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DO SOCIAL TRANSFERS IMPACT MORTALITY?

LAURA ISABEL LASCAS
SERRÃO

Work project carried out under the supervision of:

Pedro Pita Barros

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Abstract

The paper studies how social transfers affect mortality across age groups, using the Mortality Quotient as a proxy. It shows a non-linear relationship between Mortality, Risk of Poverty, and Social Transfers. The Logarithm of the Mortality Quotient is adopted, and it reveals a negative relationship between Mortality and Risk of Poverty. The connection between Mortality and Social Transfers is explored through policy simulations and exhibits a negative association, indicating social transfers' potential to alleviate poverty-related mortality. When removing social transfers for each age, the logarithm of the mortality quotient has increased by 190% for Age 40 compared to the baseline.

Keywords: Mortality; Social Transfers; Risk of Poverty; Quotient of Mortality; Age groups

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1. Introduction

Social Transfers are used to provide support for vulnerable populations by decreasing the social and economic inequalities they endure, mainly through social assistance and security, health care and food assistance, child benefits, education, unemployment benefits, and social housing.

Poverty is one of the world's biggest challenges and it prevents families from accessing resources to meet their basic needs. In 2020, around 9.1% of the global population were in extreme poverty. The top causes are, for instance, conflict, hunger, no access to clean water, climate change, and lack of education.

Recently, the linkage between Poverty, Mortality, and Social Transfers has been a focus of economic research. Poverty is an element that has been linked to high Mortality Rates, mainly because of limited health care, malnutrition, and poor living conditions. At the same time, Social Transfers, which are interventions made by institutions, can contribute to alleviating such adverse effects. Social transfers can aid with financial assistance and other forms of support, buffering the dire impacts of poverty, and therefore creating lower Mortality, by implication. As these transfers become more integrated into the fabric of public policy, understanding the impact of modifying, increasing, or even removing them is of paramount importance. Such information could help guide policymakers to formulate policies that can help balance the economy and the welfare of the population.

The goal of this analysis is to study the interplay between Poverty, Mortality, and Social Transfers, specifically evaluating the efficacy of current social transfer programs in mitigating the adverse effects of Poverty and subsequently reducing Mortality Rates. This is done by assessing the potential implications of modifying social transfer policies.

Furthermore, we have decided to test how the relationship between the variables changes suggested by the results shown by the scatterplots. The analysis will be, additionally, done for when the Logarithm of the Quotient of Mortality is bigger than 2 and smaller or equal to 2.

In the study, we used Statistics Portugal datasets of the Household Budget Survey for the year 2015-2016 to gather data on the distribution of income of the households residing in Portugal. With the different income variables, we were able to calculate the Risk of Poverty for each age group of the sample and the average Social Transfers per year, measured on a household level in EUR. The results show that the Risk of Poverty is higher in younger group ages when compared to older ones, with the age group of 0-4 registering a 34% Risk of Poverty. Furthermore, it was used another Statistics Portugal dataset to obtain the Quotient of Mortality between the years 2015-2017.

The study focuses on how financial support can influence Mortality in across age groups. The underlying assumption would be that by strategically influencing Social Transfers, we can cause positive changes in Mortality, addressing potential economic vulnerabilities.

The findings of the baseline analysis suggest that there is a complex relationship between the Risk of Poverty and Mortality, as well as between Social Transfers and Mortality. The pattern suggests that there are non-linear relationships between the variables. Despite that, the total pattern suggests that Social Transfers act as a protective layer in reducing the impact of Poverty on Mortality. The results when researching the reallocation of Social Transfers from one age group to another show that it has the power to reduce the risk of poverty for the elderly age group while impacting very little on the younger age group.

The paper also illustrates that when the Logarithm of the Quotient of Mortality is smaller or equal to 2, its higher values of Mortality correspond to lower values of the Risk of Poverty. The inverse happens when the Logarithm of the Quotient of Mortality is bigger than 2. Social Transfers also appear to not change much, as the Logarithm of the Quotient of Mortality below or equal to 2 increases. A different scenario is shown when it is above 2 as a higher level of

Social Transfers will be, with some exceptions, associated with a lower level of Mortality. The the reallocation of Social Transfers exercise is also performed depending on the level of the Logarithm of the Quotient of Mortality.

This paper aims to address a gap in the existing literature related to the relationship between Social Transfers and Mortality per age group. There is a lack of data and results on policy simulations that could help in better outcomes of Mortality and Risk of Poverty, in Portugal.

The paper is organized into several sections, with the first relevant one for the analysis being the Data. This section will describe each data source, variables, assumptions, and will examine variable correlations. The Methodology will contain the explanation of the methods by which data was analysed. After, in the Results, we present the findings of what was introduced in the Methodology, interpreting the baseline analysis, and highlighting the difference in results depending on whether the Logarithm of the Quotient of Mortality is higher or lower or equal to 2. The relationships between the Risk of Poverty, Age, Logarithm of the Quotient of Mortality, and Social Transfers are discussed in more detail. Lastly, the impact of the reallocation strategies on Risk of Poverty and Mortality, for different age groups is also mentioned.

2. Literature Review

The research question studied in this paper will discuss two different phenomena: the effect of Social Transfers on the Risk of Poverty and the effect of Social Transfers on Mortality per age group in Portugal.

The existing literature referring to this topic touches on different perspectives, such as the role of Social Transfers on the economic growth of developing countries, income inequality, poverty, mortality reduction, and changes in the consumption of households.

According to the OECD, in most countries, the Risk of Poverty increases with age. On average, the Poverty level across the Organization for Economic Co-operation and

Development countries is higher for individuals in older group ages than for those in younger age groups. For example, Poverty incidence among the age group of 66-75 years is lower than in individuals aged 75 and over. This suggests that efforts to reduce Poverty should be applied to the older age groups.

Numerous studies converge on the same understanding that Social Transfers can help to mitigate poverty. Chapman (2006), using data from existing schemes around the world, shows that social transfers can help diminish hunger, improve education and health, and consequently Poverty. Poverty is one of the most important social determinants of health and is seen as a leading cause of death in the United States in Brady, Kohler, and Zheng (2023), used large databases to estimate the risk of death and the number of deaths associated with Poverty (income lower than 50% of the median), proving that current and cumulative Poverty is associated with excess Mortality. Current Poverty is associated with a 42% excess risk of death and cumulative Poverty is associated with a 71% excess risk for death.

Regarding the main question of the paper, the authors highlight the large impact of low levels of Social Transfers on Mortality in the United States – Galea, Tracy, Hoggatt, DiMaggio, and Karpati (2011) show that approximately 162,000 deaths in the United States in 2000 were due to low social support, 113,000 to individual-level poverty and 119,000 to income inequality. This showed the need to implement stronger levels of Social Transfers in the United States.

On the other side, a study in Brazil conducted by Rasella, Aquino, Santos, Paes-Sousa, and Barreto (2013) points out that conditional cash transfers are contributing to a decrease in childhood mortality in Brazil. According to the World Health Organization, conditional cash transfers are programs that support households financially if they comply with specific requirements. Current evidence, shown by WHO, suggests that these programs can increase the use of health services and improve health outcomes.

The same conclusion was obtained by Barham (2011), in Mexico, showing that conditional cash transfers through the program “Progresa” have the power to reduce rural infant mortality. It led to a decline of 17% in rural infant mortality among the treated but on average, it did not reduce neonatal mortality. Another research worth mentioning is Moncayo, Granizo, Grijalva, Rasella (2019), which shows that a social program in Ecuador called BDH, which was created to guarantee a minimum level of consumption for families is reducing the level of mortality caused by poverty, such as malnutrition and respiratory infections. BDH also reduced hospitalization rates in children younger than 5 years old.

Furthermore, the relationship between Social Transfers and Mortality may depend on the design of Social Transfer programs. This is demonstrated by Siddiqi, Rajaram, and Miller (2018), that cash transfer programs that are not attached to prerequisites have yielded better outcomes in terms of infant mortality than those that are. Programs that were carried with the pre-requisite that the individual must be an active part of the working population tended to show no positive effects. In terms of demographic factors, in the case of a social transfer program having targeted elderly people, the household components will tend to benefit from that also. In Richterman, Millien, Bair, Jerome, Dimitri, Suffrin, Behrman and Thirumurthy (2023), it was found that programs with higher coverage and larger cash transfer amounts were associated with larger reductions in mortality. This suggests that programs with lower coverage and lower cash transfer amounts are not as effective in reducing the population mortality rates.

The relationship between Social Transfers and Mortality varies across countries. According to the World Bank in 2022, 962 cash transfer programmes were adopted in 203 countries. These were distributed to 17% of the world’s population. In Richterman, Millien, Bair, Jerome, Dimitri, Suffrin, Behrman, and Thirumurthy (2023), it was also found that countries with higher regulatory quality ratings, according to the Worldwide Governance Indicators showed, on average, a greater reduction in Mortality when adding Social Transfers. Countries that have a lower health expenditure per capita and countries with lower life expectancies, show larger effect sizes. When looking into regions, the same study concluded that there is a stronger association between cash transfers and Mortality in sub-Saharan Africa when compared to outside the region.

From this literature review, we have understood the critical role of Social Transfers in mitigating factors such as hunger and healthcare, which impact Poverty-related Mortality. The studies implemented in the several countries mentioned, show that conditional cash transfer programs have the power to have a positive impact on mortality rates. The specificities in which the social transfers programs are implemented can have a direct impact on the Mortality outcomes, showing the importance of studying the potential impacts programs intensively before implementing them. Additionally, it was made evident that the regional context plays an important role in the relationship between Social Transfers and Mortality. There is also a lack of literature regarding policy simulations and its effect on Mortality. These insights allow us to draw expectations regarding the results and to define a righteous path for our research.

3. Data

For the variables studied in this paper, the survey "Household Expenditure Survey 2015/2016" is used, conducted by Statistics Portugal. The data used is related to a representative stratified clustered sample of households residing in non-collective dwellings in Portugal. The survey presents the structure of expenditures and income of households living in Portugal, among other things, for the period between 16 March 2015 and 13 March 2016, with a sample size of 17.790. This database is used to obtain information on the age code of each individual at the date of the survey (Idade_cod), the ID of the household (ADP_cod), and the yearly equivalent income in EUR of each person per household in the sample **(Appendix A)**. The age groups in the survey are delineated in four-year intervals, starting with 0-4 years, 5-9 years, 10-

14 years, and so forth until we reach 80-84, followed by 85+. With the previous information, the average Risk of Poverty will be calculated, through coding on STATA software, for each age group **(Figure B.1).** The explanation for the coding is presented in **Figure B.2**. The equivalent income calculated in Figure B.1 will consider RNMonetario (Non-Monetary Expenditures), as we find essential to consider the broader view of the factors that can impact the overall well-being and standard of living of the household. Also, the equivalent income threshold of 6.608 EUR yearly was obtained from the Income and Living Conditions 2022 Survey by Statistics of Portugal. The main assumption with the Risk of Poverty calculation for each age group is that all the ages belonging to the age group will have the same Risk of Poverty, due lack of data on an age basis.

To the analysis, we add the variable Quotient of Mortality per age that acts as a proxy for the Mortality Rate, mainly due to a lack of data on compatible age groups. The Quotient of Mortality for Continental Portugal was obtained from “Deaths between exact ages x and (x+1)” of INE between the years 2015-2017 yearly, for each age, ranging between 0 and 100 years. The data was obtained for Continental Portugal due to the lack of available information. Furthermore, during the paper, we will use the logarithm of the Quotient of Mortality, to exclude potential non-linear effects and to linearize the series. Now, we can trace a possible relationship between the average Risk of Poverty and Mortality.

From “Household Expenditure Survey 2015/2016”, we will also be able to estimate, through coding, the average Social Transfers per year for each household. The variables used were Idade_cod, ADP_cod, pond_adp, Rm_rsi, Rm_csi, Rm_pvelh, Rm_psoc, Rm_psob, Rm_pinv, Rm_cdep, Rm_desemp, Rm_doenca, Rm_edfp, Rm_fam, Rm_aloj, and Rm_abono. Each of the variables used in the paper are explained in **Appendix A**. Again, we take the assumption that for the ages in an age group, there will be the same average social transfers for each age **(Figure B.3).** The explanation for the coding will be shown in **Figure B.4.**

The correlation of the variables Risk of Poverty, Age, Logarithm of the Quotient of Mortality (ln_qm), and Social Transfers with each other is shown in **Figure B.5**. Focusing on this figure, the Risk of Poverty appears to have a strong negative correlation with the Logarithm of the Quotient of Mortality (-0,6850). The results may suggest that as efforts are directed toward reducing the Risk of Poverty, these may contribute to the Mortality increase. Further analysis shows that there is a non-linear relationship between the variables and that can explain this result.

In turn, Age is shown to have a strong positive correlation with the Logarithm of the Quotient (0,9731) and a negative correlation with the Risk of Poverty (-0,7589), implying that as Age increases, Mortality will tend to increase while the Risk of Poverty will tend to decrease. Social Transfers also have a positive correlation (0,8541) with Age, as elderly people have higher levels of Social Transfers, due to pension payments and other things.

Regarding Social Transfers, it has a negative correlation with the Risk of Poverty (-0,6640) and a positive correlation with the Logarithm of the Quotient of Mortality (0,8437), also showing the fact that elders tend to have a higher Mortality and receive more Social Transfers.

