Sustainability of the Social Security Financing System: an analysis of the Brazilian model in the face of demographic challenges

Sustentabilidade do sistema de financiamento da Seguridade Social: uma análise do modelo brasileiro diante dos desafios demográficos

Sostenibilidad del sistema de recaudación de la Seguridad Social: análisis del modelo brasileño frente a los desafíos demográficos

Lavínia de Souza e Medga[1]
ORCID: https://orcid.org/0009-0007-9352-0708
E-mail: laviniamegda2015@gmail.com

Fábio Lucas de Albuquerque Lima[2]
ORCID: https://orcid.org/0009-0000-2881-3853
E-mail: Fabio.lima@idp.edu.br

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[1] Graduada em Direito pela Universidade IDP em Brasília/DF. Advogada no Passos & Sticca Advogados Associados em São Paulo.

[2] Doutorando em Direito pelo UniCEUB em Brasília/DF. Professor de Direito Previdenciário na Universidade IDP e Faculdade ANASPS em Brasília/DF. Mestre em Administração Pública pela FGV/RJ. Membro do Crossref. Membro do Conselho de Altos Estudos em Direito. Membro da Comissão Nacional de Agentes Públicos do IBDA. Presidente do Conselho Deliberativo do IDAS. Procurador Federal junto ao INSS. Coordenador do Centro de Estudos Jurídicos Celso Barroso Leite em Brasília/DF.

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ABSTRACT: This study analyzes the sustainability of financing for Brazil's General Social Security Regime (RGPS) through a comparison with institutional responses adopted in Spain. The research employs a qualitative approach based on a narrative literature review and documentary analysis, supported by demographic and socioeconomic data. It examines the pressures that population aging, informality, and changes in work associated with the digital economy and artificial intelligence place on the contribution base. The analysis identifies mechanisms in Spain's reforms for strengthening revenues and protecting purchasing power within the public pay-as-you-go system, without quantifying their fiscal effects. It concludes that RGPS sustainability requires aligning financing with benefit adequacy, expanding contributory coverage, and adapting revenue sources to economic transformations.

Keywords: Social Security; General Social Security Regime; financial sustainability; demographic transition; actuarial balance; comparative law.

RESUMO: Este estudo analisa a sustentabilidade do financiamento do Regime Geral de Previdência Social (RGPS) brasileiro por meio da comparação com as respostas institucionais adotadas na Espanha. A pesquisa adota abordagem qualitativa, baseada em revisão bibliográfica narrativa e em análise documental, com apoio em dados demográficos e socioeconômicos. Examina as pressões que o envelhecimento populacional, a informalidade e as transformações do trabalho associadas à economia digital e à inteligência artificial exercem sobre a base contributiva. A análise identifica, nas reformas espanholas, mecanismos de reforço das receitas e de proteção do poder aquisitivo no interior do sistema público de repartição, sem lhes atribuir efeitos fiscais quantificados. Conclui que a sustentabilidade do RGPS exige articular o financiamento com a suficiência dos benefícios, ampliar a cobertura contributiva e adaptar as fontes de receita às transformações econômicas.

Palavras-chave: Seguridade Social; Regime Geral de Previdência Social; sustentabilidade financeira; transição demográfica; equilíbrio atuarial; direito comparado.

RESUMEN: Este estudio analiza la sostenibilidad del financiamiento del Régimen General de Previsión Social (RGPS) de Brasil mediante una comparación con las respuestas institucionales adoptadas en España. La investigación emplea un enfoque cualitativo, basado en una revisión bibliográfica narrativa y un análisis documental, con apoyo de datos demográficos y socioeconómicos. Se examinan las presiones del envejecimiento poblacional, la informalidad y las transformaciones del trabajo vinculadas a la economía digital y la inteligencia artificial sobre

la base contributiva. El análisis identifica en las reformas españolas mecanismos de refuerzo de los ingresos y de protección del poder adquisitivo dentro del sistema público de reparto, sin atribuirles efectos fiscales cuantificados. Se concluye que la sostenibilidad del RGPS exige articular el financiamiento con la suficiencia de las prestaciones, ampliar la cobertura contributiva y adaptar las fuentes de ingresos a las transformaciones económicas.

Palabras clave: Seguridad Social; Régimen General de Previsión Social; sostenibilidad financiera; transición demográfica; equilibrio actuarial; derecho comparado.

1 INTRODUCTION

Social security is responsible for supporting thousands of families in Brazil. Metaphorically, it could be said that social security is the extended family. Falling birth rates and increasing longevity are raising alarms about the financial balance of the entire social protection system worldwide and, consequently, in Brazil. The Brazilian demographic pyramid is turning into a funnel. In light of the principle of solidarity, demographic challenges, and advances in artificial intelligence, the law must reflect on its sustainability.

Social cohesion, which extends to all members of society and aims to provide protection against social risks (Balera, 2010, p. 37) such as old age, illness, unemployment, and the inevitability of death, imposes on scholars of social security law the task of identifying pathways and possible solutions to the problems faced. In this regard, the Brazilian social security system is of fundamental socio-economic importance, with the basic purpose of ensuring the essential means of subsistence for its beneficiaries in the face of social risks (Zuba, 2023, p. 25).

The same intergenerational solidarity also governs the financing of Spanish pensions. The parallel between Brazil and Spain makes it possible to examine how pay-as-you-go systems respond to population aging, without assuming that their institutional structures, revenue sources or the scope of the benefits they guarantee are identical.

As expressly provided in the Brazilian Constitution**,** the system is divided into three regimes: the General Social Security Regime (RGPS), the Special Social Security Regimes (RPPS) and the Supplementary Regime (RPC), with the RGPS being the most comprehensive pillar, responsible for covering workers in the private sector and comprising the largest proportion of contributors and beneficiaries, and administered by the National Social Security Institute (INSS).

The RGPS operates under a simple pay-as-you-go system, in which current revenues finance the benefits in payment. Intergenerational solidarity is part of this system, whose sustainability depends on the relationship between expenditure and financing capacity, which is in turn influenced by the age structure, employment, labor income and productivity.

