector, making it more susceptible to political interference. This diagnostic is fundamental to correcting distortions caused by the current system. Overall, there is a significant margin for improvement in the credit framework.

Brazil has shown that investing in research and development (R&D) can have significant impacts on agriculture. The country has produced important Climate-Smart Agriculture (CSA) practices and technologies such as Agriculture-Livestock-Forest Integration (ILPF) and zero tillage farming. Such investments can have broad impacts and bring fewer distortions compared to other rural policies. Increasing investing in agricultural R&D, agroclimatic zoning, and other direct farmer support instruments can help Brazil achieve its agriculture and environmental objectives.

Considering the portfolio of Brazil's policies for the agricultural sector, it is clear that government support is concentrated on rural credit.<sup>17</sup> However, it should be considered that market failures in rural insurance leads to underinvestment in production, less efficient agricultural production, and adverse land use impacts. Farmers in riskier environments select portfolios of assets that are less sensitive to rainfall variation and thus less profitable. Also, the current context of intensification in agriculture has changed producers' risk profile, raising the risk of investment decisions. Extensive livestock farming, for example, is less prone to damage by weather shocks than crop production. Therefore, the modernization process in the country's rural sector demands that policymakers consider how to make producers manage their risks more efficiently. Greater emphasis on insurance has already been part of the 2020/21 *Plano Safra*.

<sup>17</sup> For an international comparison, the agricultural policy of the United States contains more risk management tools and offers insights into how financial instruments directed to safeguard producers could be designed. For further information, please see: Souza, and Assunção, *Risk Management in Brazilian Agriculture: Instruments, Public Policy, and Perspectives*, [bit.ly/3pILtTv](https://bit.ly/3pILtTv).

### 3. EMPIRICAL EVIDENCE ON RURAL CREDIT

Understanding the impacts of rural credit is fundamental to guide improvements in public policy. This chapter first provides a literature review on agricultural policy, focused on rural credit. Then, it summarizes empirical work developed by CPI/PUC-Rio that evaluates Brazilian rural credit and finds significant impact on agricultural outcomes, with important increases in land and labor productivities.

In economies with well-functioning financial markets, the size of the farmland and the level of deforestation should not be affected by subsidized credit. Nevertheless, farmers who experience credit constraints will likely change their production decisions (Banerjee et al., 2003; Banerjee and Duflo, 2014). Variations in subsidized credit that lead to variations in deforestation (through changes in farm sizes) provide evidence of farmers' credit constraints. When farmers do not experience credit constraints, they will substitute other financing forms for the subsidized credit without affecting farm size.

Two competing theories – the Bourlaug hypothesis and the Jevons paradox– have different views on the relationship between agricultural productivity and environmental protection. The Bourlaug hypothesis views agricultural productivity improvements as a savior of ecosystems, since they make it possible to achieve higher production levels with a lower use of natural resources, especially land, leading to less deforestation. However, the Jevons paradox disputes this view and argues that the increased profits provided by agricultural productivity gains will ultimately reverse the trend of reduction in the use of natural resources by driving greater use of those resources. So, the Jevons paradox occurs when technological progress or government policy increases the efficiency of a resource used (reducing the amount necessary for any use). However, the rate of consumption of that resource rises due to increased demand. Given these conflicting views, there is uncertainty about the correlation between productivity and deforestation.

The relationship between subsidized credit and deforestation depends on many factors, including how farmers choose to use their financial resources and which agricultural technologies they adopt. If rural farmers choose to increase production by clearing new land, their increase in subsidized rural credit will likely lead to a rise in deforestation. On the other hand, if their increased credit is used to fund capital improvements that raise productivity per unit of used land, then increases in subsidized rural credit may reduce deforestation. Greater productivity in Brazil would allow for the expansion of agricultural production without the need to clear new land. Empirical evaluations that examine this theoretically ambiguous relationship about how credit affects deforestation are necessary.

#### 3.1 LITERATURE REVIEW ON RURAL CREDIT

This section provides a brief summary of the economic literature on agricultural policy, focusing on rural credit. Assunção et al., (2019) shows that the 2008 CMN's Resolution 3,545/2008 reduced deforestation in the Amazon biome by conditioning rural credit concessions to the observance of legal and environmental rules. The introduction of



Resolution 3,545 by the CMN determined that banks in the Amazon region could only provide rural credit to producers in compliance with environmental regulations.<sup>18</sup> This condition led to a reduction of R\$ 2.9 billion in the volume of credit provided to producers living in the Amazon biome. This helped to reduce deforestation through two channels: (i) the conditionality of Resolution 3,545 on environmental compliance made producers restrain deforestation activities in order to access credit; and (ii) the financial constraint imposed on producers who had not complied with the new regulations contained the expansion of extensive agriculture. According to counterfactual simulations in the study, more than 2,700 km<sup>2</sup> would have been cleared in the analyzed period if not for Resolution 3,545.

Mata and Resende (2015) evaluate the Northeastern Constitutional Fund and analyze the possible effects of credit on development through an exogenous variation in credit policy. In 2005, the government changed the classification criteria of semiarid municipalities in Brazil. With this change, 102 municipalities became part of the semiarid area. This created an external credit shock for 102 municipalities, since being in the semiarid area (the region with one of the lowest HDI in Brazil) makes a municipality eligible for subsidized credit provided by a state-owned bank (*Banco do Nordeste*). Because municipalities are unable to decide whether to enter the semiarid area, the authors consider that the change in criteria led to a “quasi-randomization” of municipalities. They considered the 102 municipalities as the treatment group and the municipalities that were already part of the semiarid as the control group. With an Intent-to-Treat (ITT) analysis to compare the treatment group with the control group, the paper finds an increase in loans in the treatment group (the newly added municipalities). No effect was found in per capita GDP and other measures of local development. Alternatively, the researchers found evidence that credit was cheaper for small livestock producers after the reform, but not enough to generate an effect on per capita GDP. There was an overall increase in risky loans, and the results suggest no difference in default rates between the treatment and control groups. No evidence was found that the semiarid reform generated a crowding-out effect on loans provided by other banks.

Farmers’ financial environments in developing countries affect their investment decisions. Several papers have found that binding credit market constraints and incomplete insurance can limit investment in activities with expected high profits. In India, the expansion of commercial banks – and with it, the credit supply – to rural areas slightly increased the aggregate crop output and the demand for fertilizers, which have high rates of return (Binswanger, Khandker and Rosenzweig, 1993). Evidence from Kenya shows that financial constraints limit farmers’ opportunities to invest in fertilizers. Offering farmers the possibility of purchasing fertilizer at harvest time – that is, when they have more income – increases their adoption of this input by 17% (Duflo, Kremer and Robinson, 2008). Several papers also emphasize the importance of insurance to rural farmers (Rosenzweig and Wolpin, 1993; Karlan, Osei, Osei-Akoto and Udry, 2014; Kazianga and Udry, 2006). Therefore, in areas with pervasive financial market imperfections, households with constrained access to credit or insurance may choose to invest less, or differently, in their farms than they would if financial services were adequate for their needs.

18 Resolution 3,545/2008 was passed prior to the Forest Code, which was approved in 2012.

A study coordinated by The Nature Conservancy (TNC) and conducted by Agroicone compared various forms of soy expansion with and without native vegetation conversion (TNC, 2019). For the areas in the study,<sup>19</sup> the returns from expanding over acquired or rented pasture are very close to those obtained by expanding over acquired native vegetation. The expansion onto already-owned surplus native vegetation yields higher returns than any of the alternatives due to the absence of land acquisition costs. In these cases, alternatives to foster deforestation free expansion of soy include direct payments for environmental services, subsidies to rent or acquire pastureland, and sectoral or jurisdictional commitments to block access to market of soy planted in land converted from native vegetation.

## 3.2 HOW CREDIT IMPACTS THE RURAL ECONOMY, LAND USE, AND DEFORESTATION

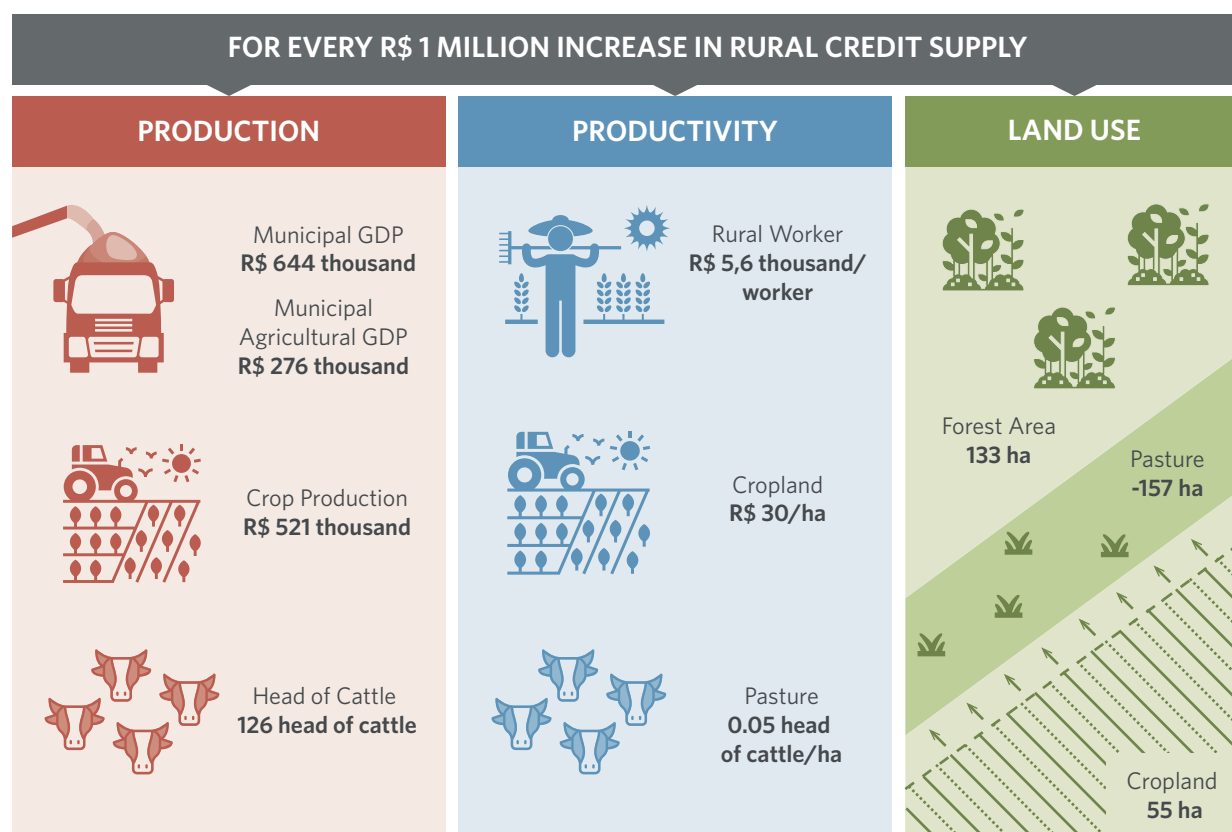
Assunção, Fernandes, Mikio and Souza (2020) build a panel data of 5,557 Brazilian municipalities for the 2002-2018 period using different sources to estimate the impacts of rural credit on agriculture, land use, and the environment.<sup>20</sup> The study uses the Central Bank of Brazil's administrative data containing detailed information regarding every rural credit contract in the country (approximately 40 million contracts in the period under analysis). These data come from two confidential datasets: Common Record of Rural Operations (*Registro Comum de Operações Rurais* – RECOR) and SICOR. On January 1, 2013, SICOR replaced the RECOR system, which had been used for the previous 30 years. SICOR expanded the RECOR set of information collected on rural contracts and introduced a requirement that each credit operation be registered at the moment of the contract agreement. The analysis aggregates rural credit contracts by municipality and year to make it compatible with other datasets. Several municipality characteristics are obtained from the IBGE, and land use data come from the Brazilian Annual Land Use and Land Cover Mapping Project (*Projeto de Mapeamento Anual da Cobertura e Uso do Solo do Brasil* – MapBiomas). Finally, the Annual Social Information Report (*Relação Anual de Informações Sociais* – RAIS), produced by the Ministry of Labor and Employment, provides data on all formally employed workers in the country.

