


# Rural and urban labor market in Brazil, 2012-2022: an analysis of agricultural and non-agricultural activities

*Mercado de trabalho rural e urbano no Brasil, 2012-2022: uma análise das atividades agrícolas e não agrícolas*

Marina Silva da Cunha<sup>1</sup> 

<sup>1</sup>Programa de Pós-Graduação em Ciências Econômicas (PCE), Universidade Estadual de Maringá (UEM), Maringá (PR), Brasil.  
E-mail: mscunha@uem.br

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**Abstract:** This work aims to analyze the evolution of the labor market in rural and urban areas of Brazil, from 2012 to 2022, considering the segmentation between agricultural and non-agricultural activities. Data from the Continuous National Household Sample Survey, by IBGE are analyzed and earnings equations and inequality measures are estimated. The results highlight the continuity of the process of reducing employment in rural agricultural activities, which was partially mitigated by the expansion of non-agricultural activities. Earnings are still higher in non-agricultural urban activities, although difference has reduced during the period compared to other segments, especially due to the decrease in returns to education.

**Keywords:** earnings, employment, occupation, inequality.

**Resumo:** Este trabalho analisa a evolução do mercado de trabalho nos meios rural e urbano do Brasil no período de 2012 até 2022, considerando a segmentação entre as atividades agrícolas e não agrícolas. São analisadas informações da Pesquisa Nacional de Amostra por Domicílios Contínua do IBGE e estimadas equações de rendimento e medidas de desigualdade. Os resultados evidenciam a continuidade do processo de redução do emprego nas atividades agrícolas do meio rural, que foi parcialmente amenizado pela expansão das atividades não agrícolas. Os rendimentos são ainda maiores nas atividades do meio urbano não agrícolas, embora o diferencial tenha se reduzido no período em relação aos demais segmentos, notadamente devido à redução dos retornos em educação.

**Palavras-chave:** rendimento, emprego, ocupação, desigualdade.

## 1 Introduction

The world is undergoing an increasing urbanization process; however, in Brazil, these changes have occurred at a faster pace. According to data from the Banco Mundial (2024), the global urban population represented 34% in 1960 and 57% in 2022. In Brazil, these percentages were 46% and 88%, respectively. Additionally, according to the World Bank, in 1960, the primary sector accounted for 7.5% of the value added globally, but by 2022, it contributed only 4.3%. In Brazil, the primary sector's share of total value added declined from 15.7% to 6.8% over the same period. These transformations have impacted living conditions and the generation of employment and earnings in the labor market, both in rural and urban areas.

In the economic literature, urbanization and the segmentation of the labor market in rural and urban areas have been associated with migration from rural areas and low earnings in the agricultural sector (Lewis, 1954; Kuznets, 1955; Harris & Todaro, 1970). Since the late 20th century, the literature has incorporated the discussion of the expansion of non-agricultural activities in rural areas, contributing to improved income and employment opportunities for



the population residing in these regions (Anderson & Leiserson, 1980; Reardon et al., 2001; Himanshu Lanjouw et al., 2013).

In Brazil, studies have also begun to address this process, highlighting the expansion of non-agricultural activities in rural areas and the reduction of employment in agricultural activities (Graziano Da Silva, 1997; Graziano Da Silva & Del Grossi, 2001; Mattei, 2015; Laurenti et al., 2005; Balsadi & Del Grossi, 2018; Balsadi et al., 2019; Nascimento et al., 2022; Cruz et al., 2022). Other studies discuss the labor market by segmenting rural and urban areas (Bacha, 1979; Souza & Machado, 2004; Kassouf, 1997). Another theme addressed is the well-being of the rural population (Kageyama & Rehder, 1993; Balsadi & Graziano Da Silva, 2001). Some studies focus exclusively on the agricultural sector (Kageyama & Leone, 2002; Del Grossi & Balsadi, 2020; Cunha, 2008; Pinto & Cunha, 2014), while others analyze the labor market in agribusiness (Castro et al., 2020; Castro & Barros, 2022). Additionally, studies have examined inequality and the determinants of earnings in the agricultural and non-agricultural sectors (Ney & Hoffmann, 2009; Hoffmann & Oliveira, 2014; Hoffmann & Jesus, 2015; Catelan et al., 2023).

Seeking to contribute to this literature on the understanding of the profound and historical inequalities present in the Brazilian labor market, this study focuses on the analysis of employment and earnings, considering the segmentation between agricultural and non-agricultural activities in rural and urban areas.

Therefore, the objective of this study is to analyze the transformations in the rural and urban labor markets, aiming to characterize the profile of occupations in both rural and urban areas by segmenting agricultural and non-agricultural activities from 2012 to 2022. For this purpose, data from the Continuous National Household Sample Survey, conducted by the Brazilian Institute of Geography and Statistics, are utilized.

In addition to this introduction, the study is divided into five further sections. The next section provides a literature review that addresses theoretical and empirical aspects of the topic. Following that, the methodological approach is presented, describing the database and methods used. The fourth section characterizes the profile of individuals employed in the Brazilian labor market, considering four segments of economic activities: rural agricultural, rural non-agricultural, urban agricultural, and urban non-agricultural. The subsequent section discusses the characteristics of earnings distribution across these four segments, considering inequality measures and earnings equations. Finally, the concluding remarks highlight the main findings of the study.

## 2 Theoretical foundation

In 20th-century economic literature, some authors addressed labor market aspects by considering the segmentation between rural and urban areas and between agricultural and non-agricultural activities. In Lewis's model (1954), two sectors are described: on one hand, a capitalist, more modern sector, and on the other, a subsistence sector dominated by traditional agriculture. In this pre-capitalist sector, there is an unlimited supply of labor, with the marginal productivity of labor approaching zero and wages set at subsistence levels. In contrast, the capitalist sector exhibits higher productivity and correspondingly higher wages. This economic structure fosters a labor shift from the subsistence sector to the more modern sector, resulting in a process that would theoretically lead to wage equalization.

Another contribution was made by Kuznets (1955), who studied the relationship between income distribution and economic growth. In the proposed model, there are two sectors: an agricultural sector and a non-agricultural sector, where industrialization and urbanization play

a significant role. In the initial stage of development, intense migration from the less dynamic agricultural sector to the more dynamic non-agricultural sector would increase income inequality. However, with economic growth, disparities in labor productivity between the two sectors would diminish, leading to a reduction in income inequality. Harris & Todaro (1970) also formulated a two-sector model with rural-to-urban migration, in which the urban minimum wage at the subsistence level is higher than agricultural earnings. In this approach, migration was driven by expected earnings in urban areas, which could result in voluntary urban unemployment.

Since the late 19th century, international literature has discussed the growth of non-agricultural activities in rural areas. Anderson & Leiserson (1980) analyzed the expansion of non-agricultural activities in rural areas of developing countries, contributing to employment and earnings generation for rural populations and improving the welfare of poorer rural areas. Among these activities were the production of goods and services for agriculture, which supported agricultural development. Reardon et al. (2001) highlighted the importance of non-agricultural activities in Latin American countries during the 1990s, representing about 40% of rural household income in the region. Similarly, Himanshu Lanjouw et al. (2013), analyzing India from 1983 to 2010, found that this rural diversification process has contributed to employment and earnings growth, poverty reduction, and increased social mobility.

