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SUSTAINABLE RURAL CREDIT: AN ANALYSIS OF THE CENTRAL BANK'S PROPOSAL FROM THE PERSPECTIVE OF THE ECONOMIC ANALYSIS OF LAW

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ABSTRACT

The present work aims to analyze, from the perspective of the Economic Analysis of Law (AED), the proposal presented by the Central Bank of Brazil in Public Consultation No. 82/2021, which aims to include sustainability criteria in the granting of rural credit. The central question is to assess the extent to which the proposed resolution can effectively promote sustainable agricultural production. The research uses the theoretical framework of the AED to examine the incentives generated by the normative proposal, considering the rationality of the economic agents involved. Based on documentary and bibliographic analysis, the study identifies five fundamental aspects for the improvement of the proposal: (1) clear definition of investments considered sustainable; (2) predictability of the benefits granted; (3) requirement of socio-environmental additionality; (4) efficient monitoring and inspection mechanisms; and (5) expansion of the integration of environmental monitoring systems with the Rural Credit and Proagro Operations System (Sicor). It is concluded that, despite representing an important advance, the proposal depends on significant adjustments to ensure its effectiveness.

Keywords: Rural Credit. Sustainability. Economic Analysis of Law.

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INTRODUCTION

Agriculture faces the triple challenge of ensuring food security for a growing global population, providing opportunities for farmers and people involved in the supply chain, and addressing environmental challenges, including climate change and biodiversity loss. The simultaneous fulfillment of these objectives depends on coordinated and efficient public policies, as well as financing mechanisms that encourage sustainable practices.

On the environmental front, Brazil made voluntary commitments at the 21st Conference of the Parties to the United Nations Framework Convention (COP-21), committing to reduce Greenhouse Gas (GHG) emissions by 37% by 2025 and by 50% by 2030, compared to 2005 levels, in addition to achieving climate neutrality by 2050.

Considering that agriculture was responsible, in 2016, for 36.3% of GHG emissions and 76.1% of Brazilian methane emissions (BRASIL, 2020b), the sector has the potential to contribute significantly to the more sustainable use of land and water resources, the reduction of GHGs and the sequestration of carbon from the atmosphere, mitigating climate variations.

The officialization, coordination, and operationalization of Brazil's voluntary national commitments took place with the creation of the National Policy on Climate Change (PNMC), instituted by Law No. 12,187, of December 29, 2009. For the implementation of the PNMC, sectoral plans for mitigation and adaptation to climate change were created, including the Sectoral Plan for Mitigation and Adaptation to Climate Change for the Consolidation of a Low Carbon Economy in Agriculture (ABC Plan).

The ABC Plan was structured in nine axes, distributed among strategies and programs, one of them being the "Program for access to credit and financing, to stimulate the adoption of SPS" (Sustainable Production Systems, Practices, Products and Processes), which has as its specific objective "to foster, expand and diversify economic, financial and fiscal sources and instruments linked to SPS" (BRASIL, 2021e).

Rural credit has played and still plays a fundamental role in the development of the Brazilian agricultural sector. The country, which until the middle of the last century was a net importer of food, has become one of the largest producers and the third largest exporter of agricultural products (GASQUES et al., 2018). Due to their relevance in the financing of the agricultural sector, the rules that govern rural credit are capable of modifying the behavior of rural producers and financial institutions.

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With this in mind, and seeking to stimulate sustainable agricultural production, the Collegiate Board of Directors of the Central Bank of Brazil presented Public Consultation No. 82, of March 11, 2021, which contained a draft resolution with the objective of including sustainability criteria to be observed by financial institutions in the granting of rural credit. Thus, the research problem that this work seeks to answer is to what extent the proposed resolution achieves the objective of promoting sustainable agricultural production.

This article has the specific objective of analyzing, from the perspective of the Economic Analysis of Law (AED), to what extent the resolution proposed in Public Consultation No. 82/2021 can achieve its purpose of promoting sustainable agricultural production. The analysis focuses on the economic incentives generated by the proposal and its possible consequences for the behavior of the agents involved: rural producers and financial institutions.

METHODOLOGY

The Economic Analysis of Law (AED) consists of the application of the methods and premises of economic theory to analyze and predict the effects of legal norms on the behavior of agents (COOTER; ULEN, 2016). It is based on the premise that economic agents are rational and respond to incentives in the search to maximize their utility or well-being (POSNER, 2014).

In the context of this study, the EDA provides the theoretical framework to examine how the economic incentives incorporated in the BCB's normative proposal can influence the decisions of rural producers and financial institutions regarding the adoption of sustainable practices.

Economic theory provides a basis for predicting the effects of laws on human behavior. For economists, sanctions are similar to prices, and people respond to sanctions in the same way as prices. When a certain price is high, people react by consuming less of that product. Likewise, more severe sanctions tend to reduce the propensity of agents to violate norms (COOTER; ULEN, 2016).

As Gico Jr. (2010) explains, modern economics is based on the study of incentives for human behavior. In turn, the law can be considered as an institutional technique for controlling human behavior through the use of state force, as opposed to the use of social or moral pressure. Thus, the AED consists of the use of economic theoretical tools to study the incentives generated by the legal system.

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The positive approach to the AED employed in this work aims to describe and predict the effects of the norms on the behavior of the agents, evaluating whether they achieve their objectives. The normative approach, on the other hand, examines the efficiency of norms and suggests alternatives for their improvement.

METHODOLOGY

The present work, based on bibliographic research and documentary analysis, uses two techniques of the Economic Analysis of Law (AED): the positive technique, which has a descriptive function by seeking to identify the reasons for the choices of economic agents and whether a certain rule achieves the proposed objectives; and the normative technique, which has a prescriptive function, seeking to identify how norms can be established to achieve efficiency.

