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ORIGINAL PAPER

Income Composition Inequality and Regional Heterogeneity: the Spanish Case

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Abstract Income Composition Inequality (ICI) has emerged as a relevant framework for linking functional and personal income distribution, yet empirical evidence remains limited and focused exclusively on national-level analyses. This paper addresses this gap by offering the first comprehensive regional study of ICI in Spain over the period 2007–2021, a context characterised by pronounced territorial heterogeneity. Using microdata from the Income and Living Conditions Survey and a set of indicators capturing primary and secondary ICI, the article provides three main contributions. First, it demonstrates that ICI varies across regions and that neither its levels nor its patterns of change follow conventional geographical divides documented in the broader inequality literature. This reveals that regional disparities in income composition represent an independent dimension of territorial inequality that cannot be inferred from standard measures of income distribution. Second, the study shows that the concentration of individual income sources (particularly wages by education level, financial income and real estate income) plays a central role in explaining regional divergence, highlighting structural factors such as ageing, specialisation in tourism or exposure to gentrification. Third, the paper documents heterogeneous redistributive capacities across regions and identifies cases where high ICI persists even after transfers, underscoring the need for region-specific approaches to fiscal policy, housing policy and human-capital accumulation. Together, these contributions advance the understanding of ICI by revealing its relevance in contexts with strong regional heterogeneity and by establishing a methodological and empirical foundation for extending regional analyses of income composition to other countries.

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1 Introduction

The study of income distribution is a core topic in economics (Sandmo 2015), traditionally approached from two angles: functional and personal. The functional perspective looks at income allocation across production factors, while the personal focuses on its distribution among individuals. Despite extensive literature on both, their connection has received limited attention (Dagum 1999), prompting Atkinson (2009) to identify it as a key area for advancing the understanding of inequality in the 21st century.

A key approach to linking functional and personal income distribution is Income Composition Inequality (ICI), introduced by Ranaldi (2019) and further developed in recent contributions (Amoedo 2025; Ranaldi 2022; Ranaldi and Milanović 2022). ICI adds a new analytical dimension (compositional inequality) by examining how income sources concentrations vary across the personal income distribution.

Despite recent advances in the study of ICI, key empirical gaps remain, especially from a regional perspective. This article examines regional heterogeneity and potential divergences in ICI within the context of pronounced territorial inequality, focusing on Spain from 2007 to 2021. By analysing differences in ICI levels and trends across regions, the study deepens understanding of both ICI and regional disparities and highlights the importance of extending such analyses to other national contexts.

Spain is selected as a case study due to its historically high regional heterogeneity, driven by factors such as political and institutional decentralisation (Díaz-Lanchas and Mulder 2021; González-Alegre 2010; Harguindéguy et al. 2021), disparities in economic development and well-being (Goerlich and Mas 2002; Lasarte et al. 2017; Murias et al. 2012), and labour market differences (Bande et al., 2007; López-Bazo et al., 2005). Furthermore, regional inequality and polarisation have intensified in recent years in Spain, potentially exacerbated by the COVID-19 pandemic effects. However, this context is not unique to Spain and reflects the reality of numerous countries, particularly those in Southern Europe, the Americas, and Asia. Therefore, this research provides conclusions of interest for contexts with similar characteristics beyond the Spanish case.

This research contributes to the existing literature on ICI by showing that, in contexts characterised by high regional heterogeneity, both the levels and the evolution of ICI can differ substantially. This highlights the need to analyse ICI from a regional perspective, underscoring the limitations of the existing literature and providing new insights into regional disparities in a dimension that has not previously been examined at the regional level. This research also shows that disparities in ICI do not follow the patterns observed in the literature on income distribution inequality (such as the north-south divide), and that regions show different redistributive capacities

in terms of income composition. This underscores the need for policies adapted to the specific realities of each region.

This article is structured into seven sections, including this introduction. Section two introduces the concept of ICI and summarises the main empirical findings in the existing literature. Section three provides context on the state and evolution of ICI in Spain through a review of relevant studies. The fourth section examines the regional disparities in Spain with the aim of contextualising the results obtained in this study. Section five outlines the data sources and methodology employed in the analysis. Section six presents the results for the Spanish regions analysing the levels of ICI, its evolution and the concentration of individual income sources. Finally, section seven sets out the main conclusions and policy implications derived from the research.

2 Income Composition Inequality

The study of income distribution has primarily been approached from two perspectives: the functional and the personal. However, throughout the history of economic thought, little attention has been paid to exploring the link between these two perspectives (Dagum 1999). Specifically, four approaches to this link can be distinguished. These are, in chronological order of development: the approach of inequality decomposition by its factorial components (Fei et al. 1978; Pyatt et al. 1980; Shorrocks 1982), the flow approach (Civardi and Lenti 2018; Dafermos and Papatheodorou 2015; Fujita 2023; Palley 2014), Piketty's approach (Piketty 2014; Piketty and Saez 2014), and the approach of income composition inequality (Iacono and Palagi 2022; Iacono and Ranaldi 2023; Petrova & Ranaldi, 2024; Ranaldi 2019, 2022; Ranaldi and Milanović 2022).

The study of ICI aims to analyse the extent to which different sources of income are concentrated along the personal income distribution (Ranaldi 2019). In other words, it seeks to examine how unequal the income composition is among individuals based on their income level. This approach was introduced by Ranaldi (2019, 2022), who, starting from a division of income into two factors or sources (capital income and wages), developed an index to measure the concentration of each factor (Income-Factor Concentration Index, IFC). This indicator ranges from –1 to 1, where a value of zero indicates that the income source holds the same weight in the income composition of all individuals in the economy (income composition equality). A negative value suggests that the income source is more concentrated among lower-income individuals, while a positive value indicates greater concentration among higher-income individuals.

For the calculation of the IFC, Ranaldi (2019, 2022) defines three concentration curves for each factor: the zero-concentration curve for capital or labour, the concentration curve for capital or labour, and the maximum-concentration curve for capital or labour. The zero-concentration curve of a factor represents the situation in which the income of all individuals in a society is composed in the same way, i.e., the situation of full equality in income composition. The concentration curve of a factor represents the real situation in society, lying between the zero-concen-

tration curve and the maximum-concentration curve. The maximum-concentration curve of a factor defines the situation where inequality in income composition is at its highest. In a dual income division framework (capital-labour), this means the existence of two social classes: capitalists, who receive income solely from capital, and workers, who receive income solely from wages.

In the framework introduced by Ranaldi (2019, 2022) and Ranaldi and Milanović (2022), three theoretical typologies of societies are considered: Classical Capitalism, Modern Capitalism, and Classical Anti-Capitalism. Classical Capitalism is characterised by a situation in which there are two clearly differentiated classes (workers and capitalists), each receiving income from a single source, and in which capitalists have higher income levels than workers. Modern Capitalism describes a society in which there is full equality in income composition, meaning that all individuals have the same income composition, although they may have different income levels. Classical Anti-Capitalism refers to a situation where social classes exist, as in Classical Capitalism, but workers have higher income levels than capitalists.

Three limitations exist in the study of compositional inequality and develops a methodological proposal that he applies to the realities of Spain and Galicia. The first limitation concerns the need for a more detailed decomposition of income beyond the simple labour-capital division. Specifically, Amoedo (2025) shows that financial and real estate capital incomes exhibit different concentrations: the former are strongly concentrated among the wealthiest households and individuals, while the latter are concentrated among the poorest. This limitation is also evident in the case of wages, as previous studies define all incomes not derived from capital as wages, including actual wages, social benefits, subsidies, and mixed incomes (Iacono and Palagi 2022; Iacono and Ranaldi 2023; Petrova & Ranaldi, 2024; Ranaldi 2019, 2022; Ranaldi and Milanović 2022).

The second limitation refers to the need to differentiate between inequality in the composition of primary and secondary income. In this regard, the proposed methodology allows for a distinction between the two. Primary income refers to the distribution of market-derived income sources, excluding those generated by redistribution carried out by the public sector. Secondary income includes both market-derived income sources and the redistribution carried out by the public sector. Table 1 presents the decomposition of primary and secondary income used by Amoedo (2025).

The third limitation highlighted pertains to the need to include in-kind income received by individuals to obtain a complete view of compositional inequality. To address this, Amoedo (2025) includes non-monetary income from the ownership of primary residences as real estate income, and public healthcare and education services as redistributive instruments of the public sector. In order to estimate in-kind income, the analysis is based on the cost of provision, which is then imputed to the individuals receiving the benefits.

The methodological approach developed by Amoedo (2025) adapts the concentration curves introduced by Ranaldi (2019, 2022) to the context with more than two income sources by employing individual Income-Factor Concentration (IFC) for the different income sources. Subsequently, he defines a new index for measuring ICI (Income Composition Inequality index, ICI) that allows the measurement

Table 1 Primary and secondary income decomposition

Source type	Income source	Description
Primary	Non-high-skilled wages	Gross wages received by individuals without tertiary education
	High-skilled wages	Gross wages received by highly educated individuals
	Mixed incomes	Profits or losses of the self-employed (including from intellectual property) and self-consumption
	Real estate incomes	Gross income received from the rental or transfer of real estate assets and income in kind derived from the ownership or enjoyment free of charge or at below-market price of the principal residence
	Financial incomes	Income received through interest, dividends and profits from holdings in companies and withdrawals from private pension systems
	Other income sources	Transfers received from other private households and income received by children under 16 years of age
Secondary	Taxes	Direct taxes on wealth, income and social contributions
	Social benefits	Benefits and social assistance for family situation, social exclusion, minors, studies, unemployment, retirement, survival, illness or disability
	Public services	Public health and education services (imputed)

Source: Own elaboration according to Amoedo (2025)

of ICI from a global perspective with more than two income sources and differentiates between primary and secondary income. Moreover, this indicator allows for its decomposition to analyse the individual role of the different income sources.

Studies on ICI reveal common conclusions but differ depending on the methodology used. Studies that apply the capital-labour division show significant ICI differences between countries, with a trend towards lower ICI in most of them (Iacono and Palagi 2022; Iacono and Ranaldi 2023; Ranaldi 2019, 2022, 2025; Ranaldi and Milanović 2022). In contrast, Amoedo (2025), by decomposing income into more than two sources for Spain, finds different results, with a trend towards greater inequality in primary income composition and an increasing concentration of financial income among higher classes. The next section provides a detailed analysis of the Spanish case and its regional heterogeneity.

3 Income Composition Inequality in Spain

The ICI in Spain has been studied by Ranaldi (2022) and Amoedo (2025) using different methods. Ranaldi (2022) examines six European countries (Germany, Norway, the Netherlands, the UK, Switzerland, and Spain) from 2007–2016, decomposing income into capital (interest, dividends, profits, private pensions) and labour (wages, mixed income, social benefits, and other sources). Amoedo (2025) studies Spain from 2007–2021, decomposing income into more than two sources, distinguishing between primary and secondary income, and including non-monetary income (see Table 1).

The methodological differences between the two studies lead to substantial variations in the conclusions regarding the evolution and levels of ICI in Spain. Among these differences, the following can be highlighted. Amoedo (2025) analyses the ICI for both primary and secondary income, whereas Ranaldi (2022) only examines secondary income. Therefore, only the results for secondary income can be analysed. Additionally, Amoedo (2025) introduces a different decomposition of secondary income, including in-kind income from the ownership of the main residence and the provision of public services, which also affects the results obtained for secondary income.

Amoedo (2025) and Ranaldi (2022) find two key differences in their studies of ICI in Spain. First, Ranaldi (2022) reports a decline in ICI over the period, while Amoedo (2025) observes an increase in secondary ICI. Second, Ranaldi (2022) combines real estate and financial income under capital income, noting lower concentration, whereas Amoedo (2025) separates them, revealing a concentration of financial income in higher classes and real estate income in middle and lower classes, also draws conclusions on the early effects of the Covid-19 pandemic.

Amoedo (2025) shows an increase in both primary and secondary ICI, exhibiting a countercyclical behaviour, with increases during recessive phases and reductions during expansive phases. He also observes that the increase in primary ICI is concentrated in the period from 2019 to 2021, primarily due to the sharp rise in the concentration of financial income among the wealthiest households and individuals.

Amoedo (2025) also highlights the differing concentration of wages depending on individuals' educational levels. Specifically, wages overall are clearly concentrated in households and individuals with higher income levels, but when divided, disparate concentrations emerge. On the one hand, wages associated with higher education tend to be more concentrated among higher-income households and individuals than wages in general. On the other hand, wages without higher education exhibit different patterns for primary and secondary income. In the case of primary income, there is a slight concentration in households and individuals with lower income levels, while for secondary income, there is a slight concentration in higher-income households and individuals. These findings demonstrate how human capital is a key factor in explaining ICI. Additionally, it is observed that over the period, the concentration of wages with higher education has increased within secondary income, indicating a growing importance of human capital.

4 Regional Disparities in Spain

This section offers an overview of regional disparities in Spain based on a range of macroeconomic dimensions keys to understanding regional disparities (production, population, and labour market). It also summarises the main conclusions in the literature that help explain these differences. Beginning with variations in economic development, Fig. 1 shows the dispersion in regional GDP per capita between 2007 and 2021 in purchasing power standards (PPS, EU27 from 2020).

To examine the uneven demographic situation across regions, Fig. 2 shows how total population changes have varied among Spanish regions, with some experiencing significant declines while others grew by more than 10%.

Furthermore, as illustrated in Fig. 3, the age structure also differs markedly between regions. As can be seen, some regions exhibit advanced levels of demographic ageing, a process that is uneven across Spanish regions. Notably, these are also the regions experiencing the greatest population loss and the most pronounced progression in this ageing process.

A final area in which significant regional disparities can be observed is the labour market and its dynamism. Figure 4 presents the unemployment rates in Spanish regions for 2007 (prior to the Great Recession), 2014 (the beginning of economic recovery), and 2021 (the last year analysed). It can be seen that marked North-South differences reappear, with southern regions exhibiting higher unemployment levels in all three years.