In national literature, studies have also incorporated discussions of non-agricultural activities in rural areas. Based on data from 1981 to 1995, Graziano Da Silva (1997) identified the expansion of non-agricultural activities in rural Brazil, which offset the decline in agricultural employment. The combination of agricultural and non-agricultural activities in rural areas was termed pluriactivity. According to the author, these non-agricultural activities serve as a strategy to retain populations in rural areas. In the 1990s, Graziano Da Silva & Del Grossi (2001) observed the growth of non-agricultural activities in rural Brazil. Nascimento et al. (2022), however, reported a decline in the number of rural families between 2006 and 2015, segmenting families into employers, self-employed workers, employees, and family farmers.

Associated with the decline in strictly agricultural employment in rural areas, Mattei (2015) emphasized daily or weekly commuting for work, particularly from rural areas, diversification of household income sources, and the integration of typically urban activities into rural settings. Balsadi & Del Grossi (2018), analyzing agriculture in Brazil's Northeast region from 2004 to 2014, noted that women and young people are most likely to leave agricultural activities. A similar phenomenon was observed by Balsadi et al. (2019) in São Paulo state, with a masculinization of the economically active population in agricultural activities. Studies have also focused on the agricultural and non-agricultural sectors within rural areas. For the period between 2001 and 2009, Laurenti et al. (2005) noted stability in the rural employed population, largely due to the expansion of non-agricultural occupations. Cruz et al. (2022) pointed out that in 2015, the non-agricultural sector generated higher earnings than the agricultural sector, with education being the primary determinant of this disparity.

The analysis of rural welfare has also been addressed in the literature. Kageyama & Rehder (1993) identified low social welfare levels for the agricultural workforce in Brazil during the 1980s, characterized by poor living conditions, low earnings levels, and limited social protection related to labor and social security guarantees. Analyzing rural São Paulo in the 1990s, Balsadi & Graziano Da Silva (2001) found that the quality of employment in non-agricultural activities for rural residents was better than in agricultural activities, except for domestic services.

In the national empirical literature, there are also studies addressing rural and urban segmentation. To examine rural and urban wage differentials, Bacha (1979) conducted an analysis for the period from 1948 to 1977, based on data available for the state of São Paulo.

Indeed, the author observed a reduction in wage differentials during the studied period. However, he argued that Lewis's theoretical model cannot fully explain all the determinants of these differentials. Thus, he suggested that the analysis should take into account the agrarian structure, the terms of trade between agriculture and industry, labor policy, and the strength of labor unions.<sup>1</sup> Souza & Machado (2004) analyzed earnings and unemployment in the rural and urban sectors from 1981 to 1999. According to the authors, historically, urban areas have higher wages, better organizational structures for workers, and better legal coverage<sup>2</sup>. They found that, in rural areas, unemployment has little impact on workers' earnings compared to its effects in urban areas, which could be explained by labor relations in rural areas that are still not fully characteristic of a capitalist market. Kassouf (1997) estimated higher returns on education and experience in the urban sector compared to the rural sector in Brazil for the year 1989. This would result in greater incentives for investment in education among urban residents. For the author, rural residents with higher levels of education would be motivated to migrate to urban areas in search of higher wages.

Other studies specifically investigate the agricultural sector in Brazil. Based on an analysis of data from the Agricultural Censuses of 1985 and 1995/96, Kageyama & Leone (2002) concluded that the trajectories of changes in the Brazilian agricultural sector across all regions were associated with a reduction in wage employment, which could lead to social problems at the beginning of the new century. Cunha (2008) analyzed the behavior of employment and wages in the agricultural sector from 1981 to 2005, observing that wage increases in the agricultural sector outpaced those of the total workforce in the country. Additionally, the study identified a reduction in wage disparities within the agricultural sector. Pinto & Cunha (2014) investigated the agricultural sector, considering agriculture, livestock, and mixed production activities from 2002 to 2012. They found a reduction in agricultural employment but an increase in mixed production, as well as a decrease in wage disparities among the segments studied.

Confirming the trend of declining employment in the agricultural sector, Del Grossi & Balsadi (2020), using data from the Agricultural Censuses from 1970 to 2017, highlighted the reduction in employment in the Brazilian agricultural sector, although at a slower pace since 1995.

There are also studies focusing on the labor market in agribusiness (Castro et al., 2020; Castro and Barros, 2022). The former identified a predominance of low qualifications, significant participation of informal labor, and average earnings in agribusiness lower than those in other economic sectors during the period from 2012 to 2015. The latter noted an increase in the real unit labor cost from 2004 to 2015, which was offset by productivity gains in the sector.

The analysis of Brazil's agricultural and non-agricultural sectors has also been the subject of research. Among these studies, Ney & Hoffmann (2009), using data from the 2000 Demographic Census, concluded that physical capital is the main determinant of agricultural income concentration. However, education is the factor that explains the largest share of income inequality, both in non-agricultural activities and in the entire rural area. Nevertheless, the impact of education is smaller in agricultural activities. Hoffmann & Oliveira (2014), examining the period from 1992 to 2012, observed a reduction in earnings inequality among workers in the agricultural sector, although this reduction was less intense and more irregular than in the non-agricultural sector.

<sup>1</sup> Among the institutional changes, the Rural Worker Statute stands out, established by Law No. 4.214 on March 2, 1963, a year that marked the beginning of significant growth in the series of daily wages for rural workers residing in São Paulo, as analyzed in the study.

<sup>2</sup> Despite the modernization process in labor relations within the Brazilian agricultural sector, Souza and Machado (2004) argue that, in rural areas, there are forms of labor market participation distinct from wage employment, such as small-scale producers, sharecroppers, and unpaid workers, among others.

Hoffmann & Jesus (2015) studied the earnings distribution of all work activities among the employed population from 1992 to 2014, highlighting evidence that earnings inequality in the non-agricultural sector has declined since 1993, while in the agricultural sector, the decline has been slower. In a study analyzing data from 2004 to 2019, Catelan et al. (2023) found that gender and race or skin color disparities are greater in agricultural activities than in non-agricultural activities.

Therefore, both theoretical and empirical literature demonstrates that transformations in rural and urban areas have significantly influenced the determination of employment and earnings in the labor market, notably through the expansion of non-agricultural activities in rural areas. Thus, this study aims to contribute to this body of literature by addressing the labor market and the segmentation between rural and urban areas and between agricultural and non-agricultural activities in each locality.

### 3 Methodology

#### 3.1 Data

This study is based on data from the Continuous National Household Sample Survey (PNADC), conducted by the Brazilian Institute of Geography and Statistics (IBGE), which began in 2012. Therefore, this research analyzed the period from 2012 to 2022. In addition to characterizing the differences between rural and urban labor markets, the study also considers heterogeneities within each locality, segmenting each sector into agricultural and non-agricultural activities. As a result, the analysis includes individuals employed in the rural segment in agricultural activities (RAG), in the rural segment in non-agricultural activities (RNAG), in the urban segment in agricultural activities (UAG), and in the urban segment in non-agricultural activities (UNAG).