The documents analyzed include the draft resolution of Public Consultation No. 82/2021, BCB reports and publications on sustainable finance, and the current legislation on rural credit and environmental sustainability.

The analytical categories derived from the EDA that guided the analysis include:

1. **Rationality of agents** - premise that rural producers and financial institutions make decisions to maximize their benefits;
2. **Incentive structure** - analysis of the costs and benefits associated with the adoption of sustainable practices;
3. **Informational asymmetry** - differences in information between the parties involved that can affect monitoring and inspection;
4. **Transaction costs** - costs associated with the implementation, monitoring, and enforcement of the policy.

AGRICULTURE AND THE ENVIRONMENT

Around the world, food production is often pointed out as one of the biggest causes of environmental degradation and animal mistreatment (OLDE and VALENTINOV, 2019). There are numerous problems associated with the agricultural sector: increased deforestation due to the expansion of the agricultural frontier; predatory use of water resources, with consumption exceeding the replacement capacity and contamination by chemical products; contamination of soil and food by the indiscriminate use of pesticides;

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and greenhouse gas emissions from livestock, contributing to global warming, among other negative externalities of the activity (SPRINGMAN, 2018).

On the other hand, there is the enormous challenge of offering products from agribusiness, such as food, beverages, clothing, fuels, and numerous inputs used in the industrial sector, to a population of eight billion people.

According to FAO estimates, global food production is expected to increase by 70% by 2050 to cope with a population increase of about 40% (BRUINSMA, 2009). Brazil is the country with the greatest arable potential, with 394 million hectares of potentially usable quality land, that is, excluding protected land (BOT and NACHTERGAELE, 2000).

Thus, a large part of the necessary increase in food production in the coming decades should be supplied by the country, which demonstrates the importance of having a legal framework, as well as control mechanisms and public policies that allow for the reconciliation of increased production with environmental preservation.

The rapid reduction in the area of the main forest ecosystems is considered one of the major environmental problems faced in the last century. Around 20% of recent greenhouse gas emissions are attributed to deforestation and forest degradation (STERN, 2008), reaching estimates between 38% (BRASIL, 2022d) and 49% (SEEG, 2021), depending on the calculation methodology. The vast biodiversity existing in the various Brazilian biomes, added to the fact that the country has one of the greatest agricultural potentials, make it especially important in the study of the apparent dichotomy between development and environmental sustainability.

Law No. 12,651, of May 25, 2012, also known as the New Forest Code, determined a series of requirements for the protection of native vegetation on rural properties to achieve sustainable development. The legal rule provides for the need to conserve Permanent Preservation Areas (APP) in various situations, such as in the marginal strips of any watercourse, slopes, hilltops, sandbanks, mangroves, and in other situations. In addition, it determined that rural landowners must maintain a minimum area with native coverage as a Legal Reserve (RL) of the property. This area varies from 80% in forest areas of the Legal Amazon to 20% in general grassland areas in that region or in properties located in other regions.

The areas of PPA and RL play an important complementary role to that of the Conservation Units, increasing the capacity of the landscape to sustain biodiversity,

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reducing soil erosion, contributing to the conservation of water resources, and providing gene flow, thus providing essential environmental services (METZGER, 2010).

However, landowners bear the opportunity costs arising from the preservation of the APP and LR areas, in addition to being subject to high fines in case of non-compliance with the rules (IGARI, TAMBOSI and PIVELLO, 2009).

A study by Chiavari and Lopes (2019) analyzed the environmental legislation of the ten largest exporters of agricultural products and concluded that the Brazilian legislation is the strictest, being the only one in this group of countries that does not provide financial compensation to landowners for the preservation of permanent protection areas and legal reserves.

In addition to measures that encourage the preservation of native vegetation, the search for a more efficient exploitation of natural resources is essential for sustainable production. Despite the excellence of some crops and the increase in productivity in recent decades, the land use of the Brazilian agricultural sector is still quite inefficient. In 2017, there were 178.7 million hectares of pastures, of which 63.7 million hectares showed signs of degradation (LAPIG, 2019). This degradation is due to the inadequate management of planted pastures, which after a few years of use begins to show a gradual reduction in productivity, which impacts the zootechnical indicators of the herds, reducing the profitability of the producer and generating incentives to search for new areas.

In this scenario, the conversion of degraded pastures into pastures of high productivity and resilience, as well as the implementation of integrated crop-livestock or crop-livestock-forest systems, are fundamental to increase the productivity and income of the producer, to reconcile the need for production with environmental conservation.

The agricultural sector plays an important role in Brazil. Although its share of GDP has fallen from about 20% in the 1950s and 10% in the 1980s to 4.4% in 2008, and has remained around that level since then, it is still higher than the world average (3.4%) and that of other major food-producing countries such as Australia (2.6%), the United States (0.9%), and the countries of the European Union (1.4%) (World Bank, 2019).

From the point of view of the workforce, data from the 2017 Agricultural Census show that agriculture employs more than 15 million people, a significant contingent, especially when considering that most of them have low education, and more than 23% of rural landowners do not know how to read and write (BRASIL, 2017).

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As Chaddad (2016) points out, the modernization of Brazilian agriculture after the 1970s, with the so-called Green Revolution, provided a great increase in productivity and the construction of well-coordinated value chains that contributed to overcoming issues such as food insecurity and high food prices in the domestic market, in addition to making the country the largest net exporter.

