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Intergenerational Transfers in Spain: The Role of Education

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Abstract

This paper shows the estimates of National Transfer Accounts (NTA) for Spain in 2006 disaggregated by education level. Overall, our results indicate that, besides age population composition, education level has a big impact on the economic behavior of households and, hence, on the aggregate economy. Educated households tend to participate more and longer in the labor market, to produce more and, consequently, to consume more. As differences in consumption are lower than in labor income, they are able to contribute to the public system with higher taxes and contributions, and they depend less on public transfers over their lifecycle. Therefore, education seems to be crucial to sustain the welfare state in an ageing society.

KEYWORDS: Ageing, Education, Intergenerational transfers, Public transfers, Welfare state

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Abstract

This paper shows the estimates of National Transfer Accounts (NTA) for Spain in 2006 disaggregated by education level. Overall, our results indicate that, besides age population composition, education level has a big impact on the economic behavior of households and, hence, on the aggregate economy. Educated households tend to participate more and longer in the labor market, to produce more and, consequently, to consume more. As differences in consumption are lower than in labor income, they are able to contribute to the public system with higher taxes and contributions, and they depend less on public transfers over their lifecycle. Therefore, education seems to be crucial to sustain the welfare state in an ageing society.

Resumen

En este trabajo se presentan los resultados de las Cuentas Nacionales de Transferencias (NTA) para España correspondientes al año 2006, desagregadas por nivel educativo. Nuestros resultados indican que, además de la estructura de edades de la población, el nivel educativo también tiene un importante impacto en el comportamiento económico de las familias y por ende en el total de la economía. Los hogares con mayor nivel educativo tienden a participar más y durante más tiempo en el mercado laboral, a producir más y, en consecuencia, a consumir también más. Pero como las diferencias en el consumo son menores que en renta, dichos hogares son capaces de pagar mayores impuestos y contribuciones al sistema público, a la vez que son menos dependientes de las transferencias públicas a lo largo de su ciclo vital. Así pues, la educación parece crucial para contribuir a sostener el estado del bienestar ante el envejecimiento.

Key words: Ageing, Education, Intergenerational transfers, Public transfers, Welfare state.

***JEL* codes: H53, I28, I38**

1. Introduction

Individuals need to consume over their entire lifecycle in order to meet their needs, while in general they can only generate resources during their working age. This implies that some mechanisms are necessary in order to reallocate resources over the human lifecycle. These reallocations can just imply an intertemporal distribution - for example, individuals can save during their working-age period to finance their old age. However, these mechanisms might often involve an intergenerational transfer dimension, reallocating resources between different generations. This is the case of family transfers: parents take care of their children as their parents did, and maybe also take care of their elderly, in turn expecting their own descendants to do the same.

What about public transfers? Over the 20th century, many countries have developed a set of public expenditure programs devoted to covering the basic needs of their citizens, which have come to be called the *Welfare State* (WS). Although important differences among countries remain as regards the characteristics, size and coverage of WS programs, it can be said that they are based on four pillars: education, health, pensions and other social services. The *WS* is *per se* another mechanism (in addition to market and families) to reallocate resources over the lifecycle of individuals, but mainly for interpersonal distribution, as most WS programs are explicitly or implicitly organized on a *pay-as-you-go* basis (transfers are financed by the taxes collected in the same period). Education is a clear example of redistribution to the young, while pensions – and also health and long-term care – are mostly directed toward the elderly.

The role of intergenerational transfers in a society has been studied since the pioneering work of Samuelson (1958), who introduced the overlapping generation models into economic analysis. Numerous contributions have been made on this issue since then, but the lack of data has limited the extent of empirical conclusions for a long time (Willis, 1988; Lee et al. 1994; Auerbach et al. 1991; Albertini et al., 2008). In the early 2000s, an international project called National Transfer Accounts (NTA) was launched in order to construct a new international data set containing information about the reallocation of resources between ages in each country. NTA disentangle the economic flows taking place between age groups of population in a given year and a given country. The estimates complement information provided by National Accounts, being consistent with them, and allowing engaging analyses. By way of example, NTA data are extremely useful to study the economic effects of ageing (in both the public and the private transfer system). Also, they can be used to test the existence and length of the so-called demographic dividend (the effects of demographics on economic growth).

The basic NTA approach only takes into account age groups of individuals, without incorporating any kind of population heterogeneity. Some extensions of NTA have subsequently been derived, including some kind of heterogeneity, hence improving the explanatory power of these estimates. Among others, it is worth mentioning the estimation of NTA profiles disaggregated by gender, especially if data on time use are also incorporated. In this way, NTA provide information by age and sex on resource reallocations not only regarding market activities but also for non-market ones, such as housework and care (see Donehower and Mejía-Guevara, 2012; Hammer et al. 2015; Zannella, 2015; Renteria et al. 2016). Another interesting extension of NTA would be to disaggregate NTA profiles by socioeconomic status, using some indicator like household income level. For example, Turra et al. (2011) used NTA profiles differentiated by income groups to analyze the incidence of public transfers in Brazil and Chile. Miller et al. (2014), Mejía-Guevara (2015) and Hammer (2016) construct NTA by education level for Chile, Mexico and Austria, respectively. This is the extension we also develop in this paper, in this case applied to Spain, estimating the NTA disaggregated by education level of household head, in order to identify the differences in behavior patterns over the lifecycle. The rest of the paper is organized as follows. Section 2 summarizes NTA methodology. In Section 3, we explain the data and estimation process. Section 4 presents the results and discusses the main findings. Finally, Section 5 contains the conclusion.

2. An overview of National Transfer Accounts

The international project to construct NTA was launched in the early 2000s. It initially involved seven countries, which nowadays are more than 40 from all over the world (including Spain). First NTA results for a selected group of countries were published by Lee and Mason (2011). NTA roots are in the broad literature on intergenerational transfers, involving both economic and demographic aspects. This highlights the fact that a system to transfer resources across ages is needed, as individuals only produce during a limited period of their lives, while they consume throughout their lifecycle. NTA disentangle how resources move between the different age groups in an economy in a given year. Hence, NTA provide complementary information to National Accounts (NA) of each country, being consistent with them. Moreover, NTA estimates are also internationally comparable, because they are constructed following a common methodology (UN, 2013). The starting point of the NTA method is the following transformation of the NA identity:

$$YL + YA + TG^{+} + TF^{+} = C + S + TG^{-} + TF^{-} \qquad [1]$$

Where *YL* is labor income, *YA* asset income, *C* consumption, *S* savings and *TG* and *TF* represent public and private transfers, respectively, being positive when they are received by individuals (inflows, +) or negative when they are paid by individuals (outflows, -). Equation [1] summarizes the resources constraint for the whole economy in a given period (time subscripts are omitted for simplicity), but also for each individual of each particular age. The different sources of revenues on the left-hand side (labor income, asset income and public and private transfers received) finance expenses collected on the right-hand side (consumption, savings, transfers to public sector – through taxes and social contributions – and to other private individuals). Rearranging Equation [1], we obtain:

$$C - YL = (YA - S) + (TF^{+} - TF^{-}) + (TG^{+} - TG^{-}) \qquad [2]$$

The difference between consumption and labor income on the left-hand side of equation [2] is the so-called *lifecycle deficit* (*LCD*), which is typically positive at the beginning and the end of the lifecycle (childhood and old age) and negative in the middle (working life). The *LCD* should be financed through the three possible mechanisms expressed on the right-hand side. First, through asset-based reallocations (*ABR*), that is to say individuals can allocate their asset income, save and dissave to transfer their income intertemporally. Second, through private transfers typically made on an intra-household basis, but that could also occur between households (inter-household transfers). Finally, age reallocations can also take place through transfers made by the public sector, like education, health, pensions and unemployment programs, among others. The role of each of these three mechanisms varies across countries – in particular, public transfers are more important in countries with consolidated welfare states - but also by age groups within the same country. This is one of the interesting features that NTA data make it possible to analyze, as it provides age profiles of resource reallocations. Figure 1 shows the amount of public (*TG*) and private (*TF*) transfers received by children (ages 0-19) and the elderly (ages 65 and over) in different countries with NTA data available. Data are expressed as a percentage of average labor income for ages 30-49 in the same country in order to make them comparable. As can be observed, public transfers are more important in European countries, and also in the USA, Brazil and Japan, while private transfers play the main role in age resource reallocations in other Asian and Latin American countries. Clearly, public transfers are mainly directed toward the elderly in almost all countries. For example, in Sweden a person aged 65 or over receives in public transfers an average of 110% the average labor income for ages 30-49 in the country, while a young under 20 year old receives only 32%. In the case of Spain, public transfers are lower, but again clearly unbalanced in favor of the elderly, who receive almost 50% of average labor income for ages 30-49, while children receive barely 17%.

[Figure 1 about here]

To summarize, NTA provide rich information about resource allocation between ages which was not previously available. Nevertheless, many factors apart from age influence the specific economic behavior of individuals. This is the case of socioeconomic status, which has given rise to an extension of NTA methodology in order to obtain estimations of age profiles disaggregated by this characteristic. Some recent works show that economic profiles by age are significantly different when including some indicator of individual socioeconomic status. Turra et al. (2011) estimated public transfers by income quartiles for Brazil and Chile. More recently, Miller et al. (2014) and Mejía-Guevara (2015) provided NTA estimations disaggregated by education level of household head for Chile and Mexico, respectively. They show that the high inequality indicators in these countries give rise to a very different resource allocation for individuals of different socioeconomic status. For example, Miller et al. (2014) estimate that children in households whose head has not completed secondary school receive barely half the educational investment of households with tertiary education. In Europe, Hammer (2015) has estimated complete NTA by individual education level in Austria, showing considerable differences in most profiles, such as labor income, taxes or public transfers received, among others.