To characterize the Brazilian rural and urban labor markets, only individuals with complete information were included in the study. Consequently, those without data on education, age, or race, as well as Indigenous individuals, those who did not report their weekly working hours, occupational status, or earnings, were excluded from the analysis. Additionally, the study considers individuals aged 14 years or older who worked at least 15 hours per week in their main job. All monetary values were adjusted to 2022 using the National Consumer Price Index (INPC) as the deflator.

#### 3.2 Method

The earnings equation is estimated based on the empirical literature, pioneered by Mincer (1974). The empirical model, estimated using weighted least squares, is given by:

$$\ln W_i = Y_i = \beta_0 + \sum_{j=1}^k \beta_j X_{ji} + \mu_i$$

The dependent variable is the natural logarithm of the usual monthly earnings from the main job. Among the explanatory variables, those related to personal characteristics, occupation, and regional factors are included. Regarding non-productive personal characteristics, a binary variable representing male gender and another binary variable indicating whether the individual is White or Asian are included. Productive personal characteristics are represented by age and its square (divided by ten), along with six binary variables representing formal education levels:

incomplete elementary education, complete elementary education, incomplete secondary education, complete secondary education, incomplete higher education, and complete higher education or more. For occupational characteristics, two binary variables are included to distinguish occupational status: one indicating whether the individual is an employer and another for self-employed workers. A binary variable represents individuals with a signed labor contract and/or social security contributions. Additionally, two binary variables are used to represent weekly working hours: 30 to 44 hours and 45 hours or more. Regional variables refer to the location of the household in metropolitan or non-metropolitan areas and the major Brazilian regions. A binary variable indicates whether the individual resides in a metropolitan area, and four binary variables represent the region of residence: Northeast, Southeast, South, or Center-West.

Thus, the reference categories are: female gender, black individuals (including both “preto” and “pardo” – black and brown), illiterates, employees without a signed labor contract, weekly working hours of less than 30 hours, non-metropolitan residence, and residence in the North region.

To estimate the marginal effects of the explanatory variables across the earnings distribution, a quantile analysis is performed using the Recentered Influence Functions (RIF), defined as,

$$RIF(Y, q_\tau) = q_\tau + \frac{\tau - 1 \{Y \leq q_\tau\}}{f_Y(q_\tau)}$$

Thus, the marginal effect of a variation in the distribution of covariates on the  $\tau$ -th unconditional quantile of  $Y$  is obtained.<sup>3</sup>

In addition, some inequality measures are calculated for the income distribution, namely the Gini index, Theil's T and Theil's L, and the mean income at some percentiles and tenths of the income distribution, following Hoffmann et al. (2019). To study the evolution of inequality in income distribution, estimates of their probability density functions based on the nonparametric kernel estimator are also used, according to Dinardo et al. (1995) and Silverman (1986).

## 4 Results and discussions

### 4.1 Evolution of Occupations in Rural and Urban Brazil

The evolution of occupations in Brazil, from 2012 to 2022, can be observed considering the employed population estimated by the PNADC, in Figure 1a, and its relative composition, in Figure 1b. During the period, there was an expansion of occupation in Brazil, from 82,900 million to 93,741 million individuals. However, employment in agricultural activities declined, particularly among those in rural areas (RAG), from 5.017 million to 4.816 million. In urban areas, the decline in jobs in agricultural activities (UAG) was smaller, decreasing from 2.781 million to 2.778 million, as shown in Figure 1a. Meanwhile, non-agricultural activities saw an increase in employment in rural areas (RNAG), from 4.435 million to 4.600 million, and even more significantly in urban areas (UNAG), from 70.667 million to 81.548 million.

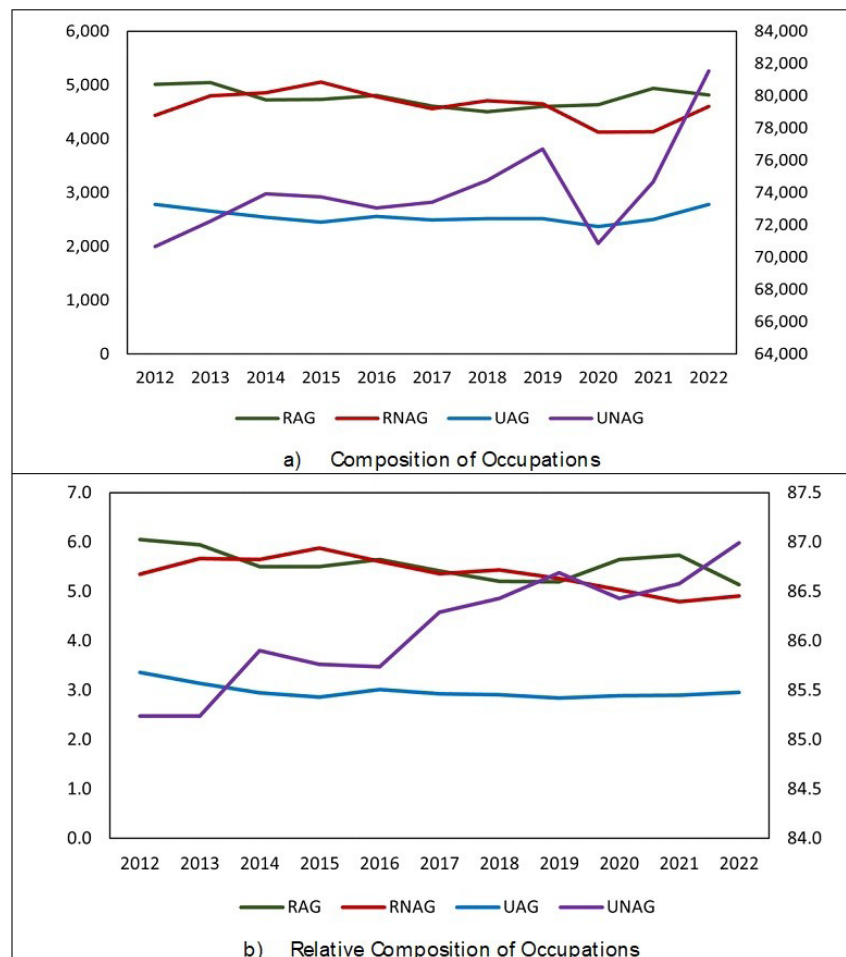
It is noteworthy that the COVID-19 pandemic significantly impacted non-agricultural occupations, especially those in urban areas, with a substantial reduction in employment from 2019 to 2020. In agricultural activities, a slight reduction was observed only in urban areas. Furthermore, during the study period from 2012 to 2022. There was a continued decline in the

<sup>3</sup> For further details, see Firpo & Pinto (2016).

rural population, from 15% to 12%, indicating the persistence of the urbanization process, as highlighted by data from the Banco Mundial (2024).

Over this period, the share of workers in agricultural activities declined both in rural areas (RAG), from 6.1% to 5.1%, and in urban areas (UAG), from 3.4% to 3.0%, as shown in Figure 1b. Similarly, the share of workers in non-agricultural activities in rural areas (RNAG) slightly decreased in the total percentage, from 5.1% to 4.9%. On the other hand, only those employed in non-agricultural activities in urban areas (UNAG) saw an increase in their share of employment, rising from 85.2% to 87.0%.