Gasques et al. (2018) demonstrate that total factor productivity was the main source of the increase in agricultural products, having grown at an annual rate of 3.08% between 1975 and 2016. The production of grains changed from 40.6 million tons to 187.0 million tons, and the livestock production, expressed in tons of carcasses, increased from 1.8 million tons to 7.4 million tons; pork, from 500 thousand tons to 3.7 million tons, and chickens, from 373 thousand tons to 13.2 million tons. On the other hand, land occupation did not follow this growth. In the same period, temporary crops increased from 36.8 million to 69.5 million hectares, but the pastures used were reduced from 165 million hectares to 145 million hectares, demonstrating greater efficiency in land use.

RURAL CREDIT AND SUSTAINABILITY

OVERVIEW OF RURAL CREDIT IN BRAZIL

In recent decades, the Brazilian Agricultural Policy has been based on three main instruments: the guarantee of prices for agricultural products, rural insurance instruments, and rural credit, in addition to technical assistance and rural extension services (ATER), which are fundamental for the dissemination of knowledge and sustainable technologies among rural producers. Numerous studies recognize that the rural credit policy played a decisive role in the transformation of national agriculture, financing the infrastructure and mechanization necessary to increase production, and is of great relevance to this day (BACHA, 2012; CONCEIÇÃO et al. 1998; SPERL; ARAÚJO, 1995; VICENTE, 1999; and BRASIL, 2016).

As provided for in Law No. 4,829, of November 5, 1965, which "institutionalizes rural credit": "Art. 2. Rural credit is considered to be the supply of financial resources by public entities and private credit establishments to rural producers or their cooperatives for exclusive application in activities that fit the objectives indicated in the legislation in force."

The attractiveness of rural credit stems from the conditions facilitated to rural producers, especially in credit operations with mandatory resources, from demand deposits or Rural Savings, or with resources equalized by the National Treasury. It is possible to

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verify that the interest rate practiced in rural credit is, as a rule, lower than that offered to other sectors of the economy, as well as to individuals, being, in some periods, even lower than the Selic rate.

In addition, a significant portion of rural producers have high liabilities with input suppliers, service providers, cooperatives, and agribusinesses, which operate with financial costs higher than usual rural credit and transfer it to farmers (BRASIL, 2018).

The rural credit policy, despite having reduced the volume of investments in relation to that observed in the second half of the last century, still plays an important role. Data from the Central Bank show that in the 2021/2022 harvest alone, the amount of rural credit contracted reached R$307.3 billion, with the indebtedness of rural credit beneficiaries with the National Financial System (SFN), in December 2021, reaching R$448.7 billion, about 10.6% of the total SFN credit operations (BCB, 2022a).

Although official rural credit represents only a third of the sector's financing needs (BRASIL, 2018), it exerts a great influence on the behavior of producers. Thus, the legal framework of rural credit can contribute to socio-environmental sustainability.

LEGAL FRAMEWORK OF RURAL CREDIT AND ITS RELATIONSHIP WITH THE ENVIRONMENT

The main regulations that regulate rural credit are Law No. 4,829, of November 5, 1965, which "institutionalizes rural credit"; and Law No. 8,171, of January 17, 1991, which "provides for agricultural policy".

Law No. 4,829, of 1965, establishes as one of the specific objectives of rural credit "to encourage the introduction of rational methods of production, aiming at increasing productivity and improving the standard of living of rural populations, and the adequate defense of the soil". This objective, even if indirectly, demonstrates environmental concern by reconciling the increase in productivity with the defense of the soil. However, there is no explicit statement in this Law that rural credit must consider the environmental dimension. It is important to note that in the 1960s, the environmental issue received less attention than it does today.

Although sustainability is not expressly included as one of the objectives of rural credit, article 4 of that law delegates to the National Monetary Council (CMN) the competence to discipline it, including defining guidelines and criteria for the application of rural credit.

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Therefore, it is up to the CMN to define criteria for the application of rural credit, establishing priorities for the distribution of credit, following the criteria it deems relevant, including those related to environmental sustainability.

Law No. 8,171 of 1991 (Agricultural Policy Law), which establishes rural credit as one of the instruments of agricultural policy, includes the preservation of the environment as one of the objectives of rural credit, in addition to encouraging the replacement of the extensive livestock system with intensive, potentially more sustainable cattle raising.

> Article 48. Rural credit, an instrument for financing rural activity, shall be supplied by all financial agents without discrimination between them, through compulsory application, free own resources, appropriations from official credit operations, funds, and any other resources, with the following objectives:
> I - to stimulate rural investments for production, non-predatory extractivism, storage, processing, and installation of agro-industry, which is carried out by rural producers or their associative forms;
> II - to favor the timely and adequate funding of production, non-predatory extractivism, and the commercialization of agricultural products;
> III – to encourage the introduction of rational methods in the production system, to increase productivity, improving the standard of living of rural populations and adequate soil conservation and environmental preservation;
> [...]
> VII -- to support the replacement of the extensive livestock system by the intensive livestock system;
> VIII -- Stimulate the development of the organic system of agricultural production.

In addition, it establishes that the approval of rural credit must take into account the Agroecological Zoning (ZAE), Article 50, Paragraph 3. The ZAE is a technical-scientific instrument that seeks sustainability from the social, economic, and environmental points of view, indicating the most suitable places for the cultivation of a given crop (BRASIL, 2010).

However, so far, only the zoning of sugarcane, approved by Decree No. 6,961 of September 17, 2009, has represented an effective restriction on the granting of rural credit. The ZAE-sugarcane prohibited credit for planting, renovation, or funding of crops or industrialization of sugarcane for ethanol production in the Amazon and Pantanal Biomes and the Upper Paraguay Basin.