Brazil's demographic transition, marked by falling fertility and rising longevity, alters the relationship between generations. Aging expands the potential demand for benefits and may extend their duration. Its effects on revenue, however, depend on the number of people actually working, on their pay and on the continuity of their contributions.

Aging is also a challenge for European countries, including Spain. The responses adopted there include changes to retirement rules and measures to strengthen revenue, which allows financing alternatives to be discussed without reducing the debate to raising the age of access to benefits.

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The projections analyzed by Vartanian, Scarano and Rodrigues (2019, p. 20) point to an increase in the old-age dependency ratio and to a deterioration in the ratio between contributors and beneficiaries.

State coverage of financial shortfalls involves decisions about the distribution of public resources and of burdens among different social groups. The comparison requires identifying which expenditures belong to the contributory regime and which are financed by other revenues, so that not every budgetary transfer is taken as sufficient evidence of actuarial imbalance. Spanish legislation draws this line expressly (Espanha, 2015, art. 109).

The Brazilian debate also addresses the relationship between the RGPS result and the broader social security budget. Carvalho, Campelo and Araújo Neto (2024, p. 9), for example, analyze the effects of the Decoupling of Federal Revenues (DRU) on the allocation of social contributions. The analysis of its historical effects must be distinguished from the regime established by Constitutional Amendment No. 103/2019, which included in Article 76, paragraph 4, of the ADCT the exclusion of contributions intended to fund social security from the decoupling provided for therein.

The objective of this article is to analyze the challenges to the sustainability of RGPS financing and to compare them with the institutional responses adopted in Spain, as well as with the reform initiatives in Chile and Mexico. The comparison focuses on financing sources, the preservation and adequacy of benefits, and the measures adopted to adapt to demographic and labor-market change.

The article argues that assessing sustainability requires linking revenue-raising capacity with the adequacy of protection, without treating expenditure cuts or a change of financial regime as sufficient solutions in themselves.

The article is divided into six sections. Following this introduction, Section 2 presents the institutional framework, the financing sources and the criteria of financial sustainability and social adequacy. Section 3 sets out the methodological approach and the axes of comparison. Section 4 examines the demographic and fiscal pressures on the RGPS. Section 5 analyzes the capitalization experiences, the changes in work and the Spanish responses to strengthen revenue, identifying their implications and limits for Brazil. Finally, Section 6 presents the final considerations.

2 INSTITUTIONAL CONTEXT OF BRAZILIAN SOCIAL SECURITY AND SIMILARITIES WITH SPAIN

Brazilian social security is enshrined in Article 6 of the Brazilian Federal Constitution as a fundamental social right, with the primary aim of guaranteeing the essential means of subsistence to its beneficiaries in situations of social risk, such as disability, old age, or death (Zuba, 2023, p. 25). Forming part of the broad concept of Social Security defined by Article 194 of the Brazilian Constitution, alongside healthcare and social assistance, it constitutes an integrated set of public and social initiatives designed to safeguard basic existential rights (Balera, 2010, p. 37).

The unification of Brazil's retirement and pension institutes, organized by occupational category, advanced in the 1960s with the creation of the National Social Security Institute (INPS). In Spain, the reorganization that established the Instituto Nacional de la Seguridad Social (INSS) took place in 1978, through Royal Decree-Law 36/1978 (Espanha, 1978, arts. 1 and 3). The two processes may be compared as instances of administrative rationalization, but their chronology and institutional configuration should not be confused.

In Brazil, the National Social Security Institute was created in 1990 and also adopted the acronym INSS. The coincidence goes beyond the name and extends to similarities between

the models. Both legal systems provide for social participation in management, although with different compositions. Article 194, sole paragraph, VII, of the Brazilian Constitution provides for quadripartite management, with workers, employers, retirees and the Government in the collegiate bodies. In Spain, Article 3 of Royal Decree-Law 36/1978 provides for the participation of trade union representatives, employers' organizations and the Public Administration. What the two systems share is the opening of management to social representation (Brasil, 1988, art. 194, sole paragraph, VII; Espanha, 1978, art. 3).

Internationally, this protection guaranteed by social security is underpinned by landmark documents such as the 1948 Universal Declaration of Human Rights and the 1966 International Covenant on Economic, Social and Cultural Rights, which treat social protection as a prerogative of the whole of humankind, and not merely of formal workers. This trend towards universalization, which took shape in the post-war period, had as its regional milestones the American Convention on Human Rights (1969) and the Protocol of San Salvador (1988) (Ibrahim; Martins, 2018, p. 55), and social security came to be understood as a state function to meet the basic needs of the entire population in the face of social risks and contingencies inherent to the human condition and not just to workers (Gomes da Silva, 2023, p. 202).

The literature uses the Bismarckian and Beveridgean models as references for understanding the formation of social protection systems. The first emphasizes insurance linked to work and contributions (Goularti; Bitencourt, 2019, p. 64); the second associates protection with the universalization of basic guarantees and with public responsibility for income security. These are analytical references rather than exact descriptions of contemporary systems, which combine contributory and non-contributory techniques (Ibrahim; Martins, 2018, p. 54).

The Beveridgean reference to universalization does not allow the whole plan to be characterized as financed exclusively through general taxation, since it describes a model in

which contributory insurance and non-contributory measures may coexist (Silveira; Campelo, 2024, p. 46). This model followed the post-war trend towards universalization, seeking to reduce income insecurity and social inequalities through a positive state safety net (Ibrahim; Martins, 2018, p. 54). In Brazil, the social security system has adopted a structure that seeks to harmonize these concepts, organized as an integrated three-pronged approach encompassing healthcare, pensions and social assistance. According to Marques, Pierdoná and Francisco (2022, p. 166, our translation), the 1988 Constituent Assembly "left no doubt as to its adherence" to the Beveridge Plan when it defined, in Article 194, the coordinated protection between the mechanisms of provision (pension provision) and aid (social assistance), to be built and operated jointly by society and the State. The same authors note, however, the disconnect between the constitutional design and its implementation. Although the Constitution expanded the forms of contribution and established a dedicated budget for social security, "the legislature paid little attention to this organizational framework" (Marques; Pierdoná; Francisco, 2022, p. 172, our translation).