Table 1 presents an occupational profile of the four studied segments. Initially, regarding gender, there is an increase in the proportion of women employed in all four segments. In agricultural activities, this relative growth was more significant, at 3 percentage points (pp) in RAG and 2 pp in UAG. In the two non-agricultural activity segments, the increase was only 1 pp. However, it is also notable that in agricultural activities, women's participation, at up to 15%, remains significantly lower than men's.



**Figure 1.** Composition of Occupations: Absolute (1.000 people) and Relative (%) in Rural and Urban Areas, Brazil, 2012–2022.

**Source:** Research data based on PNADC.

**Note:** The right axis shows information for the UNAG segment, while the left axis shows information for the RAG, RNAG, and UAG segments.

Regarding skin color or race, there is generally an increase in the participation of non-White individuals, that is, Black and Brown individuals, especially in non-agricultural activities. In rural agricultural activities (RAG), the percentage remains stable at 0.61. Meanwhile, in urban agricultural activities (UAG), there is only a 1 pp increase, reaching 0.62, the highest level among the four segments.

Qualification levels are lower in agricultural activities, both in rural and urban areas, but they show a significant increase of nearly 2 pp in both segments. In urban areas, although smaller, there is also an increase of over 1 pp, reaching an average of 11.71 years of schooling in urban non-agricultural activities (UNAG), nearly double the 6.76 years of schooling observed in RAG in 2022.

**Table 1.** Employment Composition in Rural and Urban Areas, Brazil, 2012 and 2022

Characteristic	RURAL				URBAN			
	Agricultural		Non-Agricultural		Agricultural		Non-Agricultural	
	2012	2022	2012	2022	2012	2022	2012	2022
Total	6.05	5.14	5.35	4.91	3.36	2.96	85.24	86.99
Gender								
Male	0.88	0.85	0.60	0.59	0.88	0.86	0.57	0.56
Female	0.12	0.15	0.40	0.41	0.12	0.14	0.43	0.44
Race or Skin Color								
White	0.39	0.39	0.42	0.39	0.39	0.38	0.51	0.47
Non-White	0.61	0.61	0.58	0.61	0.61	0.62	0.49	0.53
Education								
Less than 1 year of study	0.14	0.10	0.05	0.04	0.12	0.07	0.02	0.01
Incomplete elementary ed.	0.64	0.52	0.41	0.30	0.56	0.42	0.23	0.15
Complete elementary ed.	0.09	0.10	0.12	0.09	0.11	0.09	0.11	0.07
Incomplete secondary ed.	0.04	0.07	0.07	0.09	0.05	0.08	0.07	0.07
Complete secondary ed.	0.08	0.19	0.26	0.34	0.12	0.25	0.34	0.38
Incomplete higher ed.	0.00	0.01	0.03	0.03	0.01	0.02	0.06	0.07
Complete higher or more	0.01	0.02	0.06	0.11	0.03	0.07	0.17	0.26
Average years of schooling	5.03	6.76	8.36	9.62	6.14	8.09	10.57	11.71
Age								
14 to 29 years	0.24	0.21	0.38	0.30	0.25	0.24	0.33	0.27
30 to 59 years	0.66	0.67	0.58	0.65	0.66	0.66	0.62	0.66
60 years or older	0.11	0.12	0.04	0.05	0.09	0.11	0.05	0.07
Average Age	41.09	42.46	35.18	37.75	40.67	41.66	36.90	38.86
Occupational Status								
Employee	0.42	0.40	0.75	0.72	0.59	0.62	0.77	0.72
Employer	0.02	0.03	0.02	0.03	0.05	0.06	0.04	0.05
Self-employed	0.56	0.57	0.22	0.25	0.36	0.33	0.19	0.23
Employment Type								
Formal	0.30	0.36	0.54	0.55	0.44	0.50	0.71	0.69
Informal	0.70	0.64	0.46	0.45	0.56	0.50	0.29	0.31
Weekly Working Hours								
15 to 30 hours	0.22	0.25	0.23	0.24	0.16	0.17	0.15	0.16
31 to 44 hours	0.39	0.44	0.45	0.57	0.39	0.54	0.51	0.63
More than 44 hours	0.39	0.30	0.32	0.19	0.45	0.30	0.34	0.21

**Source:** Research data based on PNADC.



Table 1. Continued...

Characteristic	RURAL				URBAN			
	Agricultural		Non-Agricultural		Agricultural		Non-Agricultural	
	2012	2022	2012	2022	2012	2022	2012	2022
Sector of Activity								
Agriculture	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00
Industry	0.00	0.00	0.34	0.31	0.00	0.00	0.26	0.22
Commerce and Services	0.00	0.00	0.66	0.69	0.00	0.00	0.74	0.78
Location								
Metropolitan	0.03	0.04	0.15	0.10	0.06	0.07	0.49	0.48
Non-Metropolitan	0.97	0.96	0.85	0.90	0.94	0.93	0.51	0.52
Region								
North	0.12	0.14	0.11	0.12	0.09	0.10	0.07	0.07
Northeast	0.40	0.36	0.42	0.41	0.32	0.27	0.20	0.20
Southeast	0.24	0.24	0.24	0.25	0.36	0.40	0.49	0.48
South	0.18	0.19	0.18	0.18	0.12	0.13	0.16	0.16
Center-West	0.06	0.06	0.05	0.05	0.10	0.10	0.08	0.09

Source: Research data based on PNADC.

Regarding age, there is an overall increase across all segments, consistent with the aging of the Brazilian population. Most workers fall into the second age group, from 30 to 59 years old. Moreover, agricultural activities, both rural and urban, have the oldest workers, with an average age of over 40 years. On the other hand, younger individuals (14 to 29 years old) see their proportion decrease across all segments, with the lowest levels in agricultural activities.

Although employees do not constitute the majority of workers in rural agricultural activities, they maintain predominance in the other segments, despite declines in most of them. In rural agricultural activities, self-employed workers represent the largest share of workers, whereas in the other segments, employees are relatively the majority. An increase in self-employed workers is also observed across segments, except in UAG. This trend could be attributed to changes in labor laws that facilitated the expansion of this worker category.

The lack of a signed labor contract is most prevalent in agricultural activities, especially in rural areas, reaching 0.64 in 2022. However, in agricultural activities, both rural (RAG) and urban (UAG), there is an increase in workers with signed labor contracts during the period. The same trend is observed in rural non-agricultural activities, with 0.55 in 2022. Meanwhile, in urban non-agricultural activities, there is a 2 pp increase in the period, with informality reaching 0.31.

Full-time workers, with more than 44 weekly hours, have reduced their participation in both rural and urban labor markets. Those working up to 30 hours per week have increased their share, and even more significantly, those with working hours between 31 and 44 hours per week. However, it is still in agricultural activities that workers with 44 or more weekly hours represent a larger proportion, reaching 0.30 in both rural and urban areas.