The research shows that credit restrictions modify production decisions and lead to inefficiencies in farmers' decisions. The empirical work shows evidence of the impacts of credit on agricultural outcomes, land use, and deforestation in Brazil. An increase of R\$ 1 million in municipal rural credit, which is less than 4% of the average municipal credit, leads to an increase of R\$ 521,305 in municipal crop production, R\$ 276,323 increase in municipal agricultural GDP, and R\$ 644,430 increase in municipal total GDP. The empirical evidence also suggests that positive credit supply shocks foster productive advances, place a ceiling on agricultural area expansion, and give priority to yield gains, especially by converting pastures to crops. An increase of R\$ 1 million in rural credit leads to a increase of 55 ha in crop area, but a decrease of 157 ha in the pasture area, what means a reduction in total farming area. Remarkably, the paper finds a positive significant effect on forested area, an increase of 133 ha. There is also a positive impact on labor productivity of R\$ 5,601/worker and cropland productivity of R\$ 30/ha.<sup>21</sup>

19 The areas of the analysis include Southern Cerrado, Mato Grosso, and the MATOPIBA region (which comprises parts of the States of Maranhão, Tocantins, Piauí, and Bahia).

20 This chapter summarizes the paper Assunção, Fernandes, Mikio, and Souza (2020) wrote by the Climate Policy Initiative in partnership with the Central Bank of Brazil. The data were processed by an employee of the Central Bank to safeguard the privacy of the information. The unidentified and aggregated data were analyzed in the dependencies of the Central Bank. Available at [bit.ly/32YUzsi](https://bit.ly/32YUzsi).

21 This is a log-log regression, the coefficients for a 1% increase in rural credit are: (a) production: crop (0.275 \*\*\*); cattle heads (0.087 \*\*\*); municipal GDP (0.016 \*\*\*); municipal agricultural GDP (0.150 \*\*\*); (b) land productivity: crop production/crop area (0.165 \*\*); cattle head/pasture area (-0.207 \*\*\*); crop production/rural worker (0.322 \*\*\*); and (c) land use: forested area (0.036 \*\*\*); pasture area (-0.120 \*\*\*); crop area (0.114 \*\*\*).

**Figure 16.** Estimated Impacts of Rural Credit on Production, Productivity, and Land Use, 2002-2018

**Source:** Climate Policy Initiative with data from Central Bank of Brazil

The empirical evidence on the impacts of credit has implications that can help policymakers leverage or modify the government's efforts and subsidies. First, rural credit can reconcile production and conservation goals. Increasing food and bioenergy production does not need to come from expanding area through deforestation. Rural credit resources can be directed to promote productivity gains and relieve the pressures driving deforestation. Second, rural credit impacts are significant even with the current poorly designed and outdated financing structure and distribution system. Hence, decreasing rural credit distortions and complexity can amplify policy impacts and raise agricultural productivity by allowing producers to make better investment decisions and manage risk. Third, since rural credit is critical for financially constrained farmers, changes to this policy should be introduced gradually. Policymakers should protect the stability of the system for local producers, thus avoiding disruptions in agricultural output. Finally, rural credit is characterized by low competition among financial institutions in most municipalities and a structure of resources that favors public banks. Stimulating competition and the expansion of private sector participation can reduce market interest rates and generate innovation in the rural financial sector.

New research examines the causal impact of rural credit along three dimensions: (i) types of uses for the credit (operational costs, investments, and trade); (ii) credit lines (PRONAF, PRONAMP, Rural Savings – Restricted, and Compulsory Resources); and (iii) producer types (individuals and firms) (Assunção and Souza, 2020). Figure 17 shows the importance of the credit considered along these three dimensions. Taking the first dimension, regarding the use of the credit (working capital, investment, and trade credit), we see that credit

for investments is still quite limited in terms of amount and covered area in comparison to working capital. Regarding the second dimensions, credit lines, four largest – PRONAF, PRONAMP, Rural Savings – Restricted, and Compulsory Resources – for 77% of the area, 89% of the number of contracts, and 58% of credit amount.<sup>22</sup> On the other hand, the size of the contracts across these lines is very different. For instance, PRONAF represents 72% of the number of contracts, but only 14% of the credit amount and 27% of the area. Finally, regarding the third dimension, we observe the types of producers: firms or individuals. The figure shows that firms take 1% of loans but account for 28% of the credit amount and 4% of the area.

**Figure 17.** The Distribution of Rural Credit by Credit Lines, Credit Type, and Producer Type, 2018

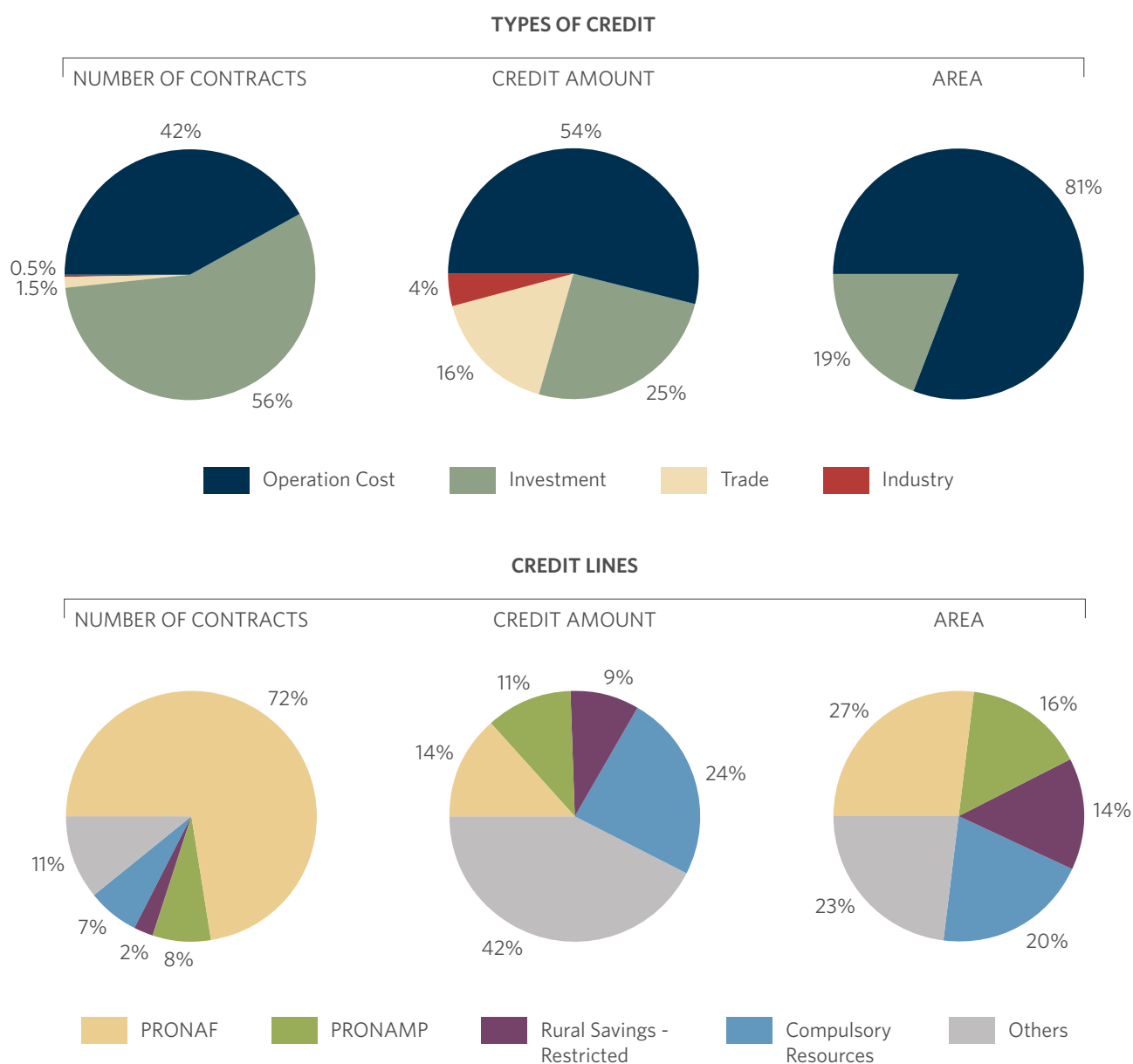
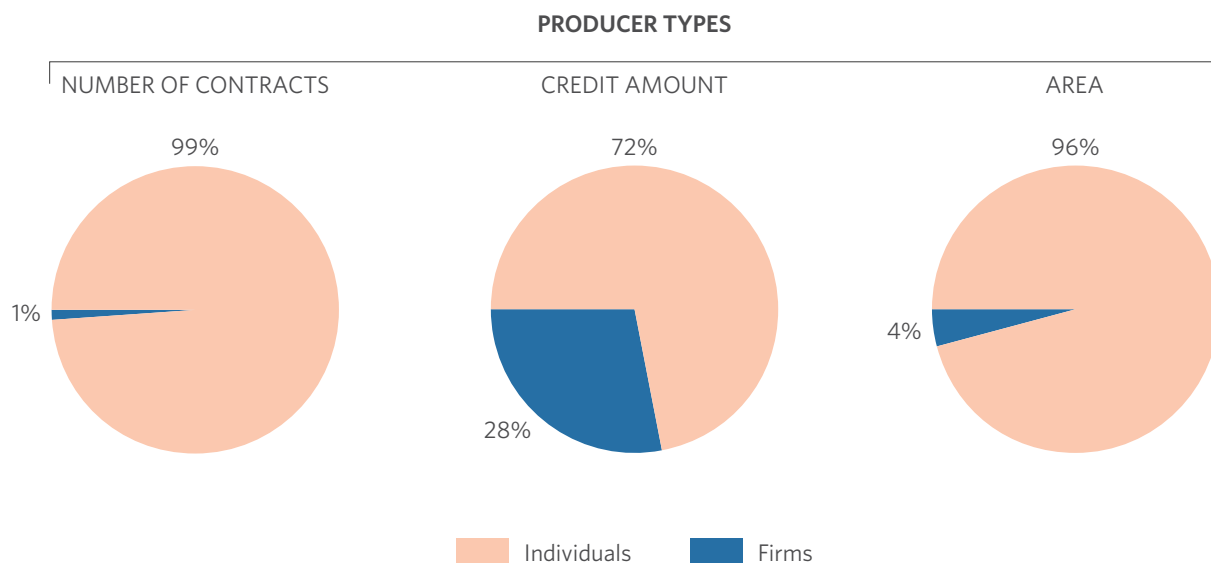


Figure 17 continues on the next page.