In the Brazilian system, healthcare is universally accessible; social assistance provides for the basic needs of those who require it, regardless of contribution; and social security retains a contributory nature (Brasil, 1991a). In Spain, the General Social Security Law also distinguishes between contributory and non-contributory benefits (Espanha, 2015). This coexistence makes it possible to compare protection techniques, provided that the differences between the Brazilian constitutional concept of social security and the Spanish organization are respected.

On the other hand, the Brazilian social security system is organized into three distinct regimes: the General Social Security Regime (RGPS), intended for workers in the private

sector; the Special Social Security Regime (RPPS), aimed at permanent civil servants; and the Supplementary Pension Regime (RPC), which is voluntary and contractual in nature.

Table 1 – Brazilian social security regimes: a comparison

	RGPS	**RPPS**	**RPC**
Legal framework	Statutory: Law No. 8,212/1991 (funding) and Law No. 8,213/1991 (benefits)	Statutory: Article 40 of the Federal Constitution and Law No. 9,717/1998	Contractual
Legal nature of membership	Compulsory	Compulsory	Optional
Funding system	Pay-as-you-go	Pay-as-you-go, which may be mixed	Capitalization

Source: prepared by the authors (2026).

Table 1 highlights the main differences between the three regimes in Brazil. The RGPS operates under a statutory regulatory framework, governed primarily by Law No. 8,212/1991 (which sets out the funding arrangements) and Law No. 8,213/1991 (which sets out the benefits scheme) (Brasil, 1991a; 1991b); membership is compulsory for anyone in paid employment, making it a compulsory social insurance scheme (Guedes, 2017, p. 242). The financing system adopted by the RGPS is a simple pay-as-you-go system, a mutualist model based on intergenerational solidarity, in which the contributions of active workers finance the benefits of retired workers.

The second column presents the RPPS, whose legal basis is also statutory, specifically grounded in Article 40 of the Federal Constitution. As with the RGPS, membership is compulsory by virtue of the employment relationship with the public body. The funding system adopted in the RPPS is traditionally a simple pay-as-you-go regime. Still, where there is segregation of funds, it may take the form of a mixed regime that combines pay-as-you-go and pension fund capitalization. The funding base comprises contributions from the federative entity, active civil servants, retirees, and pensioners (Brasil, 1988, art. 40).

The RPC is voluntary and contractual and is organized autonomously in relation to the RGPS, with the constitution of reserves to guarantee the contracted benefits. Capitalization does not necessarily imply an individual account whose balance is simply returned to the participant: financing and the method of calculating benefits depend on the type of plan, which may be defined benefit, defined contribution or variable contribution (Brasil, 2001).

In the RGPS, compulsory membership derives from the exercise of a paid activity covered by the regime. Access to benefits depends on the legal requirements for each of them, and the employer's failure to pay the contributions withheld cannot automatically be equated with a lack of protection for the employee (Brasil, 1991a, art. 33, § 5).

Participation in collegiate bodies is part of the social control of Brazilian social security (Brasil, 1991a, art. 1, sole paragraph, g). Its contribution to sustainability depends on effective conditions of access to information, monitoring of accounts and deliberation on sector policies.

The Federal Government is responsible for managing the General Social Security Regime (RGPS), which is administered by the National Social Security Institute (INSS). At the administrative level, the RGPS is overseen by the National Social Security Council (CNPS), the highest collegial decision-making body responsible for establishing general guidelines and systematically monitoring the social security system's management.

The RPPS are managed by the federative entities that maintain them, in accordance with the applicable constitutional and general rules. Article 40, paragraph 20, of the Constitution prohibits the existence of more than one special regime and more than one managing unit per entity, a rule that predates Constitutional Amendment No. 103/2019 (Funpresp, 2025). The 2019 reform made it compulsory for entities with an RPPS to set up a supplementary pension regime (Brasil, 2019); the application of the RGPS benefit ceiling to civil servants must take

into account the date on which that supplementary regime was set up and the date on which each servant joined the public service. It is not an indiscriminate limitation on all new benefits.

Supplementary pension provision, governed by Complementary Law No. 109/2001, comprises open and closed entities. Open entities are constituted as corporations; closed entities, known as pension funds, are organized as foundations or non-profit civil societies, as established by law. Plans may adopt different modalities, not all of which correspond to a strictly individual reserve. Regulation and supervision distinguish between the open and closed segments, and the investment of guarantee resources follows the guidelines of the National Monetary Council (Brasil, 2001; Funpresp, 2025).

In cases of serious actuarial imbalance or irregularities in pension funds, the supervisory body has the power to order intervention or, where recovery is not feasible, the out-of-court liquidation of the entity to protect members' rights. Furthermore, Complementary Law No. 109/2001 imposes a disciplinary regime with penalties ranging from warnings and fines to temporary disqualifications from holding management positions, ensuring transparency through the mandatory annual disclosure of detailed information about the plans to their beneficiaries (Brasil, 2001).

Law No. 8,212/1991 governs the organization and the funding plan of Brazilian social security. Its interpretation must be read together with Article 195 of the Constitution and with Law No. 8,213/1991, which sets out RGPS benefits. The diversity of social security funding sources, however, does not authorize treating all the revenues of the integrated system as revenue belonging to the pension regime, since they are directed to the social security system as a whole.

The analysis of financing must therefore specify the scope under consideration: RGPS contributory revenue, transfers intended to cover its needs, or the overall social security budget.

Article 195 of the Constitution provides for financing by society as a whole, through budgetary resources and social contributions, including those levied on labor and on revenue (Brasil, 1991a, art. 10). The counterpart rule, set out in paragraph 5 of that article, requires a corresponding source of full funding for any benefit or service to be created, increased or extended. The examination of a reform must therefore link the expansion of protection to the demonstration of its funding sources.