Regarding activity sectors, as expected, workers in agricultural activities are in the primary sector, while those in non-agricultural activities are in the secondary and tertiary sectors. Notably, there is an expansion and a larger share in the tertiary sector, comprising services and commerce.

Non-metropolitan regions account for the largest share of jobs across all four segments, with agricultural activities reaching the highest percentage, exceeding 0.90 in both rural and urban areas, even though this share decreased by 1 percentage point in both locations during

the period. Conversely, in non-agricultural activities, the opposite occurs, with an increase in the proportion of jobs in non-metropolitan areas.

The rural area is more prominent in the Northeast region, although it experienced a reduction during the period in both agricultural and non-agricultural activities. Meanwhile, the Southeast region stands out with the largest share of urban employment, showing an expansion of occupations in agricultural activities and a reduction in non-agricultural activities.

Therefore, based on these results, it is possible to outline a profile of the employed population in the Brazilian labor market. Initially, there is a notable reduction in the employed population in rural areas, in contrast to an increase in urban areas, paralleling the decline in the rural population in the country, as reported by the Banco Mundial (2024). Those employed in agricultural activities are predominantly men, non-White, less educated, older, self-employed or employees, without a formal labor contract, working longer weekly hours, and residing in non-metropolitan regions. In non-agricultural activities, there is a slightly higher participation of women, non-White individuals, higher educational qualifications, a presence of younger individuals, a predominance of employees, greater prevalence of formal labor contracts, shorter weekly working hours, and employment spread across both metropolitan and non-metropolitan areas.

Furthermore, the evidence highlights an increasing participation of women even in rural areas, the aging of the employed population, and the high degree of informality in the Brazilian labor market, particularly in agricultural activities in rural areas. It was also observed that the COVID-19 pandemic had a stronger impact on non-agricultural activities, especially in urban areas, which were more affected by social distancing measures.

#### 4.2 Distribution of Labor Earnings in Rural and Urban Areas

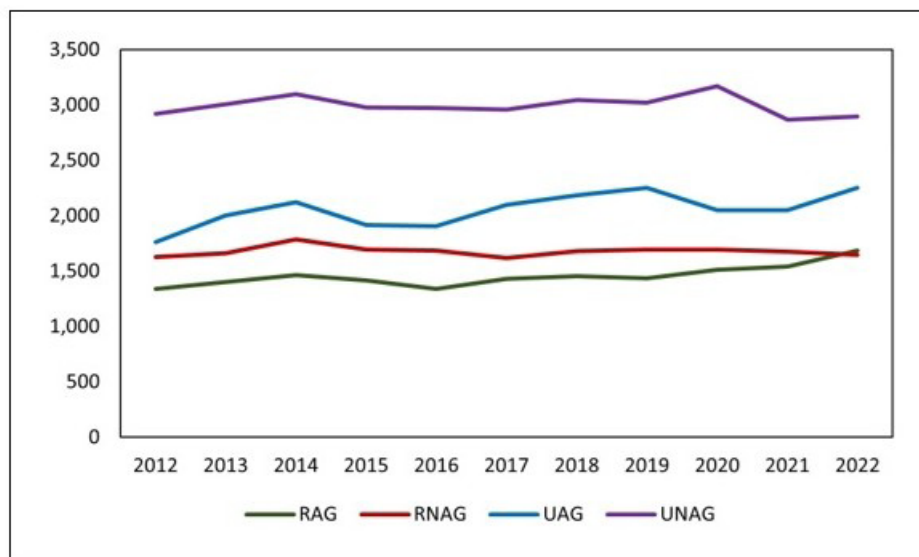
Earnings inequality did not exhibit the same trend across the segments studied, as shown in Table 2. While agricultural activities (RAG and UAG) showed an increase in the Gini index, non-agricultural activities (RNAG and UNAG) experienced a decline in this measure of inequality from 2012 to 2022. A similar pattern was observed in the Theil-L and Theil-T indices, with a sharper increase in the latter indicator in the segments with agricultural activities. Conversely, in the segments with non-agricultural activities (RNAG and UNAG), the indices showed a more significant reduction. These results suggest that changes were more pronounced at the upper tail of the earnings distribution across the four segments.

**Table 2.** Measures of Earnings Distribution in Rural and Urban Areas, Brazil, 2012 and 2022

Measure	RURAL				URBAN			
	RAG		RNAG		UAG		UNAG	
	2012	2022	2012	2022	2012	2022	2012	2022
Gini	0.504	0.532	0.408	0.390	0.482	0.526	0.479	0.472
L of Theil	0.494	0.555	0.332	0.294	0.444	0.527	0.395	0.387
T of Theil	0.541	0.644	0.368	0.307	0.511	0.680	0.483	0.464
Mean	1,339.19	1,687.37	1,628.18	1,645.77	1,760.87	2,252.04	2,920.49	2,897.92
Median	945.05	1,207.63	1,175.64	1,240.04	1,175.64	1,252.44	1,804.16	1,805.05
10 <sup>-</sup>	0.010	0.009	0.014	0.016	0.012	0.010	0.020	0.019
50 <sup>-</sup>	0.175	0.168	0.246	0.254	0.202	0.184	0.201	0.203
40 <sup>o</sup>	0.432	0.412	0.425	0.441	0.405	0.371	0.400	0.404
10 <sup>+</sup>	0.393	0.420	0.329	0.305	0.393	0.445	0.399	0.392
5 <sup>+</sup>	0.280	0.315	0.230	0.204	0.288	0.342	0.282	0.275
1 <sup>+</sup>	0.124	0.151	0.102	0.079	0.124	0.168	0.112	0.106

**Fonte:** Research data based on PNADC; <sup>o</sup> earnings captured by the middle 40%, between the, 50<sup>-</sup> and 10<sup>+</sup>.

The average earnings in rural activities are lower than those in urban activities, as can be seen in Figure 2. Furthermore, agricultural activities have lower earnings than earnings from non-agricultural activities, but this difference has become smaller in both the rural areas as in urban areas.



**Figure 2.** Average Earnings of Occupations in Rural and Urban Areas, Brazil, 2012-2022  
**Source:** Research data based on PNADC.

An estimate of the earnings distribution across the four studied segments in 2012 and 2022 can be observed in Figure 3. Initially, in the earnings distributions for rural and urban areas in 2012 and 2022, respectively shown in Figures 3a and 3b, it is notable that rural areas have a larger share of workers in the lower part of the earnings distribution. However, starting from the mode of the earnings distribution, which occurs around the value of the national minimum wage, rural earnings show a lower frequency. This result aligns with findings for average earnings, for instance, where agricultural activities, particularly in rural areas, have lower earnings. From 2012 to 2022, this pattern does not change significantly, although there is a noticeable decrease in the share of individuals in the lower part of the earnings distribution.

When considering only rural areas with agricultural activities (RAG) and non-agricultural activities (RNAG), as shown in Figures 3c and 3d, a similar pattern to that observed in Figures 3a and 3b is generally evident. However, from 2012 to 2022, there is a reduction in the proportion of individuals below the mode of the earnings distribution in agricultural activities. For those in non-agricultural activities, there is an increase in frequency around the mode of the earnings distribution.