<sup>22</sup> The impact analysis is done separately by credit lines. Loans can follow the rules of programs (such as PRONAF and PRONAMP) or the funding sources (Rural Savings – Unrestricted and Compulsory Resources) without being linked to a specific program. The analysis separates the loans by the set of financing rules that they follow.

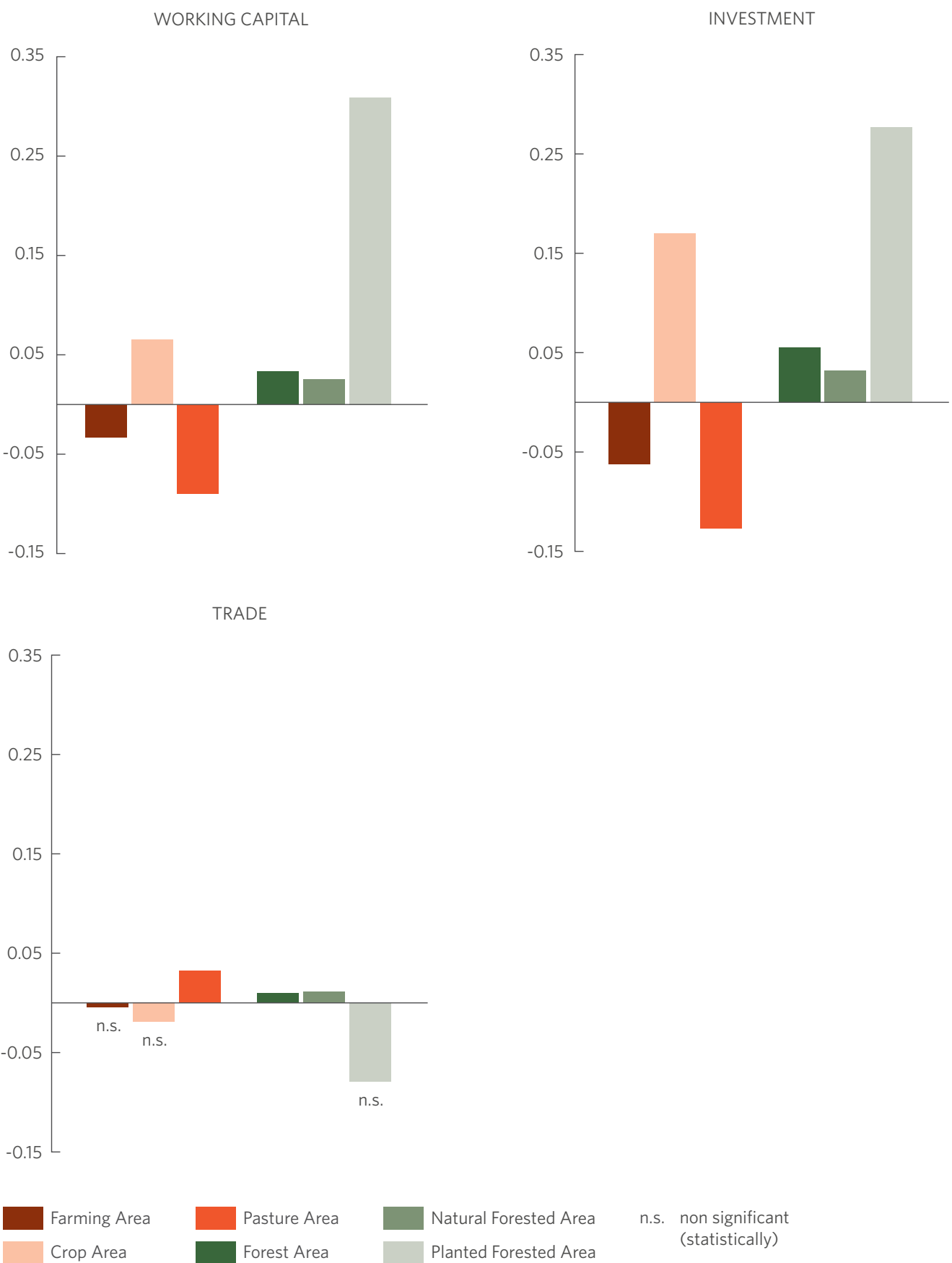


**Source:** Climate Policy Initiative with data from Central Bank of Brazil

In Brazil, the average impact of rural credit leads to an expansion in cropland and reductions in pasturelands, reducing deforestation pressures. The results from the disaggregated analysis exhibit the same pattern, but only for a subset of the rural credit policy. The gains are primarily associated with the credit for small farmers. The evidence suggest that small producers are more credit constrained since their production and productivity levels increase the most with an increase in credit supply. The analysis also shows that a strong pattern of conversion of pastures into croplands holds for PRONAF and to loans taken by individuals (but not by firms). The credit associated with large farmers, compulsory resources and rural savings, although increasing production, is also associated with both higher croplands and pastures, leading to deforestation. These results suggest the so-called Jevons paradox holds for large landowners in Brazil and not for small and medium farmers. Besides that, both loans directed to operational costs and investments improve land use, with a higher impact for investments.

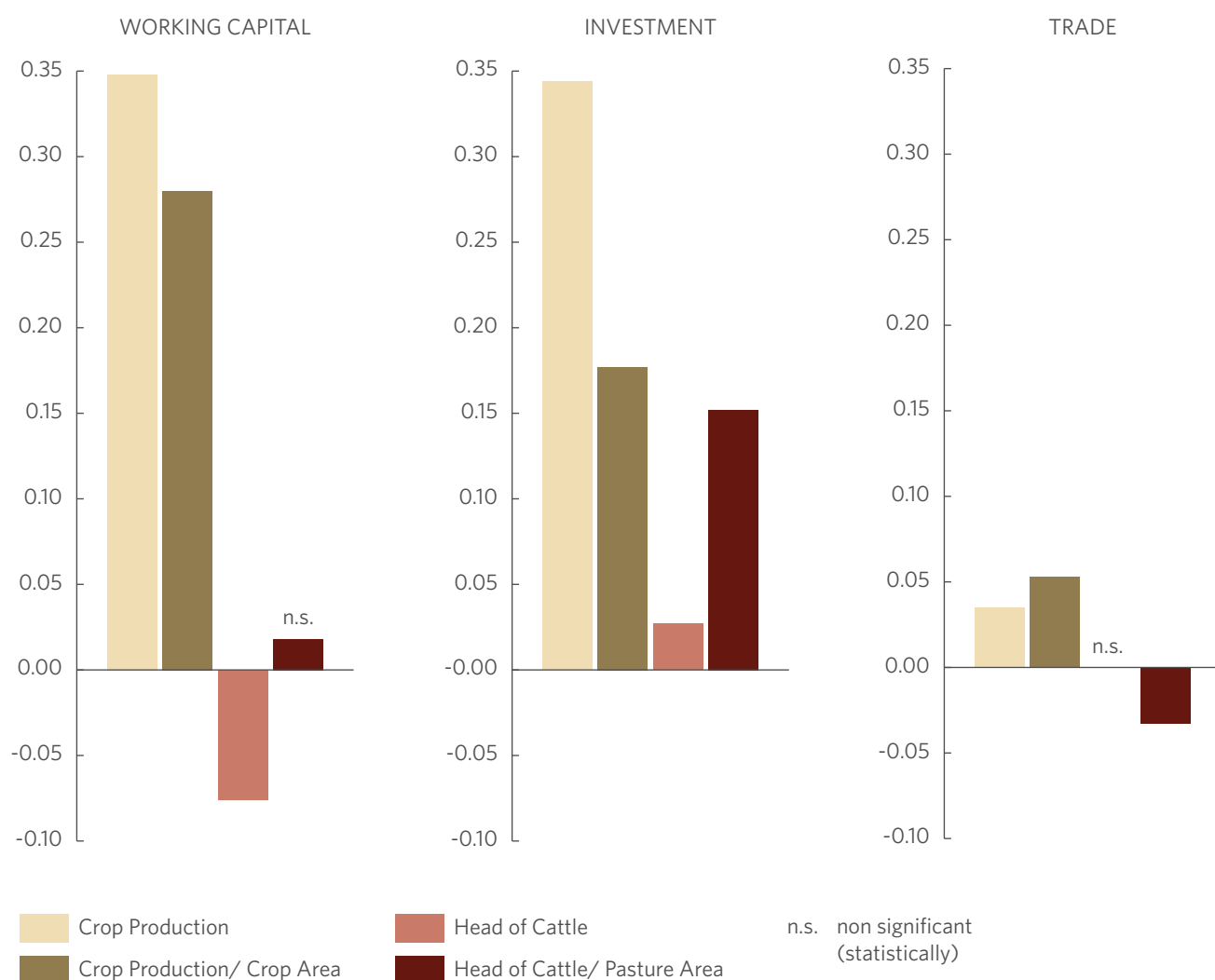
Figures 18 and 19 show the types of credit and that both working capital and investments improve land use and agricultural production, while there are small or non-significant effects from credit directed to trade. Credit for investment stands out as the most effective type for converting pasture to cropland.