In this paper, we construct NTA for Spain disaggregated by education level of household head. Education attainment and income level of individuals (or households) are clearly linked. Figure 2 shows the distribution of Spanish households observed in the European

Survey on Income and Living Conditions (EU-SILC) according to the level of education of the household head and the total income of the household – aggregated monetary income obtained by all household members. As observed, there is a clear relation between level of studies and total income. In the highest total income deciles, two thirds of households have a head with post-secondary education, while only 9% have primary studies. The picture is exactly the opposite for the households in the lowest income deciles.

[Figure 2 about here]

Our focus will be on education attainment instead of income distribution, given that education can be considered a more stable and better predictor of the permanent income of the household than the income observed in a particular year. In this way, our results complement others previously obtained in literature on inequality. For example Cantó (2013), using data from EUROMOD, analyzes the distributive effects of taxes and in-cash transfers on disposable income of families in Spain between 2005 and 2011. Calero and Gil (2013) focus on the distributive effects of public education and health policies.

3. Constructing NTA profiles by level of education in Spain

Different micro data sets are used in each country to estimate NTA. Age profiles are constructed first in per capita terms. Afterwards, each aggregate profile is obtained by multiplying the per capita age profile by the population age distribution. Aggregate profiles are then adjusted to the corresponding aggregate values provided by National Accounts, in order to make both data sources consistent. The estimation process of age profiles is complex and usually conditioned by data availability (see UN, 2013 for specific details). This complexity justifies the fact that most countries have estimations for only a few years. This Section is devoted to describing the data and estimation procedure of NTA in Spain, disaggregated by level of education referring to 2006.

The level of education in this study is a measure used to distribute households among socioeconomic groups. As explained above, educational attainment is a more stable indicator of the household's socioeconomic status in the long term, not affected by variations in the annual income. Besides labor income and other individual social transfers, the rest of the variables are obtained at the household level such as, for example, consumption, implying that household features may be more important than individual characteristics, especially for children. For this reason, we measure education attainment at the household and not at individual level. In particular, we assign households according to education level of household head, defined in the NTA as the person with the highest income in the household. The education level or education attainment is measured in the surveys as a categorical indicator that we finally grouped in three categories: compulsory, complete secondary and post-secondary. Based on these assumptions, NTA profiles were constructed separately for households belonging to each education category.

The basic NTA equation Eq. [2] needs to be balanced for each age group (x) and education level (s):

$$C_{x,s} - YL_{x,s} = (YA_{x,s} - S_{x,s}) + (TF^{+}{}_{x,s} - TF^{-}{}_{x,s}) + (TG^{+}{}_{x,s} - TG^{-}{}_{x,s}) \quad [3]$$

To do that, we construct profiles of each variable by education level of the household (when data are available), and then we adjust the sum of the aggregate amount of each specific group to match the total – for all education groups – profile by age.

When considering total population, net public transfers must equal zero, as well as net private intra-household transfers. This is because in NTA by construction all transfer inflows should be reallocated as transfer outflows. In the case of public transfers, this implies that each expenditure program is covered by general taxes or by an earmarked tax when there is one – like social contributions for contributory pensions. When flows received by the government do not equal payments made to the government, the excess or deficit is considered as public asset-based reallocations. When profiles are divided into educational groups, the same procedure applies, although net transfers equal zero only at the aggregate level but not necessarily for each education group.

We rely on different databases to construct economic age profiles for each variable. We use the Household Budget Survey (EPF) to estimate private consumption profiles, and the European Survey on Income and Living Conditions (EU-SILC) to construct income profiles. Regarding the age profiles of private transfers, they are estimated combining both databases mentioned above. Finally, public consumption, pensions and other social expenditure data are extracted from different statistics published by the government (Ministries of

Employment and Social Security – MEYSS –; Education – MECD – and Health and Social Services – MSSSI) and the NHS (National Health Survey) produced by INE (National Statistics Institute). National economic aggregates, used to adjust the resulting profiles, come from Spanish National Accounts (INE). All databases used refer to 2006, chosen as our base year in order to avoid any effect of the economic cycle on the transfer profiles.

Disaggregation by education level is only available for those data extracted from individual surveys (EPF, EU-SILC) and for the NHS. This means that, unfortunately, it is not possible to obtain all the profiles disaggregated by education level. This is the case of public consumption (education, public hospitalization and other public consumption) and some public cash transfers that are not very well specified in the EU-SILC survey, such as survivorship pensions. On the other hand, it is worth mentioning that education classification in the two main surveys (EPF and EU- SILC) used to construct the profiles differs slightly, which finally forced us to group education attainment in only three categories: primary, secondary and post-secondary. The difficulties in combining both classifications come basically from the legal changes introduced in the Spanish educational system by the LOGSE from 1990 onwards.[1] Until the LOGSE, only primary education (until age 14) was compulsory, while after its approval the first stage of secondary education (ages 14-16) also became compulsory. In the EPF survey, the compulsory education category includes all the former students that only finished primary education, but also those who completed the first stage of secondary education after the LOGSE. However, the EU-SILC does not contain a category for compulsory education, but rather one for general secondary education, mixing the first stage of secondary education (currently in the compulsory stage) with a secondary level existing in the past, more equivalent to the current second stage of secondary education. Regarding higher education, EU-SILC considers all degrees that require a second stage of secondary education for admission, which is a broader definition of post-secondary education than the one in EPF ('university degrees or equivalent education'). Table 1 shows the category matching we performed between the classifications from both surveys.

[Table 1 about here]

Figure 3 compares the population distribution by age and education level resulting from both surveys (EU-SILC and EPF). Some differences are observed between the two

[1] LOGSE, Ley Orgánica General del Sistema Educativo (General Organic Law on the Education System).

distributions, specially concentrated in the younger generations (ages 10-30) with the lowest level of education. We used the distribution observed in the EU-SILC, as it is closer to the one observed in the population censuses available for 2011.[2]

[Figure 3 about here]

Below we give more details about the construction of the different NTA profiles.

Lifecycle deficit (*LCD*)

As stated in Eqs. [2] and [3], *LCD* is the difference between consumption (private and public) and labor income at each age and for each education level. Private consumption is estimated separately for education, health and 'other consumption' (including housing consumption) using data from EPF survey. Education consumption for each age group is obtained by performing a regression of total education consumption in the household among the number of people aged less than 29 enrolled at school at each age. The estimated coefficients are then applied to the distribution of education consumption among the members of the household. Regarding health consumption, it is distributed among household members using coefficients of utilization of each item (hospitalization, outpatient care and pharmacy) obtained from available data on hospital stays (Conjunto Mínimo Básico de Datos – CMBD) and the NHS. Finally, the rest of consumption is distributed by age using the following equivalent scale proposed by the NTA method (see UN, 2013):

$$\alpha(x) = 1 - 0.6 * D(4 < x < 20) * \frac{20-x}{16} - 0.6 * D(x \leq 4) \quad [4]$$

Where *x* refers to the age of the individual and *D* is a dummy variable equal to 1 when the condition inside the parenthesis is met, and zero otherwise. This equivalent scale allows the allocation of total other expenditure of household *j* to each household member *i* as follows:

$$CHH_{ij}(x) = CHH_j / \sum_x \alpha(x) M_j(x) \quad [5]$$

[2] We also estimated the NTA profiles using the EPF population distribution instead of the EU-SILC, obtaining very similar results.

Where CHH_{ij} is the amount of other consumption by household member *i* in household *j*, CHH_j is total other consumption of household *j*, and $M_j(x)$ is the number of household members of age *x* in household *j*.

Regarding the second component of *LCD*, labor income profiles by age and education level are obtained from the data contained in the EU-SILC. Following the NTA methodology, these profiles are estimated with the mean distribution by age in the EU-SILC separately for employees (salaried workers) and self-employed.

Public Transfers

According to Eqs. [2] and [3], public transfers are divided into outflows (paid by individuals to the public sector) and inflows (received by individuals from the public sector). Outflows refer mainly to social contributions and taxes. Social contributions are estimated based on the estimated labor income profiles. In the case of taxes, the profiles are estimated at the maximum detailed category, using a mixture of consumption, income and asset profiles depending upon the type of tax. For example, profiles of special taxes on alcohol and tobacco are calculated using alcohol and tobacco consumption profile by age in the EPF survey. Public inflows are first split into in-kind (health, education, other) and cash benefits (pensions and other social transfers). In-kind profiles are assumed to be equal to the public consumption ones, and therefore the equivalent profiles were used. Regarding cash transfers, they are composed mainly of retirement pensions, but also include all kinds of social transfers. The information about their distribution by age is available in the EU-SILC, but also in the statistics published by Spanish public administrations (MEYSS) which refer to total population. Therefore, we construct the age profiles by education level using EU-SILC data and then they are adjusted to the aggregate by age observed in MEYSS.

Private Transfers

Private transfers can take place inside the household – intra-household transfers – or between different households – inter-household. In both cases, they are estimated at the household level and, therefore, NTA methodology assumes that the household head is the owner of assets. In the case of inter-household transfers, this implies that transfers are undertaken between household heads. Inter-household transfer profiles are estimated using the EU-SILC survey, where the amount of transfers given or received from other households is specified. Regarding intra-household transfers, they should ideally be estimated using a survey containing information on both consumption and income. Unfortunately, this is not the case of Spain and many European countries – as explained above, consumption data are collected by EPF, while income is collected by EU-SILC. Hence, both data sets need to be combined.[3]

To construct the private transfer profiles, the standard NTA method assumes that the household head is the owner of all assets and, therefore, all asset flows (like housing services) run from the household head to other members. Besides housing, transfers occur because members with a surplus (more income than consumption) make transfers to members with a deficit (more consumption than income). When the total sum of surpluses and deficits becomes a surplus or a deficit, the household head is responsible for balancing it using asset income or dissaving (in the case of deficit) or saving (in the case of surplus).