After obtaining the results from the baseline analysis, in which some variables do not appear to have linear relationships, we will look to observe how the relationship between the variables changes when we divide the correlation analysis for when the Logarithm of the Quotient of Mortality is bigger than 2 **(Figure B.6)** and when it is smaller or equal to 2 **(Figure B.7).**

When the Logarithm of the Mortality is higher than 2, it can be observed that the Risk of Poverty has a strong positive relationship with the Logarithm of the Quotient Mortality (0,8105) and a weak negative relationship with Social Transfers (-0,4845). These results suggest that an increase in the Risk of Poverty will be observed with an increase in Mortality and a decrease in Social Transfers, for the ages older than 61 years old, which is the start age at which the Logarithm of the Quotient of Mortality is above 2. In turn, Age will have a very high positive correlation with the Logarithm of the Quotient of Mortality (0,9958) and with the Risk of Poverty (0,8045), which suggests that as Age increases, Mortality and Risk of Poverty tend to increase. Focusing on the correlation between Social Transfers and the Logarithm of the Quotient of Mortality, it appears that there is a moderate negative correlation (-0,2275), indicating that there is a tendency for Mortality to decrease as Social Transfers increase, for the ages older than 61 years old.

When the Logarithm of the Mortality is smaller or equal to 2, the Risk of Poverty appears to have a negative relationship with the Logarithm of the Quotient of Mortality (-0,8652) and Social Transfers (-0,4926), which indicates that when Risk of Poverty decrease, Mortality and Social Transfers will be expected to increase as well, for the ages younger or equal to 61 years. This could be driven by infant mortality and by the fact that younger ages have higher Risk of Poverty. Age has a strong negative relationship with the Risk of Poverty (-0,9035) and with the Logarithm of the Quotient of Mortality, it appears to have a positive correlation (0,8972). This may indicate that there is a tendency to observe that as Age increases, the Risk of Poverty tends to decrease and Mortality to increase. On the other hand, the Logarithm of the Quotient appears to have a positive correlation with Social Transfers (0,5922). This suggests that as Mortality increases, Social Transfers tend to increase as well, for the ages younger or equal to 61 years.

Further analysis will be needed to understand the results given by the correlation tests as it is known that some of the relationships are non-linear. For context, the correlation tests do not capture non-linear relationships and only describe linear relationships.

4. Methodology

The paper started with the study of the relationship between the Risk of Poverty and Age through a scatterplot. **(Figure B.8).** After that, it was also studied the link between the Logarithm of the Quotient of Mortality and Age **(Figure B.9)**. The objective is to find if either or both variables' coefficients increase with Age and aim to find potential age groups that could be associated with deviations in expected results.

To study the relationship between the Logarithm of the Quotient of Mortality and Risk of Poverty, as well as the Logarithm of the Quotient of Mortality and Social Transfers, two scatterplots were generated in **Figure B.10** and **Figure B.11**, respectively.

The next step in the analysis would be to study the impact of the absence of Social Transfers on the Risk of Poverty and the Logarithm of the Quotient of Mortality outcomes. Using STATA software, we will approach a result for the Poverty levels for each age group computed in two ways – Risk of Poverty with Social Transfers and Predicted Risk of Poverty without Social Transfers. The data for the Risk of Poverty obtained in **Figure B.1**, will be used in the analysis as the Risk of Poverty with Social Transfers. This is because, as shown in **Figure B.2**, Social Transfers are included in the Monetary Income (RMonetario), used to obtain that specific Risk of Poverty. Its relationship with the Logarithm of the Quotient of Mortality is already illustrated in **Figure B.10**.

The relationship between the Risk of Poverty and the Logarithm of the Quotient of Mortality, both without Social Transfers is predicted in the next section. For this purpose, we had to predict both variables through coding, with the coding for the Risk of Poverty without Social Transfers and of the Logarithm of the Quotient of Mortality without Social transfers being presented in **Figure B.12,** and results in **Figure B.13** and explanation in **Figure B.14**. A multiple linear regression **(Figure B.15)** with the Logarithm of the Quotient of Mortality as a dependent variable and the Risk of Poverty and Age as independent is essential to help determine the predictors and to find the coefficients, necessary for the prediction of the new variable. In sum, the Logarithm of the Quotient is predicted based on the Risk of Poverty without Social Transfers and the relationship already existent between the Risk of Poverty with

Social Transfers and the Logarithm of the Quotient of Mortality. The scatterplot illustrating this relationship is shown in **Figure B.16**.

For a comprehensive analysis, the paper forecasts the potential consequences of modifying social transfer policies. The objective of this step is to understand how this type of redistribution works, without the intention of defining an optimal social transfer policy. It is merely an illustration of how the analysis can be used, in a general way, to understand how the different Social Transfer policies can influence Mortality across age groups. This step will involve assessing the impact of Social Transfers on Mortality for each age group by taking the difference between the Logarithm of the Quotient of Mortality with and without Social Transfers as a measure **(Figure B.13)**. The age group that displays the highest difference, will be the age group where the impact of Social Transfers is the highest, which the age group with the lowest difference has the least impact.

To study the impact of reallocating Social Transfers between age groups on the Risk of Poverty and Mortality, 10 percent of the Social Transfers from the age group with the least impact is to be redistributed to the age group with the biggest impact, in addition to the Social Transfers that age group might already have. The resulting Risk of Poverty for both age groups is calculated and displayed **(Figures B.17, B.19, B.20),** together with the predicted Logarithm of the Quotient of Mortality **(Figures B.21, B.23).** The explanations for the coding are displayed on **Figures B.18, B.22, B.24.** For comparison purposes, we analyze the Risk of Poverty and the Logarithm of the Quotient of Mortality before and after the reallocating for each affected age group.

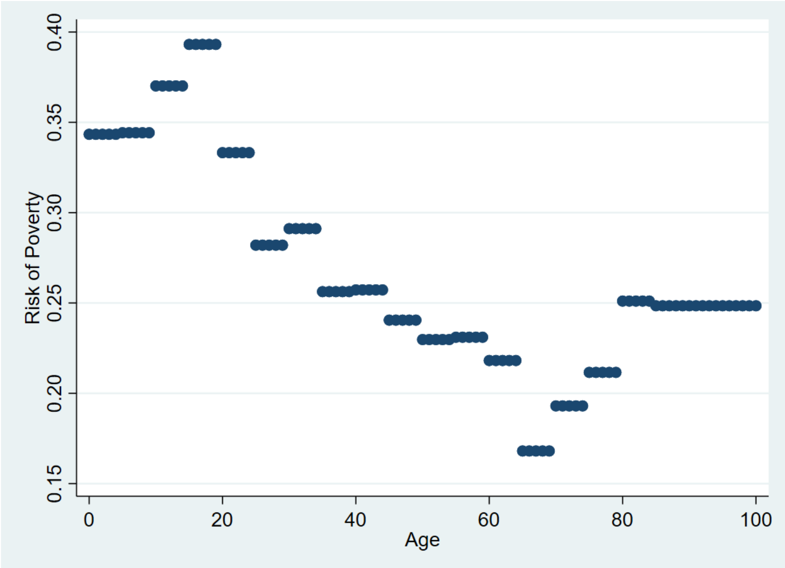
The following part of the paper involves studying the relationships between the Logarithm of the Quotient of Mortality, Age, Risk of Poverty, and Social Transfers, based on if the Logarithm of the Quotient of Mortality is greater than 2 or smaller/equal to 2 **(Figures C.1, C.2, C.3)**.

The previous analysis will be repeated for us to be able to forecast the possible consequences of modifying the Social Transfers when the Logarithm of the Quotient of Mortality is higher than 2 and when it is smaller or equal to 2. Following the same steps, the policy simulation reallocates 10 percent of the Social Transfers of the age group with the lowest impact of Social Transfers in Mortality to the age group with the highest impact, for each of the cases. When the Logarithm of the Quotient of Mortality is above 2, the outcomes include the calculated Risk of Poverty for both age groups **(Figures C.4, C.5, C.6)**, together with the predicted Logarithm of the Quotient of Mortality **(Figures C.7, C.9)** explained in **Figures C.8 and C.10**. For Logarithm of the Quotient of Mortality is smaller or equal to 2, results include the calculated Risk of Poverty for the affected age groups **(Figures C.11, B.20, C.12)** with the Logarithm of the Quotient of Mortality predictions **(Figures C.13, B.22)**, explained in **Figures C.14 and B.23.**

5. Results

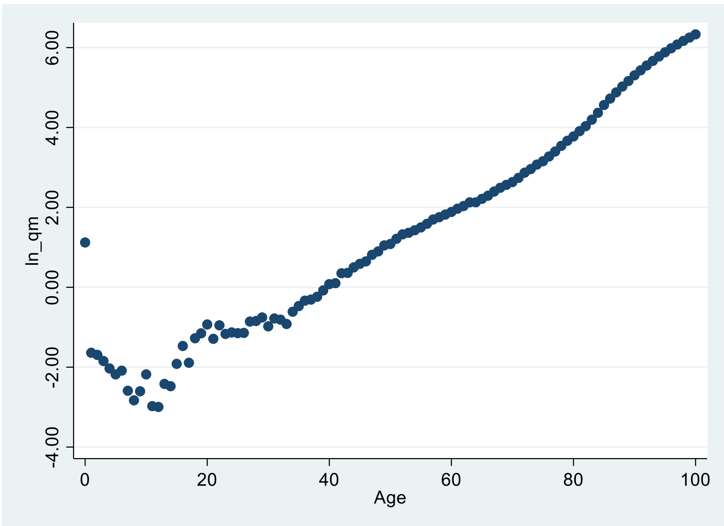
The paper starts with the baseline analysis, examining the initial relationship between the Risk of Poverty and Age, shown in **Figure B.8**. Looking at the way the Risk of Poverty behaves depending on the age group, we can see that the relationship between both variables does not follow a regular pattern. Initially, in younger age groups, the Risk of Poverty has a positive relationship with Age. However, beyond the 15-19 age group mark, where the Risk of Poverty peaks, the relationship between the variables becomes negative, except for older age groups (beyond the 60-year-old mark) where a positive relationship starts to be observed.

Figure B.8 – Scatterplot showing the relationship between the variables Risk of Poverty and Age



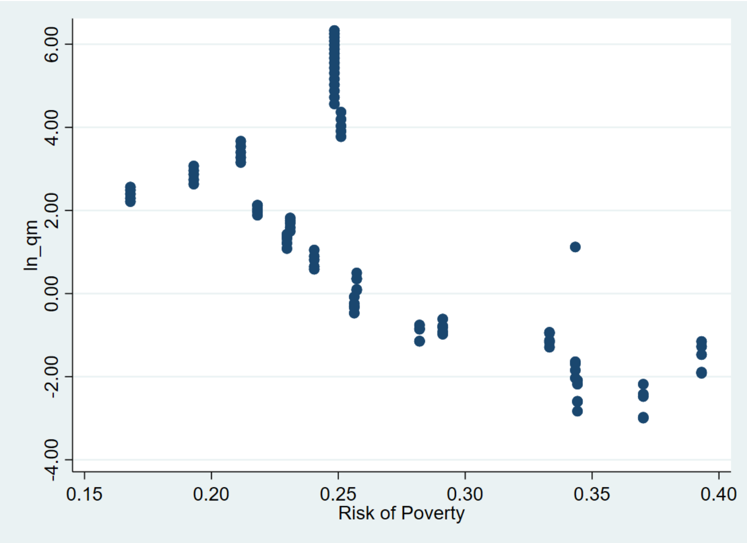
When studying the relationship between the Logarithm of the Quotient of Mortality and Age **(Figure B.9)**, the former is higher in the oldest age groups, as predicted. However, when the Logarithm of the Quotient of Mortality is below or equal to 2, the relationship appears to be non-linear, which is the opposite of when the Logarithm of the Quotient of Mortality is above 2, which appears to be more linear. In general, increases in Age appear to be followed by increases in Mortality despite some variation in younger ages.

Figure B.9 – Scatterplot showing the relationship between the variables Logarithm of Quotient of Mortality and Age



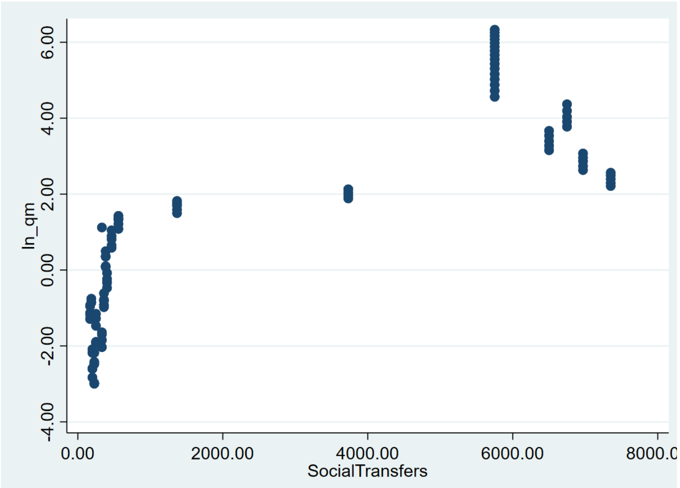
To delve into the relationship between the Logarithm of the Quotient of Mortality and Risk of Poverty, we should observe **Figure B.10**. Since we have the assumption that each age within the same age group will have the same Risk of Poverty, the resulting graph is not the most explicit. The relationship exhibits some variations. In general, it suggests that higher levels of the Risk of Poverty tend to be accompanied by lower values of Mortality. This observation may be explained by the fact that elders exhibit a higher Mortality without necessarily experiencing a higher Risk of Poverty. This situation can be observed in **Figure B.25**, showing that younger age groups tend to have higher levels of Risk of Poverty than older ones.