In urban areas, with agricultural (UAG) and non-agricultural activities (UNAG), as shown in Figures 3e and 3f, despite generally similar patterns, an opposite trend to that observed in rural areas is noted. There is a more significant reduction for workers in agricultural activities in the lower part of the earnings distribution and a reduction around the mode of the distribution for those in non-agricultural activities.

Therefore, in general, the results presented in Figure 3 are consistent with the information on the average earnings distribution shown in Table 2 and Figure 2. These findings indicate that the earnings in rural areas and agricultural activities are lower than those in other segments. However, a reduction in the negative differential was observed from 2012 to 2022.

As noted, the mode of the presented distributions occurs around the value of the national minimum wage, which was R\$ 622.00 in 2012 and increased to R\$ 1,212.00 in 2022. The 2012 value,

adjusted for inflation using the INPC to 2022, would be equivalent to R\$ 1,107.52, representing a real increase of slightly more than R\$ 100.00 over the period. In 2022, the minimum wage was close to the median earnings in the first three studied segments (RAG, RNAG, and UAG). One factor that may explain the higher proportion of rural workers earning below the national minimum wage is informality, which primarily affects rural agricultural activities, reaching 64% in 2022, compared to 31% in urban non-agricultural activities.

Table 3 presents the estimated earnings equations for the four studied segments. Initially, regarding gender, a non-productive personal attribute, the estimates indicate positive differentials favoring men over women, the reference category. However, this differential decreased over the period, suggesting greater equity in earnings between men and women. This homogeneous downward trend is not observed for another non-productive personal characteristic: skin color. While White individuals increased their earnings differential compared to non-White individuals in rural areas, a decline in this differential was observed only in urban areas.

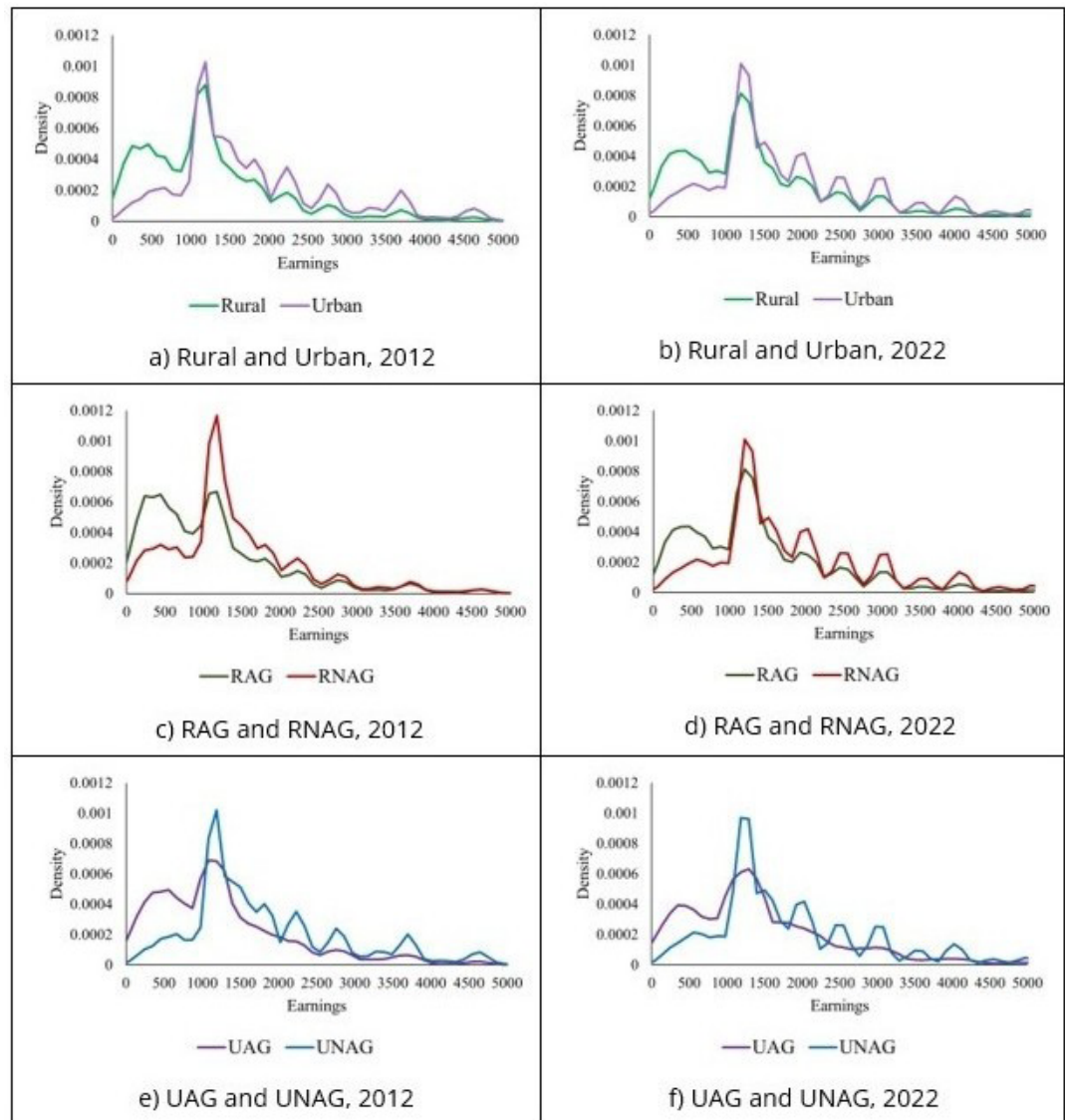
Age, representing the individual's experience, a productive personal attribute, shows a positive premium that decreases from 2012 to 2022 across all four segments. Agricultural activities, particularly in rural areas, have the lowest earnings differentials, while non-agricultural activities in urban areas have the highest. The negative squared age term indicates that the age-earnings relationship is not linear, but rather concave, increasing in the early years of the labor market and decreasing towards the end of the career.

Education is another productive personal attribute that traditionally has a positive impact on earnings, as observed in the presented estimates, meaning that the higher the educational level attained by the worker, the greater their earnings return. Initially, in general, a reduction in earnings differentials is observed from 2012 to 2022, with non-agricultural activities in urban areas (UNAG) having the highest value. There are two exceptions in agricultural activities in rural areas (RAG) and urban areas (UAG) for workers at levels 2 and 4, and in urban areas (UAG) also at Level 7, where earnings premiums increased.

Employers have higher earnings compared to employees, the reference category, as indicated by the parameter estimates. Furthermore, the earnings differential increases relative to the reference category from 2012 to 2022 in rural agricultural activities. In the other segments, however, the differential decreases. Self-employed workers have a negative earnings differential in both rural agricultural activities (RAG and RNAG) and urban agricultural activities (UAG). In urban non-agricultural activities (UNAG), despite being positive, the earnings premiums decrease from 2012 to 2022 compared to employees and the reference category.

Formal employment provides a positive earnings differential, as shown by the estimates. However, this differential decreased in rural areas (RAG and RNAG) and in non-agricultural activities in urban areas (UNAG). In UNAG activities, a modest increase is observed. Longer working hours are associated with higher earnings, which aligns with the parameter estimates. Additionally, all four segments show an increase from 2012 to 2022.