The principle of financial and actuarial balance forms the cornerstone of this plan. Whilst financial balance focuses on short-term liquidity (sufficient current revenue to cover the year's expenditure), actuarial balance requires long-term stability, demanding that the benefits scheme adhere strictly to demographic and biometric projections for the population (Ibrahim, 2011, p. 171). This provision is interpreted as recognizing an 'actuarial contingency reserve'. However, it must be reconciled with the principle of solidarity, which justifies the provision of deficit-financed benefits, such as the rural pension regime, in the interests of poverty reduction and social justice. Legal doctrine warns that it is not possible to overemphasize the importance of financial and actuarial balance to the detriment of the real objective of social security, which is social protection (Silveira; Campelo, 2024, p. 48); in this vein, Schuster (2018, p. 28, our translation) maintains that financial and actuarial balance "does not approach an absolute legal ideal, but rather a constant quest for 'adaptation'". In other words, the system must focus on strengthening its funding base, rather than merely seeking to reduce the entitlements under the benefits scheme.

Historically, the RGPS has benefited from a 'demographic dividend', a period in which the number of active contributors far exceeded that of beneficiaries. However, Brazil's rapid demographic transition, characterized by the inversion of the age pyramid and increased life expectancy, is placing growing pressure on the funding model. The fall in the birth rate reduces

the funding base, whilst the number of beneficiaries at the top of the pyramid expands, leading to successive fiscal deficits. Against this backdrop, the Federal Government is responsible for covering any financial shortfalls to ensure that the insured person's subjective public right to social security benefits is not undermined (Ibrahim, 2008, p. 73).

The continuity of financing depends on the system's capacity to obtain revenue from labor and from the other constitutionally admitted bases (Silveira; Campelo, 2024, p. 50). Changes in forms of hiring may reduce contributory regularity and alter the distribution of burdens, which makes it necessary to examine revenue collection, coverage and incentives for formalization together (Silveira; Campelo, 2024, p. 40).

Actuarial projections provide criteria for assessing the compatibility between revenue and future commitments. Their legal use requires making explicit the assumptions about employment, wages, mortality and access to benefits, and distinguishing projected risks from financial shortfalls already observed.

The legal nature of the social security benefit constitutes a subjective public right of the insured person who, having fulfilled the qualifying period and age requirements (in accordance with Article 201, paragraph 7), cannot have their protection denied due to the State's financial incapacity. On the other hand, legal scholarship emphasizes that the sustainability of the RGPS cannot be analyzed solely from a fiscal perspective; it must respect the essential content of the right to social security, which protects the core of human dignity against incapacity and old age.

Both the Brazilian and the Spanish legal systems provide grounds for this assessment. In Brazil, Article 201, paragraph 4, of the Constitution guarantees the readjustment of benefits to preserve their real value. In Spain, Law 21/2021 established the annual updating of contributory pensions in line with the average of the year-on-year rates of the consumer price

index for the twelve months prior to December of the preceding year, maintaining the nominal amount when that average is negative (Espanha, 2021, art. 1).

The existence of updating mechanisms does not, however, settle the question of adequacy. Studying food security policies for older people in Spain and Argentina, Gracia-Arnaiz, Demonte and Boragnio (2025) identify limitations in the available information and vulnerabilities that persist despite social security transfers. Their study does not allow this diagnosis to be extended automatically to Brazil, but it offers a research criterion: verifying the extent to which guaranteed income meets the material needs of beneficiaries.

The comparison thus makes it possible to distinguish between monetary preservation and social adequacy. The first refers to the updating of amounts; the second covers the initial level of the benefit, the cost of living and the conditions of the different protected groups. The assessment of Brazilian and Spanish reforms must take both dimensions into account, since preserving the purchasing power of a benefit does not, on its own, show that its amount is sufficient. Financial balance acquires meaning in social security when it allows adequate and lasting protection to be maintained.

3 METHODOLOGY

The research adopts a qualitative approach, with complementary use of quantitative data, and is carried out through a narrative literature review and documentary analysis of legislation. The object of study is the financing of the Brazilian RGPS, considered in dialogue with the Spanish institutional responses.

The literature review gathers studies on social security financing, financial and actuarial balance, social protection and changes in work, identified in the CAPES Journals, DOAJ and SciELO databases in accordance with the line of research adopted. The documentary analysis

covers the Brazilian Constitution, the legislation on funding and benefits and, in Spain, the General Social Security Law and the 2021 and 2023 reforms. The bibliographic selection is not intended to be exhaustive or to constitute a systematic review.

The comparison is organized around three axes: the composition of funding sources and the distribution of burdens; the relationship between financial sustainability and benefit adequacy; and the adaptation of financing to demographic and labor-market change. Spain was chosen because it allows the examination of reforms that strengthen revenue within a public pay-as-you-go system while preserving the purchasing power of pensions. These elements make it possible to contrast institutional responses to shared problems, without presupposing equivalence between the respective social protection systems.

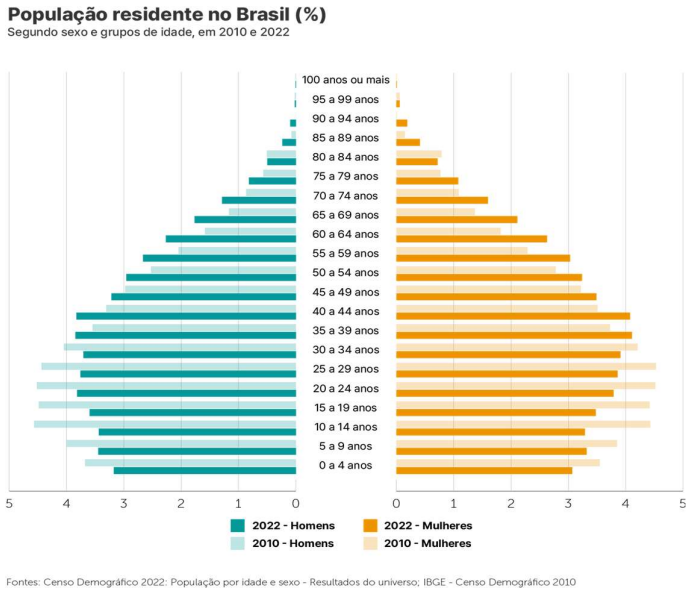
The unit of comparison consists of the legal instruments of financing and protection, not of the national systems as a whole. For each axis, the analysis examines the problem the instrument addresses, its normative basis, the parties on whom the burdens fall and the limits of its use as a reference for Brazil. The experiences of Chile and Mexico play a complementary role, confined to the discussion of transition costs and of the risks associated with individual capitalization.

