

BACHELOR'S DEGREE IN ECONOMICS

UNIVERSITY OF GIRONA

BACHELOR'S THESIS

Income inequality among the active  
population and the distributive effects of  
economic transfers in Spain. THE  
ECONOMIC RECOVERY

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2023

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## Acknowledgements

I would like to express my sincere gratitude to my thesis advisor Antonio López Estudillo, whose guidance and support throughout this project have been invaluable. Thank you for sharing your knowledge and expertise, and for providing me with numerous recommendations of books and scientific articles on inequalities. Your feedback and constructive criticism have helped me to refine my ideas and to produce a better-quality thesis.

I would also like to thank Núria Porta Solà, who has been my rock throughout this process. Your unwavering emotional support, encouragement, and belief in me have meant the world to me. Thank you for always being there to listen, and for helping me with the content and ideas for my thesis.

Finally, I would like to extend my gratitude to all the professors at the faculty who have inspired me and provided me with the tools and knowledge necessary to undertake this project. Special thanks to Andreas Kyriacou who has influenced my interest in inequalities.

# 1. Introduction

This paper aims to provide evidence about the change of income inequality in the active population in Spain since 2008, it also aims to investigate the distributional effects of monetary transfers and taxation during the long economic recovery. Investigating income inequality could provide important insights into the evolution of any given country, as it has real and measurable effects on the GDP. These effects can be either positive or negative. For example, inequality can promote growth by fostering aggregate savings or stimulating R&D (Kuznets, 1955), inequality is said to matter in terms of growth duration, as Berg & OSTRY (2017) demonstrated in their research, the relation between “growth spells”<sup>1</sup> and inequality remained strong despite the inclusion of many other possible determinants. Regarding the negative effects, they mostly tend to develop rather slowly and include a change of institution, the rise of socio-political movements or the reduction of spending on education (Bénabou, 1996). Among other things, income inequality is also positively related to domestic violence (Weede, 1981) or violent crime (Morgan, 2000). Income inequality could also affect the population’s health and well-being (Pickett & Wilkinson, 2015).

Spanish income inequality has been researched extensively. Alloza Frutos, Brunet, Forte de Campos, Moral Benito, & Pérez García (2022) analysed the structure of general government spending, which depending on the composition, the capacity of redistributive policies can be either positively or negatively affected. Gradín (2016) investigated the reasons why income inequality is so high in Spain in the EU context; they found a large association with lower employment rates, higher incidence of self-employment and lower level of education attained. Other authors focused their attention on the historic factors that determine the regional inequality (Minguela, Galarraga, & Fabregat, 2018). The 2008 financial crisis has also been at the core of many research papers, Goerlich (2016), among other things, investigated individual active population inequality, household income inequality and the distributional effects of monetary transfers and taxes. Anghel, et al. (2018) analysed the level of inequality in Spain as well as its evolution over the course of the crisis and the early stages of recovery.

Using Living Conditions Survey (LCS) microdata, this research paper aims to study the trend of inequality of earnings in different segments of the active population in Spain throughout the long economic recovery. As there was a massive increase in unemployment during the Spanish Crisis, this study will also investigate the effects of unemployment benefits on reducing income inequality (both the impact in the Gini coefficient and which deciles were most affected by these unemployment benefits will be investigated). Finally, this study will also investigate the distributional effects of monetary transfers and taxation on household income inequality.

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<sup>1</sup> Defined as “the time interval starting with a growth upbreak—the takeoff—and ending with a downbreak” (Berg & OSTRY, 2017)

Although the paper's findings in the overall trends of individual income inequality in different segments of the active population cannot be extrapolated and used in further crises, it could be used to further understand how income inequality in the active population behaves in a crisis which could help revalue further economic policies in a potential future crisis.

The research also contributes to a more updated measure of the distributive effects of monetary transfers and taxes. To carry out these research questions, the paper is divided into the following sections: First, a literature review regarding income inequality in Spain prior to and post-crisis will be conducted. In the same section, in addition to outlining the general trends and effects of monetary transfers on household income inequality, the differences between individual and household income and its effects on income inequality will also be examined. Section 3 of the paper will be focused on the inequality of earnings considering the working group. Section 4 will draw attention to the unemployed and their effect on the active distribution. Section 4 will also explore the differences between each decile in three years of the recovery. Section 4 will conclude by examining the effects of unemployment benefits on earnings inequality. In section 5 the distributive impact of economic transfers and direct taxation by deciles will be carried out for one year. Section 5 will also analyse income inequality for market income and disposable income as well as its evolution. The last section will summarize the paper's central findings.

## 2. Literature review

Literature regarding Spanish inequality prior to and following the 2008 financial crisis will be inspected in this section. The goal is to provide a general understanding of Spanish inequalities and explore their general tendencies regarding individual income derived from work and household income, both analysed in this paper. This will also provide a foundation for the distributive effects monetary transfers and taxes have on household income inequality, which will be investigated in section 5.

Goerlich (2016) analysed income inequality in the 2004-2013 period. His research was divided into four segments: the active population's inequality at the individual level was first analysed, then inequality at consumption unit<sup>2</sup> was researched; in the third section, the distributive effects of monetary transfers and direct taxation were explored; finally, the distributive impact of owner-occupied housing and in-kind public services was analysed. In his study, both inequality at individual level and inequality at household level was considered. Depending on the researcher's choice of analysing income inequality, individually or at household level<sup>3</sup>, inequality can either result in a positive or negative change. Although no research seen has confirmed a systematic higher income inequality when comparing household income to individual income or vice versa.

Regarding the active population's inequality considering the same period (2004-2013), income derived from work was analysed in different working groups. A stabilization or a slight downtrend of inequality in both full-time and part-time employees is recognized, although income inequality when considering part-time employees was always higher during the period analysed. Inequality when adding the self-employed was also always larger, Gini increased an average of 3 percentage points (PP) until 2007 when self-employed income was added: after 2008, this increase doubled. Afterwards, unemployed individuals were added to the computation, the addition of unemployed income resulted in an average increase in inequality of 8.2PP throughout the whole period. Due to the financial crisis (2008-2013), considering net earnings inequality and the active population, Goerlich (2016) measured an increase of 7.4 PP in the Gini coefficient; an increase of 8.2 percentage points over the period 2004-2013 was observed. Although unemployment benefits have an effect on reducing inequality, Gorelich (2016) noted that the distributive effects of unemployment benefits were limited.

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<sup>2</sup> The concept 'consumption unit' refers to the household income taking into consideration economies of scale that occur according to the number and the ages of the people who share the home spends. (INE, n.d.)

<sup>3</sup> Differentiating two ways of computing household inequality level: one that utilizes equivalence scales, and another that does not. The former is preferred to the latter (Michael & Lazear, 1981); (Datta & Meerman, 1980)

With regards to household income, assortative mating (which in economic terms, refers to the process of finding a partner for intimacy or reproduction means in which individuals choose a very similar partner in terms of financials or educational attainment), inequality between household size or the contribution of household structure to inequality are some of the issues investigated in Goerlich (2016). Before proceeding, the distinction between the two income distributions will be reviewed. Piketty (2015) found wages accounted for 60%, on average, across all household income distribution in France in 2000, stating a link between individual income and household income. Gottschalk & Danziger (2005) confirmed this correlation in their theoretical and empirical model. Equation 1 describes how consumption income is determined: household income is determined by a function of family earnings on the one side, depending both on individual's wage rate ( $W_i$ ) and on the hours worked ( $H_i$ ), and non-earned income ( $N_f$ ) on the other. As income of households does not only depend on individual income, but indeed depends on the joint distribution of earnings of all  $k$  persons in the family, an increase in individual inequality of earnings may not have the same effect at family level.

$$f_y(Y_f) = g(W_1, W_2 \dots W_k, H_1, H_2 \dots H_k, N_f)^4 \quad (1)$$

Goerlich (2016) found a more equal distribution measured using the Gini coefficient when comparing consumption unit income to individual income during the 2004-2013 period. On average, income inequality was 1.98 PP lower in consumption unit than individual income. His research also stated that income inequality at unit consumption is contingent on economies of scale used. In brief, income inequality in consumption unit increased by 9 PP due to the crisis (2007-2013).

Goerlich (2016) presented significant evidence toward assortative mating (which was found to exist in this period, although no significant change was found during the period, suggesting a low contribution of assortative mating to the increase in consumption unit inequality) during the same period (2004-2013). Examining the average income of the wife compared to that of their spouse, an increase in the wife's average income was seen when their partner's salary also increased. Anghel, et al. (2018) also confirmed assortative mating in the 2008-2016 period although to a lower degree. Anghel, et al. (2018) performed an exercise where they compared a simulated situation where mating was made at random and compared household income inequality to individual income inequality. Their hypothesis was, household income inequality would be smaller than individual income inequality, since without assortative mating, people of different deciles would cohabit. They found a slightly lower income inequality in household income when compared to individual income (individual P90/p10 was 10.9 and household P90/P10 was 10).

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<sup>4</sup> See Gottschalk & Danziger (2005)

Both studies reached the same conclusion which is, household structure which does not stop in assortative mating, it includes: a radical increase in single motherhood in Spain (Garriga & Cortina, 2017), and a gradual retreat of marriage in all parts of Europe (Sobotka & Toulemon, 2008) (half of the women who had not entered their first union, had a stable partner living in a different household (Casto-Martín, Domínguez-Folgueras, & Martín-García, 2008)), seem to have a negative impact in Spanish income inequality, making inequality greater.

Finally, the distributive effects of economic transfers and direct taxes, both at consumption unit and at individual unit, were inspected. Goerlich (2016) found a noticeable distributive effect when comparing market income to market income adding unemployment benefits. Moreover, an observable increase in the distributive effect of unemployment benefits of 2.14 PP<sup>5</sup> was due to the 2008 financial collapse, increasing the distributive effect from 1.16 (2004-07 average) to 3.3 (2008-2012 average). The increase in the distributive effects was not due to a greater use of the resources or a greater coverage among the unemployed but an increase in the individuals and families with no income. Proceeding then to the full examination of monetary transfers, the difference between market income inequality (defined as employment income both from wage labour and self-employed income plus capital income and income perceived by minors (below age 16)) and gross income inequality (defined as the market income plus all monetary benefits) was analysed. A reduction of 14.5 PP was found during the period; again, the same pattern as in unemployment benefits was observed, an increase in the distributive effects of monetary transfers due to the financial crisis.

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<sup>5</sup> Measured in Gini coefficient.