Asset-based reallocations

Profiles of asset-based reallocations are based on the previously described profiles of housing, total net transfers and lifecycle deficit, plus three new profiles for property income, capital income and interest payments. The three profiles are estimated from data in EU-SILC, based on the same assumption that assets are owned by the household head. Each of these profiles is adjusted to the corresponding aggregate of asset-based reallocations, in order to obtain final profiles of asset income and savings for the private and public spheres.

4. Analyzing intergenerational transfers by education level in Spain

In this Section we present the NTA age profiles disaggregated by education level of household head obtained for Spain for 2006. Figure 4 shows per capita labor income and consumption. Both present the expected pattern: while consumption is quite stable over the lifecycle – a little lower for children and the elderly – labor income is concentrated in the central period of working age. The average results – without differentiating by education level – are consistent with those previously obtained for Spain referring to other years (Patxot et al. 2011 for 2000; Patxot et al. 2015 for 2008).

[3] See UN (2013). For a subsequent update applied to European particularities see also Istenič et al. (2016).

[Figure 4 about here]

The effect observed for education level is remarkable, especially in the case of labor income. From age 25, individuals with secondary and post-secondary education earn clearly more than those with only primary studies. These differences reach a maximum at ages 45-49, when the per capita labor income profile peaks. At that point, per capita labor earnings for those with post-secondary education reach €33,000 a year, representing 41% more than the figure observed for individuals with secondary education, and more than double the one corresponding to individuals with only primary studies. As the profiles shown are in per capita terms, they are influenced by the participation and employment rates, which differ significantly according to the level of education. Indeed, aggregated data of unemployment and participation rates by level of education show that participation in the labor market increases with the educational attainment of individuals, while unemployment rates decrease. Table 2 shows the labor status of the household heads collected in the EU-SILC 2006, by age and education level. As observed, after age 25 – when the education period can be considered complete – both the participation and the employment rates are favorable for those individuals with higher education. This advantage moreover increases with age. As an example, from ages 55-64, only 3% of household heads with post-secondary studies are non-participants, compared with 11% of those with only primary education. Furthermore, in the same age category, 75% of participating household heads with post-secondary studies are employed, compared with only 59% of those with just primary education.

[Table 2 about here]

It is also worth noting that, as Table 2 shows, individuals from households with post-secondary education tend to remain more years in the labor market. First, looking at the age group 54-64 (close to the legal retirement age), 76% of individuals with post-secondary education participate in the labor market (75% are employed and 1% unemployed), compared with only 65% of those with only primary studies. On the contrary, non-participants and retired percentages are higher in the lowest education group. Second, 80% of individuals aged 65 and more with primary studies are retired, 2% employed and 18% are non-participants (probably meaning that they are not entitled to receive a retirement pension). Conversely, individuals with higher education in the same age group who are non-participants only represent 5%, while the employed percentage is significantly higher (7%).

This could have different explanations, such as that a good part of these highly educated individuals are liberal professionals without a compulsory retirement age. Moreover, these jobs tend to be less influenced by the physical capacity of workers. Overall, the interaction between educational attainment and labor market characteristics leads to an expected, but interesting result: the higher the level of education the higher the labor income profile from age 25 on.

Compared to other countries, Spain presents a similar labor income age profile to the one observed in other European countries such as Austria, Finland, Germany and Sweden, where labor participation of the elderly is low (Lee and Ogawa, 2011). On the other hand, the USA and other American and Asian countries present large elderly shares of labor participation.

Differences by education level are also observed in the consumption profiles, although they are less important. Again, the higher the education level the greater the consumption level, the life pattern being practically the same in any case: consumption grows during childhood and tends to remain quite stable over the rest of the lifecycle. It is worth mentioning that this trend is also observed in other countries, such as Austria, but differs from that observed in a few high-income countries (Sweden, Finland, Germany and the USA), where consumption grows sharply during late old age (Tung, 2011). The reason for the increase observed in these countries is public consumption – in-kind public transfers –, which increases dramatically after age 70-75, while private consumption tends to remain constant or even decrease.

The difference between consumption and labor income gives the lifecycle deficit (*LCD*) for each age group. The *LCD* can be considered as a measure of economic dependency. Typically, it is positive during childhood and old age – consumption is higher than labor income – but negative in the middle years of the working age – when labor income exceeds consumption. The age range of negative *LCD* varies a little among countries, but in most cases becomes negative around age 25-29 and lasts until 55-59. This is also what we observed for Spain in 2006, but with some differences according to education level. While childhood dependency finishes near age 25 in all cases, the surplus period is longer the higher the education level. On the other hand, there are also differences in terms of the size of both the deficit and especially the surplus. Indeed, in the case of less educated individuals, deficits during childhood and old age are clearly higher than the small surplus they generate during the middle period of their lives. Higher educated individuals, although they have bigger deficits, are able to generate much bigger surpluses due to their higher labor income.

[Figure 5 about here]

After observing Figures 4 and 5, the conclusion is clear: the higher the education level the higher the labor earnings and, as differences in consumption are smaller, the lower the *LCD*. The aggregate picture in the economy, plotted in panel b of Figure 5, depends on the population structure by age and education level, shown in Figure 3.1. During childhood, the highest aggregated *LCD* corresponds to individuals with secondary education (the most numerous), while after age 60 the *LCD* is mainly generated by individuals with only primary education. Conversely, during the working-age period individuals with secondary and post-secondary education give rise to most of the surplus, while only a small part is generated by individuals with only primary studies. Although the per capita profiles tend to be quite constant over time, aggregated figures depend crucially on the age composition of the population and on the population distribution by education level.

Below we disentangle the mechanisms used to finance *LCD*, according to Eq. [2]: transfers (both public and private) and asset-based reallocations. The question is basically how the young and the elderly receive resources to finance their consumption, as they are not able to obtain labor income. Figure 6 shows the public transfers received (inflows), estimated according to their age and education level. In the case of public transfers, only in-cash benefits are obtained disaggregated by education level, while in-kind transfers (health, education and other) are aggregated for all education levels.

[Figure 6 about here]

As expected, public transfer inflows are concentrated in the two economic dependent life periods. While children receive mainly in-kind transfers (education and some health services), the elderly obtain both in-kind (health care) and especially cash transfers (pensions). Unfortunately, as explained above, the EPC data do not allow disaggregation of in-kind public transfers by education level. However, we could estimate private consumption age profiles of both education and health care disaggregated by education level of household head, shown in Figures 7 (education) and 8 (health care). As observed, public education is clearly the most important, especially among ages 5-19. From that age, public expenditure decreases sharply, and private expenditure becomes relatively more important. Also, it is worth noting that private expenditure increases significantly with the education level of the household. On average, it is observed that individuals in households with post-secondary education spend nearly four times more on private education than those in households with only primary studies (€4,894 compared with €1,289).

[Figure 7 about here]

In the case of health (Figure 8), public expenditure is again clearly the highest at all ages. Some differences in private per capita expenditure according to the education level of household head are also observed, although they are lower than in the case of education. Households tend to complement public health care with some private expenditure, especially from age 45 onwards.

[Figure 8 about here]

In the case of cash transfers we observe that, from ages 35-55, the higher the education level the lower the cash transfers received. This probably reflects the lower unemployment rate of high-educated people, which implies that they receive less unemployment benefits. However, after age 65 the opposite occurs, in this case showing that individuals with better contribution careers (high-educated) obtain a higher retirement pension. If we look at the 65-69 age group, when most individuals enter retirement, per capita cash benefits are almost 10% higher for individuals with secondary studies than for individuals with only primary education. In the case of individuals with post-secondary education, the difference with those with primary studies increases to 33%.

If the education level of the household was a good indicator of its income level, the cash transfer inflow profiles observed (Figure 6) would mean that public expenditure has a limited impact on redistribution: the amount of cash benefits is a little lower for the most educated during the working-age period, but clearly higher at retirement age. In-kind transfers also play a role, which we are unable to evaluate properly due to the lack of data. However, they are considerably lower than the cash benefits after age 50. Hence, the redistributive impact of the public transfer system seems to be weak. Nevertheless, it is also necessary to look at the outflows profile – taxes and contributions paid – shown in Figure 9 to complete the picture about redistribution effects. Until age 25 very small differences are observed, but during the rest of their life high-educated individuals pay much more taxes and contributions to the public sector. The differences reach maximums in middle age. Individuals aged 45-49 with post-secondary education pay on average almost €15,000 a year in taxes and contributions, which is twice the amount paid by individuals of the same age with only primary education, and 42% more than those with secondary studies. Hence, the public transfer system seems to be redistributive, at least on the revenue side.

[Figure 9 about here]

In order to complete the analysis about the redistribution effects of the public transfer system in Spain, in Figure 10 we plot the aggregated net public transfer profile – inflows less outflows – by education level according to the population distribution in 2006. We observe that, during early childhood, most public transfers are received by households with secondary or higher education, as they are the most numerous. On the contrary, during old age most public transfers are directed toward the less educated. Although in general they receive much lower benefits (Figure 6), there are much more recipients with only primary studies at those ages. Moreover, we found that all education levels start to obtain negative net public transfers – they pay more taxes than they receive – at the same age – around 25 – , while the lower the education level the sooner they start to obtain positive net public transfers at old age (age 55 for primary studies, 60 for secondary and a little later for post-secondary). Finally, during the working-age period taxes are mainly raised from individuals with post-secondary and secondary education. It is important to note that this picture corresponds exclusively to that observed in 2006. As mentioned above, although per capita profiles tend to be quite stable, the aggregated profiles depend crucially on the population distribution, which is changing rapidly both in age composition and education level.

[Figure 10 about here]

The second mechanism to finance *LCD* is private transfers, which can take place inside the household – for example transfers from parents to children or between spouses – or between different households – an example could be the elderly who give money to their descendants living in another household, but also any other kind of private donation.