Another relevant point brought by Law No. 8,171 of 1991 concerns the obligation of inspection by the financier (art. 50, II). This point is especially important because the establishment of the supervisory competence to financial institutions increases the cost of compliance, which reduces the attractiveness of rural credit to the financial system and, potentially, raises the interest rates charged on the portion of rural credit with free rates. Thus, the establishment of additional rules, including those related to environmental

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sustainability, tends to increase compliance costs and face resistance from both rural producers and financial institutions.

The first environmental condition in rural credit was introduced by the CMN in 2008, with Resolution No. 3,545, which began to require proof of compliance with environmental rules for financing in the Amazon Biome. Studies indicate that this measure has contributed to reducing deforestation in the region (ASUNÇÃO et al., 2016).

In the following years, new resolutions encouraged sustainable practices, such as proof of preservation areas for access to expanded credit limits. Resolution No. 4,106/2012 allowed a 15% increase in credit for producers who demonstrated the maintenance of legal reserves or adopted no-tillage. In 2013, Resolution No. 4,226 included registration in the Rural Environmental Registry (CAR) as a criterion for this expansion, which could increase the credit by up to 30%.

However, in 2015, Resolution No. 4,412 revoked these conditions, suspending environmental incentives until 2020. As of Resolution No. 4,883/2020, a 10% increase in the funding credit for producers who invested in the recovery of protected areas or the acquisition of bioinputs was once again allowed, provided that the property's CAR had already been analyzed.

More recently, in 2021 and 2022, the Central Bank reinforced the integration of sustainability into rural credit through BCB Resolutions No. 140 and No. 204, establishing environmental and social impediments to granting credit and promoting greater transparency in operations registered in the Rural Credit Operations System (Sicor).

SUSTAINABLE FINANCE AND THE BC# SUSTAINABILITY AGENDA

In recent decades, the theme of sustainable development has gained prominence in society. This concept encompasses three aspects: economic, social, and environmental. Sustainable development aims for the current and future generations to have the necessary resources, such as food, water, health, and energy, without harming the Earth's systemic processes (SCHOENMAKER; SCHRAMADE, 2019).

According to Knoch et al. (2022), sustainable finance is that which integrates the economic, social, and environmental aspects of sustainability into the financial market, contributing to the mitigation of ESG (environmental, social, and governance) risks and the development of a sustainable economy. The financial sector can play an important role in

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allocating investments to sustainable projects, accelerating the transition to a more circular and low-carbon economy (SCHOENMAKER and SCHRAMADE, 2019).

In the agricultural sector, sustainable financial instruments can be linked, for example, to increased productivity, to a more rational use of available natural resources, such as the recovery of pastures and degraded soils, to the adoption of innovative techniques, such as Crop-Livestock-Forest Integration, and to the monetization of environmental services, reducing the need to expand the agricultural frontier, stimulating care for the environment and at the same time meeting the growing demand for food.

In line with the growing importance of the topic of sustainable development and sustainable finance, the Central Bank launched, in September 2020, its sustainability agenda, called BC# Sustainability, as an integral part of its strategic planning.

The Central Bank's Institutional Strategic Planning (PEI-BCB) presents Socio-environmental Responsibility as one of its organizational values: "We act with socio-environmental responsibility. We act with respect for citizens, the environment, employees and other stakeholders, with a view to sustainable development." Among the strategic objectives presented is to "promote sustainable finance and contribute to the reduction of socio-environmental and climate risks in the economy and the Financial System".

Within the scope of the PEI-BCB, a set of strategic actions was launched, called the BC# Agenda, subdivided into five dimensions: inclusion, competitiveness, transparency, education and sustainability. As presented in the Report on Social, Environmental and Climate Risks and Opportunities (BRASIL, 2021a), the "Sustainability" dimension of the BC# Agenda deals with the promotion of sustainable finance, the proper management of social, environmental and climate risks in the economy and in the SFN, in addition to integrating sustainable variables into the BCB's decision-making process.

With these actions, Brazil has been identified as one of the pioneers in the regulation of the subject. The monetary authority has sought to adapt to international best practices, having expressed its support for the recommendations of the *Task Force on Climate-related Financial Disclosure* (TCFD) and joined the *Network for Greening the Financial System* (NGFS).

A series of resolutions on socio-environmental risks were approved with the aim of strengthening the efficiency and soundness of the financial system, including forestry and low-carbon agriculture. In addition, requirements were introduced for all financial institutions to establish social and environmental risk systems based on the principles of

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relevance and proportionality and to integrate social and environmental issues into their risk assessments, in addition to traditional credit, market and operational risks. The underlying assumption is that incorporating environmental and social factors into risk management is a way to strengthen the resilience of the financial system (UNEP, 2015).

As part of the measures of the BC# Sustainability agenda, the creation of the Sustainable Rural Credit Bureau was announced, which would consist of an evolution of the Rural Credit and Proagro Operations System (Sicor). Such a Bureau would be guided by the principles of *Open Banking*, which would allow beneficiaries of rural credit to make information registered in the new system available to any interested party, without the need for intermediation by financial agents.

In addition, the proposal provided for the elaboration of a set of parameters associated with the sustainability of rural enterprises, which would allow agricultural policy makers to assess the possibility of granting additional incentives to the financing of these enterprises, making it possible to direct a greater flow of resources to sustainable enterprises (BRASIL, 2021a).

According to BRASIL (2021b), the expectation was that, by making explicit the characterization of rural credit operations as sustainable from a social, environmental, and climate point of view, the financial system would start to offer financing under more favorable conditions to producers with more sustainable characteristics, since one of its objectives is to mitigate social and environmental risks in the granting of credit.