### 3. Inequality across the working-age population.

In this section, an extensive analysis of workers' inequality throughout the economic recovery will be conducted. (Carabaña, 2016) and (Goerlich, 2016) both analysed Spain's income inequality as a result of 2008 financial crisis, they used 2004 base (LCS) data, which finalizes in 2012. In this paper, 2014 base will instead be used. Due to the characteristics of this database, which only goes as far back as 2008, investigation prior to 2008 is not possible.

The exploration of worker inequality will begin with the analysis of average income among all 4 categories after which inequality considering employees will be investigated. Lastly, self-employed will also be taken into account. Unemployment's net earnings and its impact on inequality will be contemplated in the next section.

#### The Recovery of full-time employees

Employees represent the highest portion of the population. In 2008, employees represented 42% of the sampled population. Employees, apart from being the most abundant category in society, are also (at least in theory) the ones that would have the least inequality. In this section, instead of providing monthly employee income, annual data will be used as monthly income is not provided, which might not be the most ideal since neither the distribution of the number of hours worked nor the distribution of wage per hour (both having a significant effect on annual distribution) will be considered.

The average annual net earnings for employees<sup>6</sup> through 2008-2020 period is computed in Figure 1. Although, we do need to keep in mind Figure 1 corresponds to net earnings, meaning all taxes on occupational income have not been considered. The analysis of net earnings is selected over the analysis of gross earnings since it is closer to what individuals end up having to interact with markets.

Before proceeding with the findings, with the above-mentioned considerations, it should also be noted the slight variability that these results have, compared to that of the INE. This is due to the different methods considered when computing employees' net earnings and the criteria used to classify the category inside the labour force. In this part of the paper, Goerlich's (2016) approach of computing net earnings was followed<sup>7</sup>.

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<sup>6</sup> Annual net earnings is computed as net monetary income of the employee, plus net non-monetary income of the employee and self-employed income.

<sup>7</sup> Rather than using gross earnings, net earnings was used which might change the definitions employed by Goerlich (2016). Using net income shouldn't change overall tendencies since the national statistical institute uses a conversion method, converting net income to gross income.

Classifying each individual work category inside of the labour force, yields us with 4 possible combinations:

- Full-time employees.
- Part-time employees.
- Self-employed (full-time).
- Self-employed (part-time).

The category where the number of months was the greatest was assigned to everyone.

**Figure 1**

*Average net earnings for workers*



*Note. Compilation based on INE(Instituto nacional de estadística)*

In Figure 1, the evolution of net earnings for the different labour force categories is shown, leaving out the unemployed. The incorporation of part-time employees reduces the average income as a consequence of considerably lower hourly earnings (Hirsch, 2005). Some of the main causes are job and worker characteristics along with the occupational skills required.

What is also visible from Figure 1, is the lower average net annual income when self-employment is added, independently if full-time or part-time is considered (although as seen with employees a higher annual net income in full-time self-employed compared to part-time self-employed). The difference between these two groups are way smaller than that of employees. A study from Hamilton (2000) found the median self-employment earnings never

overtook the alternative wage available on a paid job with zero job tenure, the study's findings also indicated that "the present value to the median entrepreneur of a business lasting 25 years is over 25 percent less than the present value of a paid job of the same duration."

Average income peaked in every category in 2010 before declining in all 4 categories, although the magnitude of the decline was different in full-time employees. Contrary to other groups, they remained somewhat stable throughout the economic recovery with a slight lower average wage than that of 2010. When the unemployment wave hit the Spanish economy, the ones that remained in the employment pool had a higher proportion of permanent jobs, more seniority, which made it expensive to lay them off, and better skills. They consequently had a better income distribution, higher wages, and a more stable average income in contrast to other groups. Non-college educated individuals were the most affected by unemployment during the recession; these individuals had lower wages on average in contrast to more educated individuals (Brindusa Anghel, Henrique Basso, et.al, 2018), and since they did not get laid off, wages of employed individuals remained relatively higher. In the US, Rothstein (2017) found the rise in unemployment (between 2007-2009) to be higher for men and women with a lower educational level. Another possible explanation for the stability of annual income of employees when compared to others is the polarization between high-skill workers and low-skill workers (both at wage level and employment level), which in fact got bigger during the financial crisis (E.Croci Angelini, F.Farina, E.Valentini, 2020).

Both employees, employees +full-time self-employed and workers, represented at its minimum 95%, compared to its maximum in 2010<sup>8</sup>. After hitting its lowest point in 2015-2014 all three categories began to recover coinciding with the long-awaited increase in employment. From Figure 1, net annual earnings from all workers managed to recover faster than all other proceeding groups.

## Inequalities across employees

In this subsection the evolution of net annual income firstly considering full-time employees and later adding employees at part-time will be shown. In the preceding's subsections, I will keep adding population into the Gini computation until all categories of the worker's population is achieved; in the next section, I will be adding all active population into the Gini computation. However, full population will not be considered in this section since, there are other income sources and if added, they will also disturb the "working income" aggravating inequality.

Before presenting the results, a brief explanation of why it is, that we expect inequality of

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<sup>8</sup> Inflation has not been accounted.

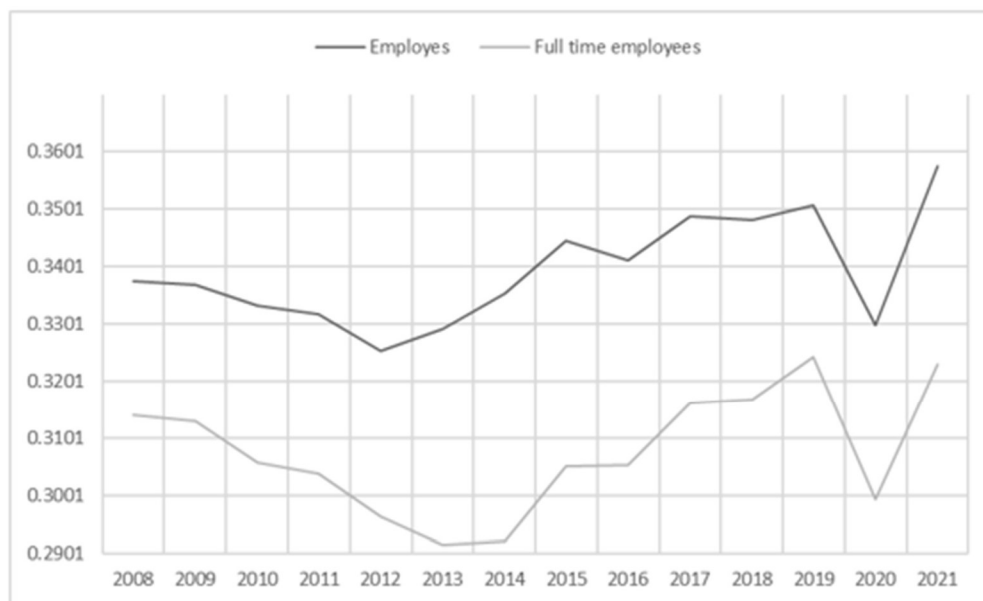
earnings among full-time employees to be the lowest is necessary. First and foremost, the number of hours, part-time workers work fewer hours than full-time earners, therefore, without contemplating hourly wages, it is obvious that part-time earners will receive less (see Figure 1). The second thing we must discuss is the lower retribution of hourly earnings among part-time employees. Goerlich (2016) in his research, found full-time employees' hourly earnings to be 3 euros higher than that of part-time earners, contributing to a more unequal distribution. In Australia, a study from Rodgers (2004) analysed whether there was a polarization of hourly wages between part-time and full-time employees; when controlling for both human capital and the type of job he found the penalty to be 21% for men and 7 % for females. When adding two additional control variables, type of employment and worker and job-specific characteristics, he found no statistical difference between the two.

Looking at full-time employees' inequality (Figure 2), the decrease in inequality seen in Goerlich (2016) until 2013 is visible. Goerlich (2016) in his research found a decrease in inequality of 1.6 percentage points, instead, the paper's findings suggest the decrease to be 2.2PP. The variation between the two findings is attributed to the fact that gross earnings<sup>9</sup> was chosen, as well as the decision to study monthly income instead of annual income, finally a different base of the database is used in this paper.

During the economic recovery, inequality among full-time employees started to increase after hitting its lowest point in 2013. Nearly at the same time unemployment began to recover from its high values, and inequality across employees began to increase. As more people with different job characteristics and different earnings began to enter the employment pool, inequality of earnings started to increase. Lots of other factors could have contributed to the increase in income inequality after 2013 apart of the incorporation of more people in the labour market; some factors include the retirement of higher-earning workers, unemployment shifts for certain jobs or changes in the labour legislation. Adding part-time to the Gini computation, we see the same trend; decreasing in the immediate years after the crisis and increasing after 2012 as people left unemployment to become employed. Figure 2 shows, as expected, the addition of part-time workers increases inequality. Throughout the period, an increase of 3.16 percentage points was measured.

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<sup>9</sup> Since net income reduces inequality when compared to gross income

**Figure 2***Evolution of the Gini coefficient in employees ( net annual earnings)**Note. Compilation based on INE(Instituto nacional de estadística)*

The evolution of inequality of earnings is what is of interest in this section, but if the level of inequality was to be considered, we should note that there are some factors that contribute to a more unequal income distribution like generational differences in work attitudes. Twenge (2010) through its literature review found GenX see work as less central to their lives, as they are more likely to value leisure.