[Figure 11 about here]

Figure 11 shows the age profile of net intra-household transfers obtained for Spain in 2006, differentiating by education level. Children receive transfers from other family members until age 25-30, but those in households with higher education receive considerably more. That difference peaks at ages 15-25, coinciding with the higher education period, and probably reflects the fact that children of high-educated families also tend to reach a high education level, needing more transfers. At ages 25-65, individuals give more transfers to the other household members than they receive, whatever their education level. However, the size of those transfers is again clearly bigger for higher education levels – on average, an individual with post-secondary education aged 45-49 gives €10,429 a year to the rest of their household members, which is 43% and 130% higher than individuals with secondary and primary education, respectively. However, maybe the most interesting feature is observed during old age: while individuals with lower education practically do not receive or give transfers to the rest of the household members, those with secondary and post-secondary studies are net recipients of family transfers, although the size of those transfers is small. Renteria et al (2016) reveal that this could be related to a gender issue: as most men of high-education level receive retirement pensions while only a few women do, the latter need to receive transfers from their spouses. Moreover, most of the elderly live alone or as a couple, although a lower education level increases the probability of them living with younger generations (Zueras and Ajenjo Cosp, 2010). This could be one of the reasons why the elderly of lower socioeconomic status are net donors of private transfers to other members of the household, especially when taking into account that the older generations are frequently the house-owners in extended families.

[Figure 12 about here]

In Figure 12 we display the age profiles of inter-household transfers, differentiating inflows and outflows, by education level. The amount of inter-household transfers is much lower than that observed for intra-household transfers. In the case of inflows, it is almost not even worth mentioning differences by education level. However, they are more notable in the case of outflows, being higher educated individuals who make more transfers to other households. It should be noted that, by construction, the aggregate net inter-household transfers equal the net transfers of the country with the rest of the world. Hence, in a country with a relatively high proportion of foreigners (9.27% of the population in Spain in 2006), a negative transfer balance (remittances abroad exceed those received) is plausible.

Finally, asset-based reallocation is the third tool to finance *LCD* according to Eq. [2]. It is especially relevant for the elderly – as they can save before they grow old – but not for children – it would imply borrowing during childhood to repay the credit later. In order to show this, Figure 13 displays the relative importance of the different sources to finance consumption during childhood – ages 0-19 – and old age – age 65 and over – estimated by education level.[4] As can be observed, for children private transfers play the main role, followed by public transfers. On the contrary, labor income is very low at these ages, and asset-based reallocation is slightly negative[5]. In the case of the elderly, the differences by education level are more striking. Public transfers are clearly the most important source of financing for elderly consumption, although their importance decreases with education level. Individuals with primary studies finance about 80% of their consumption with public transfers, while this share goes down to 67% and 51% in the case of individuals with secondary and post-secondary education, respectively. Regarding labor income, its importance is more significant the higher the education level. While the elderly with primary studies can barely finance 4% of their consumption needs with labor income, those with secondary and post-secondary studies finance 10% and 16%, respectively. The role of private transfers is also limited and, as seen above, individuals with only primary education are net givers, while the rest are net recipients. Finally, asset-based reallocation also plays a remarkable role in financing old-age consumption, a little lower in the case of individuals with secondary education – who finance 12% of their consumption through asset-based reallocations –, while this share is 19% for individuals with primary studies and 25% for those with post-secondary studies.

[Figure 13 about here]

Overall, our results reveal that, besides age population composition, education level has a large impact on the economic behavior of households and, hence, on the size of macro magnitudes of the economy. By way of illustration, Table 3 summarizes the results of a simple simulation exercise, calculating the *LCD* with alternative scenarios of population composition by education level. In particular, maintaining the profiles obtained by age and

[4] Regarding the working age, labor income is the main source of financing as it is necessary to finance not only consumption, but also transfers, both public (taxes) and private (mainly to other members of the household).

[5] A non-zero asset-based reallocation for children is obtained by construction in the NTA, as public asset-based reallocation is imputed among the whole population.

education level constant, we compute the aggregate *LCD* together with the consumption and labor income in hypothetical scenarios where the entire population has the same education level (primary, secondary or post-secondary). The results show that education clearly matters. On the one hand, labor income with the whole population in post-secondary level would be 129% of that observed with the actual distribution. On the other hand, consumption would also be higher (123%), but to a lesser extent. Consequently, aggregate *LCD* would go down to 76% of the value observed with the real population composition. Exactly the opposite occurs when we assume that the entire population has primary studies.

[Table 3 about here]

Figure 14 summarizes the implications of those changes in terms of financing the lifecycle deficit. It compares the relative importance of the three mechanisms available to finance *LCD* (TG, TF and ABR) in the three hypothetical scenarios of population distribution compared to the one observed. The total absolute value of the lifecycle deficit is given in each scenario, while the bars measure the size of each financing tool. Public and private transfers (TG and TF, respectively) are computed combining the constant age profiles with changing population structure, while ABR is the balancing item. Note that TG is zero in the real situation, by construction (see Section 3), but this is not true in our simulation exercise where we assume the same level of education for the whole population. As is shown, the huge *LCD* of an only primary educated society would need an important share of positive public transfers. On the contrary, public transfers would become negative (more taxes paid than transfers received) in the case of the whole population having post-secondary education. Along the same lines, the importance of both private transfers and asset-based reallocations would also clearly increase with the population's education level.

[Figure 14 about here]

Finally, it is worth recalling that our analysis refers to 2006 in order to avoid the possible effects of the economic crisis. Our results could certainly be affected by the crisis, although a thorough analysis of this question is beyond the scope of this paper. However, by way of illustration, we estimated the per capita *LCD* profiles by level of education for 2012, which can be considered one of the worst years of the economic crisis according to macro-economic indicators. Comparison of the *LCD* profiles by level of education in 2012 and 2006, shown in Figure 15, are revealing: the economic crisis hit the less educated especially hard, their surplus period (over the working–age period) completely disappearing. Individuals with secondary studies also worsen significantly in terms of surplus while, on the contrary, the *LCD* of the most educated remains more or less the same.

[Figure 15 about here]

5. Further remarks

The role of intergenerational transfers has been investigated over many years in the literature, although the lack of data has limited the extent of empirical evidence. In the early 2000s the National Transfer Accounts project was launched, aimed at constructing an internationally comparable data set containing information about the reallocation of resources between ages in each country. NTA provide valuable information, not previously available, about how economic resources move across ages in a country in a given year. Nowadays, about 40 countries are involved in that project, and NTA estimations for several years are available for most of them.

Some extensions of NTA have been derived by introducing some kind of individual heterogeneity, in order to enrich the information provided even more. For example, NTA can be disaggregated by gender or by socioeconomic status of individuals or households. In this paper, we estimated the NTA for Spain disaggregated according to education level of household head – defined as the person earning the highest income in the household. The reference year is 2006 in order to avoid any effects of the economic crisis. We aimed to identify the differences in behavioral patterns over the lifecycle according to education attainment. Our results are useful to assess the socioeconomic impact of the education transition experienced over recent decades. Moreover, they provide valuable information to evaluate the effects of welfare state policies, specifically education.

The NTA profiles disaggregated by education level of household head obtained for Spain show important differences through the lifecycle behavior patterns. First, the labor income age profile presents the typical inverted-U shape, peaking at around ages 40-50, but is considerably higher for the higher education levels (per capita earnings at age 50 for individuals with post-secondary education are twice the earnings of those with only primary studies). This is due not only to higher-paying jobs, but also to the higher participation and employment rates for better educated individuals. Moreover, the profile shows a tendency of those higher educated individuals to remain longer in the labor market. Second, regarding the consumption profile, the pattern is again similar for the three education levels, with differences in level, although smaller than in the case of labor – high-educated individuals consume around 50% more than individuals with primary studies. As a result, per capita *LCD* is more favorable as the education level improves.

Regarding the mechanisms to finance *LCD*, significant differences are also observed by level of education. Public transfer profiles show that high-educated individuals pay considerably higher taxes and contributions from age 25, although they also receive higher cash transfers during old age (through the pension system). We could not disaggregate in-kind transfers by level of education due to the lack of micro data, although the total age profile shows that they are especially important during childhood (education expenditure) and clearly lower than cash transfers during old age. This is a limitation of our analysis, because it prevents us from knowing how public in-kind transfers might be differently distributed according the socioeconomic status of the household. However, even without this disaggregation, we are able to observe that children from lower educated households rely more on public transfers, which are mostly in-kind. Therefore, we can expect that this result would be reinforced by the eventual disaggregation of in-kind public transfers by level of education.

Private intra-household transfers show that individuals receive transfers from the rest of the household members until age 25, the amount of these transfers being bigger for the higher educated. Between ages 25-65, all individuals give net transfers to other family members whatever their education level, although again the size of the transfers is clearly higher for better educated individuals. Finally, during old age, lower educated individuals hardly receive or give any transfers to other family members, while those with secondary and post-secondary studies are net recipients of some transfers. The size of inter-household transfers observed is small for any education level, especially in the case of inflows – received by individuals. Finally, asset-based reallocations play a role in the *LCD* financing of the elderly, being more important for individuals with post-secondary education.

Overall, our results reveal that, besides age population composition, education level has a large impact on the economic behavior of households and, hence, on the aggregate economy. Better educated households tend to participate more and longer in the labor market, to produce more and, consequently, to consume more. They are capable of contributing to the public system with higher taxes and contributions, and they depend less on public transfers over their lifecycle. Therefore, particularly education seems to be crucial to sustain the welfare state in an ageing society. A simple simulation exercise, applying the profiles observed and assuming that the total population of 2006 has post-secondary education, shows that the aggregate *LCD* would go down considerably, as aggregate labor income would increase by 29% and consumption by 23%. This exercise shows the potential for education as a policy to alleviate the impact of ageing on the sustainability of the welfare state. Undoubtedly, this positive effect is subject to the fact that the labor market can efficiently absorb those more educated individuals. The current high unemployment rate in Spain as a result of the current crisis is not signaling a very positive prospect in this sense. Nevertheless, this situation is expected to change once baby boomers start retiring from 2022 on. One could argue that the near prospect of ageing does not seem to recommend increasing expenditure on education. Nevertheless, it is worth considering that such a policy would also act as pre-funding for future retirement pensions. As long as they are financed on a pay-as-you-go basis, more educated and hence productive individuals will be able to contribute more to finance it. Consequently, the austerity measures applied during the crisis could have found a better candidate than education expenditure.