The analysis of the macroeconomic indicators examined in this section confirms the presence of pronounced regional disparities in Spain and highlights the existence of several distinct regional divides. On the one hand, in terms of economic development and labour market performance, a clear North-South divide emerges, with southern regions exhibiting the weakest outcomes. On the other hand, from a demographic perspective, notable differences also arise: a group of traditionally agrarian and/or industrial regions is experiencing demographic decline (Galicia, Extremadura, Castile and León, and the Principality of Asturias), while other regions (particularly the island territories and the national capital) are characterised by strong demographic growth. Between these two groups lies the majority of regions, which have experienced more moderate population increases. Moreover, demographic ageing varies across regions, with significant North-South differences also evident in this dimension.

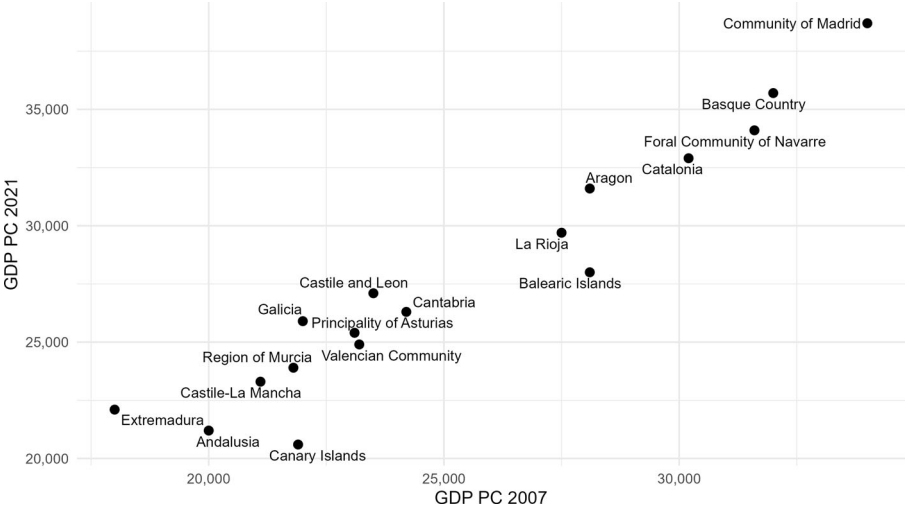

Fig. 1 GDP per capita in Spanish regions 2007–2021. Source: Author from Eurostat (2025a)

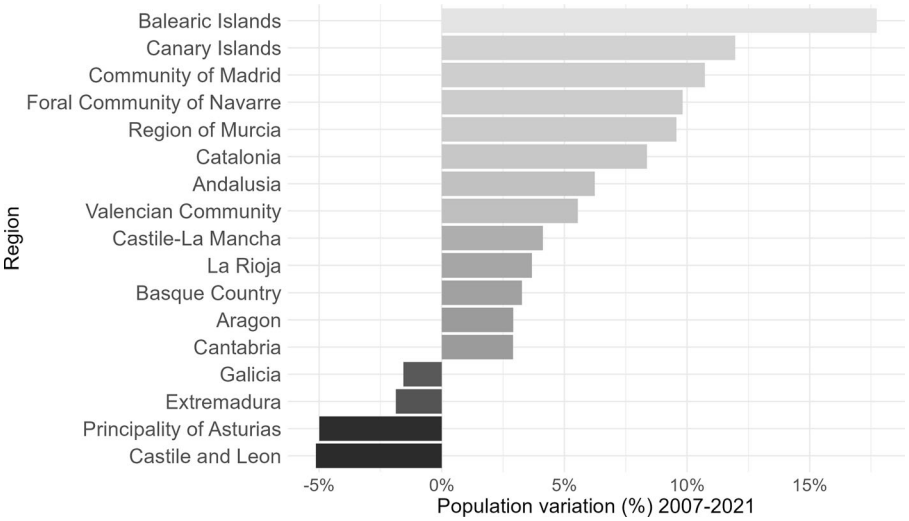

Fig. 2 Population variation in Spanish regions 2007–2021. Source: Author from Eurostat (2025a)

Behind these disparities lie numerous explanatory factors analysed in the economic literature. Among the most prominent are those linked to the structural differences that have characterised Spain throughout its history, as well as those related to the diverse resources available across territories. In explaining the varying levels of economic development, existing studies frequently point to differences in productive orientation and to the specialisation of certain regions in tourism and other low value-added services (Almeida et al. 2021), to divergent levels of human capital accumulation and investment in R&D (Delgado et al. 2024; De la Fuente 2002), and

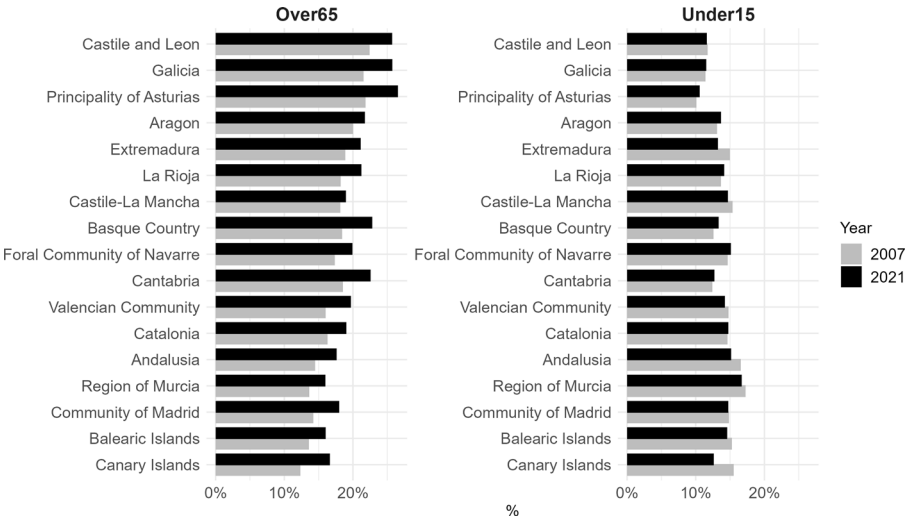

Fig. 3 Age structure in Spanish regions 2007–2021. Source: Author from Eurostat (2025a)

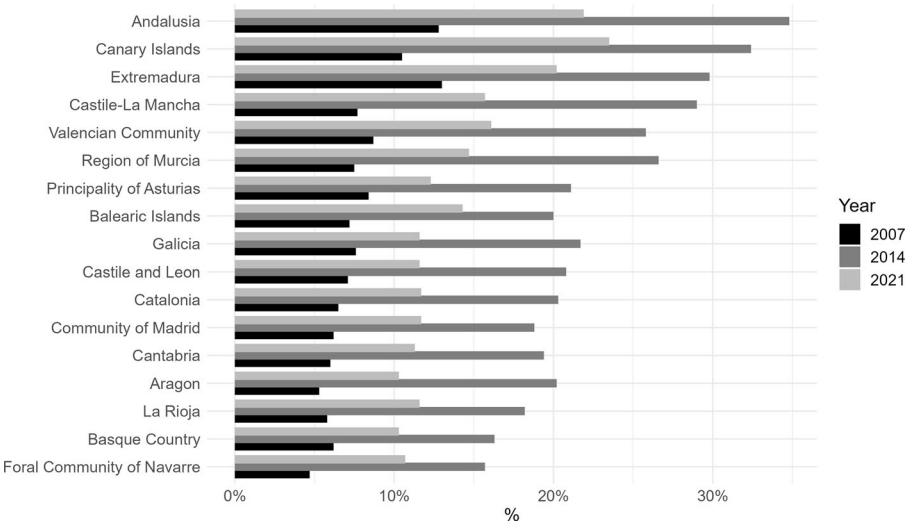

Fig. 4 Unemployment rates in Spanish regions 2007, 2014 and 2021. Source: Author from Eurostat (2025b)

to demographic phenomena such as rural depopulation, which has intensified over recent decades (Ayala et al., 2021).

Other contributions, from a different perspective, attribute some regional disparities to decentralisation (Harguindéguy et al. 2021), although others view decentralisation as a successful policy for territorial development (Díaz-Lanchas and Mulder 2021). A further conclusion widely noted in the literature is the limited capacity of territorial cohesion policies to eliminate long-standing regional disparities (Medeiros, 2017), despite their important role (Faiña et al., 2020).

5 Data and Methods

This section outlines the process followed to measure ICI across Spanish regions. The first subsection presents the data sources used, the procedure followed to construct the database, and the variables employed. It also introduces the temporal robustness checks applied to assess the properties of the estimated indicators, as well as descriptive information on the regional sample. The second subsection sets out the indicators used to measure ICI and discusses their main properties.

5.1 Data

To analyse the ICI in this research, the microdata from the Living Conditions Survey (LCS), developed by the Spanish National Statistics Institute (INE [Instituto Nacional de Estadística] 2023), are used in this research. The ECV is part of the European Union Statistics on Income and Living Conditions (EU-SILC) and includes information on income, characteristics, and living conditions of households

and individuals residing in Spain during the year prior to the interview. Additionally, the ECV provides information on the region (autonomous community) of residence of the households, allowing for regional analyses such as the one presented in this research.

The LCS is conducted annually and includes information from the year preceding its edition. For this study, editions from 2008 to 2022 are used, containing data for the period 2007–2021. It is important to note that, since its 2008 edition, the LCS uses administrative files to complement the information provided by respondents, aiming to overcome limitations in data quality. However, as highlighted by Ayala et al. (2022), the LCS still presents representativeness issues for the tails of the income distribution and for certain sources of income. Furthermore, given the regional focus of this study, it should be noted that these issues of representativeness may be exacerbated by the limited size of the regional samples. Consequently, the estimates obtained may be subject to greater uncertainty, particularly those used to measure the concentration of individual income sources.

The main advantage of the LCS lies in its detailed breakdown of monetary or quasi-monetary income into different sources, allowing for the consideration of multiple income sources and the differentiation between primary and secondary income. However, the LCS does not include information on non-monetary (or in-kind) income received through the enjoyment of public services by households and individuals. Therefore, following Goerlich (2016), this research chooses to impute these incomes based on the characteristics of individuals for public services in healthcare and education. The process for their valuation and imputation is briefly explained below. Further information on the valuation and imputation of public service incomes is provided in Appendix A.

The household is the unit of analysis. Therefore, the modified OECD consumption unit scale and the household expansion factor provided by the ECV are employed[1]. The use of the consumption unit scale considers the composition and size of the household when measuring the well-being generated by its income. The expansion factor[2], as defined by the INE [Instituto Nacional de Estadística] (2023), ensures that the results are representative of the entire population.

Since the EU-SILC already undertakes a meticulous sampling process, the microdata does not contain missing values for income variables (see Table B.1 for the sample size by region and year, as well as the effective sample size is presented in Appendix B). Moreover, the potential presence of outliers is directly mitigated by the elevation factor, which assigns them a low weight in the sample. Table B.2 in the Appendix B presents key descriptive statistics for primary and secondary income, as well as for the different income sources, for Spain as a whole over the period analysed.

[1] The modified OECD consumption unit scale assigns a weight of 1 to the first adult in the household, 0.5 to each additional adult (aged 14 or over), and 0.3 to each child under the age of 14.

[2] The elevation factor in the LIC is a sampling weight that indicates how many individuals in the total population each respondent represents, and it is constructed by combining the inverse probability of selection with adjustments for non-response and calibration to official population totals.

5.2 Methods

The income decomposition follows the classification presented in Table 1, covering both the primary and secondary income is analysed. ICI is measured using the indicator proposed by Amoedo (2025), hereafter referred to as the ICI index. The ICI index measures the compositional inequality decomposing the income in J income sources and employing (1), where π_j denotes the share of the j income source in the total income and IFC_j the Income-Factor Concentration index for the j income source.

$$ICI_t = \pi_j * \left|IFC_j\right| \tag{1}$$

The IFC for the j income sources is calculated following to Ranaldi (2019, 2022), but using the framework proposed by Amoedo (2025), whereby income is decomposed into two sources of income (j and the set of sources of income other than j). The absolute value of IFC is used because it does not matter whether j is concentrated among the richest or poorest individuals, in both cases, it generates compositional inequality.

This index has three advantages over other indicators, such as those proposed by Ranaldi (2019, 2022): it allows for decompositions into more than two income sources, differentiates between primary and secondary income, and can be broken down to analyse the reality of each individual income source.

When decomposing the ICI index, Amoedo (2025) uses the IFC for each income source compared to the other income sources as a whole. This decomposition allows for the analysis of the concentration of each income source without considering its weight in the functional distribution of income and, therefore, does not directly measure the contribution to the ICI index.

To carry out the analysis, the ICI index is calculated for both primary and secondary income for all the years in the period for the whole of Spain and the seventeen Autonomous Communities. Furthermore, the ICI index is broken down for primary and secondary income to analyse the concentration of the different income sources. The results obtained are presented and discussed in the following section.

6 Results and Discussion

This section presents and discusses the main results of the empirical analysis, using figures to represent Income Composition Inequality (ICI) across regions and over time. The section is divided into four subsections: the first analyses regional ICI levels and groups regions with similar levels; the second presents the evolution of ICI, focusing on economic cycles; the third examines the concentration of income sources in Spanish regions through the decomposition of the ICI index; and the fourth synthesises the discussion by first highlighting the limitations arising from potential issues related to temporal robustness, and then outlining the implications of these results for research on regional disparities.

6.1 Income Composition Inequality in the Spanish Regions During the 2007–2021 Period

Figure 5 shows the average value of primary ICI for the period 2007–2021 across Spanish regions (annual values are presented in Table C.1 of Appendix C). The results show notable regional heterogeneity, with values ranging from 0.25 to 0.50. The regions with the highest levels of ICI are the Community of Madrid and Andalusia, which surpass the 0.40 threshold. Following them are Basque Country, Principality of Asturias, Extremadura, Catalonia, and Cantabria, all of which exceed the 0.35 threshold. A third group surpasses the 0.30 threshold, comprising Castile and León, Canary Islands, Valencian Community, Region of Murcia, Foral Community of Navarre, La Rioja, and Aragon. Finally, there is a group made up of Galicia, Islas Baleares, and, at the lowest value, Castile-La Mancha.