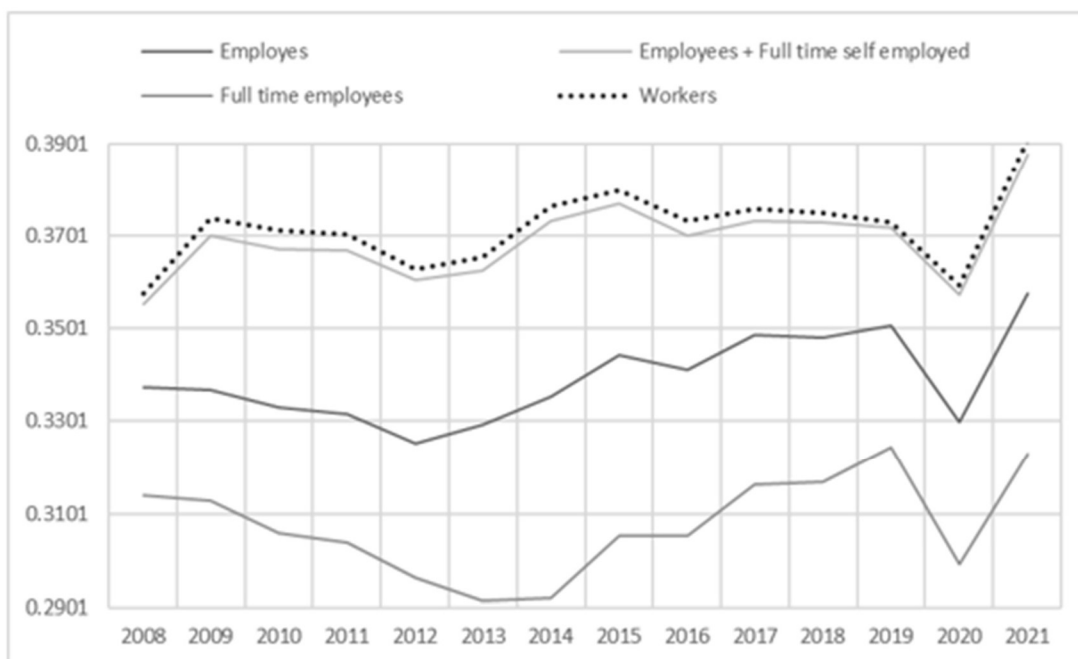
Both groups behaved in the same manner, during the economic recovery we had two phases; first inequality decreased until 2012-2013, but from 2015 forward, inequality began to increase increasing a few percentage points more than 2008. As there is no standardized way of transforming Gini increases to words, throughout this paper, Thewissen, Stefan; Kenwrothy, Lan; Nolan, Brian; Roser, Max y Smeeding, Tim (2015) terms will be used. All in all, from the financial crisis to 2019, full-time employees' inequality increased by less than 1 percentage point experiencing "some increase" in inequality. Part-time employees, on the other hand, experienced a "pronounced increase" increasing a little more than 2 PP.

### *Inequalities when adding self-employed.*

When adding the income of the self-employed, inequality is expected to rise as the average income is lower in this group (see Figure 1). It is well-known by now that self-employed income is both over-represented at the top and bottom of the annual earnings income distribution, on average between 1976 and 2013, wage income represented 59.3% whilst, entrepreneurial income represented 22.8% (Aghion, P., Akcigit, U., Bergeaud, A., Blundell, R., & Hemous, D., 2019) asserting an overrepresentation of entrepreneurial income relative to wages. A study from Schneck (2019), used representative German data and unconditional quantile regression analysis to study the effects of change in the rate of self-employment on income inequality and found an increase in the proportion of the self-employed increases income inequality. He also distinguished between two types of self-employed, solo self-employed and self-employed who create jobs for others (which I won't be considering since there is not that dimension in LCS surveys); he found the former to have significantly lower hourly wages than the latter, contributing in a big polarization between the two; therefore between that of the employees.

**Figure 3**

*Evolution of the Gini coefficient in the working population (net annual earnings)*



*Note. Compilation based on INE(Instituto nacional de estadística)*

Figure 3 displays the evolution of net earnings inequality once self-employed income is added; once again differentiating between full-time and part-time. Once more, the same pattern as before is observed, when incorporating part-time income, inequality increases by a few PP.

Although not by that much when comparing it to employees, which might be due to the low representation in the LCS survey.

The incorporation of the self-employed, however, did not experience the fall in inequality that employees experienced during the first years after the crisis. They fell 0.51 PP. Meaning during the first years of the crisis (either considering part-time or full-time), inequality could have increased among the self-employed. If inequality of a group is maintained and that of the whole increases, an increase in income inequality of the group incorporated cannot be deduced since the increase could be due to a lower average or a change in the contribution of the group. Although it is true that the average earnings of the self-employed decreased, calculating income inequality for just the self-employed always yielded a higher inequality when compared to employees. Plotting the difference between workers Gini coefficient (considering self-employed) and employees Gini coefficient (full-time plus part-time), very noticeable initial spike from 2 percentual points to 3.7 just after the crisis was identified, asserting an increase in the polarization between employees and self-employed. After 2014, the difference between these two distributions of income decreased year after year, reaching the same level as that of 2008 in 2019. If it wouldn't have been for the decrease in inequalities among employees, worker inequality could have risen in the first years after the crisis. Furthermore, the growth in income inequality that both types of employees experienced between 2016-2019 (full-time employee's Gini coefficient increased by 2 percentual points) was cancelled when all workers was considered. Denoting that self-employed income inequality could have decreased between these years if no major changed in the relative contribution was seen. Following the same terms as the previous section: Overall, workers experienced "a substantial increase" when considering the Gini coefficient during the recovery phase, increasing by 1.53 percentual points (prior to covid crisis).

## 4. Unemployment net earnings

There is a general consensus among economists that an increase in unemployment lowers the relative position of low-income groups aggravating inequality ((Sheng (2011)); (Mocan, 1999); (Giovanni, Marcelo, Roventini, & Virgillito, 2018)). This section will start with the addition of the unemployed population in the Gini computation, and it will be then followed by the cumulative distribution function between the unemployed, calculated in three different years. Finally, the effects of unemployment benefits on income inequality throughout the recovery will be investigated.

Mocan (1999) divides unemployment into two components, structural and cyclical, and investigates its effects on income inequality. Structural unemployment is found to have a substantial impact on income inequality. Its findings also indicate an increase in income polarization when cyclical unemployment increases. Since Spain's structural unemployment was affected by the 2008 financial crisis, increasing by 4PP (Doménech, 2013), and cyclical unemployment did also go up due to the crisis, even though the crisis was due to a greater extent to the natural component (Cuéllar-Martín, Martín-Román, & Moral, 2019), inequality was expected to increase until 2015 when unemployment was added.<sup>10</sup>

Figure 4 confirms the expectation, as more people entered unemployment, there were more people receiving a very low income; in a small number of cases, that amount was zero (in 2013, 30% of the unemployed population received an income of 0 that year, although the proportion of individuals receiving 0 income did go up due to the crisis). Using this Dataset however, it is difficult to assert whether inequality when considering the unemployed began to increase just after 2008, or if it began years before the crisis since there is no data prior to 2008. From Goerlich (2016) and Carabaña (2016) we can deduce a slight decrease in inequality until the moment the crisis began.

As can be seen in Figure 4, both income polarization and its divergence between workers, continued to increase to its maximum in 2014 after which it started to decrease. Centring the attention on the gap between the two distributions (workers and workers plus unemployed), the distribution of income including the unemployed, achieved at its maximum an increase of 10 PP. Considering all population and 2007-2011 period, Carabaña (2016) estimated a 3 PP increase out of the 4.4 PP increase in the Gini coefficient was due to the increase in unemployment. Considering the period 2008-2014, income polarization measured with the Gini coefficient increased by 9 percentage points, increasing to a maximum of 49. After 2015,

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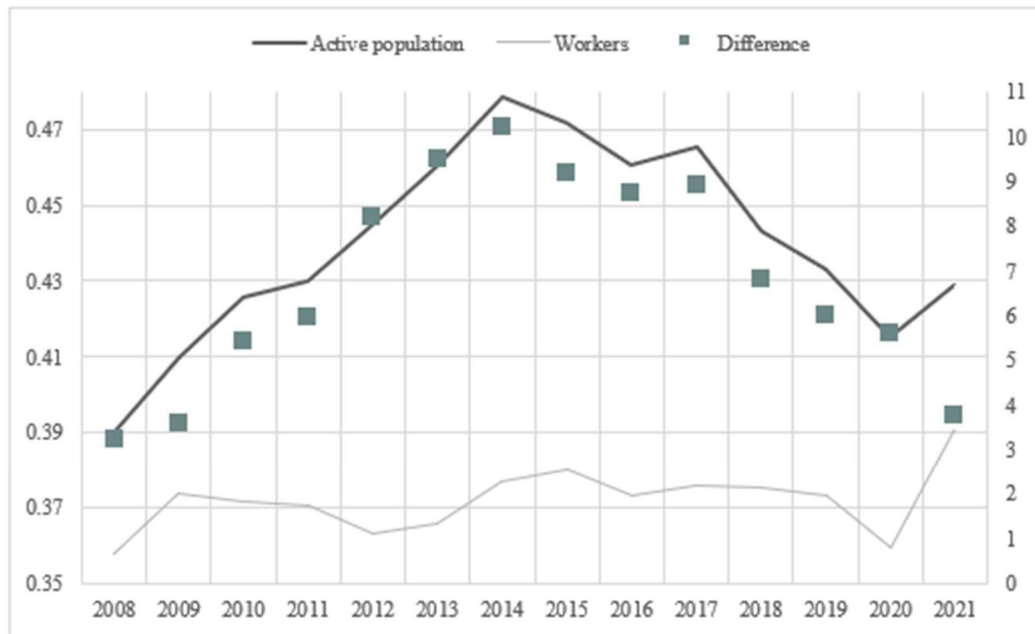
<sup>10</sup> Differences between workers and unemployed people are expected to increase since, as discussed in section 3, inequality among employees decreased during the first years subsequent to the crisis.



inequality began to decrease, although it did not manage to recover its initial point. Recalling from the previous section and following the same definitions from Thewissen, Kenwrothy, Nolan, & Roser (2015), inequality among workers experienced a “substantial increase”; active population, on the contrary, experienced a “pronounced increase”. During the full economic recovery 2008-2019, inequality across the active population increased by 4.2 percentage points.