**Figure 18.** Impact of Rural Credit on Land Use, by Credit Type, 2002-2018



**Source:** Climate Policy Initiative with data from Central Bank of Brazil



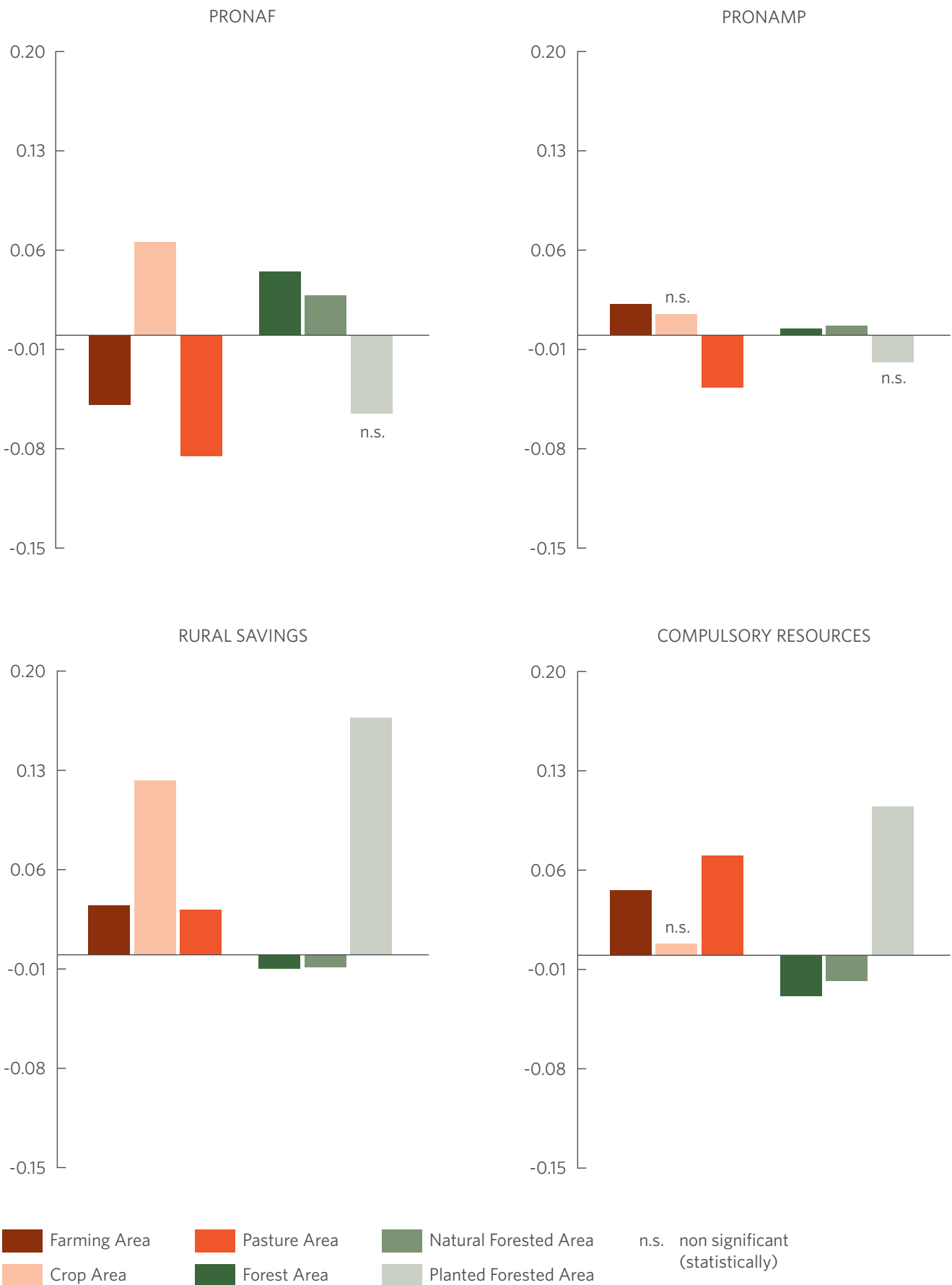
**Figure 19.** Impact of Rural Credit on Agricultural Outcomes, by Credit Type, 2002-2018

**Source:** Climate Policy Initiative with data from Central Bank of Brazil

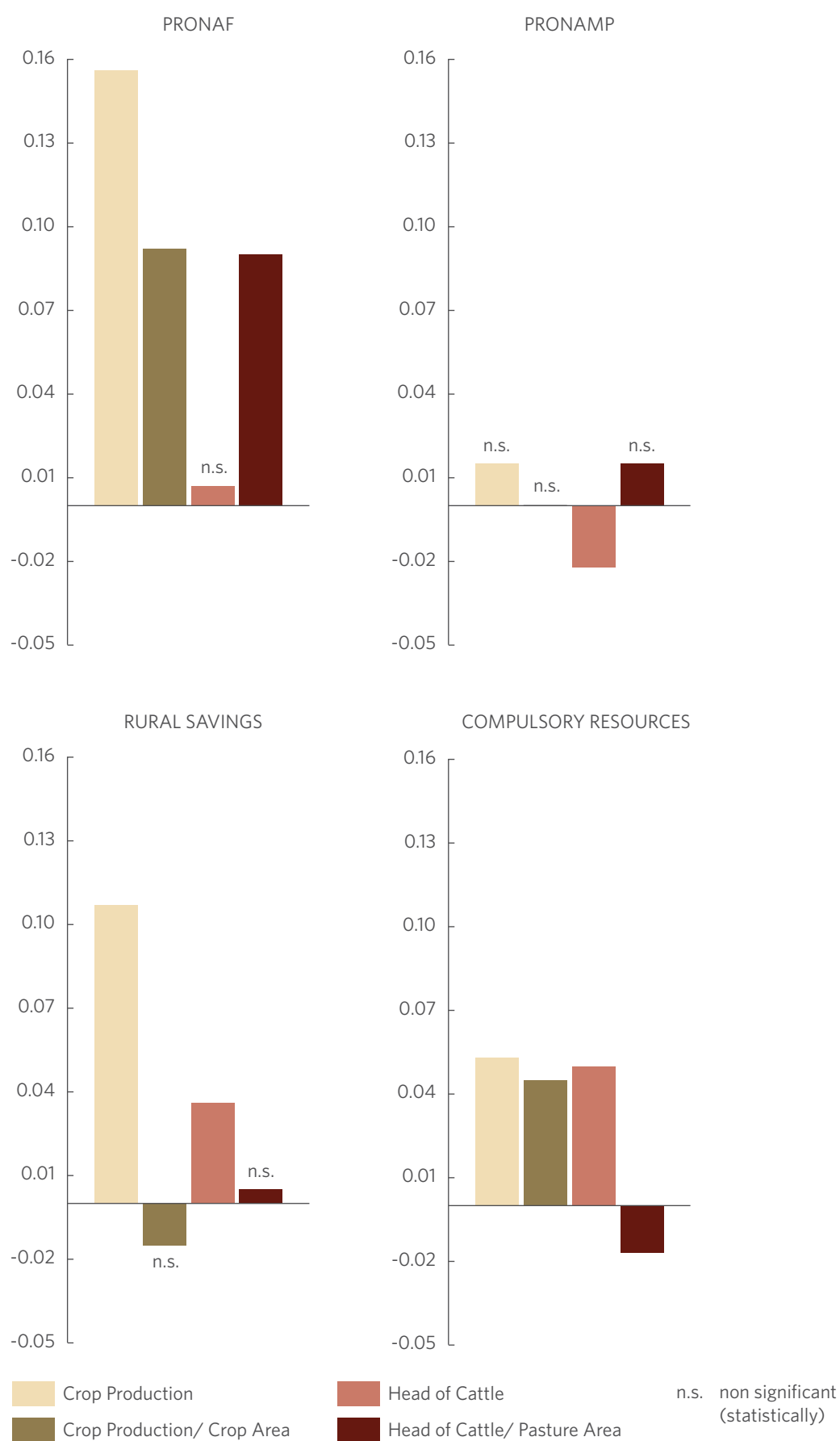
Figure 20 shows the impacts of each credit program on land use. PRONAF is the program with more forest gain, while rural savings and compulsory resources result in a decrease in forest area. PRONAMP has small impacts on increasing farming area and decreasing pasture area. Interestingly, the forest increase in the rural savings and compulsory resources programs was only in planted forested area.

PRONAF is the loan that generates the highest increases in crop production, cropland productivity, and cattle land productivity as shown in Figure 21. Compulsory resources and rural savings also show a general increase in production and productivity, but as shown, followed by an increase in areas. This shows that large producers are already at their optimal production possibilities. More credit allows them to expand in the extensive and not intensive margin. The opposite occurs with small producers.

**Figure 20.** Impact of Rural Credit on Land Use by Credit Line, 2002-2018



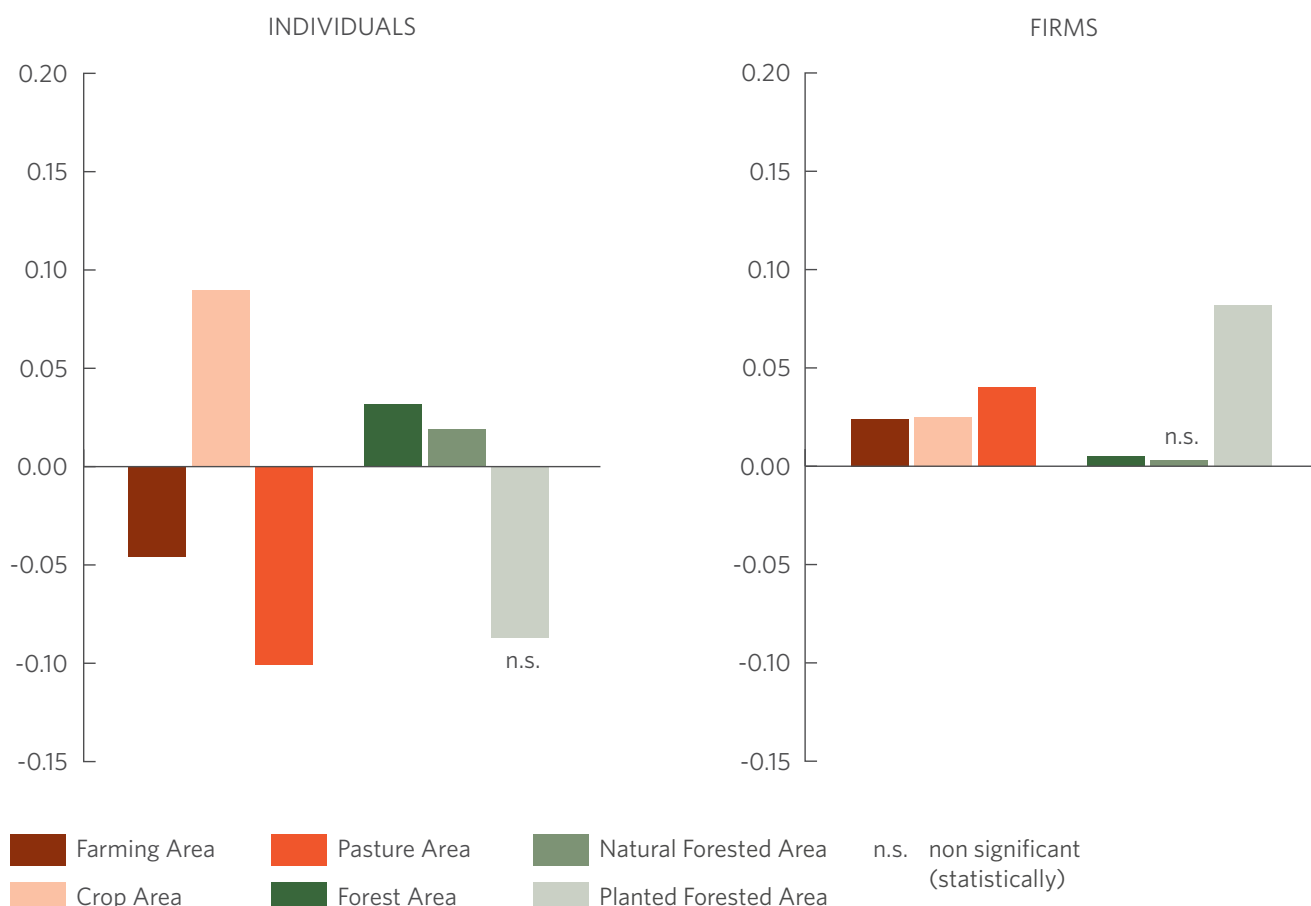
**Source:** Climate Policy Initiative with data from Central Bank of Brazil