These results show that there is no clear pattern defining regional disparities, unlike other cases where a north-south or centre-periphery divide was apparent. However, a more in-depth analysis allows for some interesting conclusions. Most of the regions with the highest levels of per capita income-such as the Community of Madrid, the Basque Country, and Catalonia-also display high levels of primary ICI (see Section 4), with the notable exception of the Foral Community of Navarre, which shows considerably lower levels.

In addition to these high-income regions, several others with medium or low-income levels, such as Andalusia, the Principality of Asturias, Extremadura, and Cantabria, also exhibit high levels of primary ICI. This suggests that regions with higher levels of economic development tend to display greater income composition inequality. Furthermore, it is worth noting that, in this case, there does not appear to be a clear north-south divide, which is commonly observed in other aspects of regional disparities in Spain.

When analysing the situation of secondary ICI in Fig. 6 (annual values are presented in Table C.1 of Appendix C), a notable regional difference emerges compared to what is observed for primary income: regional disparities are smaller. While the difference in ICI values between the region with the highest inequality and the one with the lowest inequality for primary income was over 0.16 points, for secondary income it is only 0.10 points. Going beyond the previously mentioned differences, the coefficient of variation for primary income (0.0052) is significantly higher than that for secondary income (0.0035). This highlights that the redistributive role of the public sector reduces ICI both within and across regions.

The results also show that two regions stand out significantly from the rest due to their high levels of secondary Income Composition Inequality. These regions are the Community of Madrid (0.2580) and the Basque Country (0.2498), followed at a clear distance by Castile and León (0.2148) and the Foral Community of Navarre (0.2730), which are the only other regions exceeding the 0.20 threshold. The case of Navarre is particularly noteworthy, as it is one of the regions with the lowest levels of primary ICI, yet this does not appear to carry over when analysing secondary ICI. In this regard, it is worth highlighting those regions such as Catalonia, Andalusia, Extremadura, and the Principality of Asturias show lower levels of secondary ICI compared to those observed for primary income.

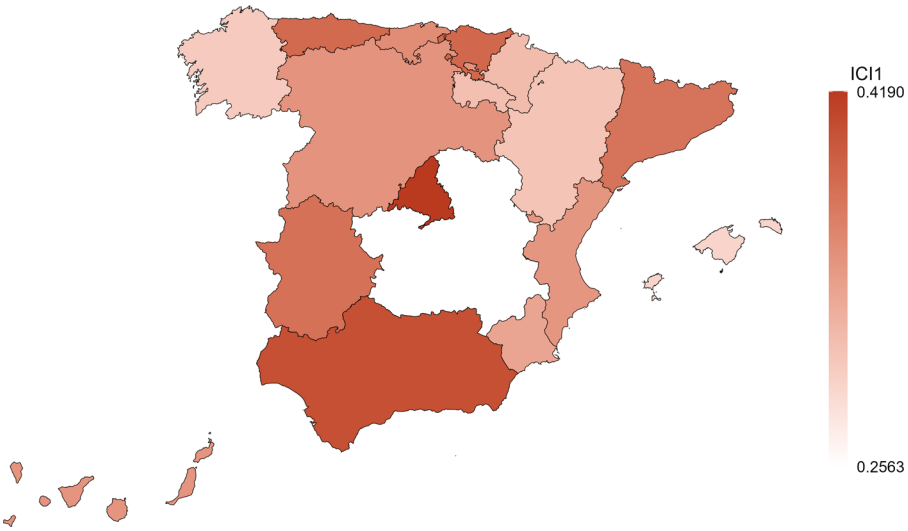

Fig. 5 Primary ICI in Spanish Regions Average for the Period 2007–2021. Source: Author from INE [Instituto Nacional de Estadística] (2023)

From the results analysed above, two main conclusions can be drawn. The first is that secondary income composition inequality does not appear to follow a clear regional pattern, similar to what was observed for primary income. The second is that the role of the public sector varies significantly across regions, showing uneven capacity in reducing income composition inequality.

Figure 7 shows the dispersion in average levels of primary and secondary income composition inequality across regions during the 2007–2021 period. It can be observed that the Community of Madrid and the Basque Country stand out as the regions with the highest levels of secondary ICI compared to the rest. The other regions display more similar levels of income composition inequality, although notable differences still exist among them. Particularly noteworthy are the Balearic Islands, which show moderate levels of both primary and secondary ICI-something also observed, to a lesser extent, in Galicia, Castile-La Mancha, Aragon, and La Rioja.

6.2 The Evolution of Income Composition Inequality in Spanish Regions

After analysing the levels of Income Composition Inequality in Spanish regions from a static perspective, it is necessary to examine its evolution throughout the studied period in order to identify patterns in its development and behaviour. To do this, the percentage variation of the ICI index for primary and secondary income is first analysed. The results are shown in Fig. 8, where it can be observed that in many regions, ICI has increased for both primary and secondary income, which is consistent with the findings of Amoedo (2025) for Spain as a whole. However, it should also be highlighted that the extent of the increase varies between regions,

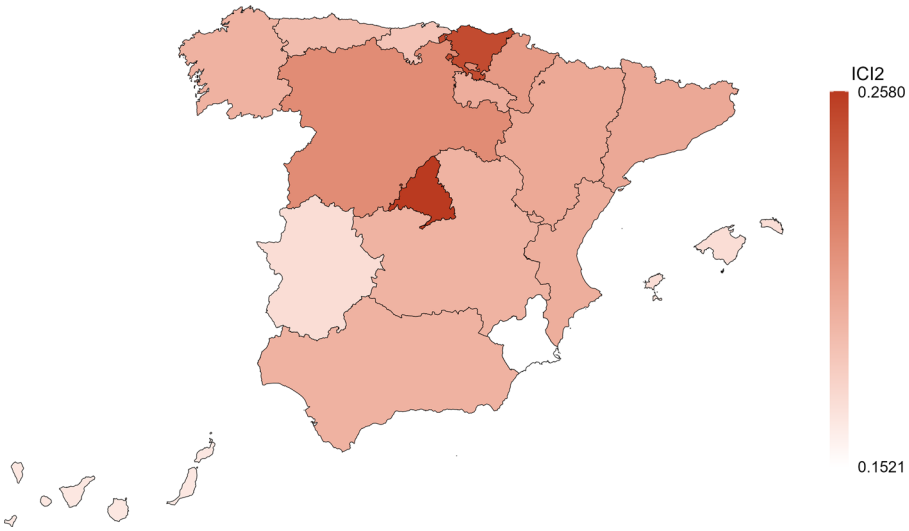

Fig. 6 Secondary ICI in Spanish Regions Average for the Period 2007–2021. Source: Author from INE [Instituto Nacional de Estadística] (2023)

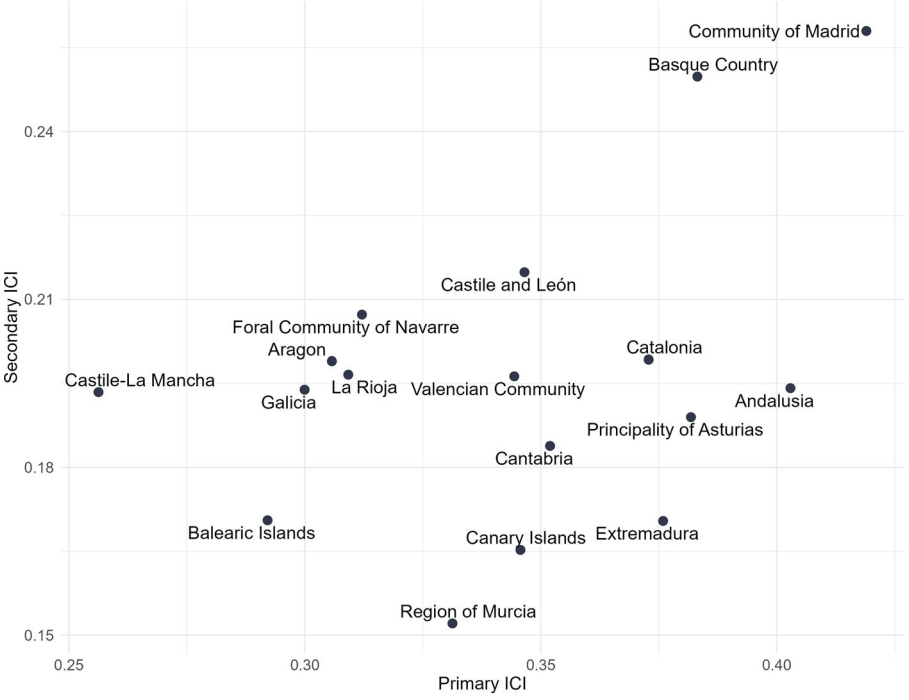

Fig. 7 Dispersion of Primary and Secondary Income Composition Inequality in Spanish Regions (2007–2021 Average) Source: INE [Instituto Nacional de Estadística] (2023)

showing a high level of regional heterogeneity. It is also important to note that some regions show variations in opposite directions for primary and secondary income.

An analysis of trends in primary and secondary income reveals two distinct patterns. For primary income, ICI increased in most regions, with La Rioja and the Foral Community of Navarre being the only exceptions. In contrast, for secondary income, a larger number of regions experienced reductions in ICI, including the Balearic Islands, the Basque Country, Extremadura, Galicia, Castile and León, and the Region of Murcia. These results point to two clear trends. First, the compositional inequality of primary income sources has tended to increase across Spanish regions in recent years, indicating a growing concentration of market-based income sources along the personal income distribution. Second, the evolution of ICI for secondary income displays no homogeneous pattern across regions.

The previous trends translate, using the variation coefficients for the initial and final years of the period, into a reduction in the dispersion for secondary income (from 0.0094 in 2007 to 0.0077 in 2021) and an increase for primary income (from 0.0023 in 2007 to 0.0033 in 2021). This translates into greater regional heterogeneity in the composition of income for primary income sources, but less for secondary income.

To understand the evolution of the ICI throughout the analysed period, it is essential not only to examine the overall variation during this period but also to study its behaviour over time. As Amoedo (2025) points out, the evolution of ICI is strongly influenced by economic cycles at the national level, displaying a countercyclical pattern (increases during recessive phases and reductions during expansive

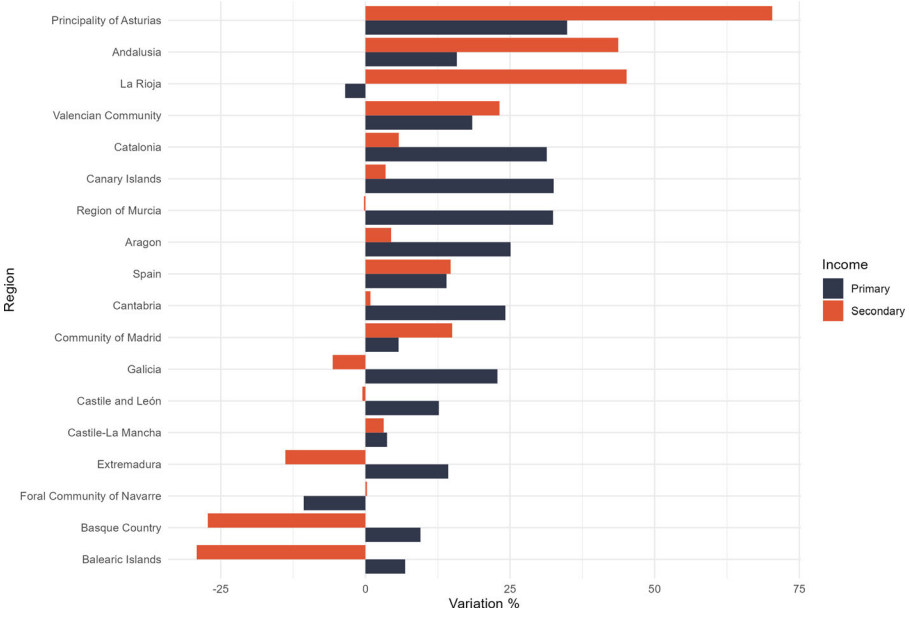

Fig. 8 Percentage change in primary and secondary ICI in Spanish regions 2007–2021. Source: Author from INE [Instituto Nacional de Estadística] (2023)

phases). Accordingly, this analysis will focus on the evolution of the ICI index for primary and secondary income across four subperiods: 2007–2014 (Great Recession), 2015–2019 (economic recovery), 2020 (pandemic), and 2021 (beginning of the post-pandemic recovery). To enhance the visualisation of trends, five key years will be included in the graphs to represent the aforementioned subperiods: 2007, 2014, 2019, 2020, and 2021. The reason for using this selection of years is to be able to visualize trends more clearly. The results for all years in the period are presented in Tables C.1 and C.2 in Appendix C, where it can be seen that the robustness of the analysis is maintained when all years are included.

Based on the results for primary income, four groups of regions with distinct evolutions can be identified. The largest group Follows a trajectory similar to that of Spain as a whole, as can be seen in Fig. 9. This group comprises eight regions that experienced an increase in their primary ICI level throughout the period, although the timing and intensity of these increases vary across subperiods. Andalusia, Aragon, the Balearic Islands and Extremadura recorded increases in most subperiods; however, in Aragon and Extremadura these increases were particularly concentrated in the later years. By contrast, the Basque Country and the Community of Madrid exhibited declines during the Great Recession, followed by marked increases in the final years of the period. Finally, Castile and León displays a distinctly counter-cyclical pattern, with increases during the Great Recession and the COVID-19 pandemic, and reductions during the subsequent economic recovery phases.

A second group of regions (see Fig. 10) exhibits a pattern marked by a strong increase in primary ICI during the economic recovery following the Great Recession, followed by reductions starting from the pandemic. This group includes Cantabria, the Valencian Community, La Rioja, and the Principality of Asturias. These results show a complex pattern of primary ICI that does not exhibit a clear relationship with the economic cycle.