**Figure 4**

*Evolution of the Gini coefficient in the active population (net earnings)*



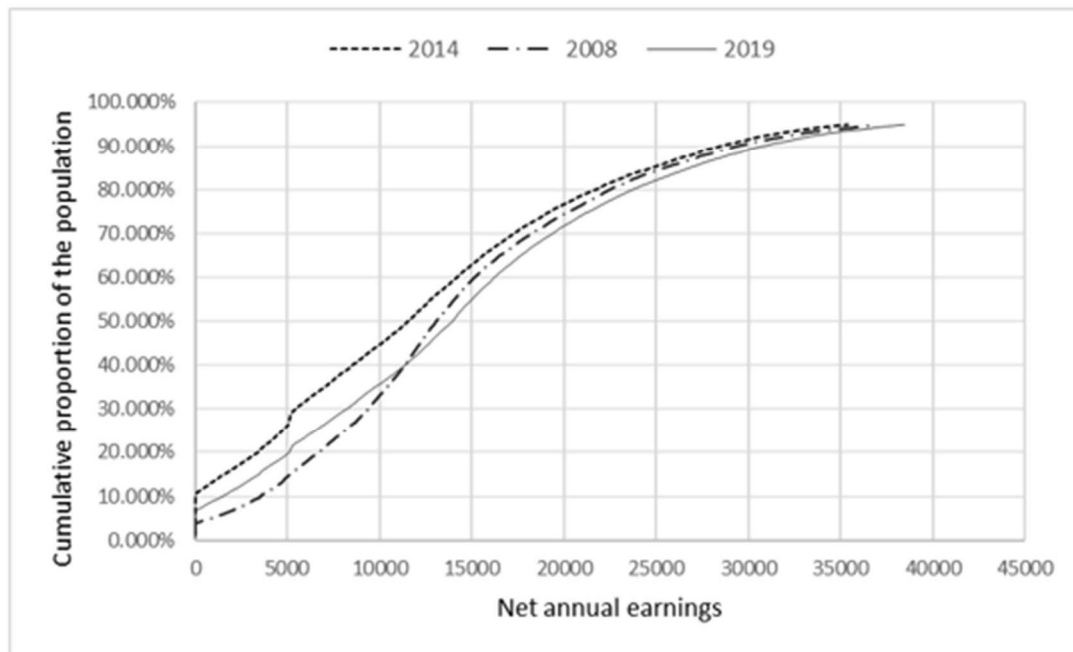
*Note. Compilation based on INE (Instituto Nacional de Estadística) Left axis: Gini coefficient. Right axis: Percentage Points difference between Active population and workers.*

To further examine the impacts on each decile, quintile and percentile of income, the cumulative function of annual net earnings at three points in time was calculated. The distributive function of annual net income is described as the accumulated proportion of individuals (on the y axis) for each income level (on the x axis). This plot presents several strengths, it first offers a quick glance at different parts of a data set, secondly, a glance at inequality (which, in this case, will not be necessary), and finally, when comparing to other distributions, it allows us to determine the first-order stochastic dominance if any, which let us know which is preferred over the other “provides priori grounds for excluding certain probability distributions from the expected utility maximization process.” (Saposnik, 1962).

Figure 5 presents the cumulative function of net annual earnings for the full active population for three years during the Spanish recovery; 2008, 2013, and 2019. The years have been selected coinciding with the initial year of data, the year with the highest inequality (2014), and the last year analysed (2019). Values above the 95 percentile have been removed since income above the 95 percentile increases rapidly and, if not truncated, visualisation of income deciles is rather difficult.

**Figure 5**

*Cumulative function of net annual earnings in Spain 2008, 2013, 2019*



*Note. Compilation based on INE(Instituto nacional de estadística)*

Comparing 2014 (the highest inequality year) to the start of the crisis, we observe for every income decile lower net annual earnings. It is also noticeable that a higher proportion of individuals received at least zero income (10.42% of the sampled population in 2014 compared to only 3.85% in 2008. See Appendix A Figure IV). What is also perceptible from Figure 5 is the reduction of income was higher in lower deciles compared to higher deciles, contributing to the increase in inequality. The reduction in annual net earnings was greater among the lower deciles; on the contrary, it seems the reduction was the lowest among people at the top of the distribution. Moving the attention to 2019, we see an increase in income in all percentiles compared to 2014 (in Appendix 1, boxplots for annual net earnings both for p10 (Figure II) and p80-90 (Figure I) for years 2014 and 2019, as well as the eta squared which “is a measure of association bounded between 0 and 1 for a numerical and a categorical variable” (Barceló, Renart, Coenders et. al, 2019) are shown. A positive association in both cases, as well as a significance at 1% level, is observed, affirming on average, 2019 is associated with a higher net annual earning than 2014 in both tests). The increase

in income was the greatest among the lower middle part of the distribution (average income between the first and the second decile increased by 125%<sup>11</sup>; on the contrary, average income between the 8<sup>th</sup> and the 10<sup>th</sup> decile, increased by 5%). Even the polarization in favour of lower income groups did not manage to increase income above 2008 level. An increase above 2008 level is only observed from decile 4 meaning that lower income groups did not manage to recover their initial income.

Further, both 2008 and 2019 cumulative functions have a first-order stochastic dominance over 2014 since, for every income, 2008 or 2019 cumulative functions have at least as high of a probability of receiving  $x$  ( $x$ =income) as the 2014 cumulative function. (Torres, 2015) thereby “providing a priory ground for excluding 2014 distribution from the expected utility maximization process” (Saposnik, 1962), meaning both distribution functions are preferred over 2014<sup>th</sup>.

Unemployment benefits programs play a crucial role, especially in hard or difficult times as it stabilizes the economy and mitigates the effects across states (Albizio, Berganza, & Kataryniuk, 2017). As unemployment is countercyclical, unemployment benefits act as a stabilizer, stabilising demand, and the economy. The way of stabilizing the economy is by protecting unemployed workers from depleting their assets to maintain consumption and by substituting work income with unemployment benefits and therefore helping individuals get out of poverty or preventing it (Moffitt, 2014) (Anghel, et al., 2018).

Anghel, et al. (2018) found a very noticeable increase in income derived from unemployment benefits, during the first period of the recovery. In 2 out of the 3 deciles analysed, an increase in unemployment benefits as a proportion of income was noticeable. A bigger difference in the lower deciles compared to the upper was noted. People at the top of the distribution experienced a slight decrease in unemployment benefits as a proportion of their income. Anghel, et al. (2018) also performed an exercise where the income of individuals receiving unemployment benefits was replaced by zero: they found unemployment benefits to limit the increase in market inequality by one-third.

Another thing to contemplate before proceeding with the findings, which might have a negative effect on the contribution that unemployment benefits have at reducing inequality, is the distinction between two types of unemployment: Those who consider themselves as unemployed people, although no unemployment benefits are registered in the LCS, and individuals who receive unemployment benefits, which are considered unemployed by the LCS. (Goerlich, 2016).

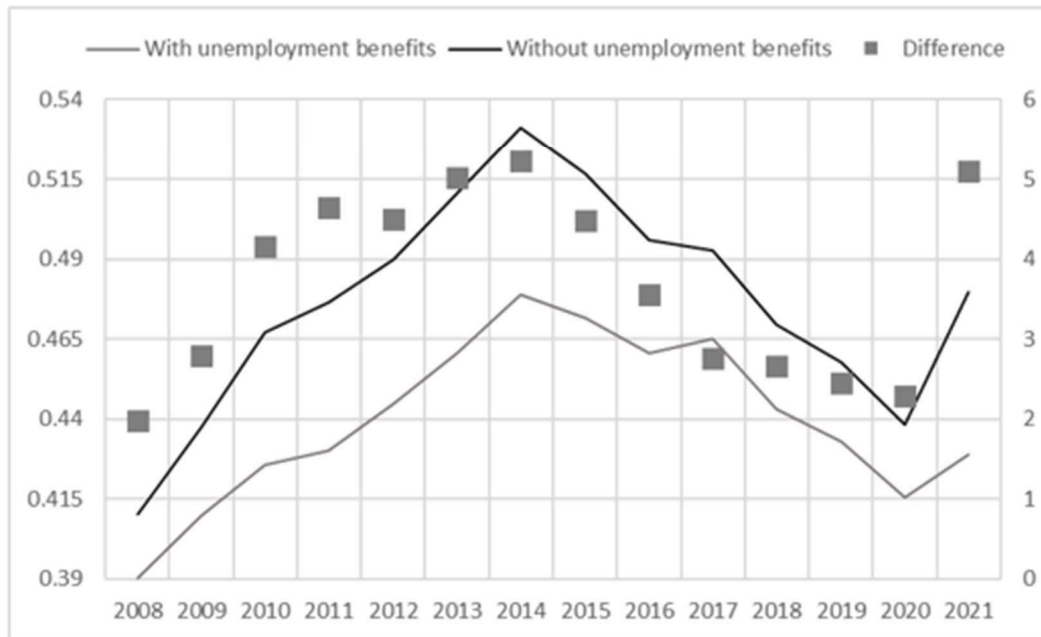
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<sup>11</sup> This increases have been calculated at current prices. A noticeable change in inequality and overall earnings could be noticeable if the increase accounted for inflation.

Figure 6 represents the same exercise as described by Anghel, et al. (2018) on net earnings. “With unemployment benefits” correspond to “active population” in Figure 4. “Without unemployment benefits”, on the other side, corresponds to the computation of the Gini coefficient replacing the income from unemployment benefits with zero and leaving everything else equal.

**Figure 6**

*Evolution of the Gini coefficient in active population and active population without unemployment benefits (net annual earnings)*



*Note. Compilation based on INE(Instituto nacional de estadística). Left axis: Gini coefficient. Right axis: Percentage Points difference between unemployment benefits and the distribution where unemployment benefits is replaced by zero.*

We observe the same pattern as in Figure 4, an overall higher inequality is seen since all income derived from unemployment benefits has been removed. Performing the cumulative function for 2014 between actual active population and the exercise where income derived from unemployment benefits is replaced by zero (see Appendix A Figure III), a noticeable increase in income in lower deciles is observed. As income at the higher deciles hardly changed due to unemployment benefits, inequality decreased when unemployment benefits were considered. Throughout the first years of the crisis, income inequality increased in both groups although a steeper increase in inequality when considering the replacement of unemployment benefits is recognized. Goerlich (2016) and Carabaña (2016) attributed the increase in the contribution that unemployment benefits had on inequality to the increase in the number of unemployed people. Figure 6 also shows the contribution unemployment benefits had on inequality in PP. During the first years of the crisis, unemployment benefits contributions in reducing inequality also increased, it is clear that when unemployment rises, unemployment benefits increase their weight in the GDP and as a consequence have a greater impact on equality indices. At its

maximum, unemployment benefits managed to reduce 5 PP in the Gini coefficient. After 2014, contributions also decreased slowly; at the end of the recovery period, the reduction in inequality due to unemployment benefits had achieved the same level as at the beginning of the crisis. Looking at the full recovery period, unemployment benefits did manage to decrease income inequality slightly, from 4.75 to 4.2 PP (comparing the increase in inequality from the active population to the exercise where all income derived from unemployment benefits is replaced by zero). What should also be considered is unemployment's benefits weight in decreasing inequality, is that it depends on multiple factors: the duration of those benefits, the average duration of unemployment, and the length of time required to qualify for benefits and the general tendencies of percentages of the unemployed who received benefits.

As the research has demonstrated, inequality of net earnings considering the full active population did experience a very noticeable increase mostly due to a massive decrease in income in the lower parts of the net earnings distribution (see Figure 5) and a very considerable increase in the proportion of individuals receiving zero or negative income (see appendix A Figure IV) achieving 10% in 2014 which was due to: the multiplication of the unemployed and the extension beyond the coverage period. As earnings above the 90<sup>th</sup> percentile did hardly change, an increase in income inequality was perceptible. Unemployment benefits helped decrease the impact of inequality, by an average of 4.67 percentage points during 2010-2015 period. Overall, in 2019, unemployment benefits contributions in reducing inequality returned to its initial level in 2008, and did not have a drastic effect in reducing inequality of net earnings among the active population.