Spatial characteristics also affect earnings differentials, as shown in the estimates for metropolitan areas and major Brazilian regions. In metropolitan areas, earnings differentials are lower compared to non-metropolitan areas, and more specifically, in rural agricultural activities (RAG), this differential becomes negative in 2022. Historical regional inequalities in the country are evident in the estimated specifications. The Northeast presents a negative differential in all four segments, which is enlarged in rural agricultural activities but decreases in other regions from 2012 to 2022. In the Southeast and South, earnings premiums are reduced, except in rural non-agricultural activities. On the other hand, the Center-West has the largest earnings differential, which increases over the study period.



**Figure 3.** Composition of Occupations in Rural Areas – Agricultural (RAG) and Non-Agricultural (RNAG) – and Urban Areas – Agricultural (UAG) and Non-Agricultural (UNAG), Brazil, 2012-2022.

**Source:** Research data based on PNADC.

Finally, further analyzing the behavior of earnings differentials, Figure 4 illustrates the magnitude of these differentials between urban and rural areas and within each of these locations, considering agricultural and non-agricultural activities. It is highlighted that these estimates are obtained for each decile of the earnings distribution.

Figure 4a presents the earnings differential between urban and rural areas in 2012 and 2022. Initially, the largest level of these differentials is observed at the 100th percentile, but it decreases significantly at the second decile, rises again until the 400th percentile, and then drops more sharply starting from the 800th percentile. Another aspect is the reduction in these differentials in 2022 compared to the values estimated in 2012 from the 200th percentile. In Figure 4b, the earnings differential within rural areas, between non-agricultural activities and agricultural activities, shows an opposite behavior of the estimated coefficients, especially in the lower tail of the earnings distribution. Initially, the differentials increase up to the third

decile, decrease until the sixth decile, widen in the next decile, and then drop again in the last two deciles. Finally, in Figure 4c, the earnings differentials in urban areas, comparing non-agricultural activities to agricultural activities, show a similar pattern to that observed in Figure 4a, except that the drop in the upper tail of the earnings distribution occurs slightly earlier, starting from the 700th percentile.

In general, it is observed that earnings differentials reduce between rural and urban activities, as well as between agricultural and non-agricultural segments. This reduction occurs not only for the average values of the earnings distribution but throughout the entire distribution.

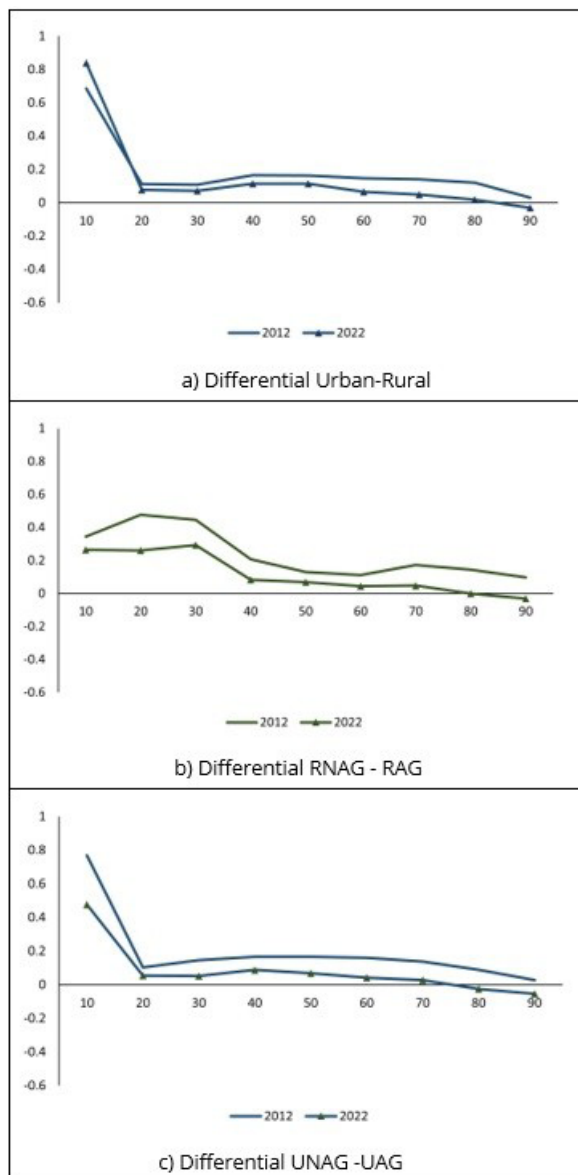
**Table 3.** Earnings Differentials in Rural (RAG and RNAG) and Urban (UAG and UNAG) Areas, Brazil, 2012-2022

Variable	RURAL				URBAN			
	RAG		RNAG		UAG		UNAG	
	2012	2022	2012	2022	2012	2022	2012	2022
Man	0.338***	0.324***	0.418***	0.295***	0.367***	0.209***	0.350***	0.286***
White	0.161***	0.203***	0.085***	0.089***	0.177***	0.146***	0.117***	0.104***
Age/10	0.197***	0.185***	0.424***	0.318***	0.288***	0.240***	0.441***	0.354***
Age <sup>2</sup> /10	-0.018***	-0.014**	-0.042***	-0.029***	-0.030***	-0.021***	-0.040***	-0.031***
Level 2	0.148***	0.156***	0.241***	0.140***	0.141***	0.153***	0.232***	0.080***
Level 3	0.293***	0.240***	0.391***	0.259***	0.261***	0.245***	0.360***	0.214***
Level 4	0.278***	0.310***	0.394***	0.269***	0.349***	0.354***	0.420***	0.240***
Level 5	0.441***	0.370***	0.532***	0.371***	0.499***	0.414***	0.555***	0.345***
Level 6	0.715***	0.515***	0.805***	0.514***	0.818***	0.754***	0.842***	0.558***
Level 7	0.967***	0.628***	1.112***	0.938***	1.001***	1.074***	1.324***	1.052***
Employer	0.706***	0.740***	0.716***	0.439***	0.873***	0.829***	0.644***	0.533***
Self-employed	-0.229***	-0.196***	-0.025**	-0.089***	-0.161***	-0.138***	0.110***	0.013**
Formal	0.382***	0.316***	0.459***	0.411***	0.359***	0.343***	0.332***	0.335***
Work 31h - 44h	0.315***	0.522***	0.339***	0.385***	0.345***	0.533***	0.312***	0.323***
Work more 44h	0.490***	0.682***	0.406***	0.432***	0.502***	0.652***	0.342***	0.381***
Metropolitan	0.121***	-0.004	0.164***	0.056***	0.189***	0.079**	0.120***	0.112***
Northeast	-0.488***	-0.526***	-0.273***	-0.129***	-0.424***	-0.401***	-0.176***	-0.142***
Southeast	0.152***	0.080***	0.034	0.158***	0.063**	0.108**	0.073***	0.135***
South	0.349***	0.308***	0.051**	0.258***	0.154***	0.216***	0.092***	0.193***
Center-West	0.374***	0.399***	0.151***	0.289***	0.295***	0.353***	0.145***	0.198***
Constant	5.395***	5.366***	4.969***	5.245***	5.322***	5.339***	5.067***	5.342***

**Source:** Research data based on PNADC. Statistically significant coefficients are indicated with asterisks: three for 1% (\*\*\*), two for 5% (\*\*), and one for 10% (\*).