The third group of regions (see Fig. 11) displays a distinctly counter-cyclical pattern of primary ICI. This group includes the Canary Islands, Catalonia, Galicia, and the Region of Murcia. Specifically, the results show a significant increase in primary ICI during the Great Recession, a modest reduction during the subsequent economic recovery, an increase at the onset of the pandemic, and a decrease in the following year. It is worth noting, however, that in the case of the Region of Murcia, an increase is observed in 2021.

The final group of regions comprises Castilla-La Mancha and the Foral Community of Navarre, whose results are presented in Fig. 12. These two regions exhibit a distinct trajectory that does not align with any of the previously identified groups and is characterised by a pro-cyclical pattern. In the case of Navarre, a marked reduction in primary ICI is observed during the Great Recession, followed by a substantial increase during the subsequent recovery and a decline following the outbreak of the pandemic-clearly reflecting a pro-cyclical trend. Castilla-La Mancha displays a similar pattern, although it is less pronounced.

The analysis of secondary income reveals a different scenario from that of primary income, both in terms of the composition of regional groupings and the patterns observed. Firstly, a large group of regions displays a trend similar to that of Spain as a whole, as shown in Fig. 13. This pattern follows an inverted U-shape, characterised

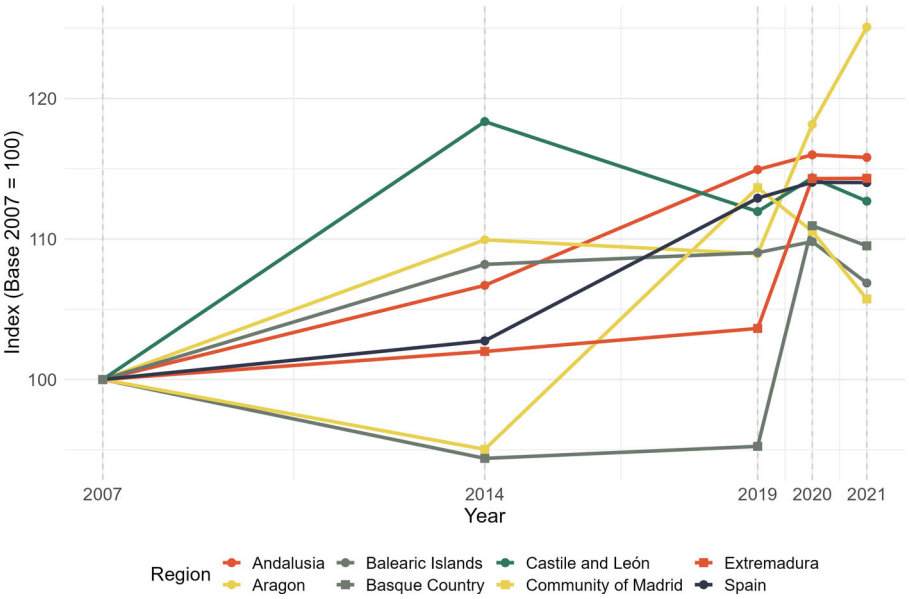

Fig. 9 Evolution of primary ICI in eight Spanish regions 2007–2021. Source: Author from INE [Instituto Nacional de Estadística] (2023)

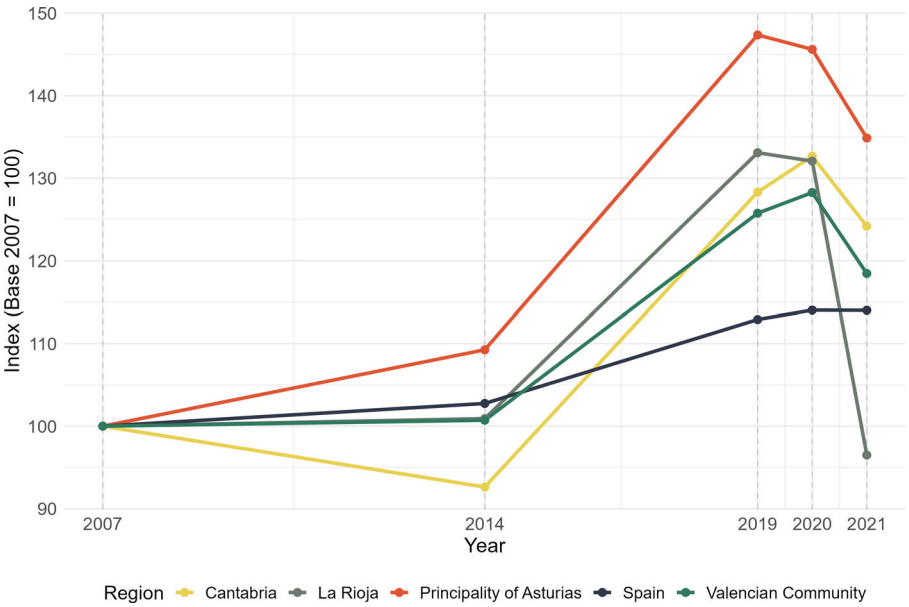

Fig. 10 Evolution of primary ICI in four Spanish regions 2007–2021. Source: Author from INE [Instituto Nacional de Estadística] (2023)

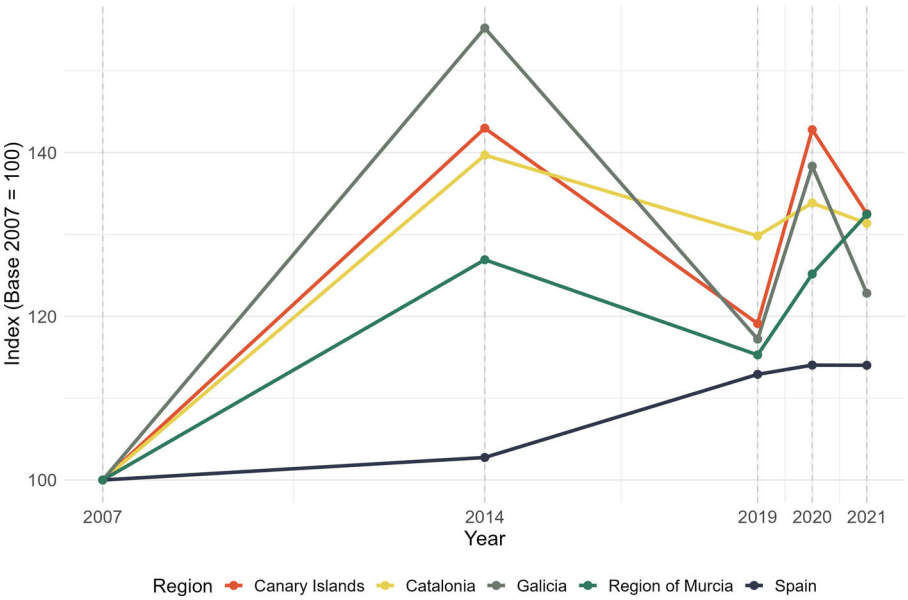

Fig. 11 Evolution of primary ICI in four Spanish regions 2007–2021. Source: Author from INE [Instituto Nacional de Estadística] (2023)

by an increase in secondary ICI during the Great Recession and a subsequent decline. Notably, in the case of secondary income, the pandemic did not lead to a clear rise in ICI, in contrast to what was observed for primary income. Specifically, only in a few regions (such as the Balearic Islands, Castilla y León, and Aragon) was an increase recorded. This suggests that, during the pandemic, policy measures were more effective in mitigating changes in income distribution than during the Great Recession, a finding consistent with other studies (EAPN-ES [European Anti-Poverty Network-Spain] 2024).

The remaining regions (see Fig. 14) exhibit patterns that differ from the previously observed inverted U-shape. Within this group, several distinct subgroups can be identified. One such pattern is found in La Rioja and the Valencian Community, which experienced a notable increase in secondary ICI during the Great Recession, a more moderate rise during the subsequent economic recovery, and a decline thereafter. A second pattern is observed in the Community of Madrid, Cantabria, and Extremadura, where a decrease occurred during the Great Recession followed by an increase during the recovery (resulting in a U-shaped trajectory). A third subgroup, comprising the Basque Country and the Region of Murcia, shows a continuous decline until the onset of the pandemic, followed by an increase thereafter. Andalusia displays a clearly counter-cyclical pattern, with a particularly sharp rise beginning with the pandemic. Lastly, the Principality of Asturias is notable for exhibiting a steady increase in secondary ICI throughout the entire period under analysis.

These results show how the evolution of the ICI also differs between regions and how there are no disparities that follow a north-south pattern or other patterns identified in the literature. Furthermore, it can be seen that disparities are greater

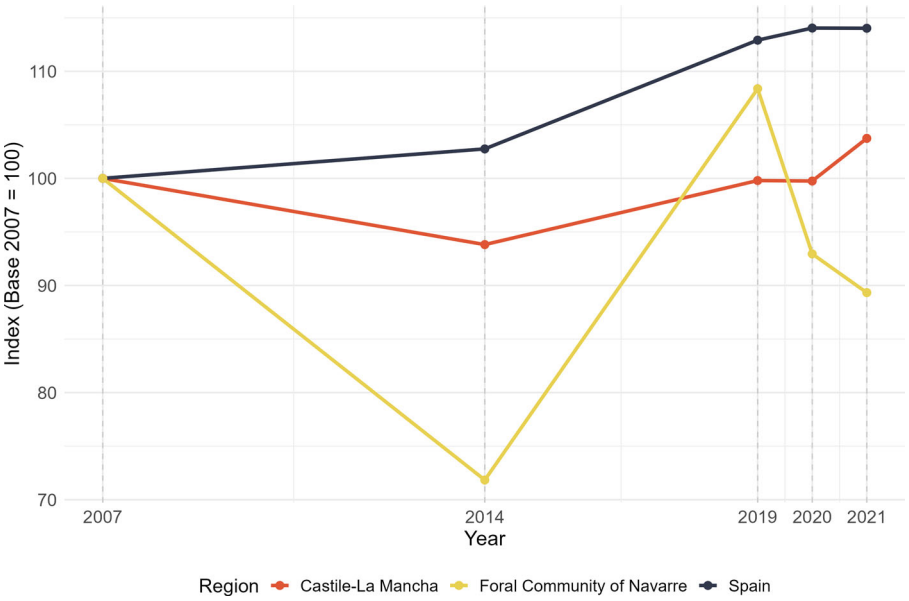

Fig. 12 Evolution of primary ICI in two Spanish regions 2007–2021. Source: Author from INE [Instituto Nacional de Estadística] (2023)

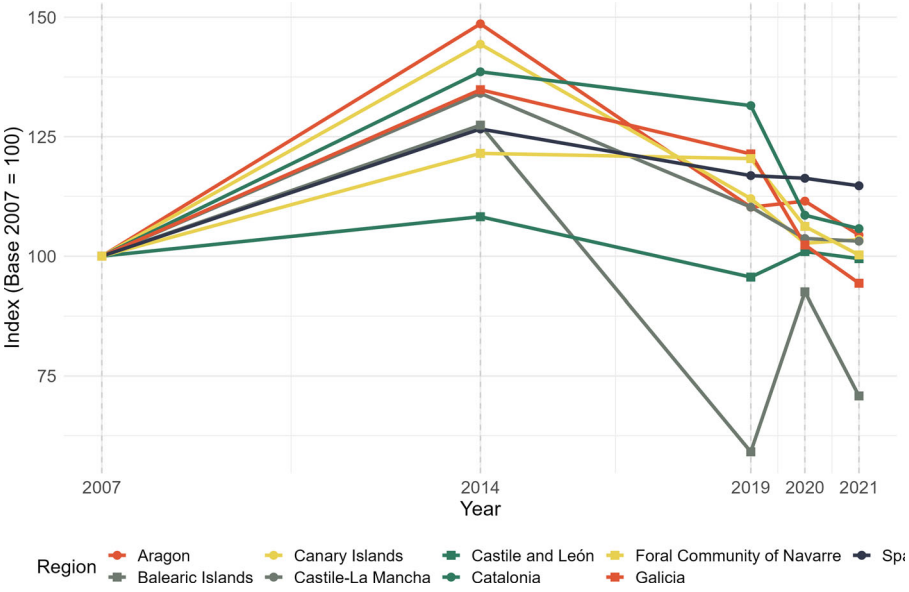

Fig. 13 Evolution of secondary ICI in eight Spanish regions 2007–2021. Source: Author from INE [Instituto Nacional de Estadística] (2023)

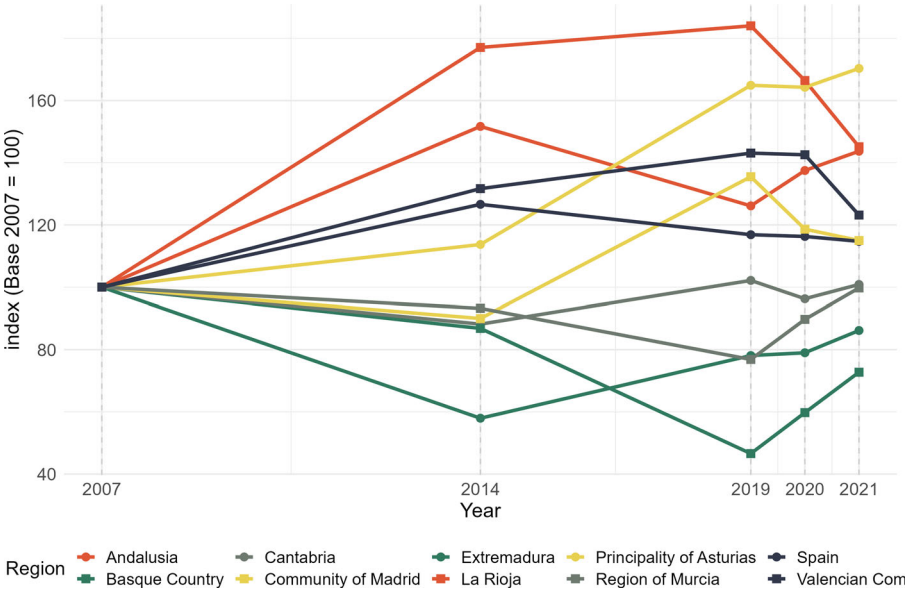

Fig. 14 Evolution of secondary ICI in nine Spanish regions 2007–2021. Source: Author from INE [Instituto Nacional de Estadística] (2023)

when analysing primary income than when analysing secondary income. This shows how the role played by the state reduces regional disparities in the ICI. This is in line with what is indicated in the literature and with the objectives of territorial cohesion policies (Faiña et al., 2018). Therefore, it is reaffirmed that, also in terms of ICI, regional inequalities are due to sectoral disparities, in the labour market, or demographics, among other factors.