## 5. Effects of monetary transfers and taxes on income inequality

In this final section of the research, the distributional effects of monetary transfers and taxes on household income inequality will be examined. Before proceeding with the findings, it is necessary to define welfare state, since it is at the core of the last section. Gutiérrez Junquera (2000) understands a welfare state as a “...cierto nivel de desarrollo económico que garantiza empleo y renta a la población y un sistema público de asignación de recursos que garantiza la cobertura de servicios básicos y la corrección de las situaciones de necesidad no cubiertas por el mercado”. The European welfare state has solidified into a welfare state comprised of public financing through progressive taxation, and basic needs such as education or health. The European Welfare state also provides social benefits to the unemployed or retired (Gutiérrez Junquera, 2000). Public financing and basic needs aim to guarantee a minimum subsistence to the population and at the same time reduce income inequality (Goerlich, 2016)& (Gimeno Ullastres, 2000).

This section will use the methodology employed by Goerlich (2016) to analyse the distributional effect, using household Market income, household gross income and household disposable income. Goerlich’s (2016) defined market income as all the income derived from work (employee income and self-employed income) plus capital income. Gross income is determined by market income plus all monetary transfers (it includes employee benefits and retirement income as well as all other monetary transfers). Lastly, disposable income refers to consumption-ready household income, meaning all taxes were deducted from gross income.

A graphic way to analyse the effects of monetary transfers on each income decile is through the kernel density and the empirical cumulative distribution function (ecdf) which will be computed for the year 2021. This year has been chosen due to the availability of recent data and the lack of significant changes in the welfare state. The main focus here is on understanding how monetary transfers affected income distribution, rather than their magnitude. After analysing monetary transfers’ impact on each decile, the Gini coefficient will be calculated for each income definition and for each year, the goal is to study how monetary transfers and taxes modified income inequality.

Figure 7 shows the empirical cumulative distribution function for 2021 for two household income distributions: market income and disposable income. As can be seen in Figure 7, disposable income increases the income from the lower deciles (the “lower the market” income the bigger the increase<sup>12</sup>) until decile 8 and lowers the income of the richest (from decile 8 to the top 1 %). As income from the bottom deciles increased and income at the top deciles decreased, a

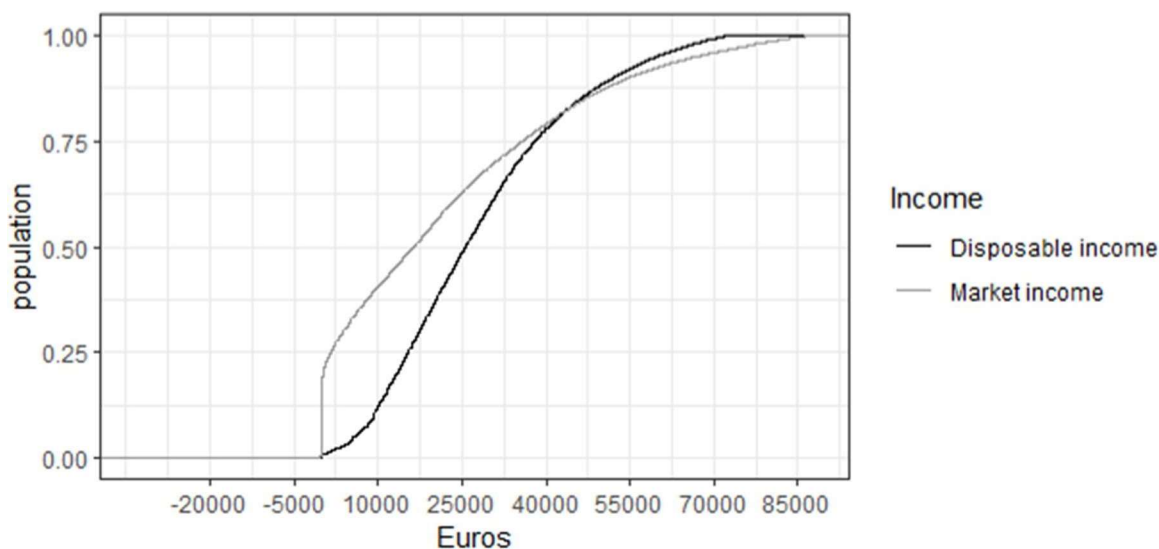
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<sup>12</sup> For most of the income distribution. See Appendix B table 1 for a statistically significant OLS model

decrease in inequality can be confirmed.

**Figure 7**

*Empirical cumulative distribution function for market household income and disposable household income*



*Note. Compilation based on INE(Instituto nacional de estadística). Income has been capped at the 95<sup>th</sup> percentile.*

After all monetary transfers and taxes, income rose in 70 % of the population whilst income got lower in 20% of the sample. In Appendix B Figure I, a statistical difference for market income and disposable income between percentile 0 and percentile 50 is shown as significant and the eta statistic is 0.63750, meaning the relationship is quite strong. Appendix B Figure II also shows the boxplot for market income and disposable income between percentile 80 and percentile 100 although a statistical significance is shown, the relation found is quite weak. To further demonstrate the negative relation between individual income position and monetary transfers, Appendix B table I shows a statistically significant OLS model where monetary transfer is the dependent variable and the decile position the predictor variable. Using deciles as a factor and comparing it to the first decile, a bigger negative<sup>13</sup> difference in the average number of monetary transfers is seen as deciles increase, affirming a negative relation between monetary transfers and income decile.

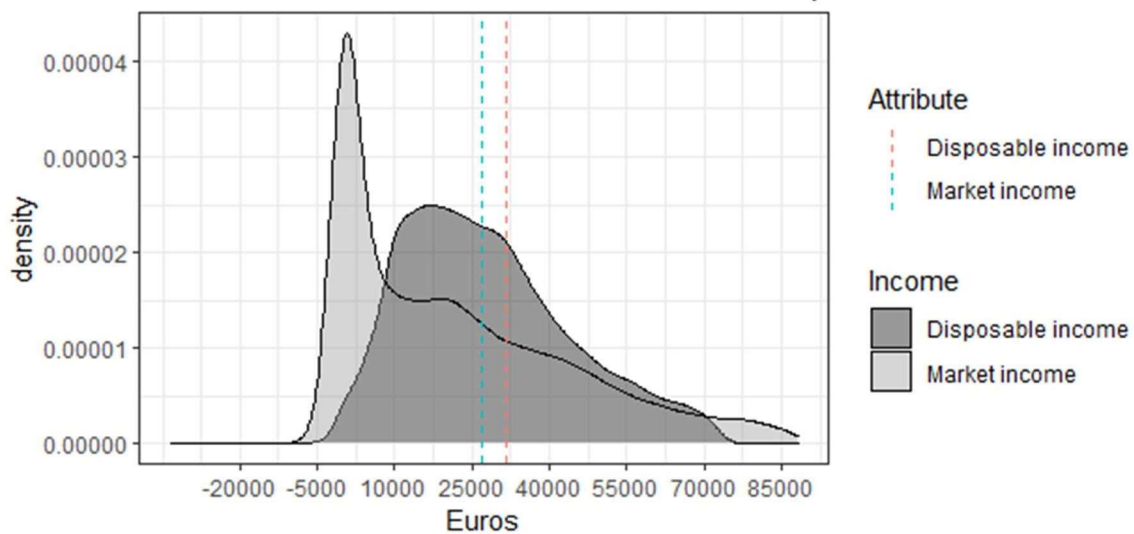
Figure 8 displays the kernel density distribution for both income definitions as well as its averages. The kernel distribution for market household income shows a very high density around the zero euros per year and household; after which the density decreases quite rapidly and stabilizes around 10,000 thousand euros per year and household. The density then continues to

<sup>13</sup> Omitting decile 2 and 3 which are positive, meaning, on average, deciles 2 and 3 receive more monetary transfers than decile 1.

decrease as income increases. Comparing the household market kernel distribution to the disposable household kernel distribution, the density peaks at a much higher income per year and household, peaking at 20,000 euros per year and household, the density remains considerably higher in the disposable income distribution. Only the density was lower in the disposable income distribution compared to market income distribution after the 70,000 euros per household.

**Figure 8**

*Kernel distribution for market household income and disposable household income for 2021*



*Note. Compilation based on INE(Instituto nacional de estadística). Where attribute corresponds the average income. Income has been capped at the 95<sup>th</sup> percentile.*

Focusing the emphasis on averages, a higher average income in disposable income compared to market income can be noticed. In Appendix B, the t-test for both disposable income and market income is computed, and a higher average income for disposable income compared to market income is statistically significant.

Figure 9 displays the evolution of household market income inequality computed in the Gini coefficient. As all population is introduced and not all income is examined (income derived from work and capital income are only considered), the inequality level, as well as its evolution was quite uneven compared to active income inequality<sup>14</sup>. Household market income inequality increased until 2015, although a faster rate was seen during the first years of the crisis (2008-2011) compared to the subsequent years (2011-2015). Overall, household income inequality finished with a 6 PP increase with respect to 2008.

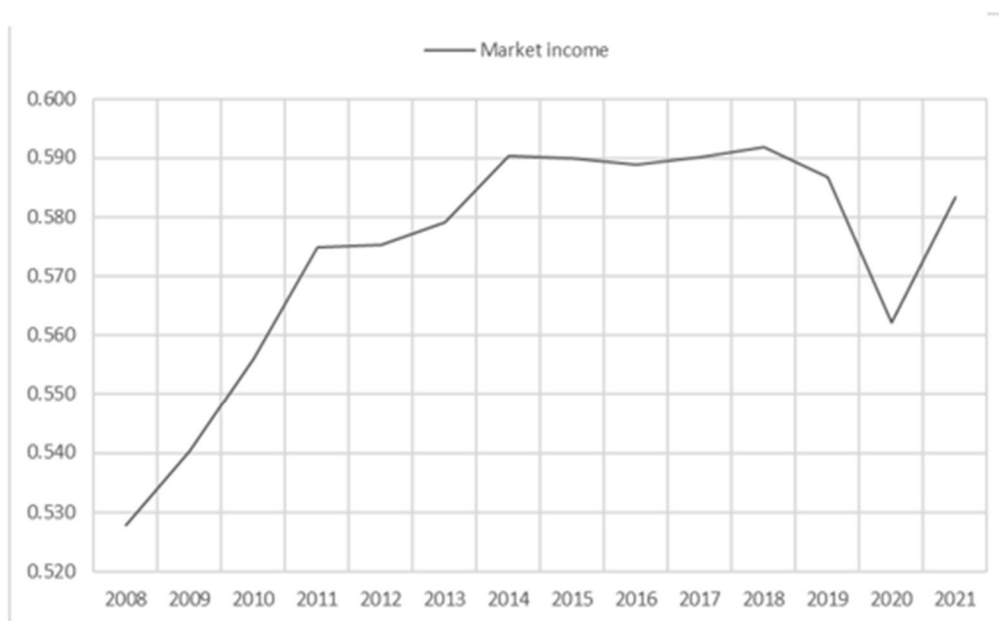
<sup>14</sup> Active income inequality was computed individually.