Demographic and socioeconomic data are used to contextualize the problems examined. The study distinguishes between observations for specific periods and projections conditioned by the assumptions of their sources. It does not estimate the fiscal impact of the reforms, nor does it establish causal relationships between their adoption and the financial results of the systems. Its scope is to identify institutional alternatives and to discuss the legal conditions for their application.

4 THE STRUCTURAL CRISIS OF THE RGPS: DEMOGRAPHY AND FISCAL PROJECTIONS

Demographic change is one of the pressures on RGPS financing in the reference period. Census charts make it possible to identify changes in age composition, but they do not directly measure the number of contributors or beneficiaries. To understand their fiscal effects, these data must be related to social security projections and to labor-market conditions.

Figure 1 – Resident population in Brazil, by sex and age group, 2010 and 2022 (%)



Source: IBGE, 2022 Demographic Census (population by age and sex) and 2010 Demographic Census.

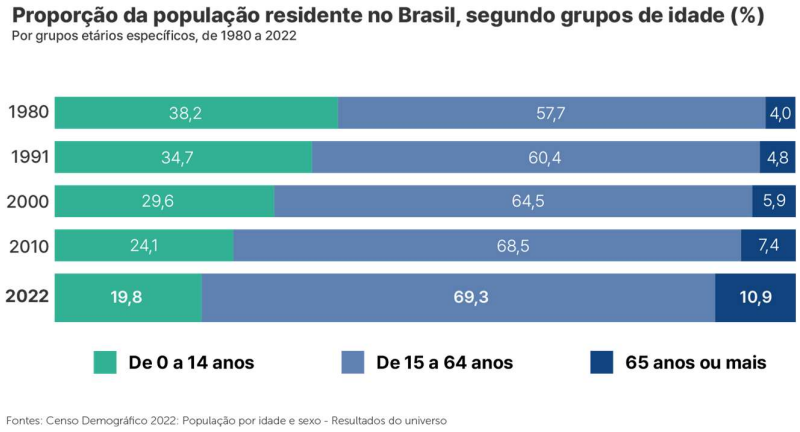
The graph illustrates Brazil's rapid demographic transition, characterized by a narrowing of the base of the age pyramid and a widening of its top, a phenomenon that undermines the logic of the social security system's simple pay-as-you-go scheme. This first graph compares the demographic pyramid for 2010 with that for 2022, based on the latest census conducted by the IBGE, revealing a sharp decline in the proportion of young people

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(aged 0 to 24) and a noticeable increase in the elderly population, among both men and women, highlighting the aging of the population, a phenomenon observed worldwide.

In the following chart, the demographic change is illustrated by decade, from 1980 to 2022, with the population divided into age groups: the first, people aged between 0 and 14; the second, people aged between 15 and 64; and the third, people aged over 65.

Figure 2 – Proportion of the resident population in Brazil, by age group, 1980 to 2022 (%)



Source: IBGE, 2022 Demographic Census (population by age and sex).

The second graph shows that the proportion of people aged 65 and over rose from 4.0 percent in 1980 to 10.9 percent in 2022, whilst the proportion of those aged 0 to 14 fell from 38.2 percent to 19.8 percent. These percentages show the aging of the population. On their own, they do not support the conclusion that the future number of beneficiaries will exceed the number of contributors, since that relationship also depends on employment, coverage and social security rules.

Aging may lengthen the duration of benefits and change the relationship between the potentially contributing population and the protected population. The intensity of the financial pressure depends, however, on employment, income, productivity and the funding sources

mobilized. For this reason, the analysis of expenditure must be accompanied by an examination of revenue-raising capacity.

The need for transfers to cover RGPS shortfalls competes for budgetary space with other public purposes. Its assessment requires identifying the time horizon, the accounting criteria and the assumptions of each projection, without taking a conditional scenario as an inevitable description of the future.

In the study 'Trends and long-term projections for contributors and beneficiaries, and implications for the financing of social security' (Costanzi; Ansiliero, 2024), carried out by the Institute of Applied Economic Research (IPEA), it is estimated that the total number of social security beneficiaries in 2060 will be more than double the figure recorded in 2022 (a forecast of 66.4 million, compared with 31.4 million in 2022). At the same time, the number of contributors will fall: whilst in 2022 the figure stood at 61.8 million contributors, the projection for 2060 is 57.2 million (Costanzi; Ansiliero, 2024, p. 41). Consequently, the ratio of contributors to beneficiaries will be disproportionate, amounting to fewer than one contributor per beneficiary.

The change in age structure affects social security financing through its relationship with the number of beneficiaries, the duration of payments and the potentially contributing population. This relationship, however, is mediated by the labor market. Being of working age is not the same as having paid employment, a regular contributory relationship or sufficient income to maintain continuous contributions. For this reason, the demographic analysis must be combined with employment conditions and revenue-raising capacity.

The problem extends beyond demographic factors: the assessment of unsustainability is further exacerbated by the high rate of informality and the need for increased economic productivity. This view is shared by other researchers, such as Silva and Morrone (2021), who

argue that the analysis of the social security system's sustainability is limited by conventional indicators that fail to account for variables related to the labor market and productivity. Without structural reforms to the economic foundations of the state, such as the tax, labor, and administrative systems, the problem is regarded as structural rather than merely cyclical, hindering balanced fiscal management.

The diagnosis of the RGPS must relate its protective function to revenue-raising capacity in the Brazilian context. Strengthening revenue, which is also discussed in the Spanish literature, is a relevant dimension of sustainability (Villar Cañada, 2026); at the same time, the quality of administration and the control of irregularities influence the use of the resources available (Barreto, 2024).

The constitutional requirement of financial and actuarial balance must be interpreted together with the protective purpose of social security. It requires compatibility between commitments and funding sources, but it does not exempt reforms from an assessment of their distributive consequences (Guedes, 2017, p. 244-245).