There are also further policy implications regarding inequality. Our results show that higher educated parents spend four times more resources on private education of their children than those with only primary studies. This could partly explain why the level of education of the parents influences to a large extent the one achieved by their children – as pointed out by the OECD (OECD, 2015), on average individuals are 4.5 times more likely to attend higher education if one of their parents has a higher education degree than if both of them have only primary studies. This calls for the need for an effective public policy to compensate for this gap and foster equal opportunities for all citizens.

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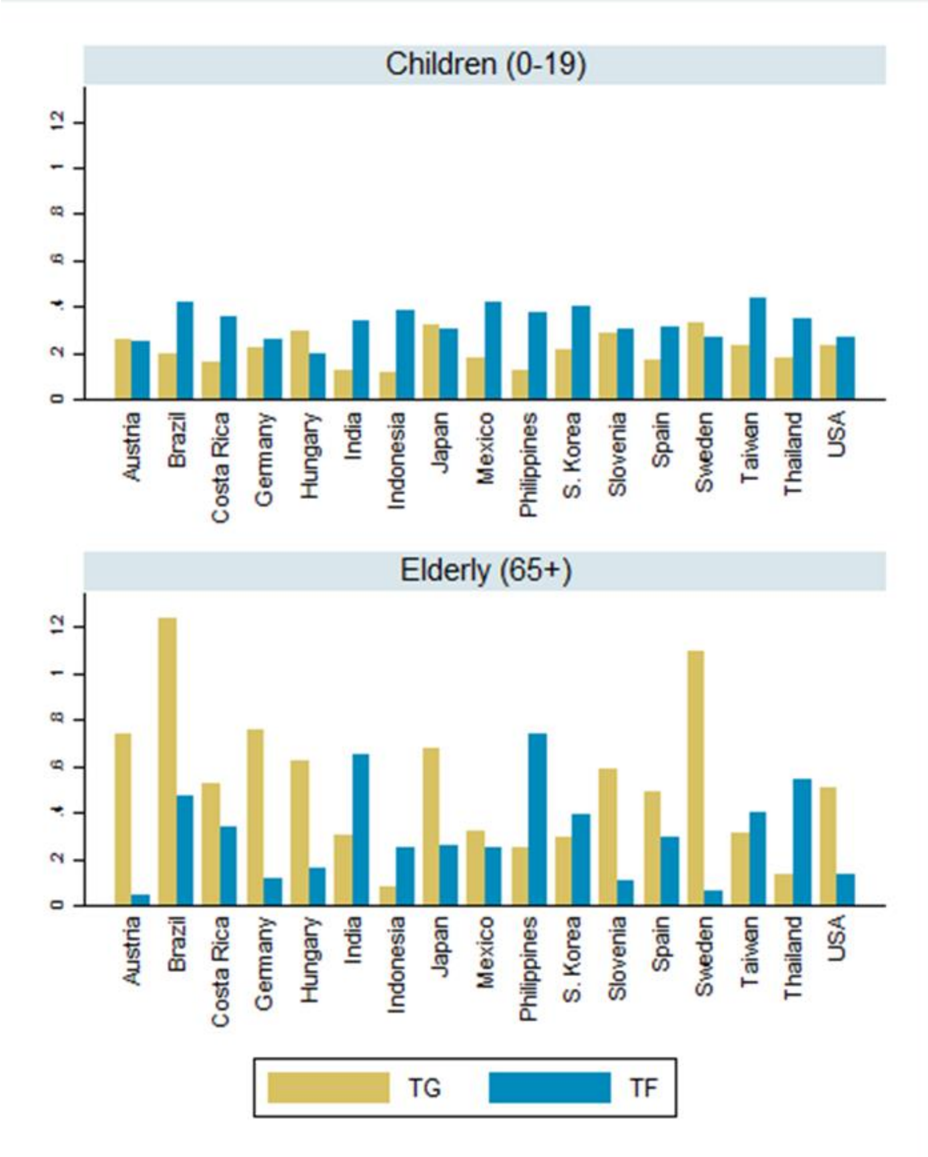
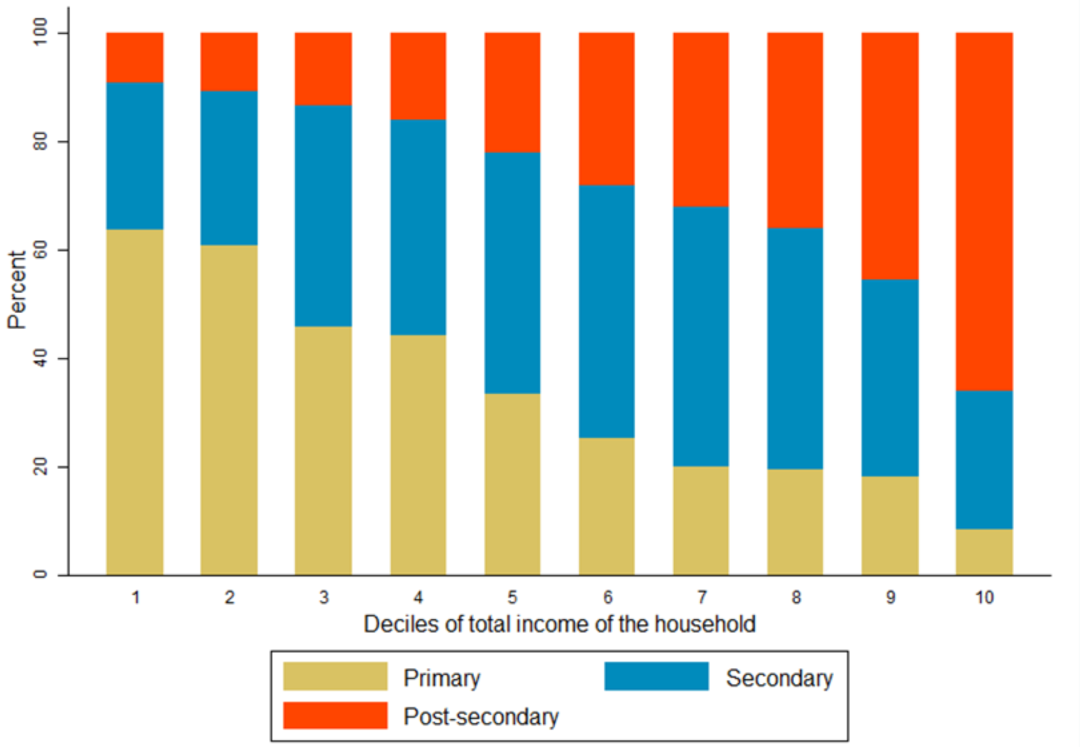
Figures and Tables

Figure 1 Per capita public (*TG*) and private (*TF*) transfers received by children and the elderly in NTA countries (as percentage of the average labor income for ages 30-49 in the same country)



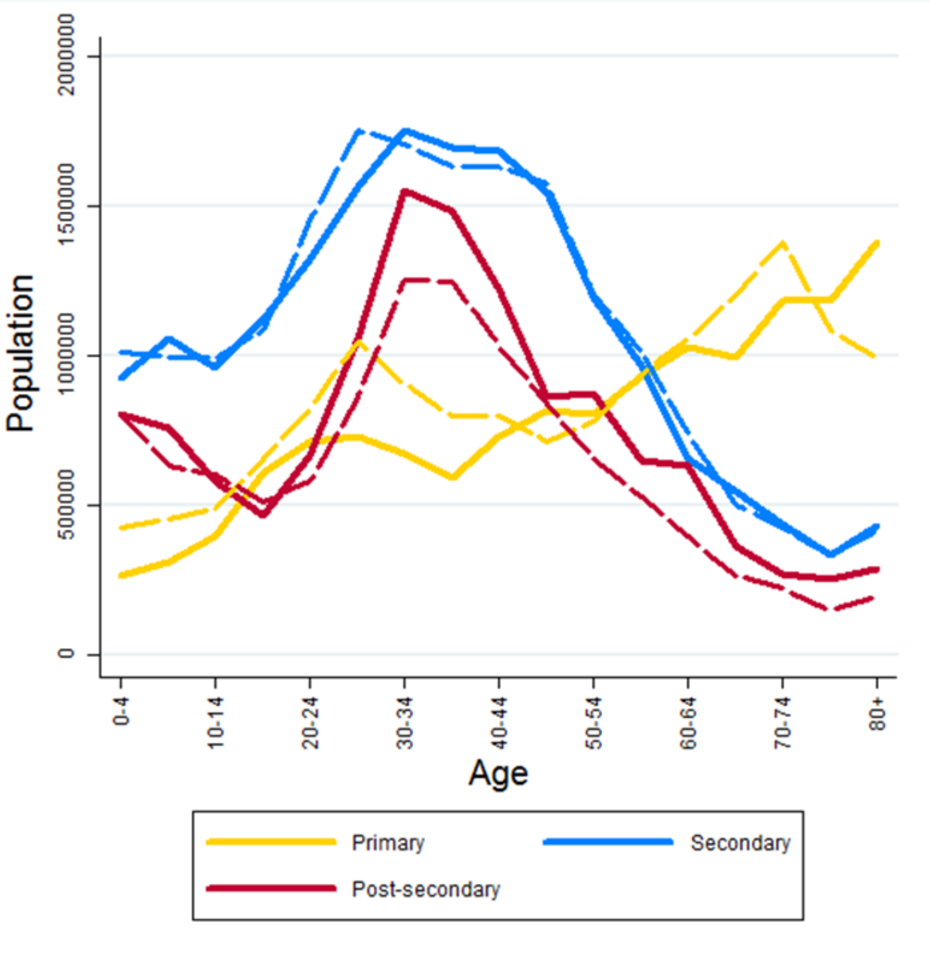
Note: estimations refers to the following years: 1996 (Brazil), 1998 (Taiwan), 1999 (Philippines), 2000 (Austria, Spain and South Korea), 2003 (Germany, Sweden and USA), 2004 (Costa Rica, India, Japan, Mexico, Slovenia and Thailand), 2005 (Hungary and Indonesia).
Source: Authors' elaboration with NTA data (www.ntaccounts.org).