The next stage is to add all monetary transfers from the state to the market income to obtain gross income. There are two ways in which a welfare state can reduce household income inequality: through monetary transfers or through progressive taxation<sup>15</sup>. Regarding the former, there are two types of monetary transfers: contributory transfers and non-contributory monetary transfers. Contributory transfers can only be accessed if certain prior contribution conditions are met. Non-contributory, transfers, on the other hand, do not require any prior conditions. Gimeno Ullastres (2000) confirms monetary benefits to have a progressive nature. For the year 1990, Gimeno Ullastres (2000) found non-contributory to maintain a progressive profile, with a benefit of 34.72% for households in the first decile. Even though he also detected a progressive profile in contributory transfers, he detected a more progressive nature in non-contributory benefits compared to contributory benefits. Despite a lower progressive nature in contributory benefits, they had a more redistributive impact than non-contributory benefits as they were larger in expenditure. Gimeno Ullastres (2000) found disability benefits followed by pensions, to be the benefits with the most redistributive impact. Goerlich (2016) also found taxes to reduce less income inequality than monetary transfers.

**Figure 9**

*Evolution of household market household income inequality*



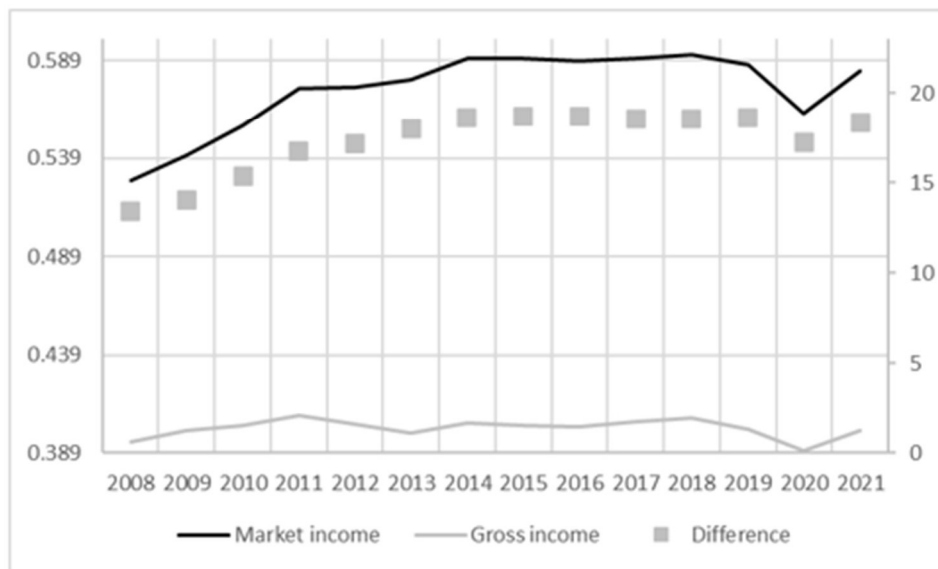
*Note. Compilation based on INE(Instituto nacional de estadística).*

<sup>15</sup> There is also a third mean by which the welfare state can further reduce income inequality: in-kind public services which Goerlich (2016) found to have a important effect on household income inequality.

Concerning progressive taxation, there are some economists that consider that the Spanish tax system is quite progressive; “Spain bears one of the highest levels of fiscal progressivity among industrialized states” (Actualidad Economica, 2011), and although it is true that progressivity reduces inequality in observed income, it has a significantly lower impact on actual inequality (Duncan & Sabirianova Peter, 2016).

**Figure 10**

Evolution of gross household income inequality and market household income inequality



*Note. Compilation based on INE(Instituto nacional de estadística). Left axis: Gini coefficient. Right axis: Percentage Points difference between household market income and gross household income.*

As contributory benefits are supposed to have the most redistributive impact, it was expected to drastically reduce income inequality when gross income was considered. The first that can be seen from Figure 10 is the drastic reduction in inequality, throughout the period, on average market household income inequality was 43% higher than gross household income inequality.

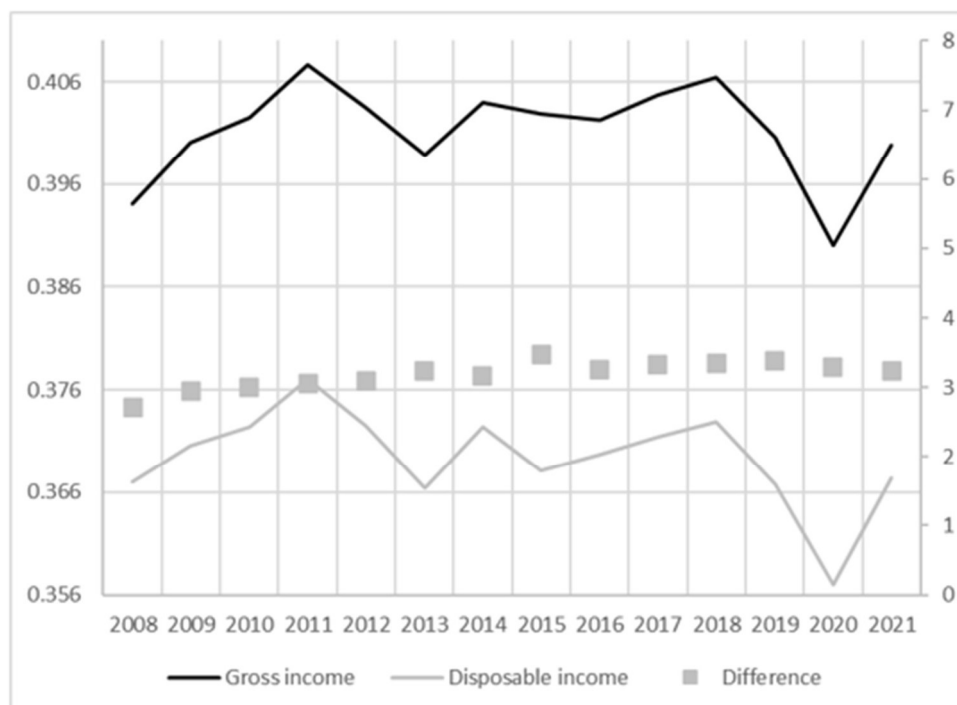
An increase in the distributional effects of monetary transfers can be seen (Figure 10 right axis), from 2008, to 2014. The increase in the distributional effects, which in fact inverted the growth trend from market income between 2011 and 2013, was probably due to a significant rise in social benefits expenditure as a percentage of GDP (Alloza, Brunet, Forte-Campos, Moral-Benito, & Pérez, 2022) due the crisis automatic stabilizers. Social Benefit expenditure as a percentage of GDP declined after its maximum in 2014 (Alloza, Brunet, Forte-Campos, Moral-Benito, & Pérez, 2022), and a stabilization of the distributive impact after 2015 is noticeable in Figure 10, stabilizing in the 18 PP reduction in the Gini coefficient. Although it is true that social benefits expenditure as a percentage of GDP declined in the subsequent years after 2015,

employed people as well as unemployed individuals started to recover stabilizing the distributive effects of monetary transfers. Overall, monetary transfers manage to reduce the Gini coefficient in more than 15 PP during the economic recovery.

Figure 11 finally adds disposable income inequality, as disposable income incorporates direct taxes and transfers to other households, inequality was expected to further decrease. As previously mentioned, taxes are expected to have a limited effect when compared to monetary transfers. Looking at the two taxes considered, property tax did not vary that significantly during the years (Estadística de los declarantes del Impuesto sobre el Patrimonio, 2023). Regarding personal tax income, no significant variation was seen either. Therefore, the reduction in income inequality is expected to be stable throughout the period analysed. Figure 11 confirms a reduction of the Gini coefficient when taxes are introduced in household family income, as anticipated, no major changes in the distributional effects were seen. According to Figure 11, taxes did not have that distributional power to change household income inequality trends. All in all, the welfare state managed to reduce 20.46 PP on average of the Gini coefficient in the period analysed. Monetary transfers had more influence at reducing household income inequality than taxes. Monetary transfers apart from reducing inequality, also changed the tendency between 2011- 2013.

**Figure 11**

*Evolution of gross household income inequality and disposable household income inequality*



*Note. Compilation based on INE (Instituto nacional de estadística).*

## 6. Conclusion

The literature review has settled the basis for the analysis of both household income inequality and individual income inequality. Individual income inequality considering full-time employees ended up decreasing from the start of the crisis until 2013. Individual income inequality when self-employed was included, always had lower average wages and a higher inequality until 2013. From the start of the crisis, inequality of earnings when considering the self-employed did increase with respect to employees. The literature also suggested a bigger inequality when the full active population was considered during 2004-2013. An increase in inequality considering the active population was also proposed by the literature from the start of the crisis. As for the analysis of the effects of monetary transfers and taxation, an increase in the distributive impact is seen from the start of the crisis.

In this paper, the trends of inequality of earnings in different segments of the active population were aimed to be explored, the paper also focused on the effects of unemployment benefits. Finally, the research also sought to find the impacts of monetary transfers and taxation on household income inequality. In addition to resolving the proposed research questions, this study also supported the expected findings. First, average income inequality was bigger when part-time employed people were added to full-time employees because of a lower average income per hour and a lower annual income; second, self-employed and unemployed people also enlarged inequalities due to a more dispersed income distribution. Finally, this paper also supported the idea that monetary transfers had a bigger effect in reducing income inequality than taxation.

Regarding the research questions, a decrease in the inequality of earnings in both full-time employees and employees was seen using the Gini coefficient until 2013-2014. When considering workers, inequality trend was similar, although the decrease was less pronounced. From 2013 to 2019, worker's income inequality remained stable whilst inequality in full-time employed and employees increased. All in all, from 2008-2019 inequality of earnings among the workers increased by 1.53 PP. With regards to the second research question, a pronounced increase in the active population was seen until 2015 which among other things, was due to the increase in unemployed individuals. After 2015, active population inequality decreased, which could be due to an increase in work individuals and a subsequent decrease in unemployed individuals. Overall, in 2019 inequality of earnings among the active population was 4.2 PP higher compared to the start of the crisis. An exercise to discover the effects of unemployment benefits was done, on average the Gini coefficient decreased by 3.68 PP when unemployment benefits was considered. As unemployed individuals increased throughout the recovery, the impact that unemployment benefits had on reducing inequality of earnings also increased. Due to the nature of unemployment benefits, no change in the overall inequality trend was found during the recovery.