6.3 The Concentration of Income Sources in Spanish Regions and Their Evolution over the Period 2007–2021

The changes observed in the ICI can be attributed either to shifts in the concentration of income sources or to changes in their relative weight within the functional distribution of income. This section examines changes in the concentration of different income sources through their individual concentration indices, in the contexts of both primary and secondary income. This approach enables us to assess how each source of income is concentrated before and after redistribution by the public sector, relative to the combined distribution of all other sources (see Methodology subsection).

Given that the analysis considers six sources of primary income and three of secondary income across 17 regions over a 15-year period, a comprehensive presentation of all results would hinder the ability to identify key patterns. Therefore, what follows is a selection of the most relevant findings, focusing on the income sources that underwent the most significant changes in concentration during the study period. Specifically, the analysis begins with wages (both in aggregate and

disaggregated by educational level) continues with property income and concludes with secondary income sources.

6.3.1 Wages

Starting with wages as a whole (without differentiating by educational attainment), Fig. 15 presents the concentration of wages within both primary and secondary income in the years 2007 and 2021. The results show that wages are concentrated among households with higher income levels, both in Spain as a whole and across its individual regions. Furthermore, in most regions, wage concentration has tended to increase over the period analysed.

In terms of regional comparison, notable heterogeneity can be observed in the levels of wage concentration. In all regions, except La Rioja, wages are more concentrated within secondary income than within primary income. This suggests that, when redistributive income is considered, wage-earning households benefit more than those without wages, thereby improving their position within the personal income distribution.

When wages are disaggregated by educational attainment, the results vary significantly depending on the type of wage. On the one hand, wages associated with high educational attainment are more heavily concentrated among high-income households than overall wages. On the other hand, wages associated with lower educational attainment are more prevalent among lower-income households in the context

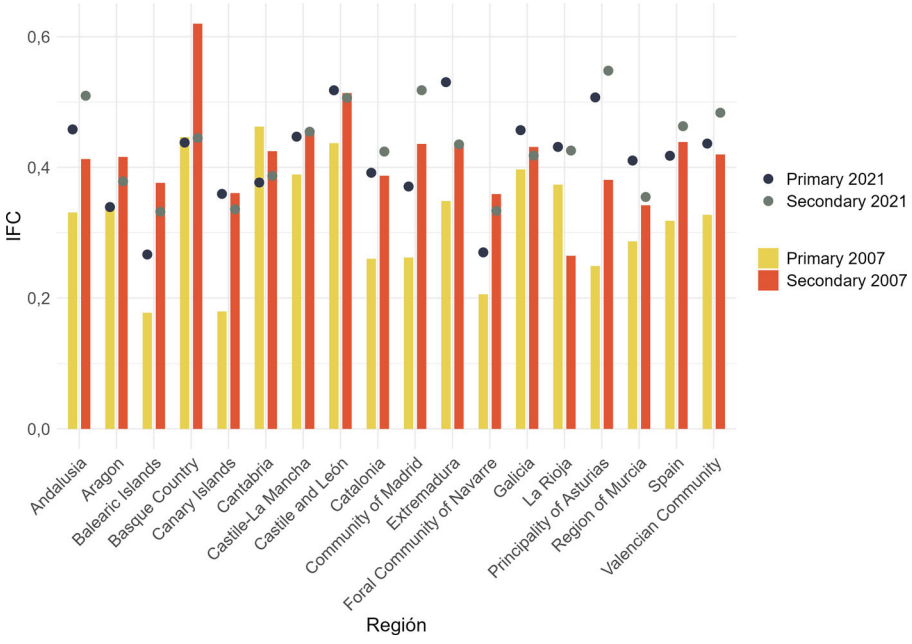

Fig. 15 Wages concentration in Spanish regions 2007–2021. Source: Author from INE [Instituto Nacional de Estadística] (2023)

of primary income, and they are less concentrated among high-income households than overall wages in the context of secondary income.

These findings highlight the crucial role of human capital as a determinant of household income levels. Figure 16 displays the concentration of wages linked to high educational attainment in 2007 and 2021, while Fig. 16 shows the concentration of wages without high educational attainment over the same period.

Starting with wages linked to high educational attainment, the results clearly show a higher concentration of these wages compared to overall wages. Additionally, when examining changes in concentration over the period, it is evident that, for most regions, there are no significant changes, with a few exceptions such as the Foral Community of Navarre, the Balearic Islands, the Principality of Asturias, and the Region of Murcia.

In terms of regional disparities, a clear north-south pattern emerges. On the one hand, northern regions tend to exhibit lower concentrations of wages linked to high educational attainment, with regions such as the Foral Community of Navarre, La Rioja, Aragon, and, to a lesser extent, the Basque Country and Galicia standing out. On the other hand, southern regions tend to show higher levels of concentration, with notable examples including Andalusia, Extremadura, and Castilla-La Mancha.

Turning to wages with low educational attainment (see Fig. 17), the results reveal a more complex scenario compared to those for wages with high educational attainment. First, wages without high educational attainment are less concentrated than wages with high educational attainment, showing larger disparities between regions.

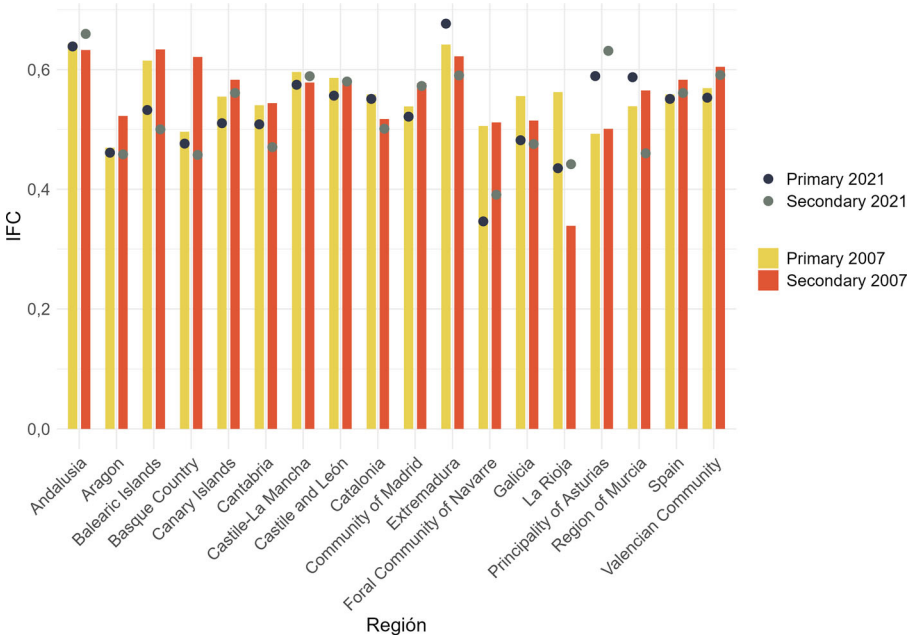

Fig. 16 The concentration of high-skilled wages in Spanish regions 2007–2021. Source: Author from INE [Instituto Nacional de Estadística] (2023)

Several regions show a relatively higher concentration of these wages among lower-income households, notably the Community of Madrid, the Balearic Islands, the Canary Islands, and Catalonia. By contrast, regions with higher concentration in households with lower income include Castile and León, Extremadura, Galicia, La Rioja, Castilla-La Mancha, the Region of Murcia, and Aragon.

These patterns suggest that regions with higher concentrations tend to be those with tertiary economies, such as large metropolitan areas (Madrid and Barcelona) or tourism-oriented regions (the Balearic Islands and the Canary Islands). Conversely, regions with a larger share of employment in the primary sector tend to exhibit lower concentration. This suggests that the sectoral composition of employment could be a factor driving the differences in concentration across the various types of wages.

A second noteworthy result is the contrasting behaviour observed between primary and secondary income. On one hand, wages without high educational attainment are concentrated in lower-income households in the context of primary income across all regions. On the other hand, in the context of secondary income, wages without high educational attainment are concentrated in higher-income households in most regions. The only exceptions to this are the cases of the Community of Madrid and the Principality of Asturias, where they are slightly concentrated in lower-income households both in 2007 and 2021, and the cases of the Community of Navarre and the Balearic Islands, where this concentration occurred in 2007 but not in 2021.

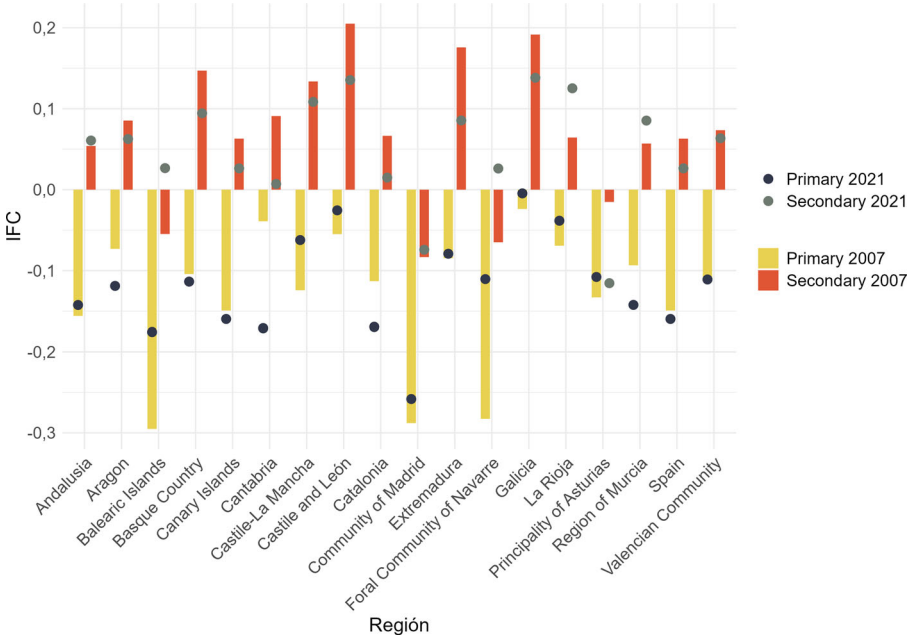

Fig. 17 The concentration of non-high-skilled wages in Spanish regions 2007–2021. Source: Author from INE [Instituto Nacional de Estadística] (2023)

The divergence between primary and secondary income reflects the redistributive effects of secondary income sources. Social benefits, public services and taxes reallocate resources from households with higher incomes, wages and educational levels towards households with lower wages and educational attainment. As a result, households earning wages without high educational attainment move upwards in the personal income distribution, occupying a more favourable position in terms of secondary income than in primary income. These shifts may also be related to age-related differences in educational attainment, as households with older members are more likely to receive social benefits and public services.

The differences observed in wage concentration and, more specifically, in wage concentration according to human capital levels are consistent to a certain extent with studies that point to differences in human capital accumulation as an explanatory factor for regional disparities (Delgado et al. 2024; De la Fuente 2002).

6.3.2 Property Incomes

Property income, as defined by Amoedo (2025), includes financial and real estate income. Ranaldi (2019, 2022) analyses them together as capital income, however they have distinct concentrations: financial income is concentrated in higher-income households, while real estate income is concentrated in lower-income ones. The results below are presented separately.

Figure 18 shows that financial income is concentrated in higher-income households, especially in primary income, and is the most concentrated income source in most regions. In secondary income, financial income also remains concentrated in higher-income households, reflecting its uneven market distribution. Redistribution policies counteract this concentration. The most significant finding is the substantial increase in the concentration of financial income across all regions over the period.

As a result of this concentration increase, all regions have an ICI index above 0.55, with most regions exceeding 0.7. This concentration of financial income is a key driver of the rise in primary ICI both at the regional and national levels. Southern regions (Andalusia, Region of Murcia and Extremadura) show higher financial income concentrations, though some northern regions (Asturias and the Basque Country) also exhibit elevated levels.

Figure 19 shows the concentration of real estate income in Spanish regions in 2007 and 2021. Results indicate that property income is concentrated in lower-income households, especially in primary income. The differences in concentration between primary and secondary income suggest that property income tends to concentrate in households dependent on public sector income, such as retirees and healthcare recipients. Over the period, property income concentration increased within primary income, while concentration levels in secondary income remained stable, except in specific regions.