Figure 2 Distribution of Spanish households according to their total income level (in deciles) and the level of education of the household head



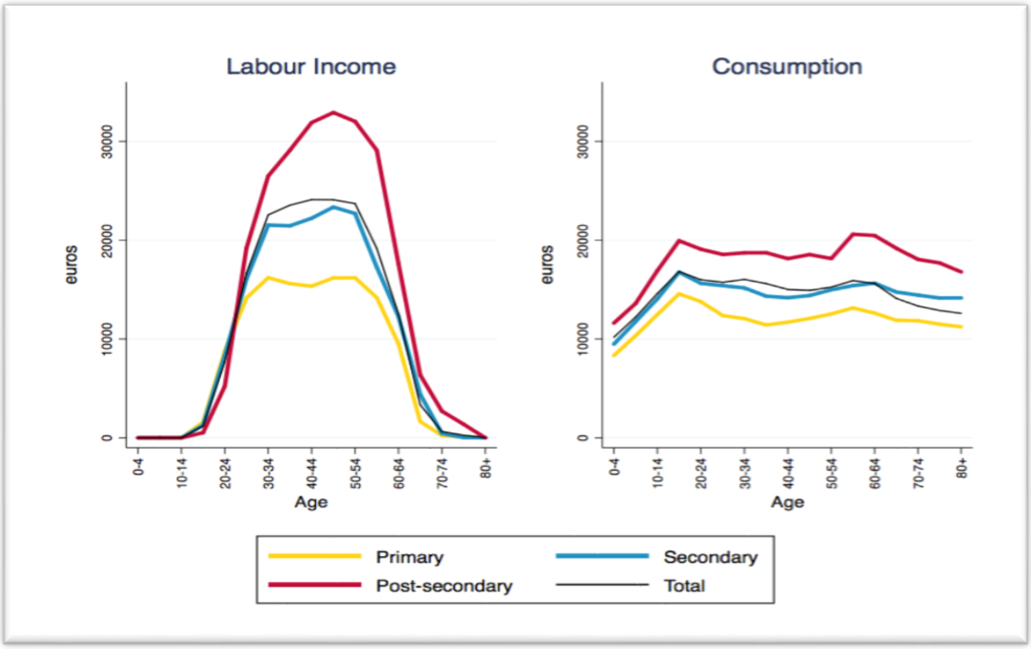
Source: Authors' elaboration from EU-SILC referring to 2006

Figure 3 Population distribution by age and level of education of the household head in Spain 2006 (EPF and EU-SILC)



Note: Dashed lines refer to EPF and continuous lines to EU-SILC
Source: Authors' calculations from EPF (2006) and EU-SILC (2007)

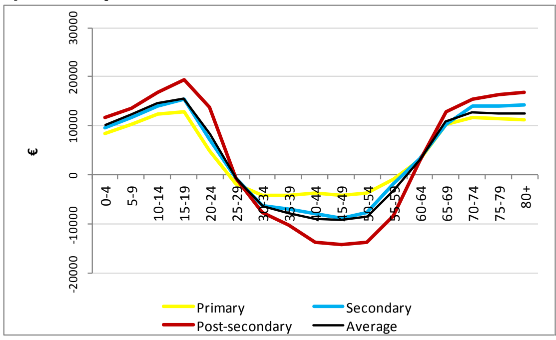
Figure 4 Per capita age profiles of consumption and labor income by level of education (Spain 2006)

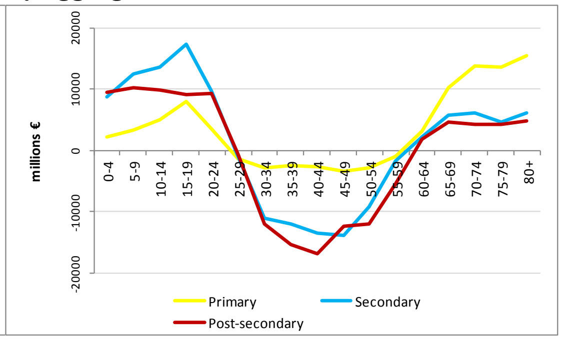


Source: Authors' elaboration

Figure 5 Age profiles of Lifecycle deficit (*LCD*) by level of education in Spain 2006

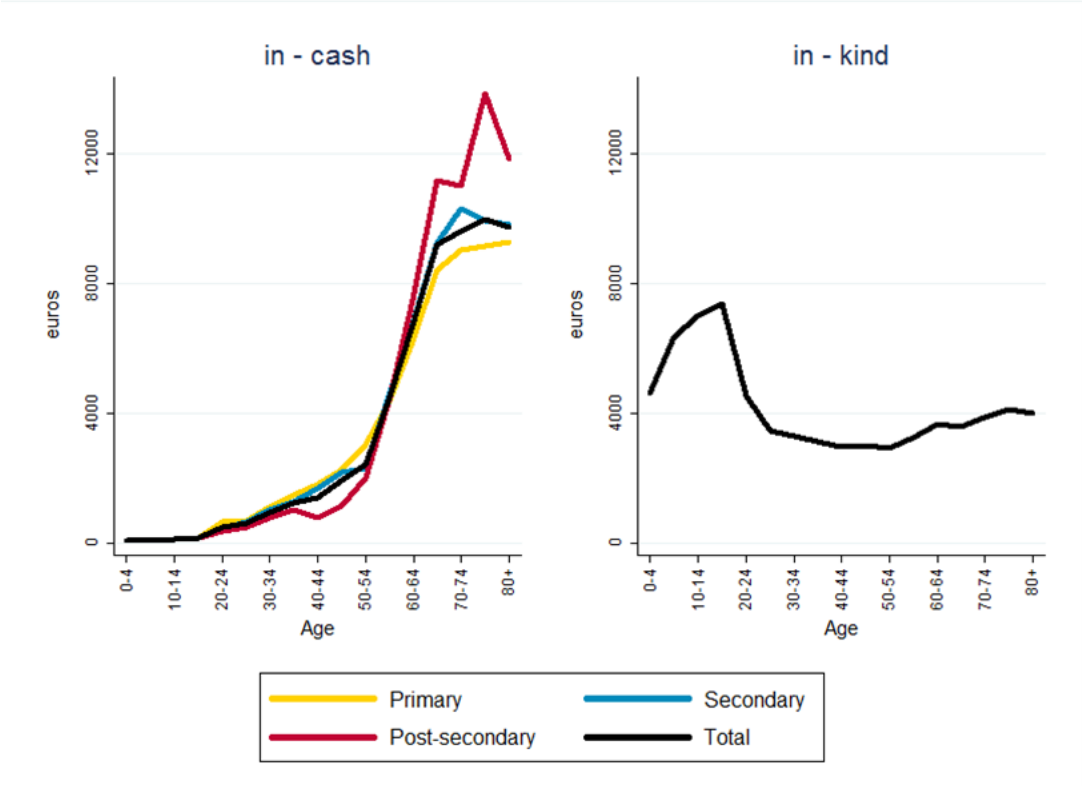
a) Per capita **b) Aggregated**





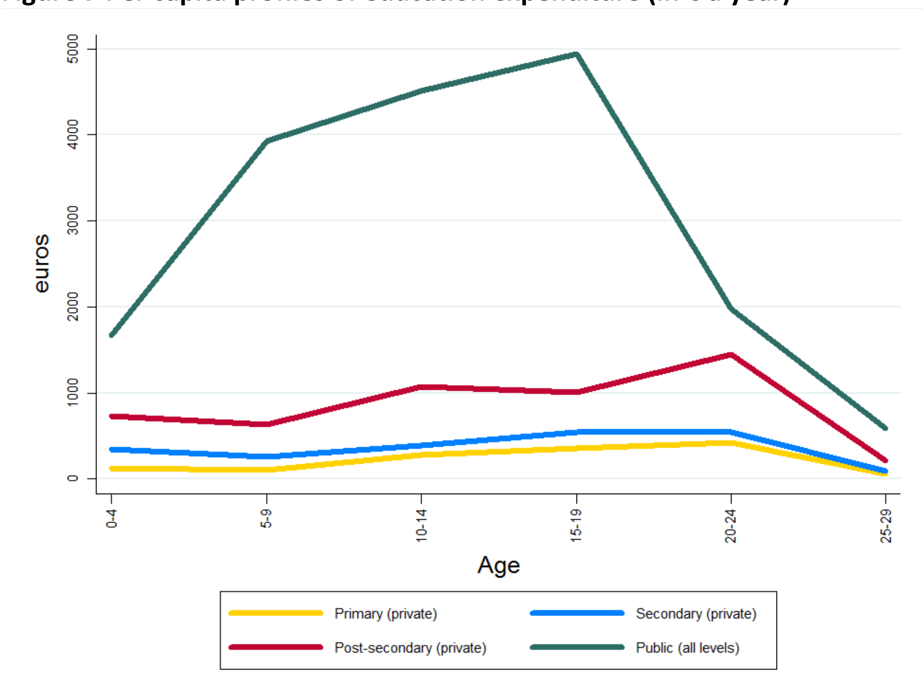
Source: Authors' calculations

Figure 6 Per capita profiles of public transfer inflows by age and level of education