Figure B.10 – Scatterplot showing the relationship between the variables Logarithm of Quotient of Mortality and Risk of Poverty



The next step would be to study the relationship between the Logarithm of the Quotient of Mortality and Social Transfers, shown in **Figure B.11**. Initially, very low increases in Social Transfers resulted in a relatively large impact on the Logarithm of the Quotient of Mortality but as Social Transfers started to increase, their impact in the Logarithm of the Quotient of Mortality decreased. In general, the pattern observed suggests a non-linear relationship between Social Transfers and the Logarithm of the Quotient of Mortality. At a certain point, for the age group of 85+, high Social Transfers will correspond to high levels of Mortality. This is attributed to the monthly pensions received by this age group and their higher mortality, compared to the rest of the age groups.

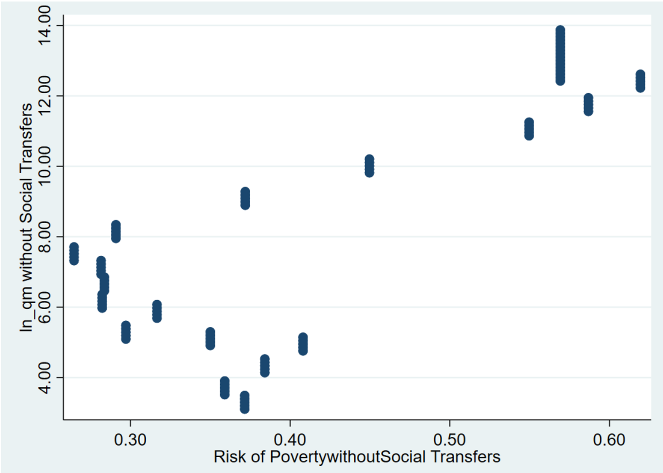
Figure B.11 – Scatterplot showing the relationship between the variables Logarithm of Quotient of Mortality and Social Transfers



Next, we investigate the impact of Social Transfers on the Risk of Poverty, examining the differences in Risk of Poverty, in different age groups, with and without Social Transfers. The Risk of Poverty with Social Transfers will be compared with the Risk of Poverty without Social Transfers **(Figure B.26).** It is possible to observe that the Risk of Poverty increases for all age groups when Social Transfers are not considered. The age group that has the highest variation in the Risk of Poverty created by the changes in Social Transfers is 75-79, with an increase from 0,21 to 0,59. When comparing the Logarithm of the Quotient of Mortality with and without Social Transfers (predicted before), we can see that the age group with the lowest Social Transfers impact on Mortality is 10-14, showing a variation between 2 and 3 percent. In turn, the 75-79 age group has the highest impact **(Figure B.13).**

The scatterplot of the relationship between the Risk of Poverty and the Logarithm of the Quotient of Mortality, when not considering Social Transfers, is in **Figure B.16**. The scatterplot shows that, in general, as the Risk of Poverty increases, the Logarithm of the Quotient of Mortality also increases, which is the opposite of what happens when Social Transfers are considered. In this way, Social Transfers appear to act as a protective factor that mitigates the impact of Poverty on Mortality, particularly in younger age groups with a higher level of Risk of Poverty.

Figure B.16 - Scatterplot showing the relationship between the variables Logarithm of Quotient of Mortality without Social Transfers and Risk of Poverty without Social Transfers.



To further test the impact of the newly established Risk of Poverty, calculated without Social Transfers, on Mortality, we will perform the multiple linear regression, as explained before **(Figure B.15)**. The results indicate the statistical significance of the model, since F(2,98)=1008,08 and the p-value is close to 0. Moreover, all the coefficients seem to be statistically significant as p-value equal to 0,000 is smaller than 0,05. The coefficients suggest that a separate increase of each of the independent variables (keeping other factors constant), is associated with an increase in Mortality. Given these observations, Risk of Poverty and Age seem to be significant predictors of the Logarithm of Mortality.

In the last section of the baseline analysis, we forecast the potential consequences of modifying existing social transfer policies. The exercise involves taking 10 percent of the Social Transfers of the age group of 10-14 to add on the Social Transfers of the age group of 75-79.

The Risk of Poverty before the reallocation and after is displayed in **Figure B.20** for each age group mentioned before. Post-reallocation, the Risk of Poverty for the age group of 75-79 decreased by approximately 3,3 percent, from 0,212 to 0,205. In turn, for the 10-14 age group, the Risk of Poverty increased approximately 0,8 percent from 0,370 to 0,373, after the reallocation. The corresponding Logarithm of the Quotient of Mortality obtained after the reallocation of Social Transfers will be lower for all ages in the age group of 75-79 **(Figure B.23)**. For instance, the Logarithm of the Quotient of Mortality for the Age of 75, decreased approximately 1,1 percent, from 3,155 to 3,120, after reallocating 10 percent of Social Transfers. Considering now the Logarithm of the Quotient of Mortality changes for the age group of 10-14 **(Figure B.21)**, all ages included in this age group will see an increase on the variable after the 10 percent cut in Social Transfers. The highest variation registered for Age 10, with approximately a 0,6 percent increase in the Logarithm of the Quotient of Mortality, following the reallocation.

The outcome from transferring 10 percent of the Social Transfers from the age group 10-14 to the age group 75-79, suggests that it could be effective in improving outcomes of Mortality and Risk of Poverty for the latest group, with only a minimal negative impact for the younger age group in terms of Risk of Poverty and Mortality.

Figure B.20 - Values compiled resulting from the coding in Figure B.17 and Figure B.19.

Age	Risk of Poverty Before	New Risk of Poverty after the Reallocation (RiskofPovertynew1)
10_14	0,370	0,373
75_79	0,212	0,205

Figure B.21 – Values for the baseline ln_qm and the ln_qm with a 10 percent cut in Social Transfers for the age group 10-14

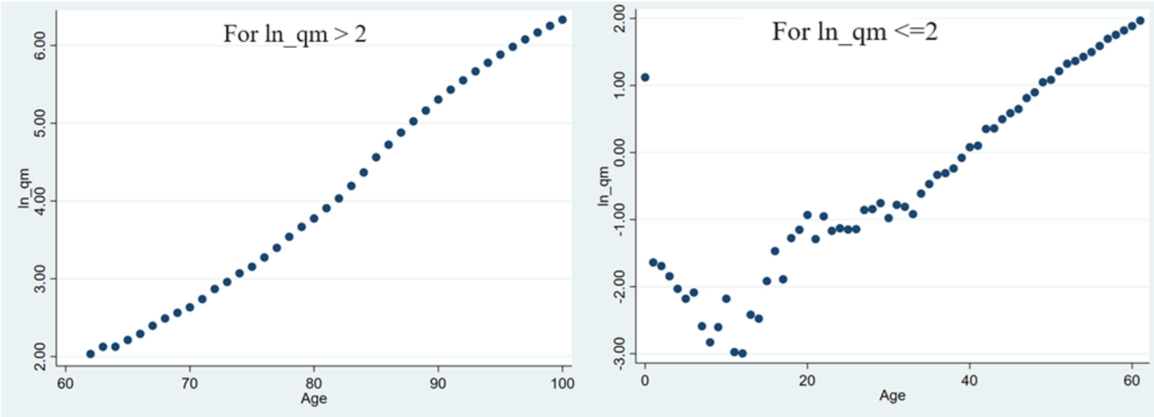
Age	ln_qm	ln_qm with a 10% cut in S.T
10	-2,180	-2,166
11	-2,976	-2,962
12	-2,996	-2,982
13	-2,419	-2,405
14	-2,477	-2,463

Figure B.23 - Values obtained from the calculation of the predicted ln_qm for the age group of 75-79 after reallocating 10% of the Social Transfers from the age group of 10-14.

Age	ln_qm	New ln_qm after reallocation of 10% of Social Transfers from the age group of 10-14 (ln_qm_new1)
75	3,155	3,120
76	3,275	3,239
77	3,398	3,363
78	3,540	3,505
79	3,667	3,632

The following part of the paper is to analyze the variables when the Logarithm of the Quotient of Mortality is higher than 2 and lower and equal to 2. Looking at the relationship between the Logarithm of the Quotient of Mortality and Age, when the first is higher than 2 **(Figure C.1),** as seen before, it appears to be a linear relationship where high levels of Age seem to respond to high levels of the Logarithm of the Quotient of Mortality (Mortality). In contrast, for the Logarithm of the Quotient of Mortality being below or equal to 2, the scatterplot suggests non-linear patterns, with levels of Age below approximately 16 having negative associations with Mortality, irregular associations between 22 and 35, and more linearity close to the 40 years.

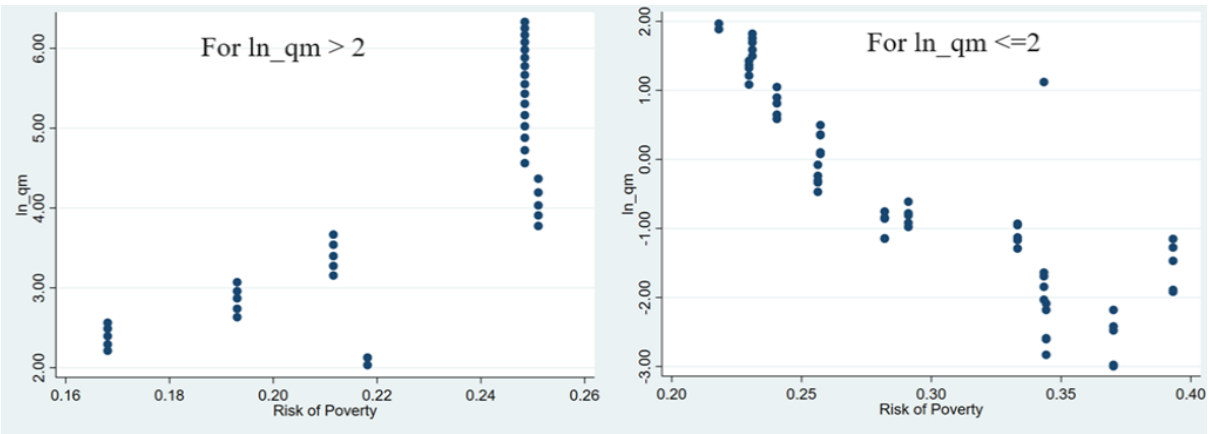
Figure C.1 - Scatterplot showing the relationship between the variables Logarithm of Quotient of Mortality and Age when the Logarithm of the Quotient of Mortality > 2 and Logarithm of the Quotient of Mortality <=2.



(a) (b)

To study the relationship between the Logarithm of the Quotient of Mortality and Risk of Poverty, (**Figure C.2)** we should start by mentioning that the two scatterplots reveal opposite trends. For the Logarithm of the Quotient of Mortality higher than 2, with an outlier in the middle, higher levels of the Risk of Poverty seem to correspond to higher levels of Mortality. In contrast, when the Logarithm of the Quotient of Mortality is below or equal to 2, with another outlier in the middle, higher levels of the Risk of Poverty correspond to lower levels of Mortality. This suggests that the relationship between Mortality and the Risk of Poverty may be based on the degree of Mortality.

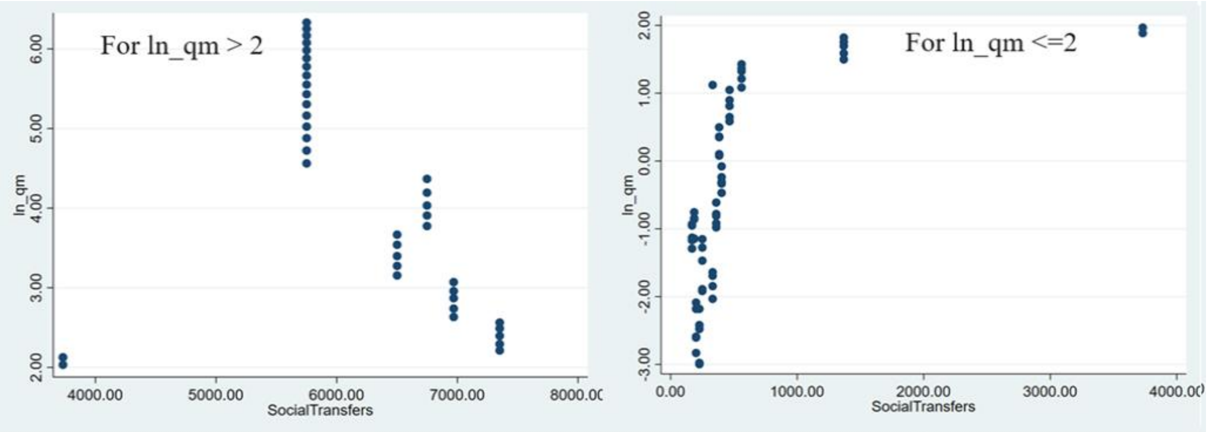
Figure C.2 - Scatterplot showing the relationship between the variables Logarithm of Quotient of Mortality and Risk of Poverty when Logarithm of the Quotient of Mortality > 2 and Logarithm of the Quotient of Mortality <=2.



(c) (d)

Next, the relationship between the Logarithm of the Quotient and Social Transfers is put in the spot. For the Logarithm of the Quotient of Mortality higher than 2 **(Figure C.3),** in general, the higher levels of Social Transfers correspond to lower Mortality. In turn, when the Logarithm of the Quotient of Mortality is below or equal to 2, very small increases in Social Transfers result in very large increases in Mortality. According to the observed pattern, the effectiveness of Social Transfers in impacting Mortality outcomes may depend on the level of mortality first experienced, with higher effectiveness observed in age groups with higher mortality rates.