The relative reduction of younger age groups changes the demographic conditions of financing, but it does not automatically determine a fall in the number of contributors. Labor-force participation and formalization may alter this relationship. Projections prepared before the 2019 reform must be read as historically situated scenarios rather than as results updated in light of all subsequent rules (Vartanian; Scarano; Rodrigues, 2019, p. 15).

Vartanian, Scarano and Rodrigues (2019, p. 21) present projections in which RGPS expenditure would reach 13 percent of GDP and 43 percent of the federal budget in 2040. These figures depend on the assumptions and on the approach of the 2019 publication. Moreover, a projection of expenditure is not a projection of the deficit, since the latter requires taking into account both revenue and the criterion used to calculate the result.

The issue of the deficit is viewed from different perspectives, with the constitutionalist view advocating an analysis of the social security surplus or deficit as a whole, including health and welfare (DIEESE, 2007, p. 4). However, this view is criticized for ignoring the fact that the 1988 Constitution linked certain contributions to the funding of social security benefits. The fiscal perspective argues that a deficit exists whenever the value of workers' contributions and payroll levies is less than the amount of social security benefits paid (DIEESE, 2007, p. 3). Gomes da Silva (2023, p. 204, our translation) criticizes the conception of the insured person and social protection 'from a purely mathematical perspective', equating them to a mere cost to be borne by the State, and points out that successive reforms erode confidence in the system, alongside historical instances of misappropriation and inappropriate prioritization of social security resources. The lack of confidence in social security systems, in turn, is identified as a contributing factor to contribution evasion, a central problem in the design and operation of contributory regimes (Savaris; Souza, 2019, p. 926).

The responses discussed in the literature include changes to benefits, revision of funding sources and measures aimed at employment and productivity (Fernandes et al., 2019, p. 426; Lima, 2023). Their combination must be assessed in terms of financing capacity and of its effects on coverage, avoiding attributing to a single reform the solution of problems with different origins.

The financial result must be presented with its date and calculation criterion. The literature cited records an RGPS primary deficit above R$ 275.83 billion in the twelve months to November 2020 (Lima, 2023, p. 93; Pierdoná; Francisco; Silva, 2023). This is a nominal figure for that period, which on its own does not describe the real evolution of the deficit throughout the 2015-2025 interval.

Changes in the labor market also affect projections. Changes in contributory classification, the informal economy and automation may alter the wage bill and revenue (Salomão Neto, 2024, p. 185). The effects of productivity vary according to the assumptions adopted, and the results of specific simulations should not be generalized to every financing model (Fernandes et al., 2019, p. 426).

The literature points to a scenario of growing actuarial imbalance if the eligibility rules are not substantially altered in the face of the population's accelerated aging. Efforts to ensure fiscal balance must go beyond 'parametric adjustments' (such as raising the minimum retirement age) and require a broader restructuring. In this context, some studies suggest adopting a mixed funding model, combining a simple pay-as-you-go system with capitalization or a book-entry capitalization system, in which the benefit is calculated based on the individual's own contributions.

5 CHALLENGES AND PATHWAYS TOWARDS A POSSIBLE RESTRUCTURING OF THE RGPS

The diagnosis of the demographic and fiscal pressures on the RGPS allows the analysis to move on to the institutional responses to the financing problem. The Spanish experience provides elements for this debate, since it combines contributory protection, non-contributory benefits and reforms affecting both revenue and benefits.

The debate on the sustainability of the General Social Security Regime (RGPS) in Brazil is inextricably linked to the reality of its simple pay-as-you-go structure, a mutualist and solidarity-based model founded on the intergenerational pact, in which the contributions of the working population immediately finance the benefits for retirees.

In the face of Brazil's rapid demographic transition, characterized by rising life expectancy and a sharp decline in fertility rates, the system is under increasing pressure,

prompting policymakers and academics to assess the feasibility of adopting an individual capitalization model. To understand the risks and potential of this change, comparative law offers fundamental insights from the experiences of Chile and Mexico, which have implemented structural reforms in recent decades.

The Chilean reform of 1981 made individual capitalization, managed by the Administradoras de Fondos de Pensiones (AFPs), a benchmark for the Latin American debate (Hujo, 1999, p. 161). Retirement accounts were financed by workers' contributions, and the subsequent results drew criticism regarding coverage and benefit levels (Fonseca Leite; Araújo Neto, 2023, p. 6; Braga; Costa, 2015, p. 79; Portella; Souza, 2021, p. 32). The 2008 reform established a state-financed solidarity pillar. The 2016 indicators cited in the literature, according to which a large share of retirees received less than the minimum wage, should be used to analyze the persistence of shortcomings after that reform, and not as its chronological cause. The analysis presented here refers to these historical stages and does not purport to describe the subsequent Chilean reforms exhaustively.

The Mexican reform of 1997 extended the use of individual accounts managed by the Afores (Braga; Costa, 2015, p. 76). The literature examined associates the limitations of coverage with high informality and contributory discontinuity (Sánchez-Rivas García; Villegas Alcántar, 2026; Braga; Costa, 2015, p. 77). These problems show that changing the financial regime does not, by itself, guarantee the inclusion of workers. The Mexican case is used as a complementary contrast, since the main comparison in this article concerns the Brazilian and Spanish responses to the public financing of pensions.

When applying these models to Brazil, the literature highlights major technical obstacles to a pure substitution, the main one being the cost of transition. By channeling contributions from the working population into individual accounts, the state loses the revenue needed to

meet current benefit payments, creating a liability which, in Chile, was estimated at 126 percent of GDP at the time of the reform (Queisser, 1998, p. 51). In Brazil, the problem is exacerbated by the rate of informal employment, which reached 38.1 percent in 2025 (IBGE, 2026), and by the phenomenon of *pejotização* (the payment of work performed by individuals as if it were provided by legal entities), which erodes the tax base derived from the wage bill.