ANALYSIS OF PUBLIC CONSULTATION NO. 82/2021

PUBLIC CONSULTATION NO. 82/2021

In pursuit of the BC# Sustainability agenda, the BCB Collegiate Board of Directors launched Public Consultation No. 82/2021, of March 11, 2021. The Consultation consisted of a proposal for a resolution by the CMN that would define sustainability criteria applicable to the granting of rural credit, and a proposal for a resolution by the BCB to provide for the characterization of enterprises with restrictions on access to rural credit due to legal or infra-legal provisions related to socio-environmental issues.

According to the public consultation notice (BRASIL, 2021b), the draft resolutions were based on a "set of criteria, obtained from an extensive technical survey, which may be considered in the definition of which rural credit operations will be classified as sustainable operations, based on environmental and social parameters".

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In addition, the notice pointed out that some rural credit operations would have potential impacts on the fulfillment of the Social and Environmental Responsibility Policy (PRSA) by financial institutions, as required by CMN Resolution No. 4,327, of April 25, 2014, and provided for the signaling to financial institutions that such operations could present social and environmental risks, not being eligible to receive the classification of rural credit operation for enterprises Sustainable.

STRUCTURE AND OBJECTIVES OF THE PROPOSAL

CP No. 82/2021 was structured in three distinct axes. The first sought to consolidate legal and infra-legal rules, then in force, which established prohibitions and conditionalities related to socio-environmental issues for the granting of rural credit operations.

The second dealt with instituting a system for sharing information on operations registered in the Rural Credit and Proagro Operations System (Sicor), a platform on which rural credit operations and the classification of enterprises in the Agricultural Activity Guarantee Program (Proagro) are registered.

Finally, the last line of action aimed to create sustainability criteria applicable to the granting of rural credit.

The first two axes, the consolidation of current legislation and the expansion of transparency, presented fewer challenges to be put into practice. The systematization and consolidation of legal and infra-legal legislation aimed to facilitate the application of the rules by financial institutions, as well as the monitoring by rural producers demanding credit.

The sharing of rural credit information stems from the implementation of what is conventionally called *Open Finance*, or open financial system, which consists of the possibility for customers of financial products and services to allow the sharing of their information between different institutions authorized by the Central Bank. This measure seeks to increase competition between financing agents, facilitating the beneficiary of rural credit access to the resources necessary to finance his enterprise.

The consolidation of the rules already in force was the subject of Vote No. 210/2021-BCB, of September 8, 2021, which gave rise to BCB Resolution No. 140, of September 15, 2021, which "Provides for the creation of Section 9 (Social, Environmental and Climate Impediments) in Chapter 2 (Basic Conditions) of the Rural Credit Manual".

The transparency of information was the subject of Vote No. 57/2022-BCB, of March

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9, 2022, which gave rise to BCB Resolution No. 204, of March 22, 2022, which "Provides for the sharing of data on operations registered in the Rural Credit and Proagro Operations System (Sicor)". With this, the two initial axes of the public consultation were contemplated.

THE DEFINITION OF SUSTAINABILITY CRITERIA AND THE DRAFT RESOLUTION OF THE CMN

The establishment of sustainability parameters for the granting of rural credit would take place through a CMN resolution (BRASIL, 2021a). However, the draft presented under CP 82/2021 did not present the criteria adopted to classify whether a given investment would be sustainable, but only listed, in its annex, a series of financing lines, programs, and activities considered sustainable:

> Article 1 The sustainability criteria applicable to the granting of rural credit operations are hereby approved.
> Article 2 The information referring to the Subprograms, the Production System, products and varieties or fields of the Rural Credit and Proagro Operations System (Sicor) related to the rural enterprise listed in the Annex to this Resolution shall be part of the set of information that may be used for, subject to the provisions of arts. 3 and 4, classify the respective operation as a sustainable rural credit operation.
> Sole Paragraph. The operation will lose its classification as a sustainable rural credit operation as a result of monitoring and inspection actions by financial institutions or the supervision actions of the Central Bank of Brazil, if:
> I - to be framed, at any time, in any of the hypotheses dealt with in arts. 3 and 4 of this Resolution;
> II - the non-compliance with the sustainability criterion that underpinned the classification of the operation as a sustainable rural credit operation is verified, at any time.
> Art. 3 When financed with rural credit, the following enterprises will receive a socio-environmental risk signal and will not be able to receive the classification of sustainable rural credit operation:
> I - whose lands are totally or partially inserted in embargoed areas, according to updated records made available by the Brazilian Institute of the Environment and Renewable Natural Resources (Ibama) and by the Chico Mendes Institute for Biodiversity Conservation (ICMBio);
> II - whose land is totally or partially inserted in areas of Permanent Preservation, Legal Reserve or Private Natural Heritage Reserve, as provided for in Law No. 12,651, of May 25, 2012;
> III - whose beneficiaries have been fined for informal or child labor in the last three (3) years, according to the list provided by the Special Secretariat for Social Security and Labor of the Ministry of Economy.
> Article 4 - The Central Bank shall provide for the characterization of enterprises with restrictions on access to rural credit due to legal or infra-legal provisions related to socio-environmental issues.
> Art. 5 This Resolution enters into force on July 1, 2021.

The provisions of arts. Sections 3 and 4 of the draft were incorporated into BCB Resolution No. 140, of 2021, which consolidated the restrictions on access to rural credit

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due to legal or infra-legal provisions related to social, environmental, or climate issues that existed until then, without promoting any innovation to the legal framework.