The results of the study show that, in rural agricultural activities, there is a notable increase in discriminatory differentials based on race or skin color, a reduction in returns on education for more qualified individuals, an increase for some lower qualification levels, and a rise in premiums for employers and residents in the Center-West region. In urban areas, agricultural activities generally experienced a decline in earnings premiums, although there was an increase in premiums in major regions compared to the North region, the reference category.

In non-agricultural activities in urban areas, there was a reduction in earnings differentials for most of the studied determinants, except for workers with a signed labor contract and/or social security contributions, those working 30 or more weekly hours, and in some locations, such as metropolitan areas and the South, Southeast, and Center-West regions. In rural areas, in non-agricultural activities, a general decrease in earnings differentials was also observed; however, there are exceptions. Earnings premiums increased for White individuals, those working more than 30 hours per week, and in the Southeast, South, and Center-West regions.



**Figure 4.** Earnings Differential Across Its Distribution, Occupations in Rural and Urban Areas, Brazil, 2012 e 2022.

**Source:** Research data based on PNADC.

It is noteworthy that there has been a reduction in earnings premiums related to education, which have the largest differentials. Historically, the increase in the qualification of the labor supply in Brazil was highlighted by Menezes Filho & Kirschbaum (2015), who analyzed data from the demographic censuses of 1960 to 2010, pointing out a particular increase in intermediate educational groups, contributing to the reduction of earnings differentials. Furthermore, Souza & Carvalhaes (2014), who analyzed the period from 2002 to 2011, considering educational groups and social classes, support the explanation of the importance of expanding schooling to reduce earnings inequality during this period. According to Carvalho & Reis (2023), who also analyzed the period from 2012 to 2022, this reduction, notably for higher and intermediate education levels, can be explained by the increase in demand for skilled labor being lower than the expansion of the supply of skilled workers. As a consequence, a process of over-education

may be occurring, meaning that workers are in occupations that require fewer years of schooling than they possess, even in agricultural activities.

Thus, the results of this study confirm the trend observed in the literature of a reduction in employment in agricultural activities and the expansion of non-agricultural activities in rural Brazil. Among the factors that may explain this behavior are public policies related to rural credit, which favor inequality and economic concentration. According to Aquino et al. (2018), there is a peripheral sector in family farming that is not reached by rural credit policies such as Pronaf, including the poorest farmers, marginalized in the field, and incorporated into social policies of the Ministry of Social Development. Similarly, Escher et al. (2014) recognize the contribution of Pronaf to family farming in Brazil but suggest that it has not been able to satisfactorily include farmers due to its conditions. Non-agricultural activities in the countryside represent a form of diversification that may contribute to reducing inequalities, as observed by Start (2001).

During this period, there was an increase in inequality in earnings distribution in rural agricultural activities, while in other segments, there was a reduction. Additionally, this segment continues to have the lowest average earnings. For Hoffmann & Jesus (2015), among the determinants of earnings distribution differences between workers in agricultural and non-agricultural activities, one can mention the minimum wage, education, and land ownership.

Despite the 2017 labor reform, established by Law No. 13.467 (Brasil, 2017), which sought to flexibilize the labor market by simplifying the relationships between workers and employers, the proportion of workers without social protection, work permits, or social security remains high in rural agricultural activities, although an increase was observed from 2012 to 2022.

The evidence points to a higher participation of women and a lower participation of young people in the labor market across all the studied segments. In a study for the Northeast region, Balsadi & Del Grossi (2018) found a reduction in the number of women and young people in rural agricultural activities from 2004 to 2014. Mattei (2015) also highlights the lower labor force participation of women and young people in rural Brazil. Indeed, according to Hasenblag (2003), the reduction of young people in the agricultural sector follows changes in the country's economic structure, as the first job was in the primary sector for 46.9% of individuals until 1967, but the percentage dropped to 10.9% between 1990 and 1996.<sup>4</sup>

Thus, the results for the period from 2012 to 2022 show the continuation of the aging process, with an increase in female participation in employment. Additionally, a reduction in earnings differentials between men and women is noted. However, in 2022, there is still a higher proportion of men and individuals in older age groups in agricultural activities, as well as a higher level of informality and gender differential for men in rural areas.

## 5 Conclusions

This study aimed to analyze the evolution of the Brazilian labor market in rural and urban areas, also considering agricultural and non-agricultural activities from 2012 to 2022. In Brazil, the urbanization process occurred more intensely at the end of the 20th century. However, the results of this study suggest that stabilization in the level of urbanization of the Brazilian population has not yet been observed, with the continued migration flow from rural to urban areas. This is associated with significant changes in the labor market, despite the growth of non-agricultural activities in rural areas.

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<sup>4</sup> Until 1967, 17.5% had their first job in the secondary sector, and the remaining 35.6% in the tertiary sector. By 1990-1996, these percentages were 15.8% and 73.3%, respectively.



During the studied period, the historical trend of a reduction in job positions in rural agricultural activities was maintained. However, non-agricultural activities in rural areas expanded their labor market, indicating the continuation of the expansion already observed in the literature. In turn, non-agricultural activities in urban areas saw the highest growth in employment from 2012 to 2022. It is noteworthy that the COVID-19 pandemic significantly impacted employment only in non-agricultural urban activities, but recovery occurred in the following years.

In parallel, these transformations in occupations have been associated with an increase in inequality in agricultural activities, both rural and urban, but the opposite is observed in non-agricultural activities. At the end of the studied period, rural activities still had the lowest average earnings, favoring the continuity of the urbanization process in the country. However, when examining the differentials across the earnings distribution, urban workers, compared to rural workers, and non-agricultural workers, compared to agricultural workers, reached a lower level or negative value in the upper tail of the earnings distribution, especially in 2022.

Regarding the profile of the employed, several characteristics stand out, such as the increased participation of women in the labor market and the aging of the workforce. Returns to education are the most significant but decreased over the study period, especially at higher education levels, which can be explained by the greater supply of more qualified labor. Additionally, despite differences in average earnings, there are other disparities when examining earnings distribution, with higher earnings in rural areas and agricultural activities in the upper tail of this earnings distribution.

These results suggest the need for public policies aimed at maintaining the rural population, with an expansion of social protection. Rural occupations in agricultural activities still persist with characteristics very distinct from the other studied segments, such as low earnings and inadequate social protection, which has contributed to their reduction over the years, to the detriment of other segments. Therefore, public policies have not proven sufficient to stabilize this process, suggesting the need for their evaluation, expansion, and the incorporation of new strategies.

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The author was solely responsible for the theoretical conception and development of the article.

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#### **Conflicts of interest:**

Nothing to declare.

#### **Ethics approval:**

Not applicable

#### **Data availability:**

The research data is available at IBGE.

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### \*Corresponding author:

Marina Silva da Cunha. mscunha@uem.br

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