**Figure 21.** Impact of Rural Credit on Agricultural Production by Borrower Type, 2002-2018

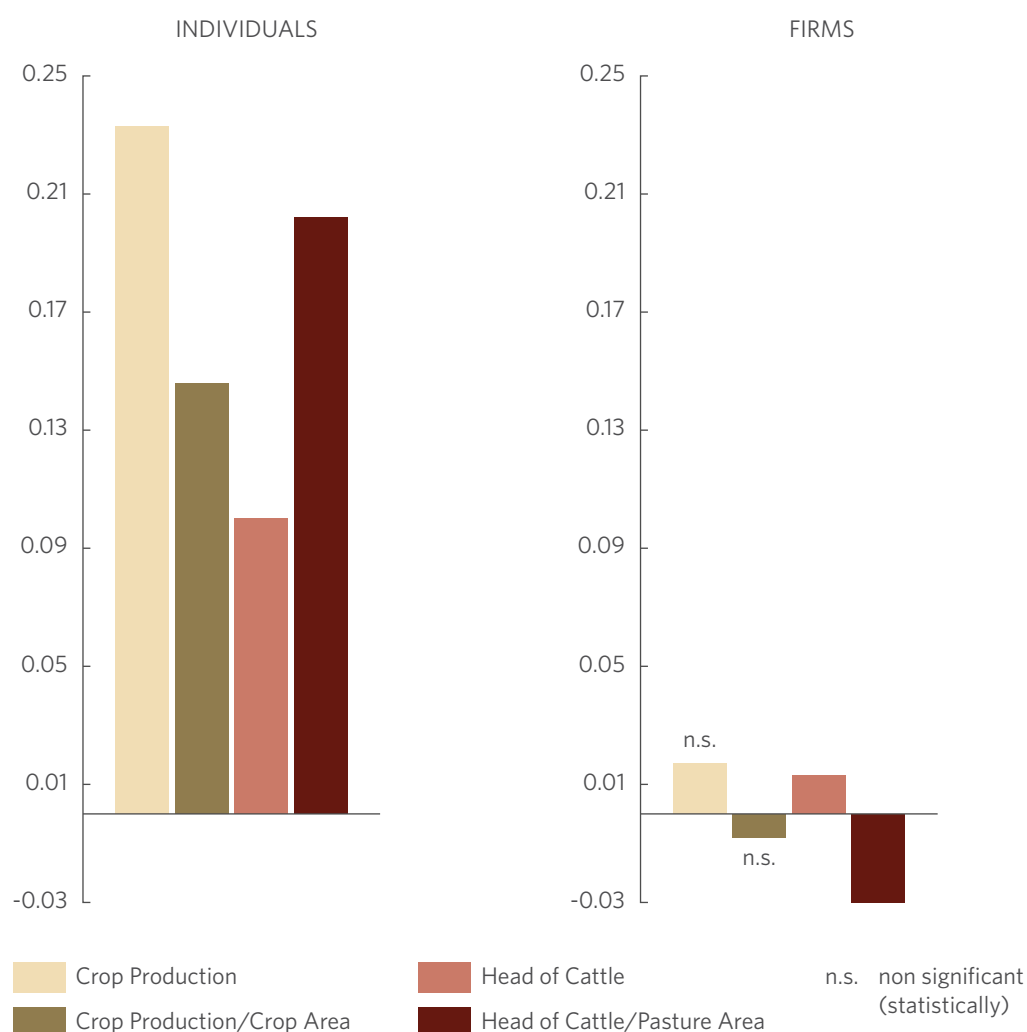
**Source:** Climate Policy Initiative with data from Central Bank of Brazil

In contrast, when comparing individuals and firms, Figures 22 and 23 show that loans to individuals have positive and significant effect on crop and forest area, while reducing pasture area. Loans to firms also have positive and significant impact, but these are very small. Upon further investigation of the forested area, individuals show a small increase in natural forested area and firms on planted forest. At the same time, loans to firms seem to have a very small, insignificant, or even negative impact on production and productivity, while loans to individuals increase production significantly on all measures.

**Figure 22.** Impact of Rural Credit on Land Use by Borrower Type, 2002-2018



**Source:** Climate Policy Initiative with data from Central Bank of Brazil

**Figure 23.** Impact of Rural Credit on Agricultural Production by Borrower Type, 2002-2018

**Source:** Climate Policy Initiative with data from Central Bank of Brazil

Therefore, besides representing approximately 30% of agricultural production in Brazil, rural credit instruments are very important to financially constrained producers. Enhancements to the design of agricultural policy will have many benefits and increase the value of the program. However, policymakers must protect the system's stability for local producers and avoid disruptions in agricultural output. Changes to rural credit should be introduced gradually, since to abruptly change public resource allocation in the sector would create obstacles for producers in the short term.

Given the subsidies embedded in the rural credit policy and the negative externalities associated with deforestation, if the agricultural policy prioritizes small and medium farmers land productivity will increase and adverse impacts on the environment will be mitigated. This prioritization can be more easily implemented considering the current context of low interest rates, in which large farmers are more likely to be served by the private sector. Therefore, the public policy can reduce rural credit subsidies and earmarked credit, especially for large producers who are less likely to be financially constrained. The current 2020/21 *Plano Safra* has made a move in this direction and already directs more resources towards PRONAF and PRONAMP.

## 4. RURAL CREDIT AND ITS POTENTIAL FOR PROMOTING CONSERVATION

As discussed, Brazil's abundance of cleared lands presents an opportunity for expanding agricultural production without further deforestation. The country has recently taken steps to nudge public policy to create appropriate incentives to meet the nation's conservation goals.

Aligning subsidies with environmental protection can bring substantial benefits at both the farm and national levels. Environmental protection is a public good that can justify targeting public subsidies to producers that maintain forests on their properties, an even more important issue in Brazil's current fiscal crisis context. By targeting subsidies in this way, rural credit resources can contribute substantially to conservation efforts and, in particular, to the implementation of the new Forest Code.

The European Union's Common Agricultural Policy (CAP) aligns subsidies with the provision of public goods. More than 95% of CAP's expenditures are direct payments to rural producers, conditioned to their public goods provision, including forest conservation, maintenance of good soil conditions, and biodiversity protection. Producers must comply with environmental rules to receive most of CAP's funds. The Green Payments, a form of CAP direct payments, currently correspond to 30% of the available budget and demands further sustainable practices. Also, CAP's rural development programs create incentives for the expansion of climate-friendly practices, such as organic agriculture.

Brazil has experience connecting rural credit and sustainability. The next sections analyze two critical policies that made such a connection: (i) ABC Program, which is the main rural credit line oriented to promote conservation; and (ii) CMN's Resolutions, which linked the public subsidies of the Brazilian credit system to a public good provision (environmental protection).

### 4.1 THE ROLE AND POTENTIAL OF THE ABC PROGRAM

The National Policy on Climate Change (*Política Nacional sobre Mudança do Clima* – PNMC) made Brazil's voluntary commitment at COP15 in Copenhagen a mandatory goal. Established by Law n. 12.187 in 2009, the PNMC set the goal of reducing the country's projected emissions between 36.1% to 38.9% GHG emissions to 2020. For this purpose, PNMC established the development of sectoral mitigation plans. One of these plans is the ABC Plan. The ABC Plan's objective is to promote the reduction of GHG emissions in agriculture and enable the agricultural sector to adapt to climate change.

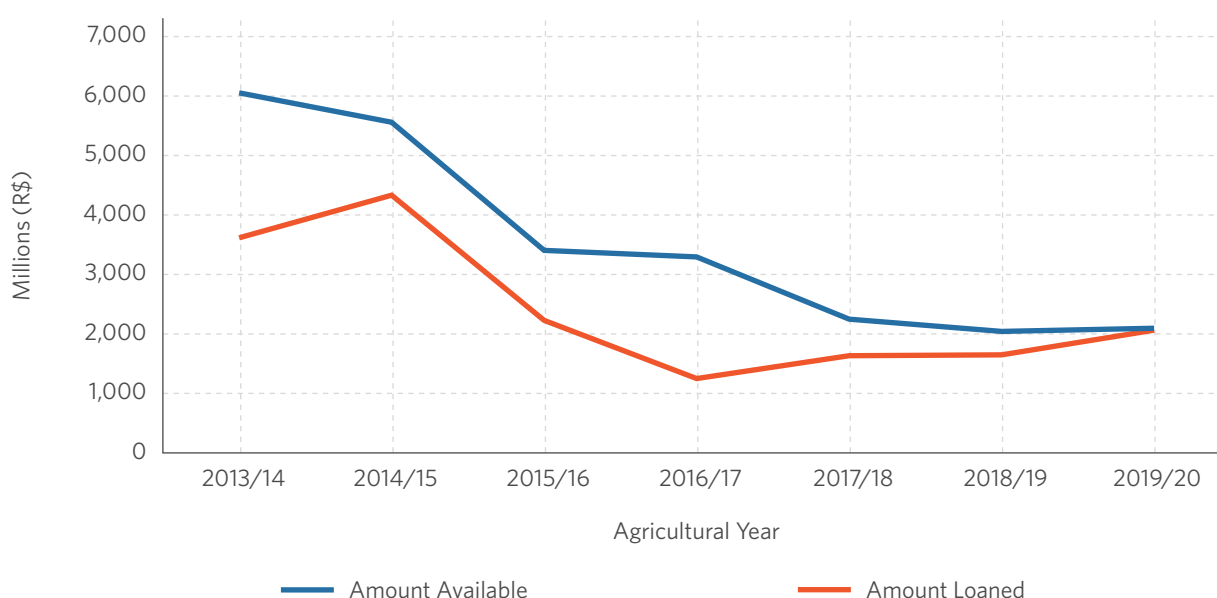
The ABC Plan goal is to reduce GHG emissions in agriculture by approximately 134 million to 163 million tons of CO<sub>2</sub> equivalents through practices and technologies that increase the efficiency of production and use of natural resources (Observatório ABC, 2017). For this purpose, the Plan established the following goals: (i) recover 15 million hectares of degraded pastures; (ii) expand the adoption of crop-livestock-forest integration systems in 4 million hectares; (iii) expand the adoption of no-till farming in 8 million hectares; (iv) expand the



adoption of biological nitrogen fixation in 5.5 million hectares of cultivated areas, replacing the use of nitrogen fertilizers; (v) expand the planting of forests in 3 million hectares; and (vi) expand the use of technologies to treat 4.4 million cubic meters of animal waste. The main instrument created to achieve these objectives was the ABC Program, a credit line aimed at financing the ABC Plan (Observatório ABC, 2019).