In turn, the application of the sustainability "parameters" defined in the draft CMN Resolution would result in the following situations (BRASIL, 2021a):

- enterprises that cannot be financed with rural credit, due to the existence of existing legal or infra-legal commands that prevent the granting of financing or the exploration of the area presented in the credit proposal;
- enterprises that may be financed with rural credit, with the alert to the supervision that the operation represents potential social or environmental risk, due to the fact that the area of the enterprise is inserted in some portion of the area with restriction established by environmental legislation, or because they have characteristics that increase social or environmental risk;
- enterprises that may receive incentives for sustainable operations, due to compliance with social, environmental or climate sustainability parameters.

Chart 1 presents examples of investments according to the categorization of sustainability parameters.

Table 1 – Examples of investments according to the categorization of sustainability parameters

Category	Description	Examples
(a) Ventures that cannot be financed	Existing legal or infra-legal impediments	Financing in areas embargoed by IBAMA; Financing for producers included in the slave labor list
(b) Projects that can be financed, with risk warning	Potential social or environmental risk	Financing in areas with partial overlap with indigenous lands; Financing in areas with partial overlap with conservation units
(c) Enterprises eligible for incentives for sustainable operations	Meet sustainability parameters	Recovery of degraded areas; Agroforestry systems; Organic production with certification; ABC Program

Source: Adapted from BRASIL, 2021a

The categorization presented in Chart 1 represents an attempt to systematize the different types of projects according to their socio-environmental impacts and their compliance with legislation. Group (a) comprises activities that violate legal norms and, therefore, are not eligible for funding. Group (b) includes operations that, although permitted, represent social and environmental risks and should be monitored more closely. Group (c) covers enterprises that adopt practices considered sustainable and, therefore, would be eligible for potential benefits.

However, the draft does not establish clear criteria to determine which specific practices are considered sustainable, limiting itself to listing generic examples. This lack of

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precision can compromise the effectiveness of the policy as an inducer of more sustainable behaviors.

DRAFT RESOLUTION FROM THE PERSPECTIVE OF THE ECONOMIC ANALYSIS OF LAW

As Gico Jr. (2012) explains, modern economics is based on the study of incentives for human behavior. In turn, the law can be considered as an institutional technique for controlling human behavior through the use of state force, as opposed to the use of social or moral pressure. Thus, the Economic Analysis of Law (AED) consists of the use of the economic theoretical tool to study the incentives generated by the legal system.

Economic theory provides the foundation for predicting the effects of laws on human behavior. For economists, sanctions are similar to prices, and people respond to sanctions in the same way as prices. When a certain price is high, people react by consuming less of that product. Likewise, more severe sanctions tend to reduce the propensity of agents to violate norms (COOTER; ULEN, 2016).

Incentives for Rural Producers

As a rational agent, the rural producer seeks to maximize profits. In the calculation of the financial result of the activity, the cost of financing is a relevant component, largely due to the long production cycle, which can require several months between the purchase of raw materials (seeds, fertilizers, pesticides, machinery and implements) and the commercialization of the harvest.

During this period, the producer needs to finance his activity, which is done, at least in part, through official rural credit, which has more favorable conditions when compared to alternative sources, such as the use of own capital; the capital market; or financing through trading companies and input resellers.

Thus, the inclusion of sustainability criteria in the granting of rural credit will potentially impact the decisions of rural producers. Those who already produce in accordance with these criteria will have no incentive to fail to comply with them. However, those who do not fit into them must analyze the incentive structure resulting from the new rule to choose between maintaining production methods or adapting to sustainability standards.

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CP 82/2021 did not specify what benefits would be granted to projects considered sustainable, and this is a decision to be made later by the CMN. Some of the possible favorable conditions are: reduction in the interest rate; raising the financeable limit; increase in waiting period; and extension of the payment term.

Short, medium and long-term planning is an essential part of rural activity. Decisions about what, how much and how to produce are complex, since they involve the expectation of future prices of potential products to be grown, the need for investments linked to different technological packages and production costs, including financing.

The offer of favorable financing conditions for sustainable investments will be a new variable to be considered by producers. In general, in order to produce the desired effects, the benefit resulting from the reduction of the cost of financing must, in the medium and long term, exceed the cost associated with the replacement of traditional production methods with those considered more sustainable. In other words, if compliance with sustainability criteria proves to be more advantageous than maintaining the status quo, the producer will opt for change. Otherwise, it will continue to carry out its activity in the conventional way.

Incentives to Financial Institutions

In turn, financial institutions will have to evaluate the attractiveness of "sustainable" financing lines, which will depend on how the rule is established. The flow of information necessary to classify an operation as sustainable, as well as the level of rigor required in the monitoring and inspection of operations, have the potential to affect the behavior of both producers and FIs.

Law No. 8,171, of 1991, establishes that the supervision of the granting of credit is an obligation of the lender (art. 50, II). The draft resolution establishes that financial institutions must monitor and inspect operations to verify compliance with the sustainability criteria that justified the classification (article 2, sole paragraph).

However, there is no mention of possible sanctions to financial institutions that fail to identify operations in disagreement with sustainability criteria, and it is possible that the CMN will later establish new responsibilities and penalties.

If there are no sanctions or compensation for the costs of observation arising from obligations with sustainability rules, there will be no incentive for financial institutions to carry out effective monitoring. This will give way to the occurrence of fraud of all kinds.

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It is important to note that the responsibility for monitoring and inspecting compliance with the rules related to sustainability in rural credit is, in theory, the responsibility of the government. However, in view of the growing budgetary restrictions, the public sector has been transferring such attributions to financial institutions, removing the associated costs from themselves.

It is expected that the establishment of punishments for FIs that fail in inspection will encourage the effective monitoring of credit operations with the application of resources in the correct destinations. However, this will increase compliance costs, which may be a disincentive to grant sustainable credit. In this case, it may be more profitable for FIs to concentrate their operations on traditional credit lines, which do not require additional inspection effort.