In section 5, a negative relation between the income received from monetary transfers and the income decile of the household can be deduced from figure 7 and confirmed from with an OLS model in Appendix B Table I. The higher the individual's position in the income distribution the lower the monetary transfers compared to decile 1. This negative relationship reduced income inequality by 20.46 PP on average throughout the 2008- 2021 period. The distributional effects of monetary transfers increased during the crisis and stabilized after 2015 around the 22PP reduction in the Gini coefficient. Monetary transfers and progressive taxation managed to change and drastically reduce household market income inequality. As a result of both progressive taxation and monetary transfers, this study noted no increase in household income inequality in Spain after the full economic recovery (2019).

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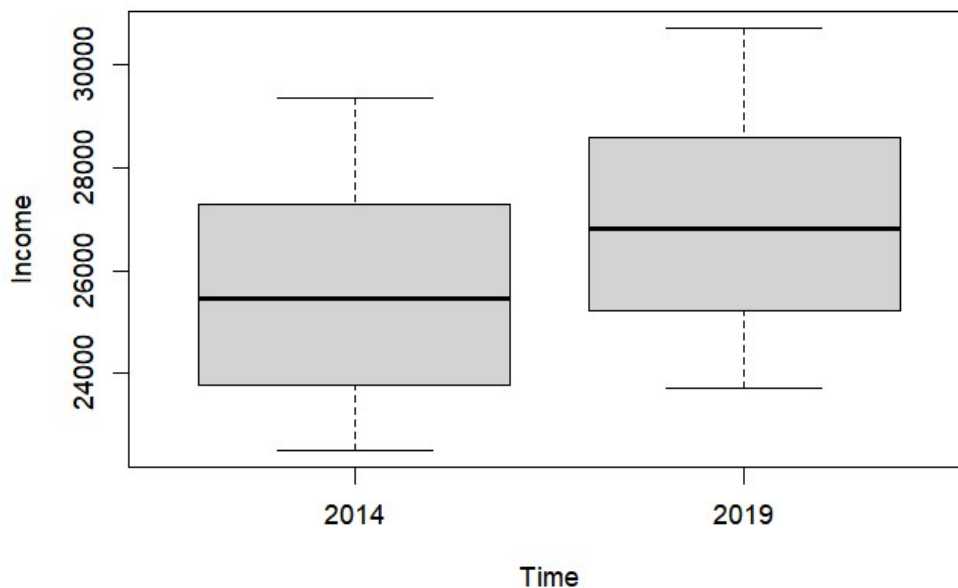


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# Appendix A. Unemployment net earnings

Figure I Box plot between 2014, 2019 p80-90 net earnings.



Note. Compilation based on INE(Instituto nacional de estadística).

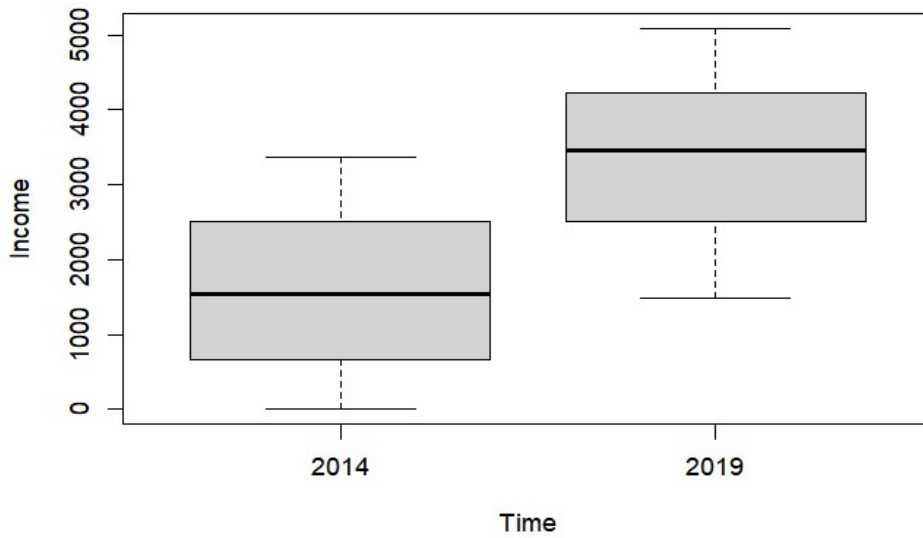
	Df	Sum Sq	Mean Sq	F value	Pr(>F)
time	1	1.609e+09	1.609e+09	400	<2e-16 ***
Residuals	3551	1.428e+10	4.022e+06		

---  
 Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

$$\sqrt{\frac{1.609 * 10^9}{1.428 * 10^{10} + 1.609 * 10^9}} = 0.31822$$

...