Regional analysis reveals significant heterogeneity. The Canary Islands and the Balearic Islands show a low concentration of property income in lower-income households, with a slight concentration in higher-income households in 2007, due to their tourism-based economies. In contrast, regions like Extremadura, Galicia, Asturias and Castile and León exhibit the highest concentrations of real estate in-

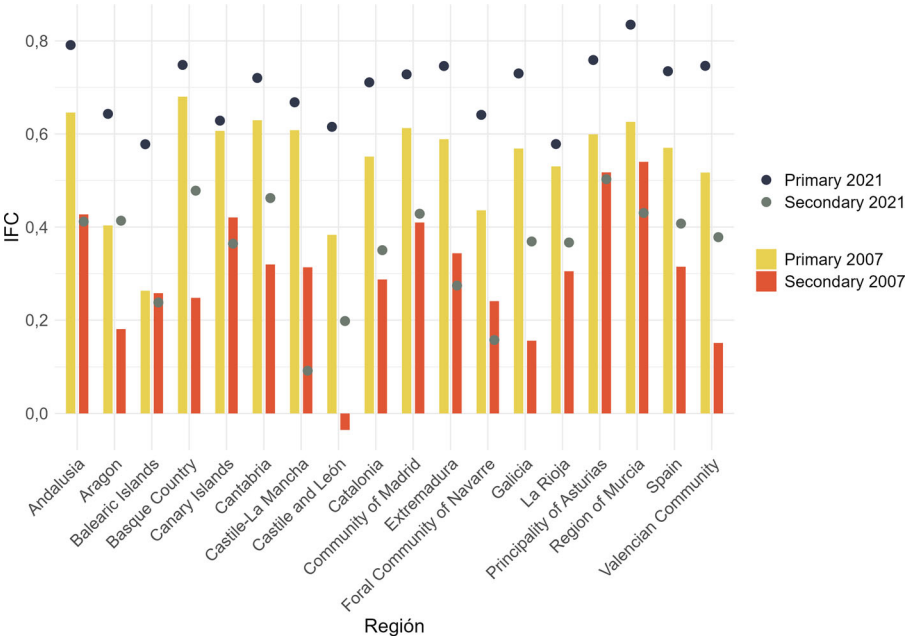

Fig. 18 The concentration of financial rents in Spanish regions 2007–2021. Source: Author from INE [Instituto Nacional de Estadística] (2023)

comes, linked to greater demographic aging in these areas. This is consistent with the conclusions drawn by studies that point to regional disparities and, more specifically, tourism specialization as factors explaining regional disparities (Almeida et al. 2021). Specifically, as the results show, in regions with a greater weight of tourism, real estate income is more concentrated, which may be due to the role of income from tourist accommodation and the greater difficulty for residents to access housing.

6.3.3 Secondary Income Sources

The analysis of secondary incomes shows notable differences from primary sources, as their concentration can only be studied within the secondary income context. Figure 20 presents the concentration of taxes, social benefits, and non-monetary incomes from public services in Spanish regions for 2007 and 2021. Taxes are concentrated in higher-income households, playing a progressive role, while social benefits concentrate in lower-income households. Public services exhibit low concentration with varying regional patterns.

Regarding the evolution of secondary income concentrations, a clear trend emerges towards a lower concentration of social benefits across all regions, except La Rioja. The regional comparison reveals key insights for regional administrations. Tax concentrations differ across regions: low in Navarre, the Basque Country, Aragon, the Balearic Islands, La Rioja, and Murcia (ICI below 0.30 in 2021), and

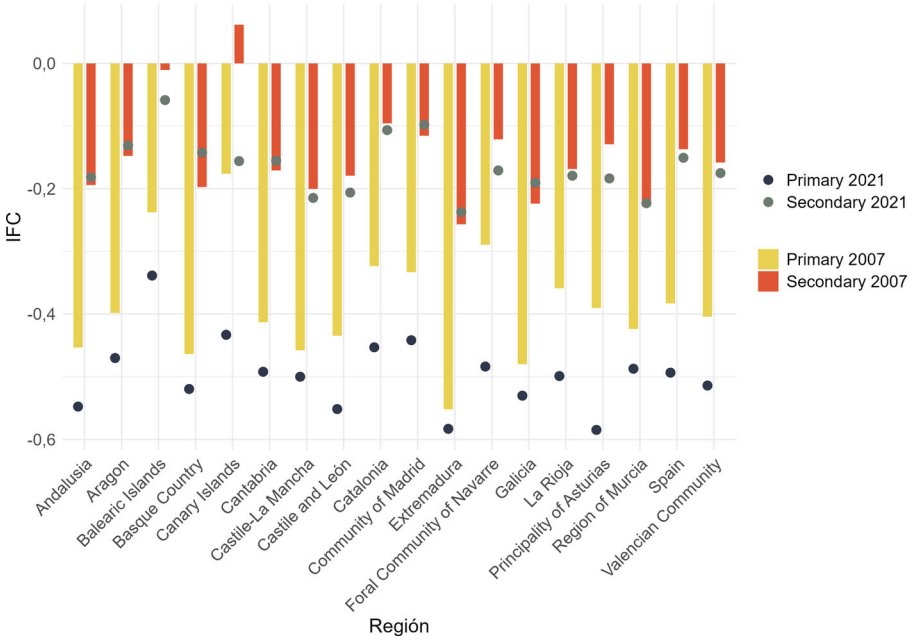

Fig. 19 The concentration of real estate income in Spanish regions 2007–2021. Source: Author from INE [Instituto Nacional de Estadística] (2023)

higher in Andalusia, the Canary Islands, Extremadura, and the Valencian Community (ICI above 0.35 in 2021). This illustrates the potential for regions to reduce ICI and inequality through progressive fiscal policies, especially in high-ICI regions like the Basque Country and Navarre.

Regarding social benefits, significant regional differences persist, but convergence has occurred. In 2021, regions like the Canary Islands, the Balearic Islands, Madrid, and Catalonia had lower concentrations, while Castilla-La Mancha, Extremadura, and Murcia had higher levels. This highlights the wider distribution of social benefits in urban and tourism-focused areas, compared to greater concentration in southern regions.

As for public services, in 2021 there was increased concentration in lower-income households compared to 2007. There were no significant regional differences in public service concentration, aligning with Costa-Font and Rico (2006) conclusion that spending differences are due to regional needs. This conclusion is consistent with studies that point to demographic disparities as the cause of regional disparities. Thus, the most aged regions (Cantabria, Castile-La Mancha, Castile and León, Extremadura, Galicia, La Rioja, and the Region of Murcia) show a slight concentration of public services in the wealthiest households.

The results obtained from analysing the concentration of secondary income sources show significant structural changes in the progressive redistributive capacity of the public sector over the period. Specifically, it can be seen that in most regions the concentration of income sources has fallen, particularly in the case of social ben-

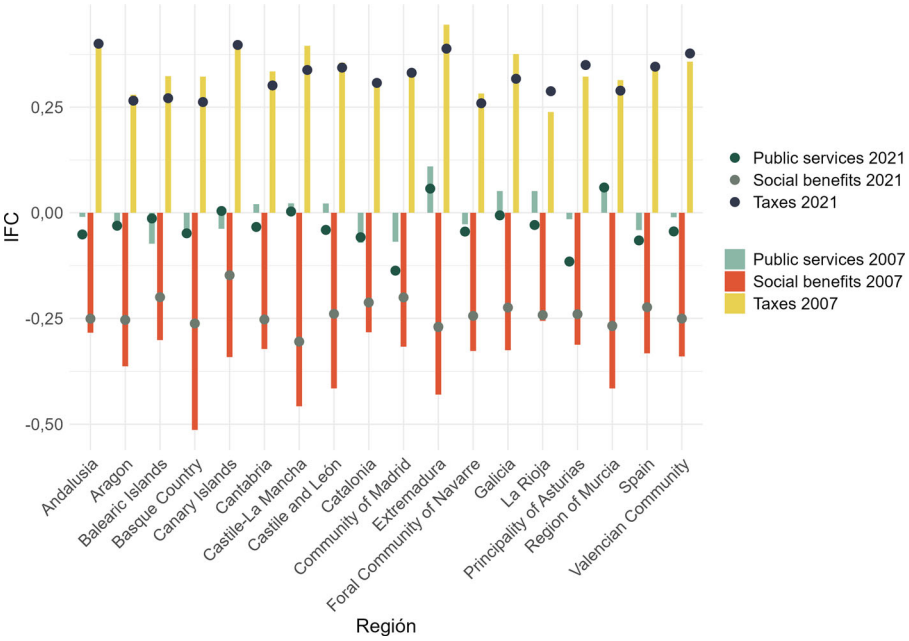

Fig. 20 Secondary income sources concentration in Spanish regions 2007–2021. Source: Author from INE [Instituto Nacional de Estadística] (2023)

efits. This common trend has led to a certain convergence between Spanish regions, but there are still notable differences that maintain regional disparities to a certain extent. In this regard, although disparities in the concentration of social benefits and public services reflect demographic differences, the concentration of taxes does not follow a clear pattern and has become more pronounced in recent years.

6.4 Implications for Regional Disparities and Temporal Robustness

Across the 2007–2021 period, several general patterns emerge consistently. Regional disparities in ICI levels persist, with some regions, such as Madrid and Andalusia, consistently exhibiting higher inequality than others. Primary ICI shows an overall increase in almost all regions, reflecting a persistent concentration of market-distributed income. Additionally, the concentration of property incomes appears widespread across regions, indicating a structural feature of income composition at the regional level.

At the same time, the evolution of both primary and secondary ICI exhibits substantial heterogeneity across regions and subperiods, influenced by economic cycles, regional structures, and policy interventions. Similarly, the concentration of other income sources, including wages by skill level and components of secondary income, varies significantly across regions and over time. Therefore, while the patterns highlighted above provide useful insights, caution is warranted when generalising trends to all regions or income components.

The results obtained confirm the need to analyse ICI not only from a national perspective, but also at the regional level. This follows from the fact that, in the context of Spain, a country characterised by pronounced territorial disparities, there are notable differences across regions in both the levels and the evolution of ICI, as well as in the concentration of individual income sources. These patterns do not necessarily coincide with those identified when regional inequalities are examined from other perspectives.

Although, as noted by Ranaldi and Milanović (2022), there is a strong correlation between inequality in income distribution and inequality in income composition, this relationship varies across contexts, making it necessary to incorporate a compositional perspective when analysing inequality. The results presented for Spain provide evidence that such divergences also exist at the regional level, underscoring the importance of integrating the compositional perspective into the literature on regional disparities. The omission of the compositional perspective in the analysis of regional disparities constitutes a limitation for redistributive and territorial cohesion policies, as it reduces the depth of understanding of regional inequalities.

7 Conclusions

Income Composition Inequality is crucial for understanding income distribution and economic inequality. However, research is limited and has focused on the national level, neglecting regional disparities. This study analyses ICI across Spanish regions (2007–2021), addressing the country's regional heterogeneity. The main conclusion is that, in regions with significant heterogeneity, both levels and trends of ICI vary, underscoring the need for regional perspectives to design context-specific redistributive policies. Furthermore, the results also identify the different role of income sources as causes of regional disparities.

This research contributes to the literature on regional disparities by analysing a new dimension in regional disparities. Furthermore, this article shows how, in contexts with high regional heterogeneity, the ICI varies significantly between regions and how redistributive policies need to be adapted to the reality of each region. These aspects were not previously addressed in the existing literature on regional disparities.

The results also show how disparities in the ICI do not follow a clear pattern of inequality such as those existing in other dimensions (north-south or centre-periphery). However, it is affected by issues previously analysed in the existing literature, as can be seen from the individual concentration of income sources. In the case of property income, disparities can be observed between regions specialising in tourism and older regions.

This research reveals key insights for Spanish regions. First, primary ICI shows significant regional variation without a clear geographical pattern. Both high-income (e.g., Madrid, Basque Country) and low-income regions (e.g., Andalusia) exhibit high inequality, suggesting economic development does not fully explain income composition differences. Second, secondary ICI is more equal across regions, with public policies playing a role in reducing inequality. However, redistributive capacity

varies widely, with regions like Madrid and Basque Country maintaining high ICI even after redistribution. Third, some regions display persistent inequality, implying structural factors that limit policy effectiveness.

Regarding the temporal evolution of ICI, primary income inequality increased during economic downturns, following a counter-cyclical pattern. This indicates that market-distributed income became more concentrated during recessions. Secondary income inequality showed diverse regional trends, decreasing after the Great Recession, reflecting the stabilizing effect of social transfers in times of crisis. These findings highlight the influence of economic cycles on ICI and the importance of regional dynamics in shaping inequality over time.

The concentration of individual income sources also reveals important patterns. Wages vary significantly by region, particularly by education level. Financial income is heavily concentrated in wealthier households, increasing during the study period, while real estate income is more concentrated in lower-income households. Additionally, regions show varying capacities for progressive redistribution, especially regarding taxes.

Three key policy implications emerge from these findings. First, fiscal policy should be homogenized across regions to ensure similar redistributive effects, as some regions exhibit low progressivity. Furthermore, as can be seen, some regions have experienced a notable decline in tax progressivity. Second, regions affected by gentrification and specialised in tourism, due to urban growth or tourism, need specific policies to improve housing access, protecting lower-income households. Thirdly, it is necessary to promote the accumulation of human capital in the most disadvantaged regions with the aim of increasing social cohesion, given the inequality in the concentration of wages according to level of education.

This research has significant methodological limitations. First, given that the data source used has limitations in terms of the representativeness of the tails of the income distribution (Ayala et al. 2022), which leads to an underestimation of inequality at the national level. In the case of regional studies, INE [Instituto Nacional de Estadística] (2023) points out that the sample is representative at the regional level; however, the limitations observed at the national level may be increased at the regional level due to the fact that regional samples as a whole can correct for temporal biases that exist individually. This limitation indicates that these results should be understood as an estimate of the minimum level of ICI that allows comparisons between regions and time periods. Second, the limited sample sizes at the regional level may increase temporal uncertainty, generating estimates with higher year-to-year variability. Third, the imputation of public services also presents limitations, as only certain services are included (specifically health and education), while other services (often targeted to vulnerable groups) are excluded. This may result in an underestimation of the redistributive role of the state. Nevertheless, it should be noted that health and education services account for more than 90% of public spending on service provision in Spain (Goerlich 2016).

Future research should focus on: (1) understanding the causes behind regional differences in inequality and ICI trends, (2) examining specific regions in greater detail, and (3) expanding the analysis of ICI to other countries with high regional heterogeneity.