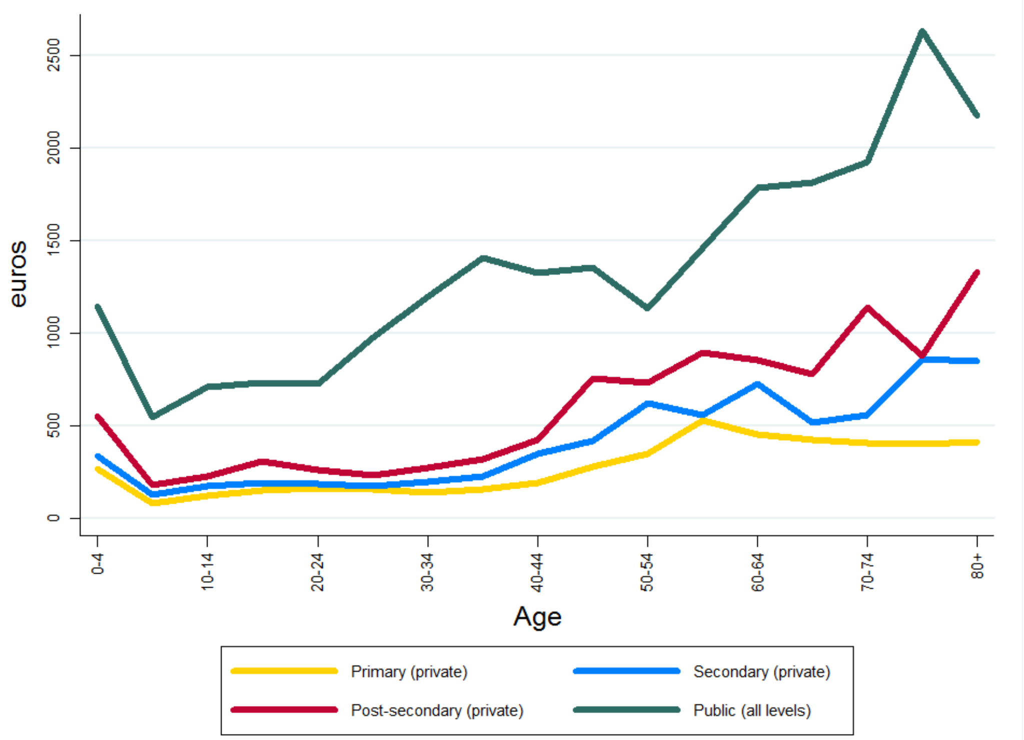
Source: Authors' elaboration

Figure 7 Per capita profiles of education expenditure (in € a year)



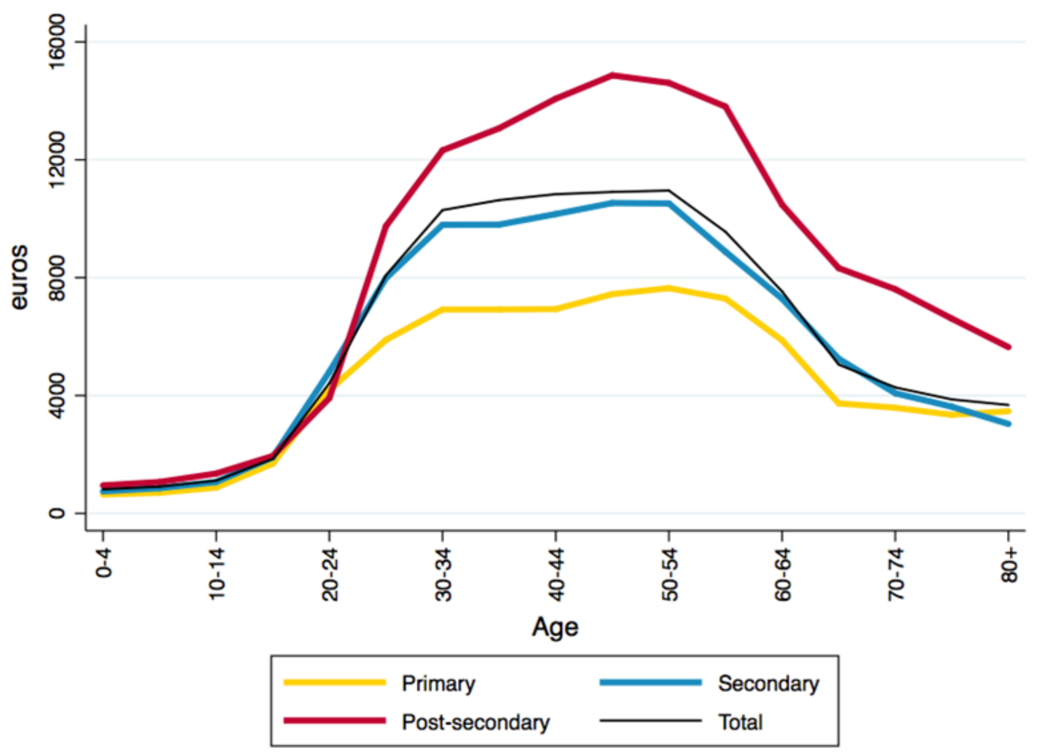
Source: Authors' elaboration

Figure 8 Per capita profile of health expenditure (in € a year)



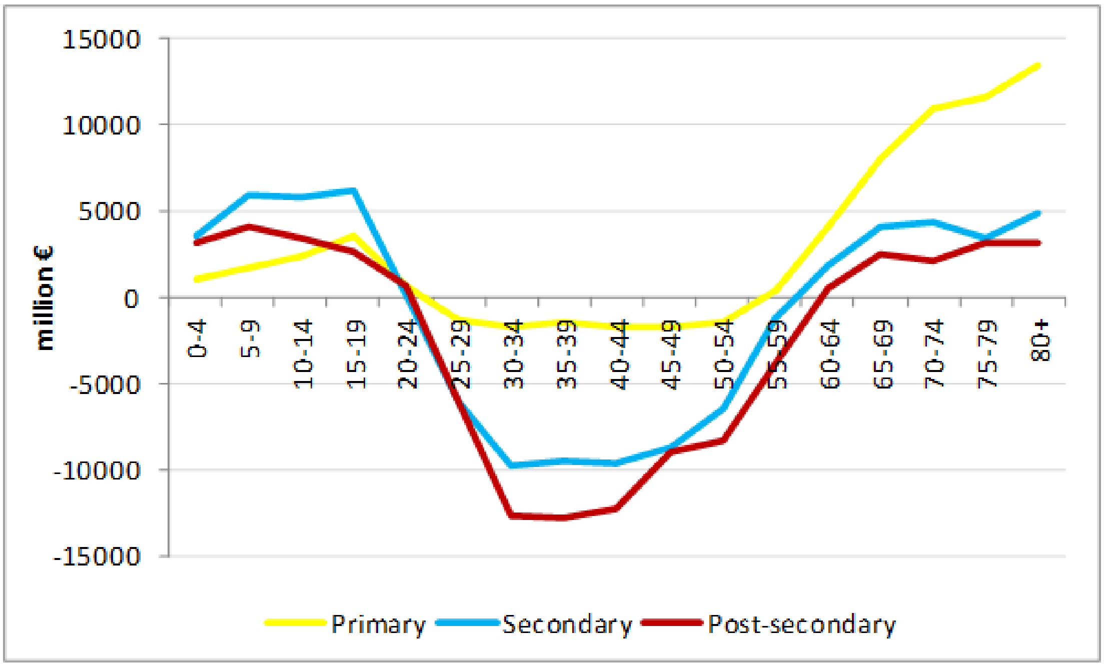
Source: Authors' elaboration

Figure 9 Per capita profiles of public transfer outflows by age and level of education



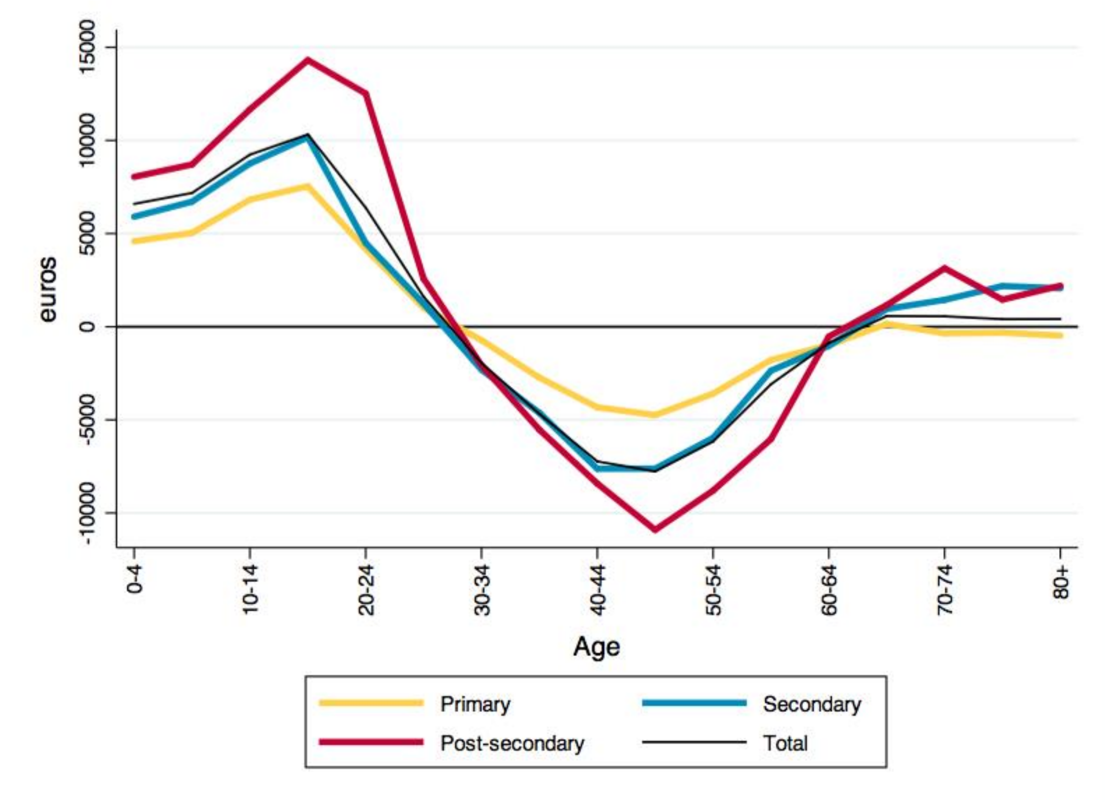
Source: Authors' elaboration

Figure 10 Aggregated profiles of net public transfers by age and level of education