Figure C.3 - Scatterplot showing the relationship between the variables Logarithm of Quotient of Mortality and Social Transfers when Logarithm of the Quotient of Mortality > 2 and Logarithm of the Quotient of Mortality <=2.



(e) (f)

To proceed with the Policy Simulation for the Logarithm of the Quotient of Mortality above 2, there is a need to define the age groups to be used, in the way explained before. In this case, as 62, 63 and 64 have a ln_qm higher than 2, we will assume that 60 and 61 also belong to this group. The exercise will involve removing ten percent of the Social Transfers of the age group of 60-64 and injecting them into the Social Transfers for the age group of 75-79.

The Risk of Poverty post-reallocation is illustrated in **Figure C.6** for each age group. For the age group of 75-79, the Risk of Poverty decreases from 0,212 to 0,184, reflecting an approximately 1,0 percent reduction. In turn, for the age group of 60-64, the Risk of Poverty increases by approximately 0,1 percent, from 0,218 to 0,228. The corresponding Logarithm of the Quotient of Mortality **(Figure C.9)** shows a decrease for the age group of 75-79, more specifically a variation of 5,0 percent for the Age of 75, going from 3,155 to 2,998 after reallocation. In the 60-64 age group, the Logarithm of the Quotient of Mortality increases, with an increase of 3,1% in the Age of 60 (1,885 to 1,944).

The outcome from transferring 10 percent of the Social Transfers from the age group 60-64 to 75-79, results in a small reduction of Risk of Poverty for the latest and in a minimal increase for the 60-64 age group. Regarding Mortality, the percentage decrease for the older age group was bigger than the percentage increase seen for 60-64. This suggests that this policy could be effective in improving the mortality outcomes for the age group of 75-79, but it needs to be carefully revised as it would imply a tradeoff.

Figure C.6 - Values compiled from the coding in Figure C.5 and Figure C.4.

Age	Risk of Poverty Before	New Risk of Poverty after the Reallocation (Risk of Povertynew2)
60_64	0,218	0,228
75_79	0,212	0,184

Figure C.7 – Value for ln_qm and the ln_qm with a 10 percent cut in Social Transfers for the age group of 60-64, when ln_qm > 2

Age	ln_qm	ln_qm with a 10% cut in ST
60	1,885	1,944
61	1,967	2,025
62	2,033	2,092
63	2,126	2,184
64	2,127	2,185

Figure C.9 - Values obtained from the calculation of the predicted ln_qm for the age group of 75-76 after reallocating 10% of the Social Transfers from the age group 60-64.

Age	ln_qm	New ln_qm after reallocation of 10% of Social Transfers from the age group of 60-64 (ln_qm_new2)
75	3,155	2,998
76	3,275	3,118
77	3,398	3,242
78	3,540	3,384
79	3,667	3,511

For the Policy Simulation involving the Logarithm of Mortality less or equal to 2, the age group with the lowest Social Transfers impact in the Logarithm of the Quotient of Mortality is 10-14 and the one with the highest is the age group of 55-59. In this way, 10 percent of the total Social Transfers of the age group of 10-14 will be removed and injected into the Social Transfers of the age group of 55-59.

The reallocation led to a decrease in the Risk of Poverty for the age group of 55-59 by approximately 1,7% (from 0,231 to 0,227) while the 10-14 age group registered a very small increase of approximately 0,001% (0,370 to 0,373) **(Figure C.12).** At the same time, the Logarithm of the Quotient of Mortality saw a decrease within the age group of 55-59, for example, for the Age of 55, where there was a decrease of 1,4%, going from 1,498 to 1,477 **(Figure C.13).** For the age group of 10-14, the Logarithm of the Quotient of Mortality appears to increase, registering an increase of approximately 0,64% for Age 10 (-2,180 to -2,166) **(Figure B.21).**

Ultimately, this reallocation strategy benefits the age group of 55-59 in terms of economic and health well-being. It results in a small reduction of Risk of Poverty for the latest and in a minimal increase for the 55-59 age group. Regarding Mortality, the percentage decrease for the older age group was bigger than the percentage increase seen for 10-14, but since the decrease of Mortality was small, this policy needs to be carefully revised as it would imply a tradeoff.

Figure C.6 - Values compiled from the coding in Figure C.5 and Figure C.4.

Age	Risk of Poverty Before	New Risk of Poverty after the Reallocation (Risk of Povertynew2)
60_64	0,218	0,228
75_79	0,212	0,184

Figure C.7 – Value for ln_qm and the ln_qm with a 10 percent cut in Social Transfers for the age group of 60-64, when ln_qm <= 2

Age	ln_qm	ln_qm with a 10% cut in ST
60	1,885	1,944
61	1,967	2,025
62	2,033	2,092
63	2,126	2,184
64	2,127	2,185

Figure C.9 - Values obtained from the calculation of the predicted ln_qm for the age group of 75-76 after reallocating 10% of the Social Transfers from the age group 60-64.

Age	ln_qm	New ln_qm after reallocation of 10% of Social Transfers from the age group of 60-64 (ln_qm_new2)
75	3,155	2,998
76	3,275	3,118
77	3,398	3,242
78	3,540	3,384
79	3,667	3,511

6. Conclusion

We used regression analysis, scatterplots, data manipulation, and simulations to study the complex relationships between Age, Risk of Poverty, Logarithm of the Quotient of Mortality, and Social Transfers.

The baseline analysis revealed some non-linear associations that can be understood when we distinguish between cases where the Logarithm of the Quotient of Mortality is higher than 2 and when it is below or equal to 2. The differentials in the relationship between the Risk of Poverty and Mortality indicate that the relationship may be determined based on the degree of

Mortality. Additionally, the effectiveness of Social Transfers in reducing Mortality may depend on the level of Mortality observed, with higher effectiveness for higher levels of mortality.

The division revealed that when the Logarithm of the Quotient is higher than 2, the relationships seem to be more linear, and it shows positive impacts on the economic and health well-being from the reallocation strategies. When the Logarithm of the Quotient is smaller or equal to 2, we find more complex relationships and the reallocation strategies appear to not have such positive impacts as in the baseline.

The paper revealed that Social Transfers can have an important impact on both the Risk of Poverty and Mortality outcomes, in different age groups. Social Transfers act as a protective layer against the impact of Poverty in Mortality, particularly in younger ages. Additionally, the reallocation strategies helped to understand that the effects of Social Transfers reallocation can vary across different age groups. These strategies can benefit some age groups but there are always tradeoffs that should be carefully considered, such as the increase in the Risk of Poverty and Mortality in the age group from which Social Transfers are removed.

The data used in the paper is under many limitations, which include the fact that the paper was written on many assumptions, such as that each age within the same age group has the same Risk of Poverty and Social Transfers, which may dramatically simplify the dynamics between the age groups. Additionally, the use of 2016 data, which is not as recent, might not capture recent changes and developments.

Further research could comprise the analysis for a different range of countries to assess if the observed relationships change, when confronted with different social, economic, and cultural contexts. Another suggestion would be to investigate whether Social Transfers have a positive effect on the Risk of Poverty and in Mortality in the long-term or just the short-term, and consequences associated with it. This could contribute to a deeper understanding of the relationship between the variables and hopefully, provide useful insights for policymakers.

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Appendix

Appendix A. List of all variables, their definition, source, and basic summary statistics

Variable	**Description**	**Source**	**Mean**	**S.d.**	**Min.**	**Max.**
Idade_cod	Age code of each individual at the date of the survey	"HES - 2015/2016" – INE	-	-	-	-
ADP_cod	ID of the household codified	"HES - 2015/2016" - INE	5765.136	3349.187	1	11398
Pond_adp	ADP (Household) Weight	"HES - 2015/2016" - INE	356.6334	334.4746	6.753049	3431.917
RMonetario	Monetary Income which refers to the income obtained from work, property and capital, and transfers.	"HES - 2015/2016" - INE	20104.29	17161.38	52	354000
RNMonetario	Non-Monetary Income, which includes self-consumption,	"HES - 2015/2016" - INE	5379.576	3917.454	0	60888.8

	self-supply, self-rental, receipts in kind and wages.					
Rm_rsi	Social Insertion Income Transfers	“HES - 2015/2016” - INE	134.2564	1123.979	0	28732.64
Rm_csi	Complementary Solidarity Transfers for the Elderly	“HES - 2015/2016” - INE	7.804164	154.3609	0	5535.75
Rm_pvelh	Old Age Pensions	“HES - 2015/2016” - INE	1774.57	4818.783	0	115000
Rm_psoc	Social Old Age Pensions	“HES - 2015/2016” - INE	20.42464	248.4	0	3939
Rm_psob	Survivor, Widowhood, or Orphan Pension	“HES - 2015/2016” - INE	154.3004	846.2755	0	28950
Rm_pinv	Disability Pensions	“HES - 2015/2016” - INE	122.0186	1002.521	0	53390

Rm_cdep	Dependency Supplement	“HES - 2015/2016” - INE	6.56803	105.8584	0	2514.12
Rm_desemp	Unemployment-related Benefits	“HES - 2015/2016” - INE	152.9505	1087.431	0	83030
Rm_doenca	Sickness-related Benefits	“HES - 2015/2016” - INE	28.1519	618.2274	0	75396
Rm_edfp	Education and Training-related Benefits	“HES - 2015/2016” - INE	9.284349	230.221	0	22009
Rm_fam	Family-related Benefits	“HES - 2015/2016” - INE	37.80241	380.5194	0	9000
Rm_aloj	Housing-related Benefits	“HES - 2015/2016” - INE	2.956481	121.4804	0	7440
Rm_abono	Transfers related to family allowance	“HES - 2015/2016” - INE	135.4215	379.3277	0	5220
Quociente de Mortalidade	Probability of one individual dying at age x	INE	53.67628	120.9032	0.05	561.655

	before reaching age x+1					
ln_qm	Logarithm of the Quotient of Mortality	-	1.2644475	2.644412	- 2.995732	6.330888

Appendix B. – Analysis of the baseline relationships and correlations between the variables

Figure B.1 - List of the code required to obtain the average Risk of Poverty for the age group 0-4 years old, including the variables Idade_cod, ADP_cod, pond_adp, RMonetario, and RNMonetario already included in the original dataset from "Household Expenditure Survey 2015/2016" conducted by Statistics Portugal.

(1) svyset ADP_cod [pweight=pond_adp]
(2) gen adult = (Idade_cod > "15_19")

(3) egen nr_adults = total(adult), by(ADP_cod)

(4) egen nr_in_household = count(ADP_cod), by(ADP_cod)

(5) gen nr_children = nr_in_household - nr_adults

(6) gen scale_factor = nr_in_household^0.73

(7) gen children_0_4 = (Idade_cod == "0_4")

(8) egen nr_children_0_4 = total(children_0_4), by(ADP_cod)

(9) gen TMonetario_no_st = RMonetario + RNMonetario
(10) gen equivalent_income_no_st = TMonetario_no_st / scale_factor

(11) gen children_0_4_poor = (Idade_cod == "0_4" & equivalent_income _no_st< 6608)

(12) egen children_0_4_poor_by_ADP = total(children_0_4_poor), by(ADP_cod)

(13) egen total_children_0_4_poor_by_ADP = total(children_0_4_poor_by_ADP)
(14) egen total_nr_children_0_4 = total(nr_children_0_4)
(15) gen prop_children_poor_wo_socialtran0_4= total_children_0_4_poor_by_ADP / total_nr_children_0_4 if Idade_cod == "0_4"
(16) svy: tabulate prop_children_poor_0_4

Figure B.2 - Explanation of the code in Figure B.1

Starting with (1), we make sure that for that analysis, the code follows survey design settings, specifying that pond_adp is used as the survey weight. With (2), (3), (4), (5), (7), (8), we can obtain the number of adults/children of a specific age group. It is necessary to calculate scale factor (scale_factor) (6), that is obtained by multiplying the number of members per household by the 0,73, which is the elasticity of the “Oxford” scale for household size in the context of assessing the income needs of households depending on their size. The chosen elasticity comes in agreement with that larger households might need less additional income per person than smaller households. This can be due to shared expenses, division of tasks and responsibilities and efficient use of living space. With this information, the equivalent income can be obtained (10) by dividing the sum of the two groups of monetary variables (RMonetario + RNMonetario) (9) by the scale-factor, to make the income account for variations in household size. It is also necessary to calculate the number of individuals of the specific age group that are in poverty per household (11,12), meaning that they have an equivalent income threshold below 6.608 EUR per year. Finally, we can obtain the average risk of poverty of the age group (15) by dividing the total number of individuals of the age group in poverty in all households (13) by the total number of individuals of the age group across all households (14).

Figure B.3 - List of the code required to obtain the average Social Transfers for the age group 0-4 years old, including the variables Idade_cod, ADP_cod, pond_adp, Rm_rsi, Rm_csi, Rm_pvelh, Rm_psoc, Rm_psob, Rm_pinv, Rm_cdep, Rm_desemp, Rm_doenca, Rm_edfp, Rm_fam, Rm_aloj, and Rm_abono already included in the original dataset from “Household Expenditure Survey 2015/2016” conducted by INE.