8 Appendix A

To value the provision of public services, the production cost approach is used (Aaberge and Langørgen 2006; De Wulf 1981), which involves valuing the services provided by their cost per capita. Since in Spain, the responsibilities for the provision of public health and education services are decentralized and fall under the responsibility of the Autonomous Communities, the expenditure by Autonomous Community is used. The centralized expenses are divided equally among each inhabitant, regardless of the region they belong to, while the decentralized expenses are equally distributed among the inhabitants of the respective region. In the case of the Autonomous Cities of Ceuta and Melilla, since the provision of these services is managed centrally and/or is incorporated into the Autonomous Community of Andalusia and is not included in the analysis as they are not considered regions, their expenses are excluded beforehand. For healthcare services, the available data from the expenditure statistics of the MEFD [Ministerio de Educación and Formación Profesional y Deportes] (2021) is used, and for educational services, the data available from MS (2023) is used.

In the case of educational services, three educational levels (early childhood and primary, secondary and vocational training, and higher education) are also differentiated when valuing the cost of provision. This is because each level has different costs and varying degrees of progressivity, driven by unequal access to higher levels among the most vulnerable population strata (Goerlich 2016). Since educational expenditure statistics are collected by academic year rather than by calendar year, a modification is necessary to transform them into an annual basis. Representing expenditure in year t, this is given by the following transformation: [t = (1/3) * (t − 1) + (2/3) * (t)].

To impute the income from public services, two distinct approaches are used due to the different nature of both services (Goerlich 2016). On the one hand, in the case of healthcare, the insurance value approach is used, which assumes that the public sector covers a premium for a universal insurance for each individual. This approach is the most appropriate, as indicated by Spadaro et al. (2013), in a context with universal healthcare like that of Spain. Additionally, following Goerlich (2016), to account for different healthcare needs by age, the correction coefficients developed by the Ministry of Health (MS 2007) are used, which reflect the healthcare needs for different age groups. On the other hand, in the case of education, the effective consumption approach is employed, which assigns to each individual the income generated by the service in the event that they consumed it during the analysed period (Verbist et al. 2012).

9 Appendix B

Table B.1 Sample size by region and year. Source: Author from INE [Instituto Nacional de Estadística] (2023)

Region	Number of households in the original sample (effective sample)														
	2007	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Galicia	927 (927)	989 (989)	984 (984)	879 (879)	854 (854)	824 (824)	811 (811)	845 (845)	851 (851)	835 (835)	782 (782)	869 (869)	904 (904)	1110 (1110)	1327 (1327)
Principality of Asturias	623 (623)	632 (632)	623 (623)	566 (566)	522 (522)	491 (491)	498 (498)	542 (542)	577 (577)	553 (553)	514 (514)	564 (564)	491 (491)	673 (673)	798 (798)
Cantabria	389 (389)	411 (411)	418 (418)	416 (416)	371 (371)	303 (303)	295 (295)	347 (347)	384 (384)	388 (388)	412 (412)	463 (463)	503 (503)	646 (646)	712 (712)
Basque Country	714 (714)	726 (726)	722 (722)	747 (747)	691 (691)	685 (685)	696 (696)	709 (709)	702 (702)	749 (749)	750 (750)	871 (871)	691 (691)	952 (952)	1060 (1060)
Foral Community of Navarre	449 (449)	458 (458)	463 (463)	434 (434)	386 (386)	408 (408)	426 (426)	441 (441)	445 (445)	389 (389)	349 (349)	398 (398)	346 (346)	540 (540)	646 (646)
La Rioja	397 (397)	420 (420)	426 (426)	447 (447)	438 (438)	398 (398)	385 (385)	364 (364)	363 (363)	355 (355)	367 (367)	423 (423)	489 (489)	577 (577)	626 (626)
Aragon	569 (569)	566 (566)	605 (605)	612 (612)	564 (564)	537 (537)	541 (541)	522 (522)	513 (513)	514 (514)	495 (495)	553 (553)	642 (642)	832 (832)	980 (980)
Community of Madrid	989 (989)	1141 (1141)	1271 (1271)	1238 (1238)	1188 (1188)	1111 (1111)	1134 (1134)	1329 (1329)	1451 (1451)	1261 (1261)	1220 (1220)	1361 (1361)	1475 (1475)	2105 (2105)	2370 (2370)
Castile and Leon	887 (887)	921 (921)	938 (938)	881 (881)	893 (893)	867 (867)	845 (845)	837 (837)	871 (871)	814 (814)	783 (783)	872 (872)	1013 (1013)	1307 (1307)	1468 (1468)
Castile-La Mancha	636 (636)	654 (654)	663 (663)	708 (708)	712 (712)	636 (636)	564 (564)	579 (579)	584 (584)	612 (612)	607 (607)	756 (756)	744 (744)	972 (972)	1041 (1041)

Table B.1 (Continued)

Region	Number of households in the original sample (effective sample)														
	2007	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Extremadura	534 (534)	522 (522)	517 (517)	496 (496)	508 (508)	508 (508)	506 (506)	529 (529)	536 (536)	517 (517)	527 (527)	663 (663)	696 (696)	868 (868)	953 (953)
Catalonia	1426 (1426)	1500 (1500)	1492 (1492)	1465 (1465)	1390 (1390)	1265 (1265)	1264 (1264)	1348 (1348)	3026 (3026)	2952 (2952)	2798 (2798)	3308 (3308)	2697 (2697)	4205 (4205)	5341 (5341)
Valencian Community	1031 (1031)	1024 (1024)	1024 (1024)	1025 (1025)	1022 (1022)	962 (962)	891 (891)	935 (935)	938 (938)	861 (861)	808 (808)	1056 (1056)	1012 (1012)	1468 (1468)	1736 (1736)
Balearic Islands	464 (464)	453 (453)	464 (464)	387 (387)	380 (380)	396 (396)	373 (373)	411 (411)	399 (399)	318 (318)	334 (334)	466 (466)	419 (419)	632 (632)	683 (683)
Andalusia	1567 (1567)	1585 (1585)	1617 (1617)	1471 (1471)	1533 (1533)	1487 (1487)	1478 (1478)	1426 (1426)	1445 (1445)	1409 (1409)	1363 (1363)	1838 (1838)	1608 (1608)	2373 (2373)	2563 (2563)
Region of Murcia	528 (528)	536 (536)	507 (507)	488 (488)	489 (489)	488 (488)	499 (499)	485 (485)	518 (518)	494 (494)	526 (526)	647 (647)	528 (528)	760 (760)	853 (853)
Ceuta Autonomous City	127 (127)	110 (110)	116 (116)	113 (113)	129 (129)	131 (131)	139 (139)	112 (112)	89 (89)	104 (104)	115 (115)	127 (127)	219 (219)	192 (192)	204 (204)
Melilla Autonomous City	124 (124)	114 (114)	116 (116)	112 (112)	95 (95)	117 (117)	119 (119)	123 (123)	116 (116)	120 (120)	128 (128)	152 (152)	105 (105)	179 (179)	169 (169)
Canary Islands	633 (633)	598 (598)	631 (631)	624 (624)	549 (549)	525 (525)	501 (501)	483 (483)	432 (432)	495 (495)	490 (490)	500 (500)	461 (461)	616 (616)	783 (783)

Table B.2 Basic descriptions of income variables (adjusted income). Source: Author from INE [Instituto Nacional de Estadística] (2023)

	Primary income	Secondary income	HS Wages	NHS Wages	Mixed income	Financial income	Real estate income	Other income sources	Taxes	Social benefits	Public services
Mean	20,927	31,713	8,415	6,846	1,341	747	3,470	108	–5,825	5,793	10,818
Median	15,368	29,942	0	0	0	0	3,207	0	–3,352	2,535	8,756
Sd.	19,917	13,735	17,083	10,926	5,684	4,188	2,679	732	8,465	7,928	7,372
Var.	396,675,266	188,636,509	291,842,598	119,369,486	32,307,847	17,535,589	7,178,017	535,470	71,657,310	62,858,643	54,341,938
Min.	–60,325	–121,532	0	0	–69,297	0	0	0	–255,459	0	755
Max.	470,206	404,148	281,990	282,373	281,762	465,172	86,152	50,000	11,750	156,388	83,068
P25	5,962	22,133	0	0	0	0	2,180	0	–7,663	0	4,768
P75	29,721	39,046	9,963	11,452	0	167	4,541	0	–711	8,938	14,756
Iqr.	23,759	16,913	9,963	11,452	0	167	2,361	0	6,953	8,938	9,988
Skewness	2.37	1.64	3.01	2.57	9.69	20.96	4.77	13.27	–5.20	2.33	1.28
Kurtosis	15.04	12.76	17.00	17.60	176.64	848.01	81.76	302.24	63.15	13.62	4.96
Obs.	219,798	219,798	219,798	219,798	219,798	219,798	219,798	219,798	219,798	219,798	219,798
Missed values	0	0	0	0	0	0	0	0	0	0	0

Table C.1 Income composition inequality index in the Spanish regions for primary income. Source: Author from INE [Instituto Nacional de Estadística] (2023)

Year	Spain	Andalusia	Aragon	Balearic Islands	Basque Country	Canary Islands	Cantabria	Castile and Leon	Castile-La Mancha	Catalonia	Community of Madrid	Extremadura	Foral Community of Navarre	Galicia	La Rioja	Principality of Asturias	Region of Murcia	Valencian Community
2007	0.2800	0.3793	0.2680	0.2739	0.3888	0.2796	0.3242	0.3200	0.2619	0.2962	0.4080	0.3620	0.3513	0.2299	0.2943	0.3276	0.2857	0.3210
2008	0.2855	0.3837	0.2433	0.2850	0.4541	0.3144	0.3362	0.3279	0.2744	0.3430	0.4524	0.4265	0.3634	0.2579	0.2786	0.3545	0.2771	0.3126
2009	0.2894	0.3906	0.2671	0.2850	0.4113	0.3508	0.3134	0.3369	0.2636	0.3600	0.4034	0.3715	0.3719	0.3167	0.2724	0.3495	0.2648	0.3427
2010	0.2906	0.3853	0.3588	0.2857	0.3759	0.3178	0.3283	0.3184	0.2613	0.3391	0.3918	0.3383	0.3821	0.2978	0.2846	0.3393	0.2920	0.3920
2011	0.2874	0.3917	0.3553	0.2929	0.4066	0.3406	0.3340	0.3147	0.2583	0.3486	0.4048	0.3467	0.3330	0.2922	0.2864	0.3491	0.2804	0.3671
2012	0.2833	0.3594	0.3590	0.2894	0.3108	0.3540	0.3687	0.3159	0.2467	0.4029	0.4050	0.3221	0.2728	0.3142	0.2836	0.3316	0.3392	0.3601
2013	0.2818	0.3980	0.3129	0.2929	0.3446	0.3741	0.3714	0.3793	0.2384	0.3983	0.3805	0.3864	0.3347	0.2966	0.2806	0.3851	0.3946	0.3513
2014	0.2877	0.4047	0.2947	0.2964	0.3670	0.3997	0.3003	0.3788	0.2457	0.4137	0.3878	0.3692	0.2524	0.3568	0.2970	0.3579	0.3626	0.3233
2015	0.2919	0.4020	0.3210	0.3031	0.3264	0.3663	0.3039	0.3986	0.2491	0.4018	0.4056	0.3816	0.2341	0.3756	0.3151	0.3631	0.3518	0.2985
2016	0.2938	0.4185	0.2744	0.2932	0.3597	0.3414	0.3172	0.3415	0.2511	0.3846	0.4237	0.3844	0.2597	0.3069	0.3372	0.3642	0.3468	0.2893
2017	0.2965	0.4260	0.2941	0.2930	0.3956	0.3194	0.3556	0.3313	0.2490	0.3746	0.4542	0.3961	0.2283	0.3247	0.3337	0.3643	0.3905	0.2886
2018	0.2972	0.3891	0.2932	0.2986	0.3797	0.3243	0.3771	0.3498	0.2498	0.3600	0.4215	0.3512	0.2768	0.2601	0.3102	0.4394	0.3181	0.3233
2019	0.3162	0.4360	0.2920	0.2987	0.3703	0.3330	0.4161	0.3583	0.2614	0.3845	0.4637	0.3751	0.3807	0.2694	0.3917	0.4828	0.3294	0.4037
2020	0.3193	0.4400	0.3167	0.3008	0.4313	0.3992	0.4302	0.3659	0.2613	0.3964	0.4511	0.4138	0.3265	0.3180	0.3887	0.4770	0.3577	0.4118
2021	0.3193	0.4393	0.3353	0.2927	0.4258	0.3705	0.4027	0.3606	0.2717	0.3890	0.4314	0.4138	0.3138	0.2823	0.2840	0.4418	0.3785	0.3803

Table C.2 Income composition inequality index in the Spanish regions for secondary income. Source: Author from INE [Instituto Nacional de Estadística] (2023)