The ABC Program was included in PAP in the 2010/11 agricultural year and is operated by Brazilian Development Bank (*Banco Nacional de Desenvolvimento Econômico e Social* – BNDES). However, the ABC Program has had limited success since it was instituted and has experienced problems that have hampered the achievement of these goals. For instance, the total amount contracted by the program has never reached the amount made available. Also, starting in the 2014/15 agricultural year, when ABC had its highest allocation ever (R\$ 4.5 billion)<sup>23</sup>, there was a downward trend in resources allocated to this credit line, reaching a low of R\$ 2.0 billion for the 2018/19 agricultural year. Despite this downward trajectory in the level of funding, producers have been increasingly taking advantage of the program since the 2016/17 agricultural year, and in 2019/20, the amount contracted for the first time almost reached the amount available. According to the ABC Observatory (2019), the combination of improved financing conditions and reduced supply of resources may have contributed to the increase in the execution of the program's resources. ABC loans have increased from R\$ 1.13 billion<sup>24</sup> in the 2016/17 agricultural year to R\$ 2.06 billion in the 2019/20 agricultural year. This agricultural year (2020/21) there was an increase of R\$ 400 million totaling R\$ 2.5 billion in resources for the ABC Program, representing an increase of 19% over the previous agricultural year. In the 2020/21 *Plano Safra*, ABC also has the lowest interest rate for investment loans of programs dedicated to medium and large producers (4.5-6%).

**Figure 24.** ABC Program Credit Amount Available and Loaned, by Agricultural Year



**Note:** July 1, 2020 constant values (inflation adjusted by IPCA).

**Source:** Climate Policy Initiative with data from Ministry of Agriculture, Livestock and Food Supply (MAPA) and Central Bank of Brazil

<sup>23</sup> R\$ 4.5 billion in 2014/15 agricultural year corresponds to R\$ 5.5 billion for July 1<sup>st</sup>, 2020 constant values with inflation adjusted by IPCA.

<sup>24</sup> R\$ 1.13 billion in the 2016/17 agricultural year corresponds to R\$ 1.2 billion for July 1<sup>st</sup>, 2020 constant values with inflation adjusted by IPCA.

Studies on the ABC Plan have included the following suggestions to improve its implementation: (i) increase the quality and availability of technical assistance; (ii) resolve inconsistent land regularization; (iii) reduce program bureaucracy identified by producers; (iv) improve marketing and knowledge of loan terms and conditions among borrowers, technical assistance professionals, and financial institutions; (v) monitor the fulfillment of the ABC Program's objectives more consistently; (vi) evaluating and monitoring low-carbon agricultural practices that are not currently funded by rural credit, in the hope that these programs will be included in the ABC Program in the future; and (vii) consider the positive externalities in terms of mitigation and adaptation to set the ABC interest rates (Observatório ABC, 2019). In some agricultural years, the low demand for the ABC Program can be explained by unattractive interest rates, as producers may have sought credit from other sources with better rates, especially considering the complex application requirements that producers face when trying to access ABC credit.

Agroicone (2020b) proposes measures to promote low-carbon agriculture and support the continuous evolution in productivity and technology. The study analyzes the 10 years of the ABC Plan (2010-2020) and makes recommendations for the new phase (2021-2030). Agroicone suggests expanding the technologies that are covered under in the ABC Plan, such as irrigation technologies, biogas production and fertilizers from the treatment of animal waste, and photovoltaic energy. The study also suggests practices that promote the resilience of productive systems, such as pollination, organic production, agroforestry, integrated and regenerative production systems, recovery of native vegetation, biological inputs, green manure, and other alternatives. It also recommends that the management of the ABC Plan focus on the state level, which is considered important due to the different regional challenges. The study suggests that allowing each state to define its priorities and strategies, seek partnerships, and necessary resources could be advantageous. Agroicone (2020a,b) proposes, among other things, to increase the share of subsidized credit for investments, especially aimed at resilient production systems and the recovery of degraded areas (Programa ABC); to incorporate ABC Program borrowers (and potential borrowers) into the Investment Guarantee Fund (FGRural) that is being created at BNDES; and to enhance the ABC Program by incorporating programs that have common objectives, such as MODERAGRO and INOVAGRO, to simplify the system.

Given the positive externalities of the ABC Program in promoting sustainable production but its limited reach so far, the government should consider improving and expanding it. Supporting the adoption of low-carbon agriculture techniques would strengthen the alignment between policies and the provision of public goods.

## **4.2 ALIGNING RURAL CREDIT WITH ENVIRONMENTAL GOALS: THE NATIONAL MONETARY COUNCIL'S RESOLUTIONS**

The usual arguments to justify credit subsidy programs, such as income generation and positive commercial balances, hold not only for agriculture but also for other economic sectors. The component of public-good provision of the Forest Code – associated with the Legal Forest Reserve and APP – can bring economic rationality to the allocation of public funds to the sector. To remain in compliance with the Forest Code, producers will

have to preserve or recover native vegetation in their farms. Channeling public resources can help boost environmental preservation, bringing it closer to the socially desirable level, and justifying, from an economic perspective, the rural credit policy. Therefore, the implementation of the Forest Code offers a unique opportunity to consolidate sustainable agriculture in Brazil. In a complex fiscal context and at a moment in which the government plans to implement important reforms, aligning these two policies can help correct distortions in Brazil's rural credit policy.

Ensuring producers' compliance with the Forest Code represents a guarantee that food production in Brazil will be managed consistently with the protection of natural resources. This alignment is in the country's economic interest since climate negotiations are increasingly associated with commercial negotiations. For example, after 20 years of negotiations, the most significant trade agreement between the Mercosur and the European Union – the EU-Mercosur Free Trade Agreement<sup>25</sup> – was completed. However, the ratification of the deal is at risk because of Brazil's setbacks on environmental governance. Recently, the European Parliament approved an amendment emphasizing that the bi-regional agreement cannot be ratified in its current form due to concerns about the Brazilian government's environmental policy.<sup>26</sup> This makes clear that aligning agricultural production with environmental protection and implementing the Forest Code could create a virtuous circle for the Brazilian agricultural sector. The Forest Code can promote the opening of new markets, which represent the opportunity for increased revenues for producers. This, in turn, will facilitate the implementation of the Forest Code.

The current *Plano Safra* (2020/21) implements an increase in loan limits to producers with a validated CAR, which is a requirement of the Forest Code. The credit limit for working capital credit is now 10% higher for producers who submit the validated CAR. The Central Bank of Brazil already signaled its intention to increase the credit limit to 20% (Banco Central, 2020b). Another important step would be to condition the increase in credit limits to producers with no environmental liability or producers with an environmental liability but with an Environmental Compliance Program (*Programa de Regularização Ambiental* – PRA) approved by the authorities. With these new rules, the financial institutions will continue to decide how much to lend to each borrower based on their credit risk assessment. Bank managers will have the option of expanding the credit limit for a given borrower that meets the environmental conditions.

The increase of the credit limit should be easy to implement. First, there is no need for additional resources from the National Treasury. Current rural credit resources should only be preferably directed to producers with a validated CAR, which indicates they have taken the first step for compliance with the new Forest Code. Second, there is no incompatibility with the current technical and political conception of rural credit. Increasing the credit limit does not interfere with other rules of credit granting, the amount of available resources in each credit line, or any other regional, economic, or political issues. Third, the rural credit distribution channels will remain unchanged. Thus, there is no significant interference in the operation of the credit system,

<sup>25</sup> The trade includes food and beverages, tobacco and farm products from the South American side and machinery, chemicals, and pharmaceutical products from the EU.

<sup>26</sup> Valor Econômico, "Parlamento Europeu rejeita simbolicamente acordo UE-Mercosul" (2020), available at: [glo.bo/3plkZbJ](https://glo.bo/3plkZbJ)

which involves thousands of managers in bank branches spread all over the country. These managers are authorized to expand the limit only to producers who meet the CAR prerequisites. Therefore, the implementation costs of this limit increase are low and mainly consist of educating bank managers on the possibility of extending the credit limit for borrowers with a validated CAR. These same simple implementation directives will hold if, in future versions of *Plano Safra*, the eligibility rules for credit limit increases include expanded environmental conditions, benefiting producers with no environmental liability or producers with environmental liability but with an approved PRA.

Notably, using credit instruments as a means for promoting environmental protection has proven successful in Brazil before. As discussed in Section 3.1, Resolution 3,545 from the CMN required producers to demonstrate compliance with environmental conditions and show proof of legitimate property titles. As a result, deforestation fell by 15% in the Amazon region (Assunção, et al., 2019). This finding suggests that rural credit can be an effective tool for conservation in Brazil.

Two other resolutions by the CMN increased rural credit limits based on environmental conditions, but they were later revoked. The CMN Resolution 4,106/2012 established that credit limits based on production costs could increase by as much as 15% if borrowers proved the existence of APP and Legal Forest Reserve on their properties or presented an approved PRA. The CMN's Resolution 4,226/2013, after the approval of the Forest Code, included a new possibility: rural producers enrolled in the CAR could also benefit by up to 15% in increased credit limits for production costs. Thus, if the borrower could legally prove the existence of APP and Legal Forest Reserve, and was enrolled in the CAR, credit limits could increase by as much as 30%. However, Resolution 4,412/2015 revoked both regulations.

As the Forest Code faces important enforcement challenges that require significant effort and resources, rural credit can serve as a key driver in the Code's successful implementation. The amount of resources distributed by the various rural credit lines can be an important funding source for implementing the law. Moreover, if rural credit provides benefits to producers that comply with the Code, it will boost rural producers' private resources to support the Forest Code's implementation.

## 5. RECENT DEVELOPMENTS AND PUBLIC POLICY OPPORTUNITIES

As awareness of climate risks increases, so does climate action. In 2020, climate change was a key theme at the World Economic Forum (WEF) Annual Meeting in Davos-Klosters. Also, for the first time in the history of the WEF Global Risks Perception Survey,<sup>27</sup> environmental concerns dominated the top long-term risks. Three of the top five risks by impact were environmental.

Climate change has become a priority, and there is an expectation that in coming years it will become a determining factor in driving investment decisions. Large institutional investors understand that climate change will inevitably impact their portfolios, and they are increasingly adopting low-carbon and resilience standards when evaluating investments. In the past three years, global commercial giants such as ING, BNP Paribas, HSBC, Blackrock and Goldman Sachs, for example, have made varying pledges to limit investments in fossil fuels. Also, driving the discussion on climate risks is the Taskforce on Climate-related Financial Disclosures (TCFD), which has released a set of recommendations for financial actors to report on the material risks posed by climate change.<sup>28</sup> Blackrock, the world's largest asset management corporation with nearly US\$ 7 trillion in investment, has been an early participant of the Sustainability Accounting Standards Board (SASB) and TCFD, and has been advocating for companies to adopt common standards that reflect these frameworks.<sup>29</sup>

Some private financial market players are already signaling ambitions to move capital away from unsustainable activities. There will be growing demand for sustainable investment opportunities that nonetheless continue to meet high risk-return expectations. In 2020, BlackRock announced that they are placing sustainability at the center of their investment approach by integrating sustainability in their portfolio construction and risk management and exiting investments that present a high sustainability-related risk.<sup>30, 31</sup> According to the BlackRock's CEO's annual letter, "Climate change has become a defining factor in companies' long-term prospects (...) Climate risk is compelling investors to reassess core assumptions about modern finance (...) We are on the edge of a fundamental reshaping of finance."