According to Becker (1968), a person prone to an illicit activity rationally weighs the costs and benefits of the practice, and then chooses to act or not in the illegal economic market. The costs would be a function of the probability of punishment, the level of punishment, the cost of planning the "crime", the opportunity cost and the moral loss of the execution of the crime. Therefore, to reduce the incentives for fraud, the probability of punishment or the expected value of the punishment can be increased if the illegal activity is identified.

ANALYSIS OF THE EXPECTED RESULTS OF THE PROPOSAL

Using the EDA analytical categories presented in the methodology, it is possible to analyze in a more structured way the possible results of the proposal:

1. **Rationality of agents**: Rural producers and financial institutions, as rational agents, will seek to maximize their benefits considering the costs and incentives created by the new regulation. The effectiveness of the norm will therefore depend on its ability to positively alter the incentive structure of these agents.
2. **Incentive structure**: The proposal creates potential benefits for producers who adopt sustainable practices, but does not specify what these benefits would be or their magnitude. This lack of definition compromises the ability of the norm to effectively induce the desired behavior. In addition, by not differentiating practices that are already economically advantageous from those that require additional incentives, the proposal may result in allocative inefficiency.

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3. **Informational asymmetry**: The proposal implicitly recognizes the existence of informational asymmetry between producers and financial institutions, attributing to the latter the responsibility for monitoring. However, it does not establish efficient mechanisms to mitigate this asymmetry, such as the broader integration of information systems or the use of remote monitoring technologies.
4. **Transaction costs**: Compliance with the standard will imply additional costs for both producers (adaptation to sustainable practices) and financial institutions (monitoring and inspection). The absence of mechanisms to reduce these costs or adequately compensate them can compromise the effectiveness of the policy.

In October 2022, the BCB informed in response to a request for information that the institution was in discussions with the Ministries of Agriculture, Livestock and Supply (Mapa) and Economy (ME) for the preparation of regulations that include sustainability criteria in rural credit, and there is no forecast for its publication.

5.6 SUGGESTIONS FOR IMPROVING THE PROPOSAL

From the analysis carried out, it is possible to identify fundamental aspects that could be improved to increase the effectiveness of the proposal in promoting sustainable agricultural production:

Definition of Sustainable Investment and Creation of a "Green" Taxonomy

There is no universally accepted definition of what sustainability is, and there is no common understanding of what constitutes a sustainable investment. Asset managers, debt issuers and credit rating agencies use their own, often slightly divergent, definitions, which makes it difficult for investors to understand what is behind an "ESG", "sustainable" or "green" label. The lack of clarity potentially decreases market confidence in sustainable finance (WALTER; SCHILDBACH, 2022).

The draft resolution presented in CP 82/2021 did not present the definition of what is considered a sustainable investment, but only listed a list of programs, production methods, and crops classified as sustainable, but with turgid criteria. Such a situation is capable of generating disbelief, since, depending on the criterion adopted, some of the items contained in the annex to the resolution may not be considered sustainable.

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If the concept of sustainability is not detailed in a clear, comprehensive and measurable way, there is a risk that the regulation will be used to carry out what is conventionally called greenwashing, giving an aspect of sustainability to activities that merely comply with what is already required by law or to cover up illicit or negative practices to the environment under a veil of supposed sustainability. threatening the credibility of the initiative (BOWEN; ARAGÓN-CORRÊA, 2014).

According to Walter & Schildbach (2022), the technical criteria that detail what should be considered a sustainable activity are a crucial point. They must strike a balance between clarity on the one hand and complexity, ease of use and regulatory burden on the other. In addition, taxonomies must be dynamic and adaptable, allowing for the integration of new technologies, while remaining a reliable classification for investors.

Therefore, for the standard to achieve its objectives, it must contain a clear definition of what sustainable investments are, based on technical criteria, prepared jointly by environmental and agricultural agencies, assisted by the scientific community, in order to avoid ambiguities. Several countries already have green taxonomies, the most prominent example being the European Union. In Brazil, Febraban has also developed a green taxonomy (FEBRABAN, 2021), which can serve as a basis for the Central Bank's efforts.

Predictability of Benefits

The notice of CP 82/2021 establishes as follows:

> The information related to sustainable operations may be used by other financial institutions, certifiers of sustainable credit securities, rating agencies specialized in ESG criteria and service providers hired to audit the adherence of enterprises to social and environmental requirements, in addition to allowing agricultural policy makers the possibility of granting additional incentives to sustainable rural enterprises.

Part of the attractiveness of producers' adoption of sustainability criteria comes from the establishment of facilitated conditions in the granting of rural credit. There are several variables that agricultural policymakers can work with: interest rate; amount financed; payment and grace periods; priority in access to the subsidy to the rural insurance premium; and guarantees.

However, the producer's decision to adapt his production system to the criteria that may be established should involve a rational analysis of the costs of adaptation about the potential benefits. Therefore, the reduction of uncertainty regarding the continuity of the rules is a relevant factor in decision-making. Changing production methods and products

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involves investments in physical and human capital. The producer needs to be confident that the return on such investments will last for several harvests. Thus, it is recommended that, once the benefits of sustainable rural credit are defined, the government indicates the minimum period in which they will be in force.

Socio-environmental Additionality for the Granting of Benefits

The granting of facilitated conditions in rural credit operations that meet sustainability criteria must take into account resource constraints, seeking to maximize efficiency in their use. This implies that not all investments considered sustainable should be entitled to the most favorable financing conditions.

The objective that is sought is, through incentives, to modify the action of rural producers, who, in the absence of these incentives, would adopt unsustainable practices.