Year	Spain	Andalu-sia	Aragon	Balearic Islands	Basque Country	Canary Islands	Cantabria	Castile and Leon	Castile-La Mancha	Catalo-nia	Community of Madrid	Ex-tremadura	Foral Commu-nity of Navarre	Galicia	La Rioja	Principality of Asturias	Region of Murcia	Valencian Community
2007	0.1688	0.1454	0.1709	0.1597	0.3010	0.1384	0.1757	0.2054	0.1656	0.1620	0.2391	0.2168	0.1775	0.1712	0.1227	0.1548	0.1717	0.1571
2008	0.1854	0.1665	0.1694	0.1632	0.3146	0.1410	0.1849	0.2076	0.1698	0.1902	0.2841	0.2423	0.2321	0.1678	0.1972	0.1727	0.1634	0.1616
2009	0.1872	0.1892	0.1867	0.1905	0.2896	0.1477	0.1710	0.2088	0.1539	0.1902	0.2528	0.2010	0.2270	0.1623	0.2002	0.1716	0.1511	0.1743
2010	0.1924	0.1967	0.1748	0.1738	0.2988	0.1570	0.1991	0.2081	0.1701	0.1775	0.2268	0.1773	0.2289	0.1859	0.2079	0.1700	0.1466	0.1748
2011	0.2040	0.2016	0.1921	0.1671	0.3195	0.1655	0.1597	0.2203	0.1813	0.1970	0.2459	0.1561	0.2268	0.1960	0.1997	0.1469	0.1530	0.1749
2012	0.1945	0.1758	0.1881	0.1496	0.2484	0.1760	0.2186	0.2018	0.2262	0.2141	0.2299	0.1133	0.2125	0.1977	0.2248	0.1333	0.1172	0.1879
2013	0.2103	0.1868	0.2325	0.1731	0.2736	0.1633	0.2195	0.2306	0.2489	0.2316	0.1974	0.1333	0.2515	0.2131	0.1908	0.1743	0.1323	0.2175
2014	0.2137	0.2206	0.2540	0.2034	0.2613	0.1997	0.1550	0.2223	0.2221	0.2245	0.2152	0.1256	0.2157	0.2308	0.2173	0.1761	0.1601	0.2069
2015	0.2283	0.2408	0.2547	0.2089	0.2415	0.1991	0.2167	0.2444	0.2422	0.2324	0.2604	0.1457	0.2172	0.2376	0.1658	0.1807	0.1525	0.2165
2016	0.2217	0.2212	0.2321	0.2596	0.2434	0.1916	0.1694	0.2212	0.1919	0.2157	0.2642	0.1869	0.2016	0.2005	0.2037	0.2051	0.1631	0.2047
2017	0.2140	0.1998	0.1798	0.2067	0.2211	0.1935	0.1886	0.2326	0.1963	0.2074	0.3008	0.1783	0.1583	0.2093	0.2197	0.1591	0.1508	0.2126
2018	0.1963	0.1758	0.1921	0.1475	0.1952	0.1658	0.1734	0.2114	0.2084	0.1860	0.2702	0.1525	0.1794	0.1918	0.1905	0.2168	0.1629	0.2131
2019	0.1973	0.1834	0.1884	0.0944	0.1402	0.1550	0.1795	0.1964	0.1826	0.2130	0.3240	0.1693	0.2138	0.2078	0.2258	0.2554	0.1319	0.2249
2020	0.1963	0.2000	0.1906	0.1477	0.1799	0.1421	0.1692	0.2074	0.1718	0.1759	0.2837	0.1712	0.1886	0.1752	0.2043	0.2543	0.1540	0.2240
2021	0.1937	0.2090	0.1785	0.1131	0.2190	0.1432	0.1773	0.2043	0.1709	0.1713	0.2750	0.1867	0.1780	0.1615	0.1781	0.2638	0.1712	0.1935

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References

Aaberge R, Langørgen A (2006) Measuring the benefits from public services: the effects of local government spending on the distribution of income in Norway. Rev Income Wealth 52(1):61–83. https://doi.org/10.1111/j.1475-4991.2006.00176.x

Almeida A, Golpe A, Justo R (2021) Regional tourist heterogeneity in Spain: a dynamic spatial analysis. J Destination Mark Manag 21:100643. https://doi.org/10.1016/j.jdmm.2021.100643

Amoedo JM (2025) A relación entre a distribución funcional e persoal da renda: Proposta metodolóxica e aplicación para España e Galicia no período 2007–2021 [The relationship between functional and personal income distribution: A methodological proposal and application for Spain and Galicia (2007–2021)] [Doctoral dissertation, Universidade de Santiago de Compostela]. https://minerva.usc.gal/entities/publication/8f031b9a-becc-48af-8438-1bd2cac9003e

Apergis N, Delgado FJ, Suárez-Arbesú C (2025) Inequality and poverty in Spain: insights from a regional convergence analysis. Int J Finance Econ 30(2):1707–1723. https://doi.org/10.1002/ijfe.2992

Atkinson AB (2009) Factor shares: the principal problem of political economy? Oxf Rev Econ Policy 25(1):3–16. https://doi.org/10.1093/oxrep/grp007

Ayala L, Jurado A (2011) Pro-poor economic growth, inequality and fiscal policy: the case of Spanish regions. Reg Stud 45(1):103–121. https://doi.org/10.1080/00343400903173209

Ayala, L., Jurado, A., & Pérez-Mayo, J. (2021). Multidimensional deprivation in heterogeneous rural areas: Spain after the economic crisis. Regional Studies, 55(5), 883–893. https://doi.org/10.1080/00343404.2020.1813880

Ayala L, Pérez A, Prieto-Alaiz M (2022) The impact of different data sources on the level and structure of income inequality. SERIEs 13(3):583–611. https://doi.org/10.1007/s13209-021-00258-0

Bande, R., Fernández, M., & Montuenga, V. M. (2007). Regional Disparities in the Unemployment Rate: The Role of the Wage-setting Mechanism in Spain, 1987–92. Regional Studies, 41(2), 235–251. https://doi.org/10.1080/00343400601099680

Civardi M, Lenti RT (2018) Can the link between functional and personal income distribution enhance the analysis of inequality? Int Rev Econ 65(2):137–156. https://doi.org/10.1007/s12232-017-0287-2

Costa-Font J, Rico A (2006) Devolution and the interregional inequalities in health and healthcare in Spain. Reg Stud 40(8):875–887. https://doi.org/10.1080/00343400600984346

Cuadrado-Roura JR, Maroto A (2016) Unbalanced regional resilience to the economic crisis in Spain: a tale of specialisation and productivity. Camb J Reg Econ Soc 9(1):153–178. https://doi.org/10.1093/cjres/rsv034

Dafermos Y, Papatheodorou C (2015) Linking functional with personal income distribution: a stock-flow consistent approach. Int Rev Appl Econ 29(6):787–815. https://doi.org/10.1080/02692171.2015.1054365

Dagum C (1999) Linking the functional and personal distributions of income. In: Silber EJ (ed) Handbook of income inequality measurement. Springer, pp 101–132 https://doi.org/10.1007/978-94-011-4413-1_3
De la Fuente A (2002) On the sources of convergence: a close look at the Spanish regions. Eur Econ Rev 46(3):569–599. https://doi.org/10.1016/S0014-2921(01)00161-1
De Wulf L (1981) Incidence of budgetary outlays: where do we go from here? Public Finance Finances Publiques 36(1):55–76
Delgado FJ, Mayor M, Presno MJ (2024) Heterogeneity of research and development expenditure: a convergence analysis for the Spanish regions. Int Reg Sci Rev 47(1):67–99. https://doi.org/10.1177/01600176221145882
Díaz-Lanchas J, Mulder P (2021) Does decentralization of governance promote urban diversity? Evidence from Spain. Reg Stud 55(6):1111–1128. https://doi.org/10.1080/00343404.2020.1863940
EAPN-ES [European Anti-Poverty Network-Spain] (2024) El Estado de la Pobreza en España. Seguimiento del indicador europeo de pobreza y exclusión social 2008–2023. https://www.eapn.es/estadodepobreza/capitulos-2024.php
Eurostat (2025a) Gross domestic product (GDP) at current market prices by NUTS 2 region. https://ec.europa.eu/eurostat/databrowser/view/nama_10r_2gdp__custom_19163616/default/table
Eurostat (2025b) Population on 1 January by age, sex and NUTS 2 region. https://ec.europa.eu/eurostat/databrowser/view/demo_r_d2jan__custom_19164743/default/table
Eurostat (2025c) Unemployment rates by educational attainment level and NUTS 2 region. https://ec.europa.eu/eurostat/databrowser/view/lfst_r_lfu3rt__custom_19168159/default/table
Faiña, A., Lopez-Rodriguez, J., & Montes-Solla, P. (2020). European Union regional policy and development in Spain: capital widening and productivity stagnation over 1989–2010. Regional Studies, 54(1), 106–119. https://doi.org/10.1080/00343404.2018.1542127
Fei JCH, Ranis G, Kuo SWY (1978) Growth and the family distribution of income by factor components. Q J Econ 92(1):17–53. https://doi.org/10.2307/1885997
Fujita S (2023) Income inequality in terms of a Gini coefficient: a Kaleckian perspective. CAMECO 47(6):1087–1106. https://doi.org/10.1093/cje/bead036
Goerlich FJ (2016) Distribución de la renta, crisis económica y políticas redistributivas. https://www.fbbva.es/publicaciones/distribucion-de-la-renta-crisis-economica-y-politicas-redistributivas/
Goerlich F, Mas M (2002) Intertemporal and interprovincial variations in income inequality: Spain, 1973–1991. Reg Stud 36(9):1005–1015. https://doi.org/10.1080/0034340022000022549
González-Alegre J (2010) Decentralization and the composition of public expenditure in Spain. Reg Stud 44(8):1067–1083. https://doi.org/10.1080/00343400903365151
Harguindéguy JB, Rivera CF, Sánchez AS (2021) So close yet so far: intergovernmental tensions in Spain. Reg Stud 55(5):894–906. https://doi.org/10.1080/00343404.2020.1813882
Iacono R, Palagi E (2022) Still the lands of equality? Heterogeneity of Income Composition in the Nordics, 1975–2016. Be J Econ Analysis Policy 22(2):221–268. https://doi.org/10.1515/bejeap-2021-0165
Iacono R, Ranaldi M (2023) The evolution of income composition inequality in Italy, 1989–2016. Rev Income Wealth 69(1):124–149. https://doi.org/10.1111/roiw.12555
INE [Instituto Nacional de Estadística] (2023) INEbase/Nivel y condiciones de vida (IPC)/Condiciones de vida/Encuesta de condiciones de vida/Resultados/Microdatos. https://www.ine.es/
Lasarte E, Fernández-Vázquez E, Rubiera F (2017) Higher cost of living in urban areas? An AIDS-based analysis of food in Spain. Reg Stud 51(11):1665–1677. https://doi.org/10.1080/00343404.2016.1228870
López-Bazo, E., Barrio, T. D., & Artís, M. (2005). Geographical distribution of unemployment in Spain. Regional Studies, 39(3), 305–318. https://doi.org/10.1080/00343400500087034
Martínez-Galarraga J, Rosés JR, Tirado DA (2015) The long-term patterns of regional income inequality in Spain, 1860–2000. Reg Stud 49(4):502–517. https://doi.org/10.1080/00343404.2013.783692
Medeiros, E. (2017). European Union Cohesion Policy and Spain: a territorial impact assessment. Regional Studies, 51(8), 1259–1269. https://doi.org/10.1080/00343404.2016.1187719
MEFD [Ministerio de Educación, Formación Profesional y Deportes] (2021) Estadísticas del MEFD [Dataset]. https://www.educacionfpydeportes.gob.es/servicios-al-ciudadano/estadisticas.html
MS [Ministerio de Sanidad] (2007) Informes para el Análisis del Gasto Sanitario. https://www.sanidad.gob.es/estadEstudios/estadisticas/sisInfSanSNS/infAnalisGasto.html
MS [Ministerio de Sanidad] (2023) Cuentas Satélite del Gasto Sanitario Público. Tablas estadísticas EGSP [Dataset]. https://www.sanidad.gob.es/estadEstudios/estadisticas/inforRecopilaciones/gastoSanitario/tablasEstEGSP/home.html

Murias P, Novello S, Martinez F (2012) The regions of economic well-being in Italy and Spain. Reg Stud 46(6):793–816. https://doi.org/10.1080/00343404.2010.504702
Palley TI (2014) A neo-Kaleckian-Goodwin model of capitalist economic growth: monopoly power, managerial pay and labour market conflict. CAMECO 38(6):1355–1372. https://doi.org/10.1093/cje/bet001
Palomino JC, Rodríguez JG, Sebastian R (2023) The COVID-19 shock on the labour market: poverty and inequality effects across Spanish regions. Reg Stud 57(5):814–828. https://doi.org/10.1080/00343404.2022.2110227
Petrova, B., & Ranaldi, M. (2024). Determinants of income composition inequality. Comparative Politics, 56(4), 449–471. https://doi.org/10.5129/001041524X17045519842791
Piketty T (2014) Capital in the twenty-first century (Harvard University Press). https://www.hup.harvard.edu/books/9780674430006
Piketty T, Saez E (2014) Inequality in the long run. Science 344(6186):838–843. https://doi.org/10.1126/science.1251936
Pyatt G, Chen C, Fei J (1980) The distribution of income by factor components. Q J Econ 95(3):451–473. https://doi.org/10.2307/1885088
Marco, R (2019) Income composition inequality: The missing dimension for distributional analysis [Doctoral dissertation, Université Panthéon-Sorbonne (Paris I)]. HAL Thèses. https://theses.hal.science/tel-02464278/
Ranaldi M (2022) Income composition inequality. Rev Income Wealth 68(1):139–160. https://doi.org/10.1111/roiw.12503
Ranaldi M (2025) Global distributions of capital and labor incomes: capitalization of the global middle class. World Dev 188:106849. https://doi.org/10.1016/j.worlddev.2024.106849
Ranaldi M, Milanović B (2022) Capitalist systems and income inequality. J Comp Econ 50(1):20–32. https://doi.org/10.1016/j.jce.2021.07.005
Sandmo A (2015) The principal problem in political economy: income distribution in the history of economic thought. In: Atkinson EAB, Bourguignon F (eds) Handbook of income distribution. Elsevier, pp 3–65 https://doi.org/10.1016/B978-0-444-59428-0.00002-3
Shorrocks AF (1982) Inequality decomposition by factor components. Econometrica 50(1):193–211. https://doi.org/10.2307/1912537
Spadaro A, Mangiavacchi L, Moral-Arce I, Adiego-Estella M, Blanco-Moreno A (2013) Evaluating the redistributive impact of public health expenditure using an insurance value approach. Eur J Health Econ 14(5):775–787. https://doi.org/10.1007/s10198-012-0423-6
Tirado DA, Díez-Minguela A, Martinez-Galarraga J (2016) Regional inequality and economic development in Spain, 1860–2010. J Hist Geogr 54:87–98. https://doi.org/10.1016/j.jhg.2016.09.005
Verbist G, Förster M, Vaalavuo M (2012) The Impact of Publicly Provided Services on the Distribution of Resources: Review of New Results and Methods. OECD https://doi.org/10.1787/5k9h363c5szq-en

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