Given this greening of the global financial system, there is great potential for Brazil's financial institutions to become greener as well, particularly given the strong role they play in the country's agricultural sector. These institutions must scale up risk mitigation instruments for climate financing, providing first-loss or partial-credit guarantees to mitigate risks associated with projects in certain segments, such as adaptation and resilience. This includes improving guarantees and other risk mitigation mechanisms that could increase investments in sustainable land use.

27 World Economic Forum, "The Global Risks Report" (2020), available at: [bit.ly/2lWyDH6](https://bit.ly/2lWyDH6)

28 TCFD 2017 Recommendations available at [bit.ly/32YaVlb](https://bit.ly/32YaVlb)

29 Blackrock, "Sustainability as Blackrock's New Standard for Investing" (2020), available at: [bit.ly/2UI4fDm](https://bit.ly/2UI4fDm)

30 The New York Times, "BlackRock C.E.O. Larry Fink: Climate Crisis Will Reshape Finance" (2020), available at: [nyti.ms/3kM6cJh](https://nyti.ms/3kM6cJh)

31 BlackRock, "A Fundamental Reshaping of Finance" (2020), available at: [bit.ly/2HhxBoX](https://bit.ly/2HhxBoX)

The Brazilian banking system has begun taking steps to better align finance and sustainable practices. The *Plano Safra* 2020/21 included an increase of up to 10% in the working capital credit limit for producers who submit a validated Rural CAR, which is a first move for compliance with the Forest Code. Another important measure was to allow financing for the acquisition of CRA.

The 10% extension of the subsidized credit limit conditional on the presentation of the validated CAR is a good start to align rural credit with the Forest Code that benefit both sides. First, the Forest Code could help justify the funneling of public funds to the rural sector, since environmental preservation is a public good. Second, rural credit could boost rural producers' private funds for the implementation of the Forest Code. In the short term, it is possible to offer higher credit limits to farmers complying with the new Forest Code, which does not require the expansion of total rural credit funding. The only immediate change would be in loan limits, without creating any other relevant ruptures in the system.

In September 2020, considering the economic impacts of environmental issues and the importance of improving climate risk management within the banking sector, the Central Bank of Brazil launched the sustainability dimension of its Agenda BC#. Key elements of this agenda include seeking to incorporate sustainable variables within the Central Bank of Brazil's decision-making process, promote adequate management of climate and socio-environmental risks in the banking sector, and promote sustainable finance. In particular, two initiatives are relevant to highlight: 1) the announcement of the "Green Bureau," which will be associated with the rural credit information system and contain information on farmers' sustainable practices; and 2) the intention to boost incentives to move rural credit in a green direction. With this new initiative, the Central Bank of Brazil signaled the possibility of continuing to increase credit line limits to producers with environmental conditions up to 20% (Banco Central do Brasil, 2020b).

One step further in this direction is to condition increased limits to producers with no environmental liability or producers with environmental liability but with a PRA approved by the environmental authorities. To comply with the Forest Code, producers will have to preserve or recover native vegetation in their farms, so the Code's implementation is an important target for public policy.

A current challenge for the Forest Code's implementation is that some states still have to analyze and validate the CAR and define the rules for the PRA. As a result, they are lagging behind in resolving existing environmental liabilities. In this case, increasing the current credit limit from 10 to 20% will provide extra incentives for farmers and states to move forward with Forest Code compliance and regulation.

Brazil's tight national budget and declining interest rates imply that subsidies tend to decrease at the aggregate level. It is crucial to remove the distortions that create a layer of allocative inefficiency in agricultural policy. Policy reform can potentially make the system more efficient and targeted to alleviate producers who are financially constrained, while simultaneously creating stronger incentives for public good provision related to environmental conservation.

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## APPENDIX. DESCRIPTION AND FINANCING CONDITIONS OF RURAL CREDIT PROGRAMS AND FUNDING SOURCES

LOANS LINKED TO RURAL CREDIT PROGRAMS				
Program	Credit Volume Loaned (2019/20)	% of Total Credit	Description	Current Financing Conditions (2020/21)
PRONAF	R\$ 28.87 billion	15.17%	<p>PRONAF aims to improve financing and increase productivity in family farming activities and to generate income for family farmers and rural settlements beneficiaries.</p> <p><b>Funding sources:</b></p> <ul style="list-style-type: none"> <li>Rural Savings – Restricted: R\$ 12.4 billion</li> <li>Compulsory Resources: R\$ 8.6 billion</li> <li>BNDES/FINAME – subsidized: R\$ 3.2 billion</li> <li>Northeastern Constitutional Fund for Financing: R\$ 3.2 billion</li> <li>Other Sources: R\$ 1.5 billion</li> </ul>	<p><b>Interest rate:</b> 0.5%-4.0%</p> <p><b>Financing limit:</b> R\$ 250,000 (production costs) and R\$ 330,000 (investment).</p> <p><b>Beneficiaries:</b> Rural producers who present a valid Aptitude Declaration (<i>Declaração de Aptidão</i> – DAP) to PRONAF.</p> <p><b>Main conditions:</b> Hold area no greater than four fiscal modules, earn at least 50% of gross family income from agricultural activities, have a maximum gross household income of R\$ 415,000 over the last 12 months prior to DAP application.</p>
PRONAMP	R\$ 27.82 billion	14.61%	<p>PRONAMP aims to support the development of activities of medium-sized producers, generating jobs and increasing income in rural areas.</p> <p><b>Funding sources:</b></p> <ul style="list-style-type: none"> <li>Compulsory Resources: R\$ 14.4 billion</li> <li>Rural Savings – Restricted: R\$ 11.4 billion</li> <li>Other Sources: R\$ 2.0 billion</li> </ul>	<p><b>Interest rate:</b> 5.0%-6.0%</p> <p><b>Financing limit:</b> R\$ 1.5 million (production costs) and R\$ 430,000 (investment) per beneficiary. For collective loans aimed at investments, the limit is R\$ 150 million at BNDES (respecting the limit of R\$ 430,000 per beneficiary).</p> <p><b>Beneficiaries:</b> Rural producers with at least 80% of their gross annual income from agricultural or vegetal extractives activities and gross annual income up to R\$ 2 million.</p>
MODERFROTA	R\$ 5.88 billion	3.09%	<p>MODERFROTA's main goal is to finance the acquisition of agricultural equipment, such as tractors, harvesters, and agricultural machinery.</p> <p><b>Funding sources:</b></p> <ul style="list-style-type: none"> <li>BNDES/FINAME – subsidized: R\$ 5.8 billion</li> <li>Other Sources: R\$ 1.6 million</li> </ul>	<p><b>Interest rate:</b> 7.5%</p> <p><b>Financing limit:</b> 85% of the value of the assets subject to financing.</p> <p><b>Beneficiaries:</b> Rural producers and agricultural cooperatives with gross annual income up to R\$ 45 million.</p>

## LOANS LINKED TO RURAL CREDIT PROGRAMS

Program	Credit Volume Loaned (2019/20)	% of Total Credit	Description	Current Financing Conditions (2020/21)
FUNCAFÉ	R\$ 3.29 billion	1.73%	<p>FUNCAFÉ provides financial support for activities carried out on coffee plantations, such as harvesting and storage. Its resources come from a fund with the same name.</p> <p><b>Funding sources:</b></p> <ul style="list-style-type: none"> <li>Fund for the Defense of the Coffee Industry: R\$ 3.2 billion</li> <li>Other Sources: R\$ 15.7 million</li> </ul>	<p><b>Interest rate:</b> 6.0%-7.5%</p> <p><b>Financing limit:</b> R\$ 30 million (for production costs) – The financing limits vary greatly for credit lines directed to storage and commercialization.</p> <p><b>Beneficiaries:</b> Coffee producers and coffee production cooperatives.</p>
PROCAP-AGRO	R\$ 11 million	0.01%	<p>PROCAP-AGRO supports the recovery of assets of agricultural, agro-industrial, aquaculture and fisheries cooperatives, financing the payment of quotas and obtaining working capital.</p> <p><b>Funding sources:</b></p> <ul style="list-style-type: none"> <li>BNDES/FINAME – subsidized: R\$ 11 million</li> </ul>	<p><b>Interest rate:</b> 7%</p> <p><b>Financing limit:</b> R\$ 45,000 per associated rural producer and R\$ 65 million per cooperative.</p> <p><b>Beneficiaries:</b> Rural producers (private individuals or companies) and agricultural cooperatives.</p>
ABC	R\$ 2.06 billion	1.08%	<p>ABC supports investments that reduce environmental damage caused by agricultural activities by reducing greenhouse gas emissions or adopting sustainable practices to increase production.</p> <p><b>Funding sources:</b></p> <ul style="list-style-type: none"> <li>Rural Savings – Restricted: R\$ 1.18 billion</li> <li>Other Sources: R\$ 863.6 million</li> </ul>	<p><b>Interest rate:</b> 4.5%-6.0%</p> <p><b>Financing limit:</b> R\$ 5 million.</p> <p><b>Beneficiaries:</b> Rural producers and agricultural cooperatives, including loans to cooperative associates.</p>
MODERAGRO	R\$ 1.12 billion	0.59%	<p>MODERAGRO focuses on improving agricultural productivity through modernization of the agricultural sector and soil recovery activities.</p> <p><b>Funding sources:</b></p> <ul style="list-style-type: none"> <li>BNDES/FINAME – subsidized: R\$ 1.12 billion</li> </ul>	<p><b>Interest rate:</b> 6.0%</p> <p><b>Financing limit:</b> R\$ 880,000 per beneficiary, R\$ 2.64 million for joint venture and R\$ 400,000 for replacement of bovine and buffalo matrices.</p> <p><b>Beneficiaries:</b> Rural producers and agricultural cooperatives, including loans to cooperative associates.</p>
PCA	R\$ 1.51 billion	0.79%	<p>PCA supports investments that improve the storage capacity of rural producers and cooperatives.</p> <p><b>Funding sources:</b></p> <ul style="list-style-type: none"> <li>BNDES/FINAME – subsidized: R\$ 641.9 billion</li> <li>Other Sources: R\$ 617.9 million</li> </ul>	<p><b>Interest rate:</b> 6.5%</p> <p><b>Financing limit:</b> Up to 100% of the project's value.</p> <p><b>Beneficiaries:</b> Rural producers and their production cooperatives.</p>