It turns out that there are sustainable practices that are superior, from the agronomic and economic points of view, to traditional practices. An example is the no-tillage of soybeans. Such a practice is capable of reducing the use of fossil inputs, such as fuels and certain fertilizers; contributes to carbon sequestration in the soil; it prevents its erosion; improves its physical, chemical and biological characteristics; and increases productivity. Thus, regardless of additional benefits, the rational decision of the producer is already to adopt no-tillage, as the method reduces the use of inputs, reducing costs, and increases productivity.

Thus, there would be no reason to stimulate, with facilitated conditions of sustainable rural credit, a practice that is already proving to be superior to the others.

Therefore, any benefits should be directed to practices that would not be implemented in its absence. In other words, it is necessary to demonstrate social or environmental additionality to be entitled to benefits, in order to optimize the use of scarce rural credit resources.

Monitoring and Enforcement

The rules that establish sustainability criteria for the purpose of granting rural credit must establish the responsibilities of each participant, as well as any consequences for deviations observed.

The establishment of an efficient monitoring system, on the one hand, and a low-cost one, on the other, can prove to be a challenge at first. The use of automated

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technological systems through remote sensing and artificial intelligence can reduce inspection costs.

On-site inspection, by random sampling, associated with strict punishments for creditors who adopt opportunistic behaviors, seeking to defraud the rules, may prove to be sufficient to discourage such practices. It is important, however, that the size of the samples be established in such a way as not to excessively increase the cost of compliance with financial institutions, so as not to discourage the granting of sustainable rural credit.

Expand the Integration of Sicor with Other Systems

The prohibition of credit in certain situations, and the generation of alerts for operations that represent a social, environmental or climate risk, are very relevant instruments to reduce the economic risk associated with the image of financial institutions, but also to prevent and reduce the negative impacts caused by rural credit operations.

According to BRASIL (2021b), Sicor cross-checks databases and queries other systems external to the BCB, validating records and attesting to the veracity of information, preventing operations in non-compliance with the regulation from being formalized as rural credit. "In the registration of operations, information is collected in 270 data fields, which are subject to 1,300 checks. Several of these fields bring information that shows good environmental and sustainability practices of each operation".

There is, however, room to advance further in the integration of Sicor with other systems and platforms, such as, for example, the SatAlerta system of Inpe/CNMP/CNJ, which would allow an analysis of deforestation that occurred within the rural property, generating alerts to FIs at the time of contracting the credit.

CONCLUSION

The present work analyzed, from the perspective of the Economic Analysis of Law, the proposal presented by the Central Bank of Brazil in Public Consultation No. 82/2021, which aims to include sustainability criteria in the granting of rural credit. The study sought to answer to what extent the proposed resolution achieves the objective of promoting sustainable agricultural production, examining the incentives generated by the normative proposal and its possible consequences for the behavior of the agents involved.

The analysis revealed that, although the initiative represents an important advance

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in the promotion of sustainable finance in the agricultural sector, the proposal has limitations that may compromise its effectiveness. The main weakness identified is the absence of a clear and technically grounded definition of what would constitute a sustainable investment, but merely lists generic examples of practices and programmes. This inaccuracy increases the risk of greenwashing and makes it difficult to monitor and enforce compliance with the criteria.

The incentive structure created by the proposal also has deficiencies, since it does not specify which benefits would be granted to enterprises classified as sustainable or for how long they would be in force. This uncertainty reduces the attractiveness of adopting sustainable practices, especially when they require long-term investments.

In addition, the proposal does not adequately differentiate between practices that are already economically advantageous for producers and those that require additional incentives to be adopted, potentially resulting in inefficiency in the allocation of limited resources. Nor does it establish efficient mechanisms for monitoring and inspecting operations, transferring these costs to financial institutions without providing adequate compensation, which may discourage the granting of sustainable credit.

Finally, despite recognizing the importance of the integration of information systems, the proposal does not make sufficient progress in this regard, failing to fully exploit the potential of available technologies to reduce monitoring costs and increase the effectiveness of the policy.

Based on these findings, five fundamental aspects were identified that need to be improved to increase the effectiveness of the proposal: (1) clear and technically grounded definition of investments considered sustainable, preferably through a green taxonomy; (2) greater predictability regarding the benefits granted, including their magnitude and duration; (3) focus on practices that demonstrate socio-environmental additionality, that is, that would not be adopted in the absence of incentives; (4) development of efficient and low-cost mechanisms for monitoring and enforcement; and (5) expansion of Sicor's integration with other environmental monitoring systems.

The study contributes to the debate on agricultural policy by applying the theoretical framework of the Economic Analysis of Law to evaluate a normative proposal of the Central Bank aimed at promoting sustainability, demonstrating how aspects related to the structure of incentives and transaction costs can influence the effectiveness of such policies.

Brazil is one of the largest food producers and has advanced, in recent years, in the

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efficiency and sustainability of its production systems. Rural credit is capable of contributing to the consolidation of a more sustainable agriculture, to the transition to a low-carbon economy and to the achievement of the goals of the Paris Agreement, favoring Brazil's leadership both in agriculture and in the environmental debate. However, for these objectives to be achieved, public policies in this area must be designed in order to create adequate incentives and minimize transaction costs, considering the particularities of the Brazilian agricultural sector and the needs of its various actors.

A suggestion for future research would be to analyze the impacts of the resolutions effectively implemented after the public consultation, evaluating to what extent the recommendations of this study were incorporated and what results were obtained in terms of promoting sustainability in the agricultural sector. Another possibility would be to carry out comparative studies between the Brazilian approach and the experiences of other countries in terms of sustainable rural credit, identifying good practices that could be adapted to the national context.

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