(1) svyset ADP_cod [pweight=pond_adp]
(2) gen adulto = (Idade_cod > "15_19")
(3) egen nr_adults = total(adulto), by(ADP_cod)
(4) egen nr_in_household = count(ADP_cod), by(ADP_cod)
(5) gen nr_children = nr_in_household - nr_adults
(6) gen children_0_4 = (Idade_cod == "0_4")
(7) gen TSocial = Rm_rsi + Rm_csi + Rm_pvelh + Rm_psoc + Rm_psob + Rm_pinv + Rm_cdep + Rm_desemp + Rm_doenca + Rm_edfp + Rm_fam + Rm_aloj + Rm_abono
(8) egen total_social_transfers_0_4 = total(TSocial) if children_0_4, by(ADP_cod)
(9) egen nr_children_0_4 = total(children_0_4), by(ADP_cod)
(10) gen scale_factor = nr_in_household^0.73
(11) gen avg_social_transfers_0_4 = total_social_transfers_0_4 / scale_factor
(12) svy: mean avg_social_transfers_0_4

Figure B.4 - Explanation of the code in Figure B.3

Starting with (1), we continue to make sure that the code follows the survey design settings, specifying that pond_adp is used as the survey weight. With (2), (3), (4), (5), (6), (9), we can obtain the number of adults/children in general and of a specific age group per household. After, (7) allows to calculate the total amount of social transfers per household yearly and together with (8), we obtain the total amount of social transfers for the specific age group, per household. With (10), we use calculate the scale factor the same way as explained in Figure B.1. The total social transfers for the specific age group are then divided by the scale factor to obtain the corresponding average social transfers (11) and shown in a detailed table (12).

Figure B.5 - Correlations of the Variables of the Baseline Analysis

	Riskof~y	Age	ln_qm	Social~s
RiskofPove~y	1.0000			
Age	-0.7589	1.0000		
	0.0000			
ln_qm	-0.6850	0.9731	1.0000	
	0.0000	0.0000		
SocialTran~s	-0.6640	0.8541	0.8437	1.0000
	0.0000	0.0000	0.0000	

Figure B.6 - Correlations of the Variables when ln_qm > 2

	Riskof~y	Age	ln_qm	Social~s
RiskofPove~y	1.0000			
Age	0.8045	1.0000		
	0.0000			
ln_qm	0.8105	0.9958	1.0000	
	0.0000	0.0000		
SocialTran~s	-0.4845	-0.1677	-0.2275	1.0000
	0.0018	0.3075	0.1637	

Figure B.7 - Correlations of the Variables when ln_qm <=2

	Riskof~y	Age	ln_qm	Social~s
RiskofPove~y	1.0000			
Age	-0.9035	1.0000		
	0.0000			
ln_qm	-0.8652	0.8972	1.0000	
	0.0000	0.0000		
SocialTran~s	-0.4926	0.5751	0.5922	1.0000
	0.0000	0.0000	0.0000	

Figure B.8 – Scatterplot showing the relationship between the variables Risk of Poverty and Age.

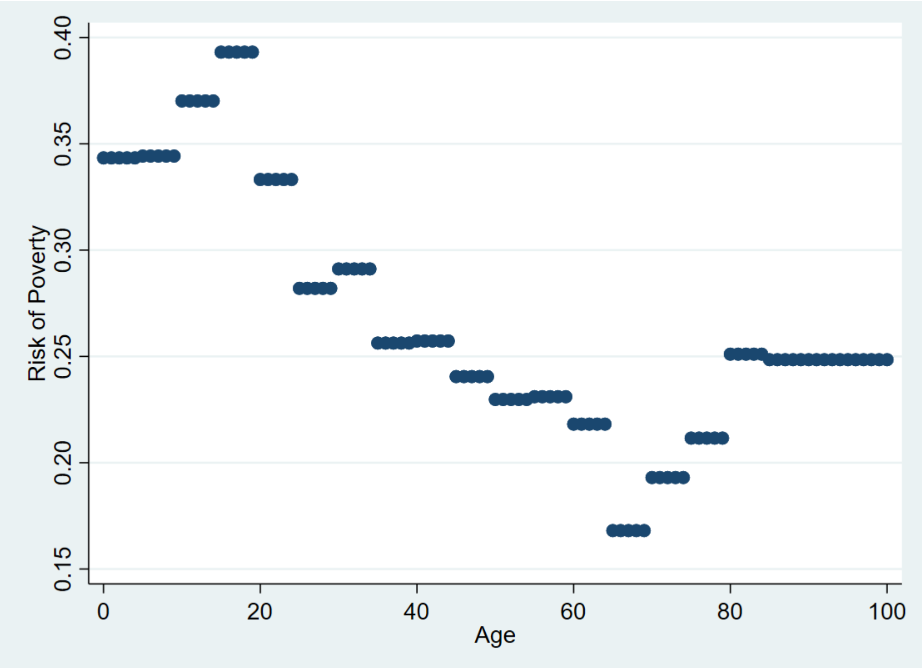


Figure B.9 – Scatterplot showing the relationship between the variables Logarithm of Quotient of Mortality and Age.

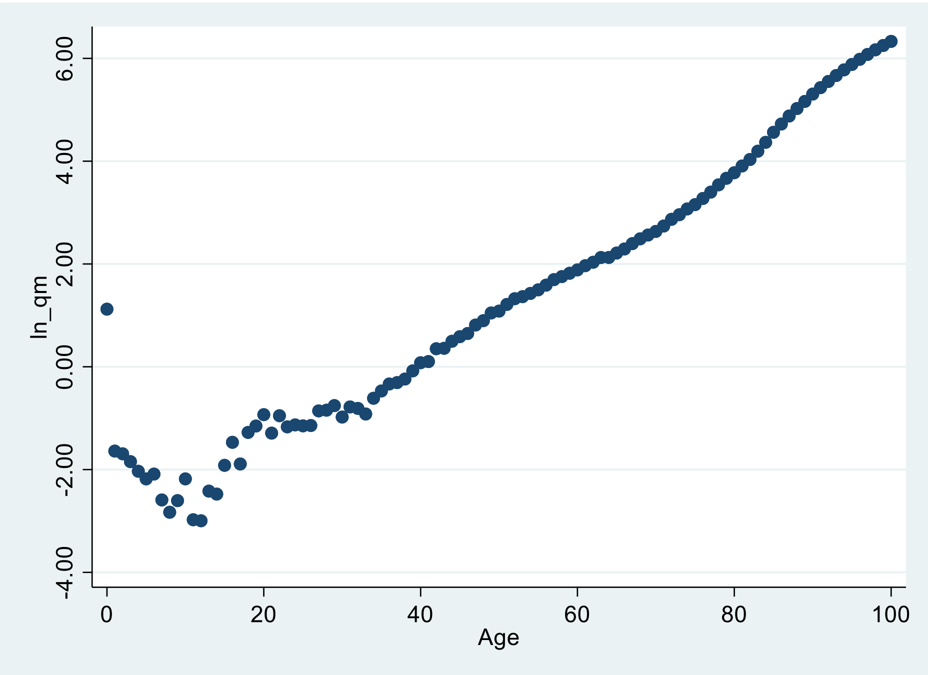


Figure B.10 – Scatterplot showing the relationship between the variables Logarithm of the Quotient of Mortality and Risk of Poverty.

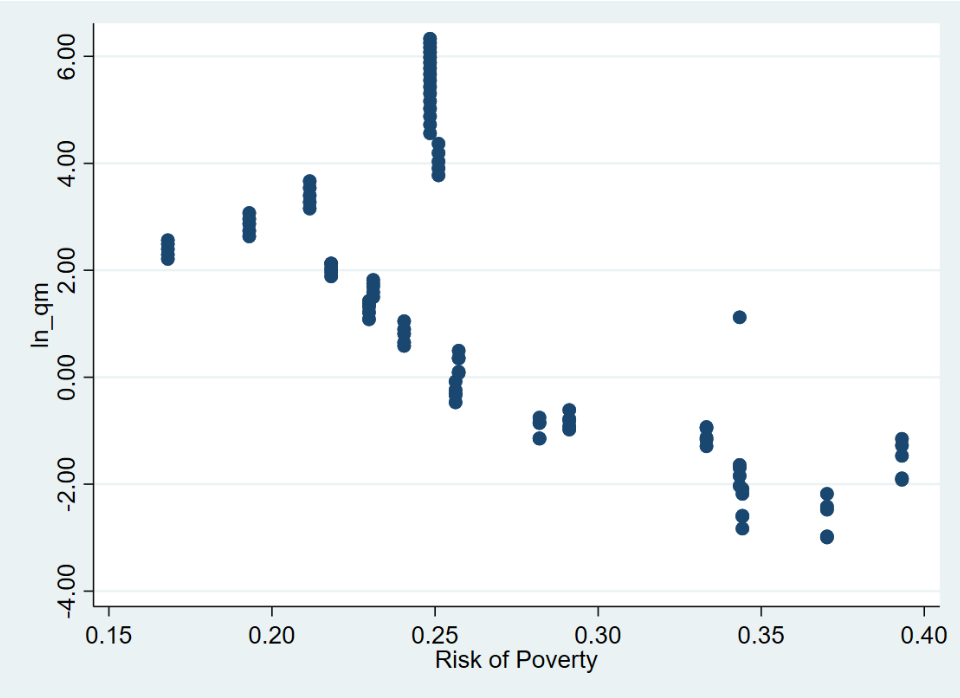


Figure B.11 – Scatterplot showing the relationship between the variables Logarithm of Quotient of Mortality and Social Transfers.

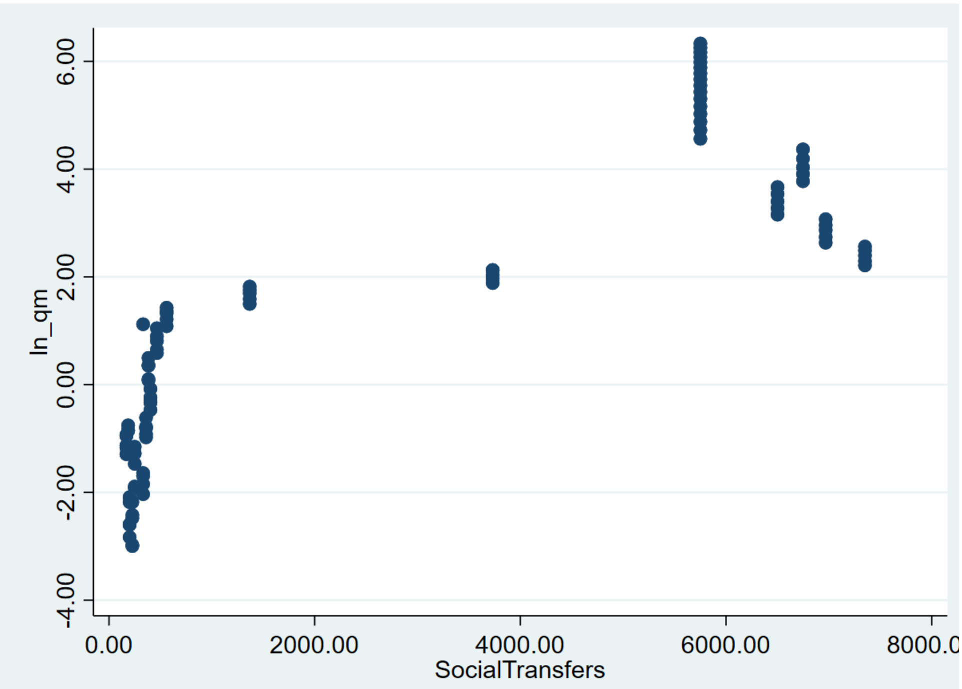


Figure B.12 - List of the code required to obtain the average Risk of Poverty without considering Social Transfers (Rm_rsi, Rm_csi, Rm_pvelh, Rm_psoc, Rm_psob, Rm_pinv, Rm_cdep, Rm_desemp, Rm_doenca, Rm_edfp, Rm_fam, Rm_aloj, and Rm_abono) for the age group 0-4. This code includes the variables Idade_cod, ADP_cod, and pond_adp, already included in the original dataset from "Household Expenditure Survey 2015/2016" conducted by Statistics Portugal.

(1) svyset ADP_cod [pweight=pond_adp]
(2) gen adult = (Idade_cod > "15_19")

(3) egen nr_adults = total(adult), by(ADP_cod)

(4) egen nr_in_household = count(ADP_cod), by(ADP_cod)

(5) gen nr_children = nr_in_household - nr_adults

(6) gen scale_factor = nr_in_household^0.73

(7) gen children_0_4 = (Idade_cod == "0_4")

(8) egen nr_children_0_4 = total(children_0_4), by(ADP_cod)

(9) gen TMonetario_no_st = RMonetario + RNMonetario - Rm_rsi - Rm_csi - Rm_pvelh - Rm_psoc - Rm_psob - Rm_pinv - Rm_cdep - Rm_desemp - Rm_doenca - Rm_edfp - Rm_fam - Rm_aloj - Rm_abono
(10) gen equivalent_income_no_st = TMonetario_no_st / scale_factor

(11) gen children_0_4_poor = (Idade_cod == "0_4" & equivalent_income _no_st< 6608)

(12) egen children_0_4_poor_by_ADP = total(children_0_4_poor), by(ADP_cod)

(13) egen total_children_0_4_poor_by_ADP = total(children_0_4_poor_by_ADP)
(14) egen total_nr_children_0_4 = total(nr_children_0_4)
(15) gen prop_children_poor_wo_socialtran0_4= total_children_0_4_poor_by_ADP / total_nr_children_0_4 if Idade_cod == "0_4"
(16) svy: tabulate prop_children_poor_wo_socialtran0_4

Figure B.13 - Differences calculated between the Logarithm of the Quotient of Mortality with Social Transfers and the predicted Logarithm of the Quotient of Mortality without Social Transfers, per age.