Individual capitalization may transfer to the participant a significant share of investment risk and of the risk of insufficient accumulation. The allocation of longevity risk depends, among other factors, on the form in which benefits are paid and on the guarantees in place. In labor markets marked by informality and low income, discontinuous contributions may result in insufficient reserves, which makes redistributive mechanisms and complementary public protection necessary (Fonseca Leite; Araújo Neto, 2023, p. 7).

The introduction of the Chilean solidarity pillar shows that individual accumulation did not eliminate the need for public financing of basic guarantees (Portella; Souza, 2021, p. 32). This outcome recommends assessing coverage, benefit adequacy and the fiscal commitments of the transition together, rather than assuming that capitalization eliminates the State's obligations (Oliveira; Machado; Hein, 2019, p. 3).

In contrast, Brazil has resisted total privatization, maintaining the simple pay-as-you-go structure and the intergenerational solidarity pact enshrined in the 1988 Constitution. Although Brazil has adopted successive parametric adjustments inspired by fiscal austerity, such as the introduction of the social security factor and the setting of minimum retirement ages, the public and redistributive nature of the General Social Security Regime (RGPS) has been preserved (Salomão Neto, 2024, p. 193).

Hiring through a legal entity may change the incidence of contributions and the amounts actually collected (Salomão Neto, 2024, p. 185). Its effects depend on the tax regime, the

remuneration and the characteristics of the activity, so it cannot be stated that every hiring of this kind indiscriminately eliminates the 20 percent employer contribution. When used to conceal an employment relationship, the practice raises problems of classification and enforcement that affect both the protection of the worker and revenue (Araújo Neto; Rocha, 2023, p. 124).

In Brazil, registration as an Individual Micro-entrepreneur (MEI) is an instrument of contributory inclusion, with a favorable payment regime under the conditions laid down by law. Its misuse to conceal employment relationships must be distinguished from the legitimate formalization of self-employed activities admitted under that regime (Ideta; Teixeira, 2024, p. 4068). The reduced rate presupposes solidarity-based financing, and its effect on the balance of the system cannot be assessed solely by comparing, in isolation, the individual contribution with the potential benefit, without considering coverage, the composition of the insured population and the other funding sources (Araújo Neto; Rocha, 2023, p. 116-117).

In Brazil, Articles 194 and 195 of the Constitution place pensions within a social security system that also covers health and social assistance and is financed by budgetary resources and social contributions. This design requires distinguishing the financial result of the RGPS from the totality of social security revenue and expenditure. In Spain, Article 109 of the General Social Security Law lists compulsory contributions and State contributions among the sources of resources and establishes the State's responsibility for financing the non-contributory modality, without prejudice to the specific features of the powers transferred to the autonomous communities (Espanha, 2015, art. 109).

The analysis by Monereo Pérez, Rodríguez Iniesta and Trillo García (2024, p. 391) illustrates this differentiation by identifying State contributions to the Social Security budget as the source of financing of the Spanish Minimum Living Income (Ingreso Mínimo Vital). The

example clarifies the financial organization of a Spanish non-contributory benefit. Its comparative use depends, however, on preserving the difference between this income guarantee and the contributory pensions that form the core of this study.

Work mediated by digital platforms may combine income instability with discontinuous contributions. Carrying out a paid activity on one's own account generally entails compulsory membership of the RGPS as an individual contributor, under Article 12, V, of Law No. 8,212/1991, and should not be confused with the category of voluntary insured person (Brasil, 1991a, art. 12, V). The controversy over a possible employment relationship is distinct from the obligation to contribute that arises from self-employment. The literature cited points to low contributory coverage among platform workers, which recommends focusing the analysis on the effectiveness of collection and on the responsibilities of the agents involved, without automatically equating informality with the absence of contributions (Ideta; Teixeira, 2024, p. 4060; Marques Vieira, 2025, p. 9, 13-14).

Observing the Brazilian system, Ibrahim and Martins (2018, p. 56) record high rates of non-contribution among informal workers. These indicators must be distinguished from the informality rate of 38.1 percent recorded for 2025 (IBGE, 2026). Although they refer to different periods and measures, both show the need to link formalization, contributory regularity and financing capacity.

With regard to Spain, Monereo Pérez, Rodríguez Iniesta and Trillo García (2024, p. 41) relate the challenges of social protection to the digital economy, job insecurity and aging under conditions of unemployment or instability. Changes in the organization of work affect financing insofar as they alter the revenue obtained from contributions and the continuity of the link with the system.

Automation may alter the composition of employment and the distribution of income between labor and capital. For social security, the question is how these changes affect the revenue bases. The use of artificial intelligence does not make economic activity immune to contributions levied on revenue or profits, nor does it justify assuming a net loss of revenue without examining productivity, new jobs and taxation rules.

The estimate published in 2019, according to which 54 percent of formal jobs in Brazil are exposed to automation, describes a potential risk under certain assumptions, not the proportion of jobs actually eliminated (Pinto, 2019; Montanhani, 2023). Gomes Prado (2025, p. 7) relates digitalization to the limitations of a revenue base that remains concentrated on formal work. The debate must also take into account job creation and wage changes, without converting global employment projections into direct estimates for the RGPS. The legal problem consists in adapting funding sources to the transformations of economic activity and distributing burdens in a manner compatible with solidarity (Gomes Prado, 2025, p. 6).

Bill No. 2,358/2020 proposes the Cide-Digital, a contribution for intervention in the economic domain levied on the gross revenue from certain digital services provided by large technology companies. The proposal is part of the debate on taxing the digital economy, but it cannot automatically be regarded as a source earmarked for the RGPS. Revenue estimates relating to the Goods and Services Tax (IBS) are not social security revenue either: an analysis of their contribution to social protection requires distinguishing between taxing power, the allocation of resources and any transfer mechanism.

The international debate on taxing multinationals, structured around the OECD's Pillars 1 and 2, provides references for the allocation of taxing rights and for the minimum taxation of profits (Aguiar, 2022, p. 11). This is a question distinct from defining the social security obligations of workers and platforms. Convergence between these fields requires showing how

additional revenue could finance social protection while respecting each country's constitutional and budgetary rules (Gomes Prado, 2025, p. 9).