## LOANS LINKED TO RURAL CREDIT PROGRAMS

Program	Credit Volume Loaned (2019/20)	% of Total Credit	Description	Current Financing Conditions (2020/21)
INOVAGRO	R\$ 1.29 billion	0.68%	<p>INOVAGRO finances technological innovations that increase producers' productivity and improve their farming practices.</p> <p><b>Funding sources:</b></p> <ul style="list-style-type: none"> <li>Rural Savings – Restricted: R\$ 656.1 billion</li> <li>BNDES/FINAME – subsidized: R\$ 626.2 million</li> </ul>	<p><b>Interest rate:</b> 6.0%</p> <p><b>Financing limit:</b> R\$ 1.3 million per beneficiary and R\$ 3.9 million per joint venture.</p> <p><b>Beneficiaries:</b> Rural producers and their production cooperatives.</p>
MODERINFRA	R\$ 373.6 million	0.20%	<p>MODERINFRA finances improvements in agricultural infrastructure, such as the development of sustainable irrigated agriculture and protection of fruticulture against the incidence of hail.</p> <p><b>Funding sources:</b></p> <ul style="list-style-type: none"> <li>BNDES/FINAME – subsidized: R\$ 373.6 million</li> </ul>	<p><b>Interest rate:</b> 6.0%</p> <p><b>Financing limit:</b> R\$ 3.3 million per beneficiary and R\$ 9.9 million per joint venture.</p> <p><b>Beneficiaries:</b> Rural producers and their production cooperatives.</p>
PRODECOOP	R\$ 527.48 million	0.28%	<p>PRODECOOP stimulates the modernization of production and trading systems, improving competitiveness of Brazilian agricultural cooperatives.</p> <p><b>Funding sources:</b></p> <ul style="list-style-type: none"> <li>BNDES/FINAME – subsidized: R\$ 527.48 million</li> </ul>	<p><b>Interest rate:</b> 7%</p> <p><b>Financing limit:</b> R\$ 150 million</p> <p><b>Beneficiaries:</b> Agricultural, agroindustrial, aquaculture and fisheries cooperatives, and rural producers associated with them.</p>
PNCF	R\$ 51.11 million	0.03%	<p>PNCF seeks to provide access to land for small producers (who have no land or insufficient land), for example by offering loans for farmers to purchase rural properties. It also promotes investments in infrastructure for these workers.</p> <p><b>Funding sources:</b></p> <ul style="list-style-type: none"> <li>Farmland and Land Reform Fund: R\$ 51.11 million</li> </ul>	<p><b>Interest rate:</b> 0.5%-2.5%</p> <p><b>Financing limit:</b> R\$ 25,000 per beneficiary.</p> <p><b>Beneficiaries:</b> Rural producers who have annual gross family income up to R\$ 40,000 and annual property below R\$ 80,000.</p>

## LOANS LINKED TO FUNDING SOURCES RULES

Source	Credit (2019/20)	% of Total Credit	Description	Current Financing Condition
<b>Compulsory Resources</b> (Recursos Obrigatórios – MCR 6.2)*	R\$ 36.5 billion	19.19%	Compulsory Resources come from 27.5% of deposits in checking accounts collected during a one-year period by Brazilian financial institutions. Most of these resources (63% in the agricultural year 2019-2020) are not targeted at any particular rural credit program.	<b>Interest rate:</b> 6.0% <b>Financing limit:</b> R\$ 3 million for production costs. <b>Beneficiaries:</b> Rural producers and agricultural cooperatives.
<b>Rural Savings – Restricted</b> (Poupança Rural – Controlados)	R\$ 6.80 billion	3.57%	Three institutions follow the Rural Savings' rules: Banco da Amazônia, Banco do Nordeste, and Banco do Brasil. For these banks, it is mandatory to keep 59% of the rural savings deposits applied to rural credit for one year. Funds are offered at subsidized interest (restricted) or at free interest (unrestricted).	<b>Interest rate:</b> 6.0% <b>Financing limit:</b> R\$ 3 million for production costs. <b>Beneficiaries:</b> Rural producers and agricultural cooperatives.
<b>Rural Savings – Unrestricted</b> (Poupança Rural – Livre)	R\$ 19.44 billion	10.21%		<b>Conditions:</b> Freely agreed between the parties.
<b>BNDES/FINAME – Subsidized</b> (BNDES/Finame – Equalizável)	R\$ 508.19 million	0.27%	BNDES/FINAME's resources are primarily focused on technological innovation, equipment acquisition, machinery, and projects. In the agricultural year 2019/20, most of its resources were applied to rural credit programs and only 3.5% had no link to specific programs, following the rules of the source.	<b>Interest rate:</b> Long term interest rate (TLP) + BNDES fees (2.1%) + Financial Intermediate Rate (0.1%) + Financial agent fee (mutually agreed between the parties) <b>Financing limit:</b> 80% of the investment value (micro, small, and medium enterprises) and 70% of the investment value (other enterprises). <b>Beneficiaries:</b> Rural producers, companies, entrepreneurs, cooperatives, and other institutions connected to agricultural, forestry production, fisheries, and aquaculture activities.
<b>BNDES – Unrestricted</b> (BNDES Livre)	R\$ 1.18 billion	0.62%	BNDES – Unrestricted refers to resources offered at unrestricted rates, that is, rates negotiated mutually by the client with the bank.	<b>Conditions:</b> Mutually agreed between the parties. <b>Beneficiaries:</b> Rural producers and agricultural cooperatives.
<b>Agricultural Credit Notes</b> (Letra de Crédito do Agronegócio – LCA)	R\$ 27.6 billion	14.49%	Agricultural Credit Notes is an investment instrument offered by public or private financial institutions to their clients. Of the total collected, 35% should be applied to rural credit, financing the agricultural sector. These resources are not linked to any program.	<b>Interest rate:</b> 6.0% (LCA at favorable rates) and mutually agreed between the parties (LCA at floating rate) <b>Financing limit:</b> Mutually agreed between the parties. <b>Beneficiaries:</b> Rural producers and agricultural cooperatives.

## LOANS LINKED TO FUNDING SOURCES RULES

Source	Credit (2019/20)	% of Total Credit	Description	Current Financing Condition
<b>Unrestricted Resources</b> ( <i>Recursos Livres</i> )	R\$ 11.55 billion	6.06%	Unrestricted Resources are mutually agreed to between financial institutions and borrowers. When there is a government direction or subsidy, they are called Unrestricted Resources – Subsidized.	<b>Conditions:</b> Freely agreed between the parties. <b>Beneficiaries:</b> Rural producers and agricultural cooperatives.
<b>Unrestricted Resources – Subsidized</b> ( <i>Recursos Livres Equalizáveis</i> )	R\$ 25.2 million	0.01%		<b>Conditions:</b> various
<b>External Financing</b> ( <i>Captação Externa</i> )	R\$ 990.86 million	0.52%	Funding from External Financing comes from foreign financial institutions to be applied to rural credit in Brazil. Most of these resources (79%) are concentrated in Rabobank.	<b>Conditions:</b> various
<b>Northeastern Constitutional Fund for Financing</b> ( <i>Fundo Constitucional de Financiamento do Nordeste – FNE</i> )**	R\$ 4.75 billion	2.50%	The Constitutional Fund for Financing provides resources aiming at the growth and development of Brazil's Northeastern, Midwestern, and Northern regions. The Constitutional Funds come from 3% of the collection of Taxes on Industrialized Products (IPI) and Income Tax. A portion of these funds is invested in rural credit operations.***	<b>Interest rate:</b> For investment: 4.39%-4.49% (Mini, Small, Small-Medium); 4.59%-4.71% (Medium I); 4.78%-4.94% (Medium II, Large). For production costs: 4.45%-4.56% (Mini, Small, Small-Medium); 4.67%-4.81% (Medium I); 4.88%-5.05% (Medium II, Large). (See Table 2 for producer's size definition) <b>Financing limit:</b> Varies according to the producers' size and municipality's classification. (See Table 1) <b>Beneficiaries:</b> Rural producers and agricultural cooperatives (in areas served by the Northeastern Constitutional Fund).



## LOANS LINKED TO FUNDING SOURCES RULES

Source	Credit (2019/20)	% of Total Credit	Description	Current Financing Condition
<b>Midwestern Constitutional Fund for Financing</b> ( <i>Fundo Constitucional de Financiamento do Centro-Oeste – FCO</i> )	R\$ 4.15 billion	2.18%	The Constitutional Fund for Financing provides resources aimed at the growth and development of Brazil's Northeastern, Midwestern, and Northern regions. The Constitutional Fund come from 3% of the collection of Taxes on Industrialized Products (IPI) and Income Tax. A portion of these funds is invested in rural credit operations.***	<b>Interest rate:</b> For investment: 5.99%-6.28% (Mini, Small, Small-Medium) 6.58%-6.97% (Medium) 7.16%-7.64% (Large). For production costs: 6.17%-6.49% (Mini, Small, Small-Medium) 6.82%-7.25% (Medium) 7.46%-8.00% (Large). (See Table 2 for producers' size definition) <b>Financing limit:</b> Varies according to producers' size and the municipality's classification (See Table 1). <b>Beneficiaries:</b> Rural producers and agricultural cooperatives (in areas served by the Midwestern Constitutional Fund).
<b>Northern Constitutional Fund for Financing</b> ( <i>Fundo Constitucional de Financiamento do Norte – FNO</i> )	R\$ 3.93 billion	2.06%		<b>Interest rate:</b> For investment: 4.62%-5.62% (Mini, Small, Small-Medium) 5.07%-6.07% (Medium) 5.51%-6.51% (Large). For production costs: 4.62%-5.62% (Mini, Small, Small-Medium) 5.07%-6.07% (Medium) 5.51%-6.51% (Large). (See Table 2 below for producers' size definition) <b>Financing limit:</b> Varies according to the producers' size and the municipality's classification. (See Table 1) <b>Beneficiaries:</b> Rural producers and agricultural cooperatives (in areas served by the Northern Constitutional Fund).

\* MCR 6.2 refers to Compulsory Resources defined under the rules of the Rural Credit Manual, Chapter 6, Section 2.

\*\* The interest of the Northeastern Constitutional Fund (FNE) refers to FNE Rural since there is variation in rates among the subprograms.

\*\*\* The total amount planned for the Northeastern Constitutional Fund in 2019 was R\$28.5 billion; for the Midwestern Constitutional Fund it was R\$8.5 billion; and for the Northern Constitutional Fund it was R\$9.3 billion. The percentage of each of these funds applied to rural credit (considering both loans linked and not linked to specific programs) was 27.9%, 50.4%, and 45.9%, respectively, in that same year (January to December).

**Source:** Climate Policy Initiative with data from Rural Credit Manual (MCR from BCB); Rural Credit Data Matrix (MDCR from BCB); Banco do Brasil; Banco do Nordeste; Banco da Amazônia; Brazilian Development Bank (BNDES); Ministry of Agriculture, Livestock, and Supply (MAPA)

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