Age	ln_qm	ln_qm without Social Transfers (ln_qmwosocialtransfers)	Difference
0	1,121	1,281	0,160
1	-1,640	-1,480	0,160
2	-1,693	-1,533	0,160
3	-1,845	-1,686	0,160
4	-2,033	-1,873	0,160
5	-2,180	-2,097	0,084
6	-2,087	-2,004	0,084
7	-2,590	-2,506	0,084
8	-2,830	-2,746	0,084
9	-2,604	-2,520	0,084
10	-2,180	-2,101	0,079
11	-2,976	-2,897	0,079
12	-2,996	-2,917	0,079
13	-2,419	-2,340	0,079
14	-2,477	-2,398	0,079
15	-1,917	-1,833	0,085
16	-1,470	-1,385	0,085
17	-1,890	-1,806	0,085
18	-1,277	-1,192	0,085
19	-1,152	-1,067	0,085
20	-0,931	-0,836	0,095
21	-1,291	-1,196	0,095
22	-0,952	-0,857	0,095
23	-1,168	-1,073	0,095
24	-1,130	-1,035	0,095
25	-1,149	-1,063	0,086
26	-1,143	-1,057	0,086
27	-0,858	-0,773	0,086
28	-0,844	-0,758	0,086
29	-0,755	-0,670	0,086
30	-0,978	-0,834	0,144
31	-0,781	-0,637	0,144
32	-0,810	-0,666	0,144
33	-0,919	-0,775	0,144
34	-0,612	-0,468	0,144
35	-0,470	-0,323	0,147
36	-0,334	-0,187	0,147
37	-0,308	-0,161	0,147
38	-0,238	-0,091	0,147
39	-0,079	0,068	0,147

40	0,079	0,228	0,150
41	0,102	0,251	0,150
42	0,351	0,501	0,150
43	0,360	0,509	0,150
44	0,497	0,646	0,150
45	0,586	0,819	0,233
46	0,648	0,881	0,233
47	0,812	1,044	0,233
48	0,897	1,130	0,233
49	1,048	1,281	0,233
50	1,083	1,281	0,198
51	1,213	1,411	0,198
52	1,324	1,522	0,198
53	1,364	1,562	0,198
54	1,427	1,625	0,198
55	1,498	1,837	0,339
56	1,588	1,927	0,339
57	1,695	2,034	0,339
58	1,754	2,093	0,339
59	1,820	2,159	0,339
60	1,885	2,757	0,871
61	1,967	2,838	0,871
62	2,033	2,905	0,871
63	2,126	2,997	0,871
64	2,127	2,998	0,871
65	2,213	3,809	1,596
66	2,293	3,888	1,596
67	2,396	3,992	1,596
68	2,490	4,085	1,596
69	2,563	4,159	1,596
70	2,633	4,655	2,021
71	2,739	4,760	2,021
72	2,869	4,890	2,021
73	2,959	4,980	2,021
74	3,071	5,092	2,021
75	3,155	5,281	2,127
76	3,275	5,401	2,127
77	3,398	5,525	2,127
78	3,540	5,667	2,127
79	3,667	5,794	2,127
80	3,775	5,863	2,087
81	3,908	5,995	2,087
82	4,033	6,120	2,087
83	4,194	6,282	2,087
84	4,367	6,455	2,087
85	4,562	6,380	1,818
86	4,723	6,541	1,818
87	4,879	6,697	1,818

88	5,024	6,842	1,818
89	5,163	6,981	1,818
90	5,305	7,123	1,818
91	5,431	7,249	1,818
92	5,551	7,369	1,818
93	5,667	7,485	1,818
94	5,777	7,595	1,818
95	5,882	7,700	1,818
96	5,982	7,800	1,818
97	6,077	7,895	1,818
98	6,167	7,985	1,818
99	6,251	8,069	1,818
100	6,331	8,149	1,818

Figure B.14 - Explanation of the code in Figure B.13

It is assumed that ln_qm is the result of the following equation: ln_qm = b0 + b1RiskofPoverty + b2 Age. After removing Social Transfers, there is the need to create a new Risk of Poverty associated with this change, as shown in Figure B.12. In this way, we have ln_qmwosocialtransfers = b0 + b1RiskofPovertywosocialtransfers + b2Age = ln_qm + b1(RiskofPovertywosocialtransfers – RiskofPoverty). B1 is identified as the coefficient of the RiskofPoverty in the multiple linear regression with the variables Logarithm of the Quotient of Mortality, Risk of Poverty and Age, shown in Figure B.15.

Figure B.15 - Multiple Linear Regression with the variables Logarithm of the Quotient of Mortality, Risk of Poverty and Age.

```
      Source |       SS           df       MS      Number of obs   =       101
-------------+----------------------------------   F(2, 98)        =   1008.08
       Model |  666.876272         2  333.438136   Prob > F        =    0.0000
    Residual |  32.4150382        98  .330765696   R-squared       =    0.9536
-------------+----------------------------------   Adj R-squared   =    0.9527
       Total |   699.29131       100   6.9929131   Root MSE        =    .57512

------------------------------------------------------------------------------
       ln_qm | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
-------------+----------------------------------------------------------------
RiskofPoverty |   5.666882   1.501383     3.77   0.000     2.687436    8.646328
         Age |   .0964568    .003014    32.00   0.000     .0904756    .1024379
       _cons |  -5.075836   .5287483    -9.60   0.000     -6.12512   -4.026553
------------------------------------------------------------------------------
```

Figure B.16 - Scatterplot showing the relationship between the variables Logarithm of Quotient of Mortality without Social Transfers and Risk of Poverty without Social Transfers.

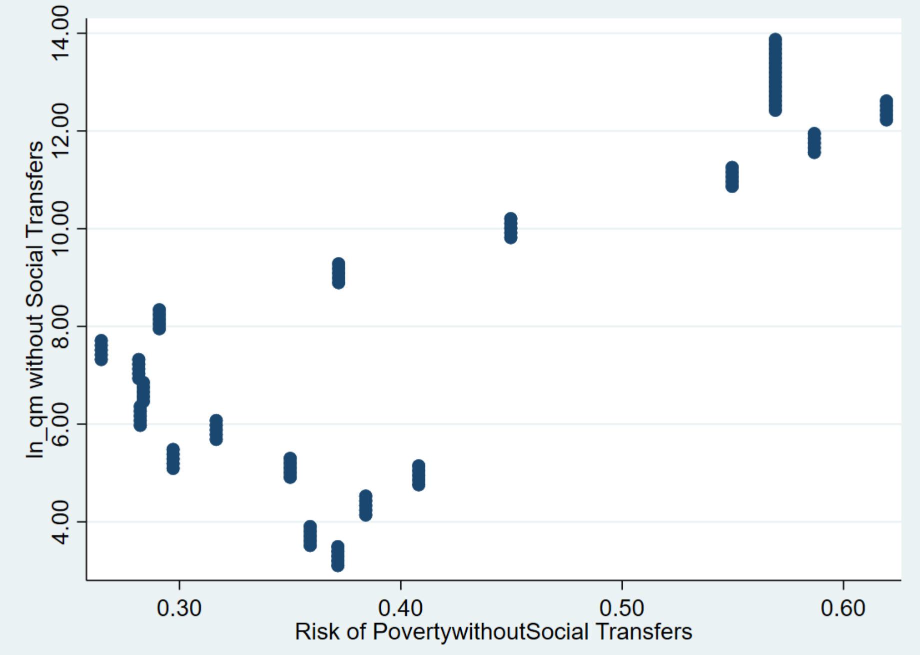


Figure B.17 - List of the code required to obtain the average Risk of Poverty for the age group of 75-79 years, considering an additional 10% Social Transfers from the age group 10-14.

(1) svyset ADP_cod [pweight=pond_adp]
(2) gen adult = (Idade_cod > "15_19")
(3) egen nr_adults = total(adult), by(ADP_cod)
(4) egen nr_in_household = count(ADP_cod), by(ADP_cod)
(5) gen nr_children = nr_in_household - nr_adults
(6) gen children_10_14 = (Idade_cod == "10_14")
(7) egen nr_children_10_14 = total(children_10_14), by(ADP_cod)
(8) gen TSocial = Rm_rsi + Rm_csi + Rm_pvelh + Rm_psoc + Rm_psob + Rm_pinv + Rm_cdep + Rm_desemp + Rm_doenca + Rm_edfp + Rm_fam + Rm_aloj + Rm_abono
(9) egen TS = total(TSocial), by(ADP_cod)
(10) gen T_pc_i = TS / nr_in_household
(11) egen T_total_10_14 = total(T_pc_i) if Idade_cod == "10_14", by(ADP_cod)
(12) gen T10_total_10_14 = 0.1 * T_total_10_14
(13) egen T10_total = mean(T10_total_10_14)
(14) gen adults_75_79 = (Idade_cod == "75_79")
(15) egen nr_adults_75_79 = total(adults_75_79), by(ADP_cod)
(16) gen T10_total_pc_75_79 = T10_total / nr_adults_75_79

(17) gen TMonetario = RNMonetario + RMonetario + T10_total_pc_75_79 if Idade_cod == "75_79"
(18) gen scale_factor = nr_in_household^0.73
(19) gen equivalent_income = TMonetario / scale_factor
(20) gen adults_75_79_poor = (Idade_cod == "75_79" & equivalent_income < 6608)
(21) egen adults_75_79_poor_by_ADP = total(adults_75_79_poor), by(ADP_cod)
(22) egen tadults_75_79_poor_by_ADP = total(adults_75_79_poor_by_ADP)
(23) egen tnr_adults_75_79 = total(nr_adults_75_79)
(24) gen prop_adults_poor_75_79 = tadults_75_79_poor_by_ADP/tnr_adults_75_79 if Idade_cod == "75_79"
(25) svy: tabulate prop_adults_poor_75_79

Figure B.18 - Explanation of the code in Figure B.17

Starting with (1), we make sure that through this code the data follows the survey design settings, specifying that pond_adp is used as the survey weight and ADP_cod is the survey variable. With (2), (3), (4), (5), (6), (7), (14), (15), we can obtain the number of adults, of people in the household, of children, of children of the age group of 10-14 and of adults of the age group 75-79 per household. In (8), we create a variable “TSocial” that sums all the Social Transfers included in the dataset. In (10), we divide “TS” which comprises the Social Transfers per household (9) by the number of individuals in the household (4) to obtain Social Transfers per capita per household. After this, in (11), we generate a new variable that comprises the total Social Transfers per capita for individuals aged 10-14 per household. In (12), the value is multiplied by 0,1, that is the amount that represents 10% of the social transfers to be taken out of the age group 10-14. With (13), we will “spread” the value obtained in (12) for all observations to later use the value only in the households that have individuals in the age group of 75-79. With the (16) step, it is divided the variable obtained in (13) by the number of adults in the age group 75-79 and this represents the 10% social transfers per capital to be distributed for adults in the 75-79 age group. In (19), we calculate the equivalent income by diving TMonetario, which is the sum of the monetary and non-monetary income already discussed previously (17) and the 10% social transfers per capita reallocated calculated in (16), for the age group of 75-79, by the scale factor (18), to make the income account for variations in household size. It is necessary to calculate the number of individuals in the age group of 75-79 that are in poverty per household (20,21), meaning that they have an equivalent income threshold below 6.608 EUR per year. Finally, we can obtain the average risk of poverty of the age group (24) by dividing the total number of individuals of the age group 75-79 in poverty in all households (22) by the total number of individuals of the age group across all households (23).

Figure B.19 - List of the code required to obtain the average Risk of Poverty for the age group of 10-14 years, with a reduction of 10% in Social Transfers.

(1) svyset ADP_cod [pweight=pond_adp]
(2) gen adult = (Idade_cod > "15_19")
(3) egen nr_adults = total(adult), by(ADP_cod)
(4) egen nr_in_household = count(ADP_cod), by(ADP_cod)
(5) gen nr_children = nr_in_household - nr_adults
(6) gen scale_factor = nr_in_household^0.73
(7) gen children_10_14 = (Idade_cod == "10_14")
(8) egen nr_children_10_14 = total(children_10_14), by(ADP_cod)
(9) gen TMonetario = RMonetario + RNMonetario - 0.10*(Rm_rsi + Rm_csi + Rm_pvelh + Rm_psoc + Rm_psob + Rm_pinv + Rm_cdep + Rm_desemp + Rm_doenca + Rm_edfp + Rm_fam + Rm_aloj + Rm_abono)
(10) gen equivalent_income = TMonetario / scale_factor
(11) gen children_10_14_poor = (Idade_cod == "10_14" & equivalent_income < 6608)
(12) egen children_10_14_poor_by_ADP = total(children_10_14_poor), by(ADP_cod)
(13) egen total_children_10_14_poor_by_ADP = total(children_10_14_poor_by_ADP)
(14) egen total_nr_children_10_14 = total(nr_children_10_14)
(15) gen proportion_children_poor_10_14 = total_children_10_14_poor_by_ADP / total_nr_children_10_14 if Idade_cod == "10_14"
(16) svy: tabulate prop_children_wo10_poor_10_14

Figure B.20 - Values compiled resulting from the coding in Figure B.17 and Figure B.19.

Age	Risk of Poverty Before	New Risk of Poverty after the Reallocation (RiskofPovertynew1)
10_14	0,370	0,373
75_79	0,212	0,205

Figure B.21 – Values obtained for the baseline ln_qm and the ln_qm with a 10 percent cut in Social Transfers for the age group 10-14.