In Brazil, the diversity of the funding base is provided for in Article 194, sole paragraph, VI, and is linked to the sources listed in Article 195 of the Constitution. Paragraph 9 of Article 195 allows differentiated rates for the contributions in item I according to the criteria listed there, but it does not establish specific taxation of automation. The residual power in paragraph 4, exercised in accordance with Article 154, I, must also be distinguished from the power to create contributions for intervention in the economic domain, provided for in Article 149. A proposal to finance social security from new manifestations of wealth must identify the type of levy, the tax base and its allocation, and demonstrate its compatibility with those powers (Brasil, 1988, arts. 149, 154, I, 194, sole paragraph, VI, and 195, §§ 4 and 9).

Taxation of the digital economy may form part of the debate on expanding fiscal capacity, but its contribution to social security financing depends on legal design and on the actual allocation of the revenue. This distinction makes it possible to compare the Brazilian proposals with Spanish instruments that directly strengthen the financing of public pensions.

In Spanish law, the Intergenerational Equity Mechanism (Mecanismo de Equidad Intergeneracional), created by Law 21/2021, was reshaped by Royal Decree-Law 2/2023 and is based on a contribution allocated to the Social Security Reserve Fund, with no individual effect on the calculation of benefits. The 2023 reform also introduced an additional solidarity contribution on earnings above the maximum contribution base, applied gradually from 2025. These measures reveal a response that mobilizes additional revenue to meet future commitments (Espanha, 2021; 2023).

The 2023 reform is thus oriented towards strengthening contributory financing. The Intergenerational Equity Mechanism feeds a collective reserve of the system without creating

any individual capitalization account, and the solidarity contribution applies to earnings above the maximum base. Although related to sustainability, these measures are not taxes on digital companies or on the use of artificial intelligence.

A first finding of the comparison concerns the distribution of financing responsibilities. In Spain, the Intergenerational Equity Mechanism and the additional solidarity contribution strengthen revenue through charges linked to work, although each responds to a specific design. For Brazil, their interest lies in showing that adapting a pay-as-you-go system may involve changes in the distribution of the contributory effort, without requiring its replacement by individual accounts. This possibility must be examined in light of the wage structure, informality and the contributory capacity of the groups affected.

Using these instruments as a reference nevertheless requires assessing their limits. An increase in contributions may expand revenue, but its effects depend on the base on which it falls, on who bears the burden and on the responses of economic agents. In the Brazilian case, contributory discontinuity and the heterogeneity of labor relations preclude any presumption that a given measure would produce results equivalent to those in Spain. The comparative question is therefore to identify which problems can be addressed by redistributing existing burdens and which require expanding coverage or examining other funding bases.

A second finding concerns the relationship between revenue and benefits. The preservation of purchasing power provided for in Spanish legislation and the Brazilian guarantee of the real value of benefits reveal a shared concern with the material continuity of protection. Monetary updating, however, does not by itself demonstrate the adequacy of a benefit. The legal assessment of sustainability must consider both the capacity to keep paying benefits and the level of protection they provide, so that balance is not assessed solely on the basis of reduced expenditure.

The third finding concerns the identification of budgetary responsibilities. The Spanish regulation of contributions and State contributions offers a reference for specifying which benefits and commitments are financed by each source. In Brazil, this distinction is relevant for separating the RGPS result from the integrated social security budget. The comparison does not allow Spanish categories to be transposed automatically, but it does require that any diagnosis of deficit identify the revenue counted, the expenditure considered and the transfers provided to cover it.

The Spanish experience thus provides criteria for examining the distribution of burdens, the protection of benefits and the delimitation of financial responsibilities. Its contribution to the Brazilian debate depends on the correspondence between each instrument and the problem it is intended to solve. Strengthening contributions may meet certain needs of the system, whereas informality and digital transformation also require analysis of the regularity of contributions and of the relationship between new manifestations of wealth and the financing of social protection.

6 FINAL CONSIDERATIONS

This article has examined the challenges facing RGPS financing and compared them with the Spanish responses to pressures on public pensions. The analysis indicates that population aging changes the conditions of financing, but its effects are mediated by employment, income and productivity. The age structure alone does not support the conclusion that a pay-as-you-go system is unviable.

In Spain, the distinction between contributory and non-contributory modalities and the provision for State contributions offer elements for discussing the distribution of burdens, without assuming full equivalence between the two systems.

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The Spanish reforms of 2021 and 2023 combine the preservation of purchasing power with the strengthening of revenue. The Intergenerational Equity Mechanism and the additional solidarity contribution show that the response to aging may include new contributory charges within the public system. Their possible use as a reference for Brazil requires taking into account differences in wages, coverage, the informal economy and constitutional limits, which rules out the automatic reproduction of these measures.

The monetary preservation of benefits does not exhaust the adequacy of protection either. The assessment of financing must consider whether benefits allow the needs of the protected groups to be met. In the Brazilian case, increasing contributory regularity and examining new funding bases are measures that must be combined with maintaining coverage and protecting workers with discontinuous careers.

The review of tax reliefs and exemptions may be part of this effort, provided that it is based on an assessment of their objectives, costs and results. Likewise, taxing the digital economy requires defining the constitutional power involved and the allocation of revenue, since it cannot be assumed that every increase in tax collection becomes a resource available to the RGPS.

The capitalization experiences examined do not support a recommendation for the general replacement of the pay-as-you-go regime. Any combination with reserve-accumulation mechanisms depends on an assessment of the transition cost, the allocation of risks and the guarantees of protection. The existence of a reserve fund within a public pay-as-you-go system must be distinguished from migration to individual accounts.

Future research could carry out fiscal simulations of these instruments for Brazil, compare the distributive incidence of the funding sources and examine the relationship between benefits, material needs and contributory careers.

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The Spanish experience helps to shift the debate from an abstract opposition between pay-as-you-go and capitalization towards the concrete analysis of revenue, contributions and guaranteed protection. For the Brazilian RGPS, sustainability requires financing decisions compatible with the transformation of work and with constitutional solidarity, preserving the capacity to pay benefits and the social purpose that justifies their existence.

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