Figure II Box plot between 2014, 2019 p10 net earnings

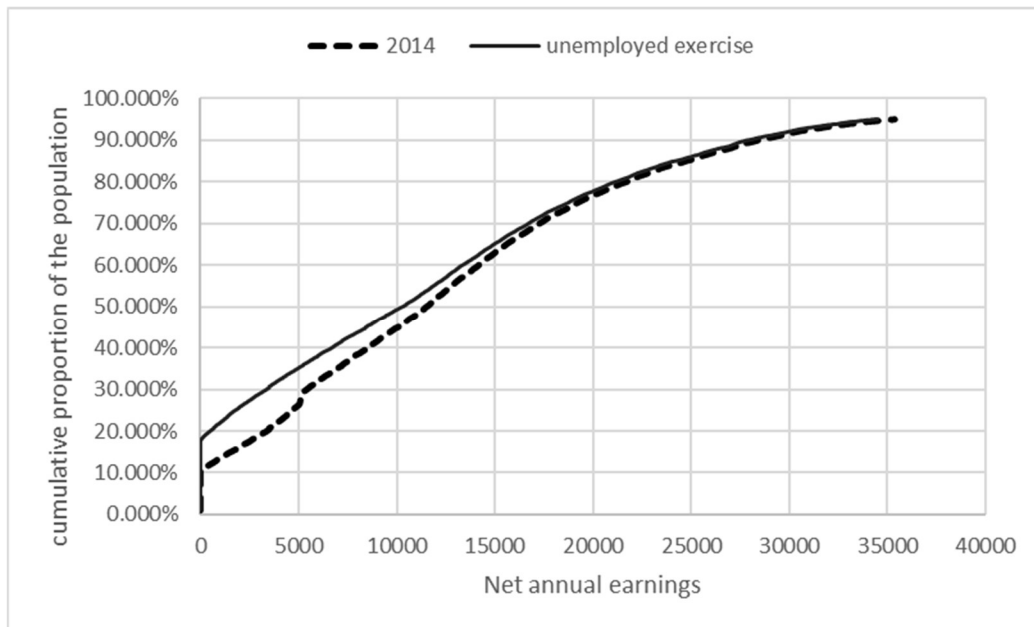


Note. Compilation based on INE(Instituto nacional de estadística).

```
> summary(aov(income~time))
              Df Sum Sq Mean Sq F value Pr(>F)
time           1  2.643e+09  2.643e+09    2485 <2e-16 ***
Residuals    3370  3.584e+09  1.064e+06
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

$$\sqrt{\frac{2.643 * 10^9}{3.584 * 10^9 + 2.643 * 10^9}} = 0.65149$$

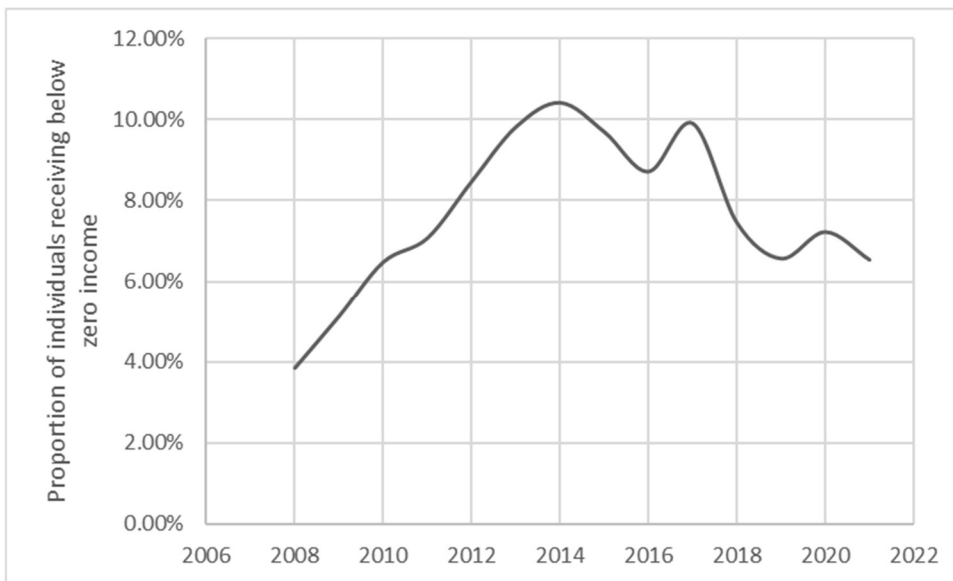
Figure III Cumulative function of net annual earnings 2014 unemployed exercise



Note. Compilation based on INE(Instituto nacional de estadística).

...

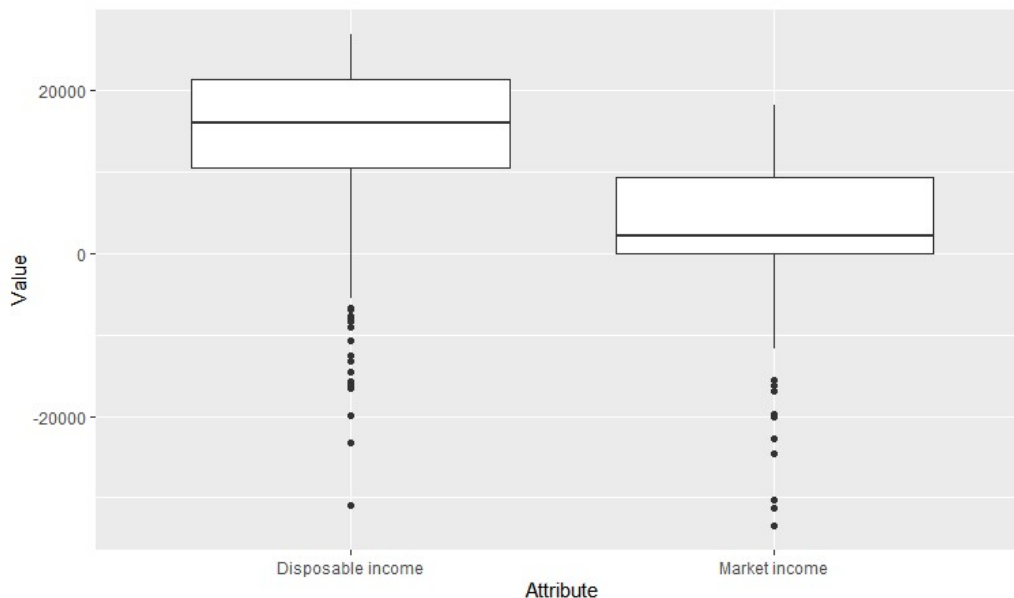
Figure IV Proportion of individuals receiving below zero income



Note. Compilation based on INE(Instituto nacional de estadística).

## Appendix B. Distributive effects of monetary transfers

Figure I Boxplot for market income and disposable income between percentile 0 and percentile 50



Note. Compilation based on INE(Instituto nacional de estadística).

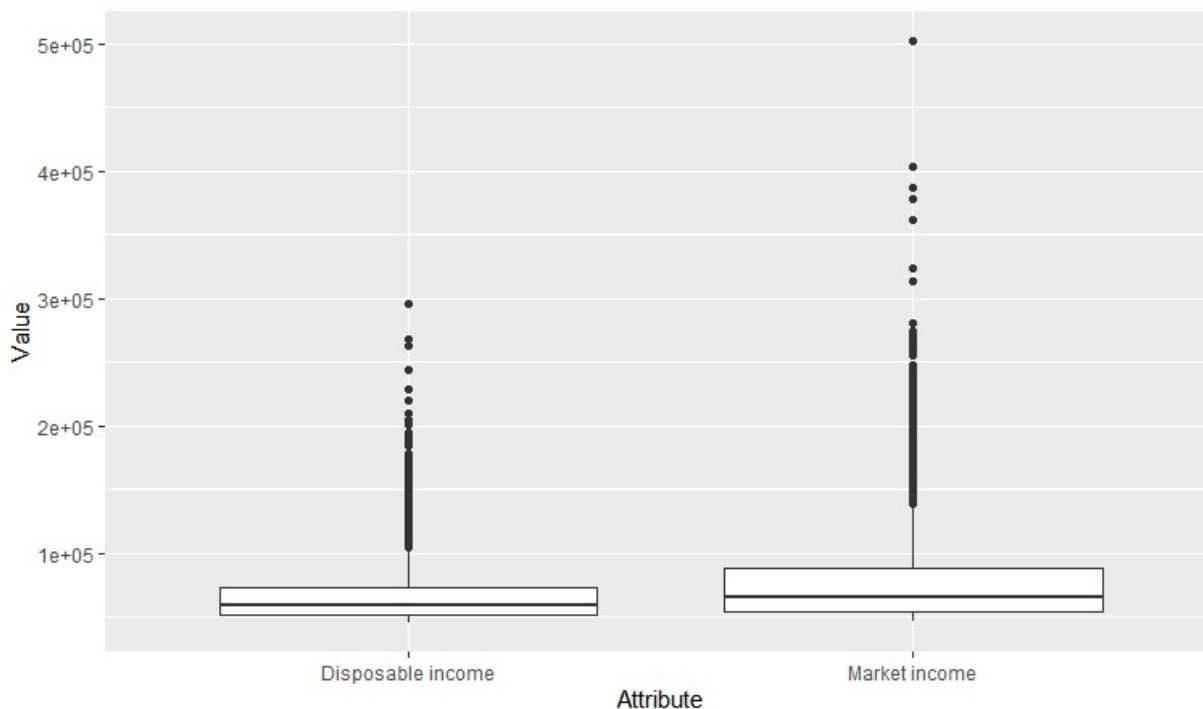
	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Attribute	1	5.945e+11	5.945e+11	14383	<2e-16 ***
Residuals	21004	8.682e+11	4.134e+07		

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

$$\sqrt{\frac{5.945 \cdot 10^{11}}{8.682 \cdot 10^{11} + 5.945 \cdot 10^{11}}} = 0.63750$$

...

Figure II Boxplot for market income and disposable income between percentile 80 and percentile 100



Note. Compilation based on INE(Instituto nacional de estadística).

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Attribute	1	2.557e+11	2.557e+11	280.7	<2e-16 ***
Residuals	8402	7.655e+12	9.110e+08		

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

$$\sqrt{\frac{5.945 \cdot 10^{11}}{8.682 \cdot 10^{11} + 5.945 \cdot 10^{11}}} = 0.1797$$

```
> t.test(Renta.de.mercado, conf.level = .95)

One Sample t-test

data: Renta.de.mercado
t = 120.77, df = 21006, p-value < 2.2e-16
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
 26595.62 27473.16
sample estimates:
mean of x
 27034.39

> t.test(Renta.disponible, conf.level = .95)

One Sample t-test

data: Renta.disponible
t = 201.61, df = 21006, p-value < 2.2e-16
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
 31154.88 31766.60
sample estimates:
mean of x
 31460.74
```

Table I OLS model between monetary transfers and deciles as factor

	<i>Dependent variable:</i>
	transferencias
factor(deciles)2	2,506.068*** (396.267)
factor(deciles)3	1,792.708*** (396.267)
factor(deciles)4	-1,679.670*** (396.314)
factor(deciles)5	-5,423.279*** (396.267)
factor(deciles)6	-7,842.957*** (396.267)
factor(deciles)7	-8,954.901*** (396.314)
factor(deciles)8	-10,018.010*** (396.267)
factor(deciles)9	-10,327.180*** (396.267)
factor(deciles)10	-11,722.570*** (396.267)
Constant	16,758.940*** (280.236)
Observations	21,007
R <sup>2</sup>	0.137
Adjusted R <sup>2</sup>	0.136
Residual Std. Error	12,842.050 (df = 20997)
F Statistic	369.248*** (df = 9; 20997)
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

*Note.* Compilation based on INE(Instituto nacional de estadística).



## Abstract

This paper aims to provide evidence about the change of income inequality in the active population in Spain since 2008, it also aims to investigate the distributive effects of monetary transfers and taxation during the long economic recovery.

## Objectives

- Study the trends of inequality of earnings in different segments of the active population.
- Investigate the effects of unemployment benefits.
- Find the impacts of monetary transfers and taxation on household income inequality as well as its trend.

## Techniques

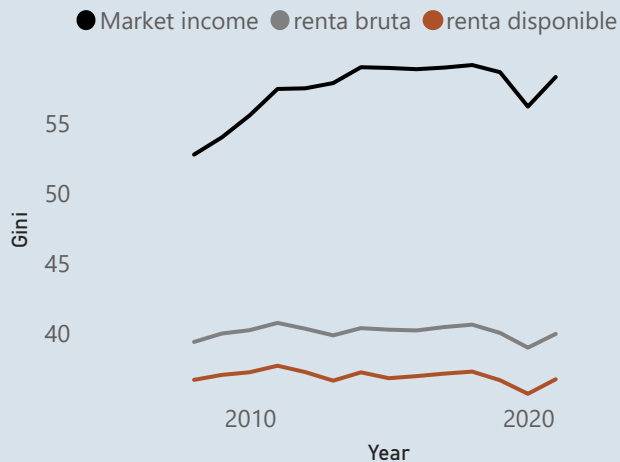
- Goerlich (2016) methodology used in both inequality of earnings and household distributional effects.
- Anghel, et al. (2018) technique for finding unemployment benefits impact in inequality.
- Various econometric techniques to test hypothesis: OLS, T.TEST, eta squared.

## Main Conclusions

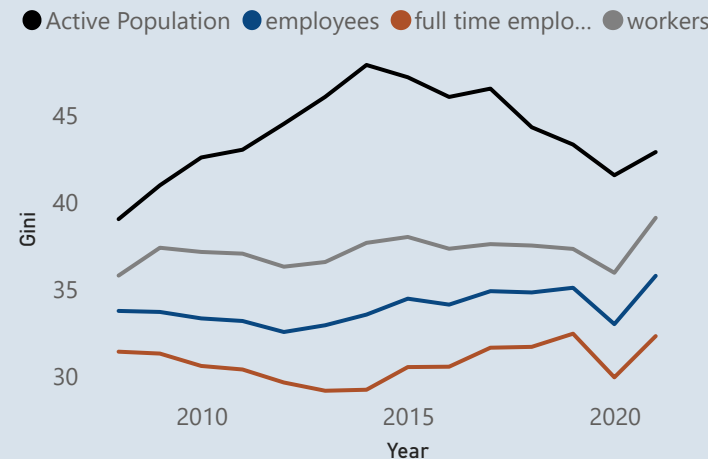
- From 2013 to 2019, worker's income inequality remained stable. Inequality of earnings among the workers increased by 1.53 PP.
- On average the Gini coefficient decreased by 3.68 PP when unemployment benefits were considered
- Negative relationship between income position and monetary transfers reduced income inequality by 20.46 PP on average throughout the 2008- 2021 period

## Results - Compilations based on INE (LCS)

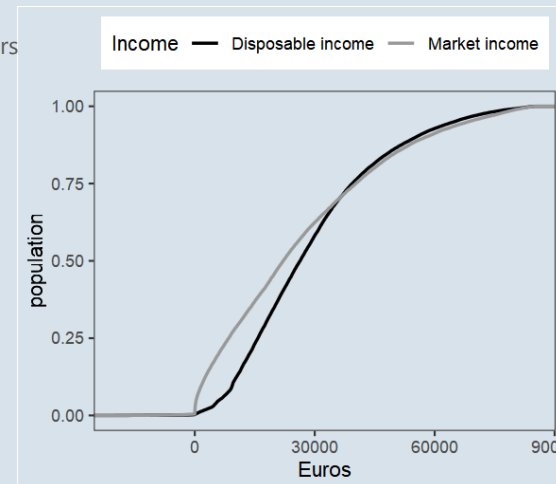
Evolution of household market, gross and disposable income inequality



Evolution of the gini coefficient in active population categories (net annual earnings)



Empirical Cumulative Distribution Function for market income and disposable income



Evolution of the gini coefficient in active population categories (net annual earnings)