Age	ln_qm	ln_qm with a 10% cut in ST
10	-2,180	-2,166
11	-2,976	-2,962
12	-2,996	-2,982
13	-2,419	-2,405
14	-2,477	-2,463

Figure B.22 - Explanation of the code in Figure B.21.

It is assumed that ln_qm is the result of the following equation: ln_qm = b0 + b1RiskofPoverty + b2 Age. After removing 10 percent of the Social Transfers in the age group of 10-14, there is the need to create a new Risk of Poverty for the age group 10-14 associated with this change, as shown in Figure B.20. In this way, we have ln_qmwo10st = ln_qm + b1(RiskofPovertynew1 – RiskofPoverty). RiskofPovertynew1 corresponds to the new values in Figure B.20 for the age group 10-14. B1 is identified as the coefficient of the RiskofPoverty in the multiple linear regression with the variables Logarithm of the Quotient of Mortality, Risk of Poverty and Age, shown in Figure B.15.

Figure B.23 - Values obtained from the calculation of the predicted ln_qm for the age group of 75-79 after reallocating 10% of the Social Transfers from the age group of 10-14.

Age	ln_qm	New ln_qm after reallocation of 10% of Social Transfers from the age group of 10-14 (ln_qm_new1)
75	3,155	3,120
76	3,275	3,239
77	3,398	3,363
78	3,540	3,505
79	3,667	3,632

Figure B.24 - Explanation of the results shown in Figure B.23

In the same way as before, after introducing an additional 10% of Social Transfers in the age group of 75-79 from the age group 10-14, there is the need to create a new Risk of Poverty for the age group of 75-79 associated with this change, as shown in Figure B.20. In this way, we have ln_qm_new1 = ln_qm + b1(RiskofPovertynew1 – RiskofPoverty). RiskofPovertynew1 corresponds to the new value in Figure B.20 for the age group 75-79. Additionally, b1 is identified as the coefficient of the RiskofPoverty in the multiple linear regression with the variables Logarithm of the Quotient of Mortality, Risk of Poverty and Age, shown in Figure B.15.

Figure B.25 – Logarithm of the Quotient of Mortality, Risk of Poverty and Social Transfers estimated, per age.

Age	Risk of Poverty	ln_qm	SocialTransfers
0	0,343	1,121	331,864
1	0,343	-1,640	331,864
2	0,343	-1,693	331,864
3	0,343	-1,845	331,864
4	0,343	-2,033	331,864
5	0,344	-2,180	200,819
6	0,344	-2,087	200,819
7	0,344	-2,590	200,819
8	0,344	-2,830	200,819
9	0,344	-2,604	200,819
10	0,370	-2,180	227,046
11	0,370	-2,976	227,046
12	0,370	-2,996	227,046
13	0,370	-2,419	227,046
14	0,370	-2,477	227,046
15	0,393	-1,917	250,276
16	0,393	-1,470	250,276
17	0,393	-1,890	250,276
18	0,393	-1,277	250,276
19	0,393	-1,152	250,276
20	0,333	-0,931	169,044
21	0,333	-1,291	169,044
22	0,333	-0,952	169,044
23	0,333	-1,168	169,044
24	0,333	-1,130	169,044

25	0,282	-1,149	186,229
26	0,282	-1,143	186,229
27	0,282	-0,858	186,229
28	0,282	-0,844	186,229
29	0,282	-0,755	186,229
30	0,291	-0,978	360,246
31	0,291	-0,781	360,246
32	0,291	-0,810	360,246
33	0,291	-0,919	360,246
34	0,291	-0,612	360,246
35	0,256	-0,470	402,946
36	0,256	-0,334	402,946
37	0,256	-0,308	402,946
38	0,256	-0,238	402,946
39	0,256	-0,079	402,946
40	0,257	0,079	383,826
41	0,257	0,102	383,826
42	0,257	0,351	383,826
43	0,257	0,360	383,826
44	0,257	0,497	383,826
45	0,241	0,586	465,662
46	0,241	0,648	465,662
47	0,241	0,812	465,662
48	0,241	0,897	465,662
49	0,241	1,048	465,662
50	0,230	1,083	560,572
51	0,230	1,213	560,572
52	0,230	1,324	560,572
53	0,230	1,364	560,572
54	0,230	1,427	560,572
55	0,231	1,498	1368,355
56	0,231	1,588	1368,355
57	0,231	1,695	1368,355
58	0,231	1,754	1368,355
59	0,231	1,820	1368,355
60	0,218	1,885	3731,142
61	0,218	1,967	3731,142
62	0,218	2,033	3731,142
63	0,218	2,126	3731,142
64	0,218	2,127	3731,142
65	0,168	2,213	7350,818
66	0,168	2,293	7350,818
67	0,168	2,396	7350,818
68	0,168	2,490	7350,818
69	0,168	2,563	7350,818
70	0,193	2,633	6969,024
71	0,193	2,739	6969,024
72	0,193	2,869	6969,024
73	0,193	2,959	6969,024
74	0,193	3,071	6969,024
75	0,212	3,155	6500,816

76	0,212	3,275	6500,816
77	0,212	3,398	6500,816
78	0,212	3,540	6500,816
79	0,212	3,667	6500,816
80	0,251	3,775	6748,409
81	0,251	3,908	6748,409
82	0,251	4,033	6748,409
83	0,251	4,194	6748,409
84	0,251	4,367	6748,409
85	0,248	4,562	5750,910
86	0,248	4,723	5750,910
87	0,248	4,879	5750,910
88	0,248	5,024	5750,910
89	0,248	5,163	5750,910
90	0,248	5,305	5750,910
91	0,248	5,431	5750,910
92	0,248	5,551	5750,910
93	0,248	5,667	5750,910
94	0,248	5,777	5750,910
95	0,248	5,882	5750,910
96	0,248	5,982	5750,910
97	0,248	6,077	5750,910
98	0,248	6,167	5750,910
99	0,248	6,251	5750,910
100	0,248	6,331	5750,910

Figure B.26 – Risk of Poverty, Risk of Poverty without Social Transfers estimated, and the Difference between the Risk of Poverty's per age.

The Risk of Poverty without Social Transfers is calculated through the coding in Figure B.12

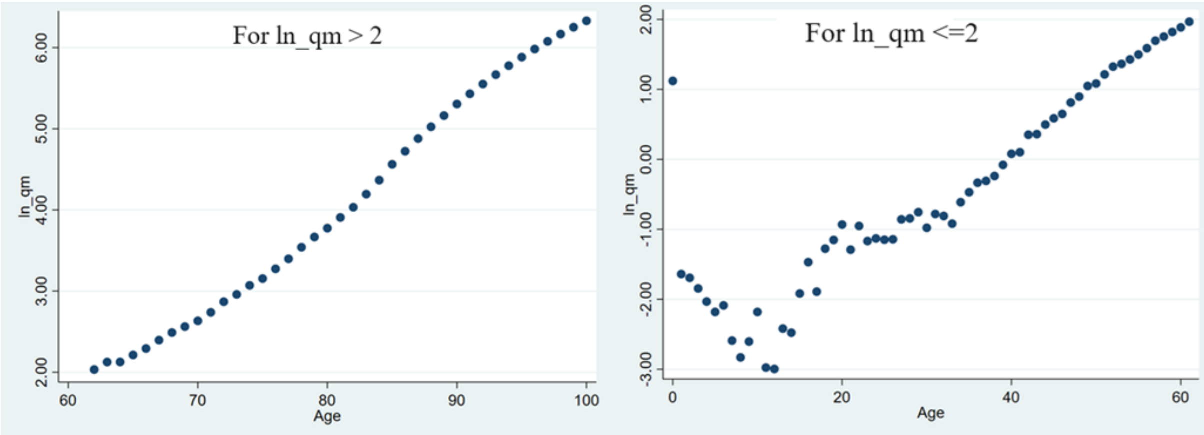
Age	Risk of Poverty	Risk of Poverty without Social Transfers	Social Transfers	Difference between Risk of Poverties
0	0,343	0,372	331,864	0,028
1	0,343	0,372	331,864	0,028
2	0,343	0,372	331,864	0,028
3	0,343	0,372	331,864	0,028
4	0,343	0,372	331,864	0,028
5	0,344	0,359	200,819	0,015
6	0,344	0,359	200,819	0,015
7	0,344	0,359	200,819	0,015
8	0,344	0,359	200,819	0,015
9	0,344	0,359	200,819	0,015
10	0,370	0,384	227,046	0,014
11	0,370	0,384	227,046	0,014
12	0,370	0,384	227,046	0,014
13	0,370	0,384	227,046	0,014
14	0,370	0,384	227,046	0,014
15	0,393	0,408	250,276	0,015

16	0,393	0,408	250,276	0,015
17	0,393	0,408	250,276	0,015
18	0,393	0,408	250,276	0,015
19	0,393	0,408	250,276	0,015
20	0,333	0,350	169,044	0,017
21	0,333	0,350	169,044	0,017
22	0,333	0,350	169,044	0,017
23	0,333	0,350	169,044	0,017
24	0,333	0,350	169,044	0,017
25	0,282	0,297	186,229	0,015
26	0,282	0,297	186,229	0,015
27	0,282	0,297	186,229	0,015
28	0,282	0,297	186,229	0,015
29	0,282	0,297	186,229	0,015
30	0,291	0,317	360,246	0,025
31	0,291	0,317	360,246	0,025
32	0,291	0,317	360,246	0,025
33	0,291	0,317	360,246	0,025
34	0,291	0,317	360,246	0,025
35	0,256	0,282	402,946	0,026
36	0,256	0,282	402,946	0,026
37	0,256	0,282	402,946	0,026
38	0,256	0,282	402,946	0,026
39	0,256	0,282	402,946	0,026
40	0,257	0,284	383,826	0,026
41	0,257	0,284	383,826	0,026
42	0,257	0,284	383,826	0,026
43	0,257	0,284	383,826	0,026
44	0,257	0,284	383,826	0,026
45	0,241	0,282	465,662	0,041
46	0,241	0,282	465,662	0,041
47	0,241	0,282	465,662	0,041
48	0,241	0,282	465,662	0,041
49	0,241	0,282	465,662	0,041
50	0,230	0,265	560,572	0,035
51	0,230	0,265	560,572	0,035
52	0,230	0,265	560,572	0,035
53	0,230	0,265	560,572	0,035
54	0,230	0,265	560,572	0,035
55	0,231	0,291	1368,355	0,060
56	0,231	0,291	1368,355	0,060
57	0,231	0,291	1368,355	0,060
58	0,231	0,291	1368,355	0,060
59	0,231	0,291	1368,355	0,060
60	0,218	0,372	3731,142	0,154
61	0,218	0,372	3731,142	0,154
62	0,218	0,372	3731,142	0,154
63	0,218	0,372	3731,142	0,154
64	0,218	0,372	3731,142	0,154
65	0,168	0,450	7350,818	0,282
66	0,168	0,450	7350,818	0,282

67	0,168	0,450	7350,818	0,282
68	0,168	0,450	7350,818	0,282
69	0,168	0,450	7350,818	0,282
70	0,193	0,550	6969,024	0,357
71	0,193	0,550	6969,024	0,357
72	0,193	0,550	6969,024	0,357
73	0,193	0,550	6969,024	0,357
74	0,193	0,550	6969,024	0,357
75	0,212	0,587	6500,816	0,375
76	0,212	0,587	6500,816	0,375
77	0,212	0,587	6500,816	0,375
78	0,212	0,587	6500,816	0,375
79	0,212	0,587	6500,816	0,375
80	0,251	0,619	6748,409	0,368
81	0,251	0,619	6748,409	0,368
82	0,251	0,619	6748,409	0,368
83	0,251	0,619	6748,409	0,368
84	0,251	0,619	6748,409	0,368
85	0,248	0,569	5750,910	0,321
86	0,248	0,569	5750,910	0,321
87	0,248	0,569	5750,910	0,321
88	0,248	0,569	5750,910	0,321
89	0,248	0,569	5750,910	0,321
90	0,248	0,569	5750,910	0,321
91	0,248	0,569	5750,910	0,321
92	0,248	0,569	5750,910	0,321
93	0,248	0,569	5750,910	0,321
94	0,248	0,569	5750,910	0,321
95	0,248	0,569	5750,910	0,321
96	0,248	0,569	5750,910	0,321
97	0,248	0,569	5750,910	0,321
98	0,248	0,569	5750,910	0,321
99	0,248	0,569	5750,910	0,321
100	0,248	0,569	5750,910	0,321

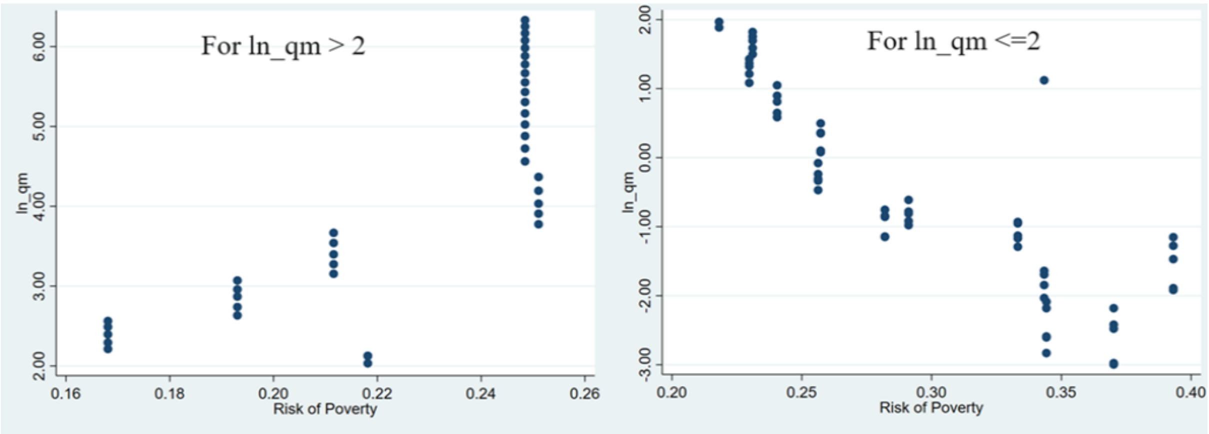
Appendix C – Analysis of the variable's behaviour when separating the data for when the Logarithm of the Quotient of Mortality is higher than 2 and when it is lower or equal to 2.

Figure C.1 - Scatterplot showing the relationship between the variables Logarithm of Quotient of Mortality and Age when the Logarithm of the Quotient of Mortality > 2 (a) and Logarithm of the Quotient of Mortality <=2 (b).



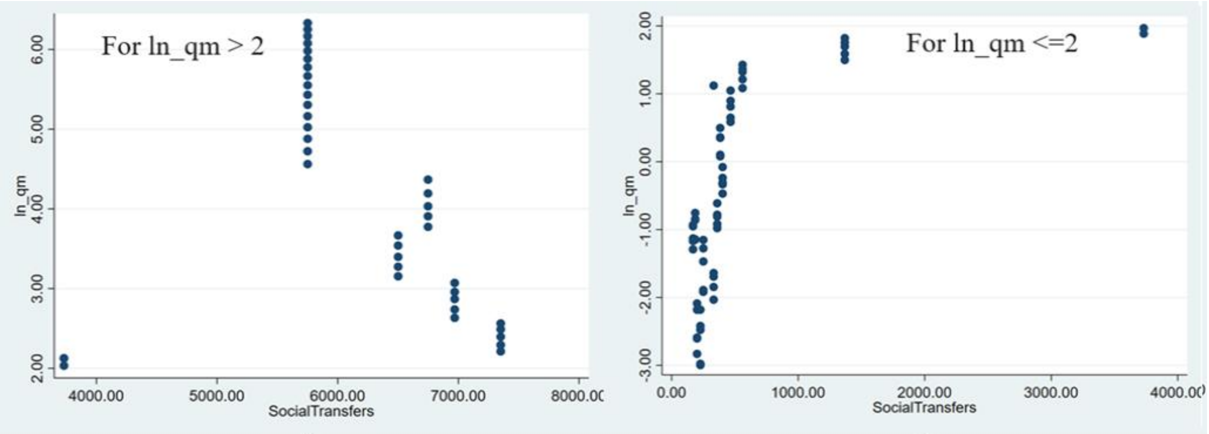
(a) (b)

Figure C.2 - Scatterplot showing the relationship between the variables Logarithm of Quotient of Mortality and Risk of Poverty when Logarithm of the Quotient of Mortality > 2 (c) and Logarithm of the Quotient of Mortality <=2 (d).



(c) (d)

Figure C.3 - Scatterplot showing the relationship between the variables Logarithm of Quotient of Mortality and Social Transfers when Logarithm of the Quotient of Mortality > 2 (e) and Logarithm of the Quotient of Mortality <=2 (f).



(e) (f)

Figure C.4 - List of the code required to obtain the average Risk of Poverty for the age group of 75-79, considering an additional 10% Social Transfers from the age group 60-64, for when the Logarithm of the Quotient of Mortality is higher than 2.

(1) svyset ADP_cod [pweight=pond_adp]
(2) gen adult = (Idade_cod > "15_19")
(3) egen nr_adults = total(adult), by(ADP_cod)
(4) egen nr_in_household = count(ADP_cod), by(ADP_cod)
(5) gen nr_children = nr_in_household - nr_adults
(6) gen adults_60_64 = (Idade_cod == "60_64")
(7) egen nr_adults_60_64 = total(adults_60_64), by(ADP_cod)
(8) gen TSocial = Rm_rsi + Rm_csi + Rm_pvelh + Rm_psoc + Rm_psob + Rm_pinv + Rm_cdep + Rm_desemp + Rm_doenca + Rm_edfp + Rm_fam + Rm_aloj + Rm_abono
(9) egen TS = total(TSocial), by(ADP_cod)
(10) gen T_pc_i = TS / nr_in_household
(11) egen T_total_60_64 = total(T_pc_i) if Idade_cod == "60_64", by(ADP_cod)
(12) gen T10_total_60_64 = 0.1 * T_total_60_64
(13) egen T10_total = mean(T10_total_60_64)
(14) gen adults_75_79 = (Idade_cod == "75_79")
(15) egen nr_adults_75_79 = total(adults_75_79), by(ADP_cod)
(16) gen T10_total_pc_75_79 = T10_total / nr_adults_75_79
(17) gen TMonetario = RNMonetario + RMonetario + T10_total_pc_75_79 if Idade_cod == "75_79"
(18) gen scale_factor = nr_in_household^0.73
(19) gen equivalent_income = TMonetario / scale_factor
(20) gen adults_75_79_poor = (Idade_cod == "75_79" & equivalent_income < 6608)
(21) egen adults_75_79_poor_by_ADP = total(adults_75_79_poor), by(ADP_cod)
(22) egen tadults_75_79_poor_by_ADP = total(adults_75_79_poor_by_ADP)
(23) egen tnr_adults_75_79 = total(nr_adults_75_79)

(24) gen prop_adults_poor_75_79 = tadults_75_79_poor_by_ADP/tnr_adults_75_79 if Idade_cod == "75_79"
(25) svy: tabulate prop_adults_poor_75_79

Figure C.5 - List of the code required to obtain the average Risk of Poverty for the age group of 60-64 years, with a reduction of 10% in Social Transfers when the Logarithm of the Quotient is higher than 2.

(1) svyset ADP_cod [pweight=pond_adp]
(2) gen adult = (Idade_cod > "15_19")
(1) egen nr_adults = total(adult), by(ADP_cod)
(2) egen nr_in_household = count(ADP_cod), by(ADP_cod)
(3) gen nr_children = nr_in_household - nr_adults
(4) gen scale_factor = nr_in_household^0.73
(5) gen adults_60_64 = (Idade_cod == "60_64")
(6) egen nr_adults_60_64 = total(adults_60_64), by(ADP_cod)
(7) gen TMonetario = RMonetario + RNMonetario - 0.10*(Rm_rsi + Rm_csi + Rm_pvelh + Rm_psoc + Rm_psob + Rm_pinv + Rm_cdep + Rm_desemp + Rm_doenca + Rm_edfp + Rm_fam + Rm_aloj + Rm_abono)
(10) gen equivalent_income = TMonetario / scale_factor
(11) gen adults_60_64_poor = (Idade_cod == "60_64" & equivalent_income < 6608)
(12) egen adults_60_64_poor_by_ADP = total(adults_60_64_poor), by(ADP_cod)
(13) egen total_adults_60_64_poor_by_ADP = total(adults_60_64_poor_by_ADP)
(14) egen total_nr_adults_60_64 = total(nr_adults_60_64)
(15) gen proportion_adults_poor_60_64 = total_adults_60_64_poor_by_ADP / total_nr_adults_60_64 if Idade_cod == "60_64"
(16) svy: tabulate prop_adults_wo10_poor_60_64

Figure C.6 - Values compiled from the coding in Figure C.5 and Figure C.4.

Age	Risk of Poverty Before	New Risk of Poverty after the Reallocation (Risk of Povertynew2)
60_64	0,218	0,228
75_79	0,212	0,184

Figure C.7 – Value for ln_qm and the ln_qm with a 10 percent cut in Social Transfers for the age group of 60-64, when ln_qm > 2

Age	ln_qm	ln_qm with a 10% cut in ST
60	1,885	1,944

61	1,967	2,025
62	2,033	2,092
63	2,126	2,184
64	2,127	2,185

Figure C.8 - Explanation of the code in Figure C.7

After removing 10 percent of the Social Transfers in the age group of 60-64, there is the need to create a new Risk of Poverty for the age group 60-64 associated with this change, as shown in Figure C.6. In this way, we have ln_qmwo10st = b0 + b1RiskofPovertynew2 + b2Age = ln_qm + b1(RiskofPovertynew2 – RiskofPoverty). RiskofPovertynew2 corresponds to the new value in Figure C.6 for the age group 60-64. B1 is identified as the coefficient of the RiskofPoverty in the multiple linear regression with the variables Logarithm of the Quotient of Mortality, Risk of Poverty, and Age, shown in Figure B.15.

Figure C.9 - Values obtained from the calculation of the predicted ln_qm for the age group of 75-76 after reallocating 10% of the Social Transfers from the age group 60-64.

Age	ln_qm	New ln_qm after reallocation of 10% of Social Transfers from the age group of 60-64 (ln_qm_new2)
75	3,155	2,998
76	3,275	3,118
77	3,398	3,242
78	3,540	3,384
79	3,667	3,511

Figure C.10 - Explanation of the results shown in Figure C.9

After introducing an additional 10% of Social Transfers in the age group of 75-79 from the age group 60-64, there is the need to create a new Risk of Poverty associated with this change, as shown in Figure C.6. In this way, we have ln_qm_new2 = b0 + b1RiskofPovertynew2 + b2Age

= ln_qm + b1(RiskofPovertynew2 – RiskofPoverty). RiskofPovertynew2 corresponds to the new value in Figure C.6 for the age group 75-79. With b1 being identified as the coefficient of the RiskofPoverty in the multiple linear regression with the variables Logarithm of the Quotient of Mortality, Risk of Poverty and Age, shown in Figure B.15.

Figure C.11 - List of the code required to obtain the average Risk of Poverty for the age group of 55-59 years, considering an additional 10% Social Transfers from the age group 10-14, for the Logarithm of the Quotient to be smaller or equal to 2.

(1) svyset ADP_cod [pweight=pond_adp]
(2) gen adult = (Idade_cod > "15_19")
(3) egen nr_adults = total(adult), by(ADP_cod)
(4) egen nr_in_household = count(ADP_cod), by(ADP_cod)
(5) gen nr_children = nr_in_household - nr_adults
(6) gen children_10_14 = (Idade_cod == "10_14")
(7) egen nr_children_10_14 = total(children_10_14), by(ADP_cod)
(8) gen TSocial = Rm_rsi + Rm_csi + Rm_pvelh + Rm_psoc + Rm_psob + Rm_pinv + Rm_cdep + Rm_desemp + Rm_doenca + Rm_edfp + Rm_fam + Rm_aloj + Rm_abono
(9) egen TS = total(TSocial), by(ADP_cod)
(10) gen T_pc_i = TS / nr_in_household
(11) egen T_total_10_14 = total(T_pc_i) if Idade_cod == "10_14", by(ADP_cod)
(12) gen T10_total_10_14 = 0.1 * T_total_10_14
(13) egen T10_total = mean(T10_total_10_14)
(14) gen adults_55_59 = (Idade_cod == "55_59")
(15) egen nr_adults_55_59 = total(adults_55_59), by(ADP_cod)
(16) gen T10_total_pc_55_59 = T10_total / nr_adults_55_59
(17) gen TMonetario = RNMonetario + RMonetario + T10_total_pc_55_59 if Idade_cod == "55_59"
(18) gen scale_factor = nr_in_household^0.73
(19) gen equivalent_income = TMonetario / scale_factor
(20) gen adults_55_59_poor = (Idade_cod == "55_59" & equivalent_income < 6608)
(21) egen adults_55_59_poor_by_ADP = total(adults_55_59_poor), by(ADP_cod)
(22) egen tadults_55_59_poor_by_ADP = total(adults_55_59_poor_by_ADP)
(23) egen tnr_adults_55_59 = total(nr_adults_55_59)
(24) gen prop_adults_poor_55_59 = tadults_55_59_poor_by_ADP/tnr_adults_55_59 if Idade_cod == "55_59"
(25) svy: tabulate prop_adults_poor_55_59

Figure C.12 – Values compiled resulting from the coding in Figure C.11 and Figure B.20

Age	Risk of Poverty Before	New Risk of Poverty after the Reallocation (RiskofPovertynew3)
10_14	0,370	0,373
55_59	0,231	0,227

Figure C.13 - Values obtained from the calculation of the predicted ln_qm for the age group of 55-59 after reallocating 10% of the Social Transfers from the age group of 10-14, when the Logarithm of the Quotient is lower or equal to 2.

Age	ln_qm	New ln_qm after reallocation of 10% of Social Transfers from the age group of 10-14 (ln_qm_new3)
55	1,498	1,477
56	1,588	1,568
57	1,695	1,675
58	1,754	1,734
59	1,820	1,799

Figure C.14 - Explanation of the results shown in Figure C.13

After introducing an additional 10% of Social Transfers in the age group of 55-59 from the age group 10-14, there is the need to create a new Risk of Poverty associated with this change, as shown in Figure C.12. In this way, we have ln_qm_new3 = = ln_qm + b1(RiskofPovertynew3 – RiskofPoverty). The RiskofPovertynew3 values used above are relative to the age group of 55-59, from Figure C.12. With b1 being identified as the coefficient of the RiskofPoverty in the multiple linear regression with the variables Logarithm of the Quotient of Mortality, Risk of Poverty and Age, shown in Figure B.15.