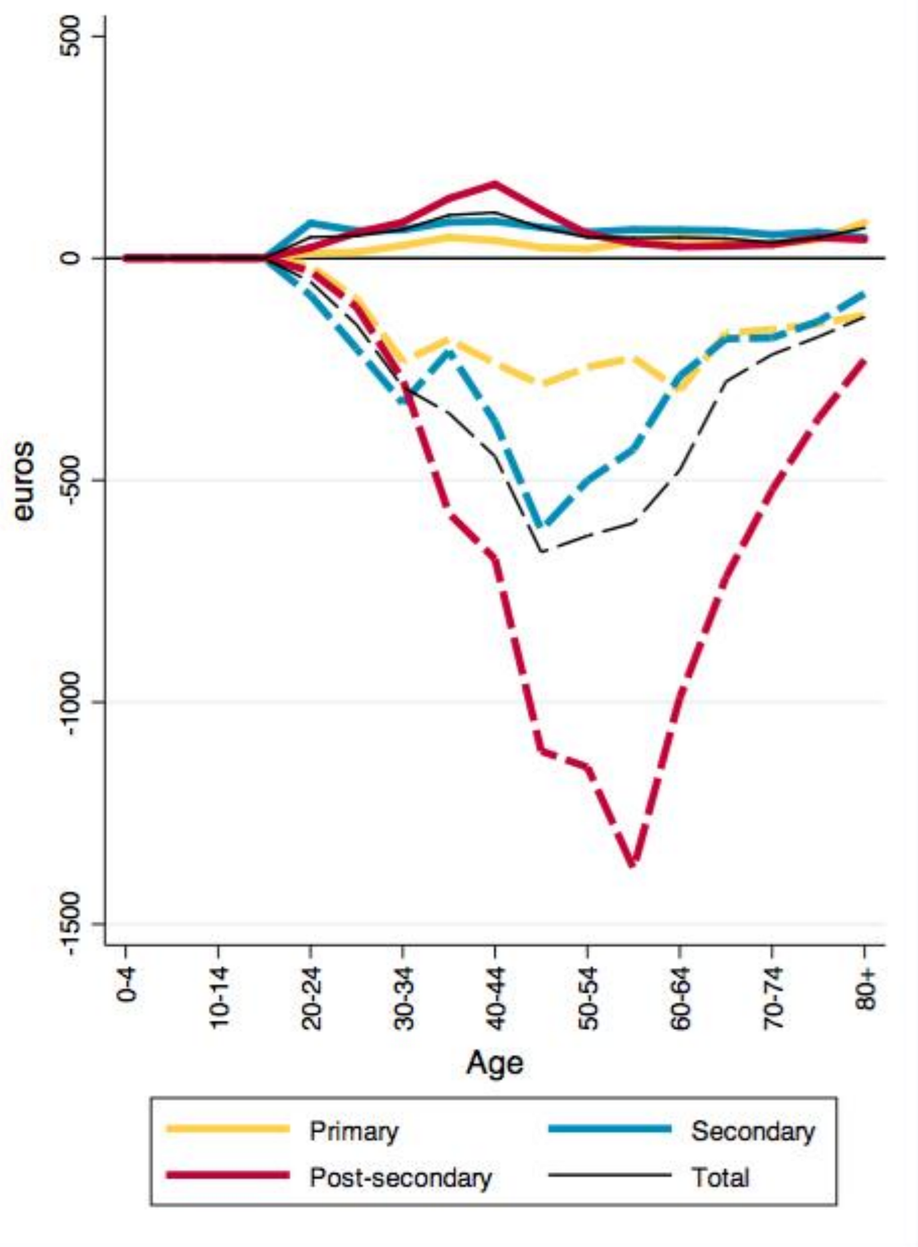
Source: Authors' elaboration

Figure 11 Per capita profiles of net intra-household transfers by age and level of education



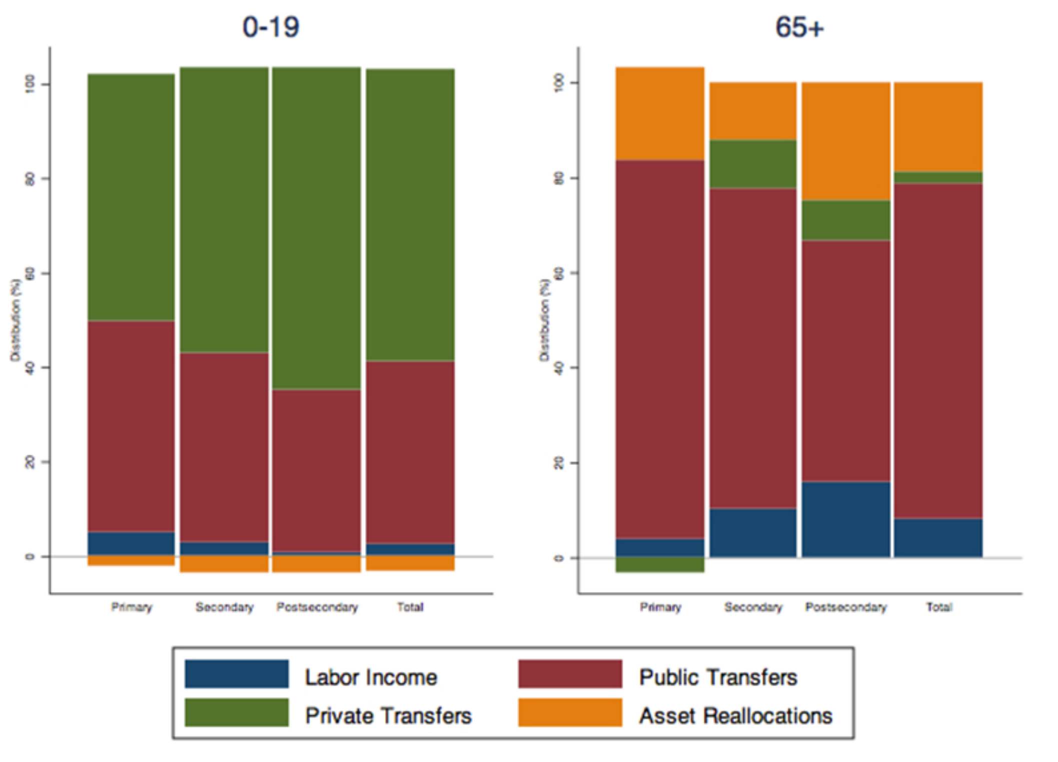
Source: Authors' elaboration

Figure 12 Per capita profiles of inter-household transfers (inflows and outflows) by age and level of education



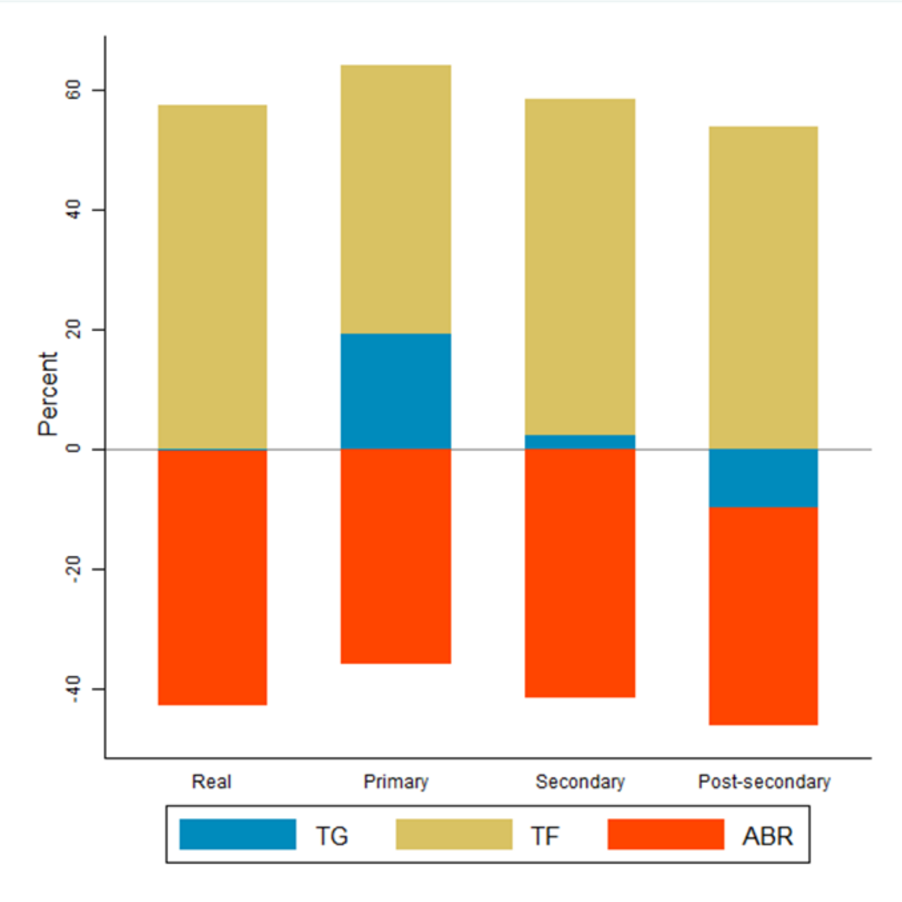
Note: Solid lines refer to inflows and dashed lines to outflows
Source: Authors' elaboration

Figure 13 Consumption financing of children (0-19) and the elderly (65+) by level of education



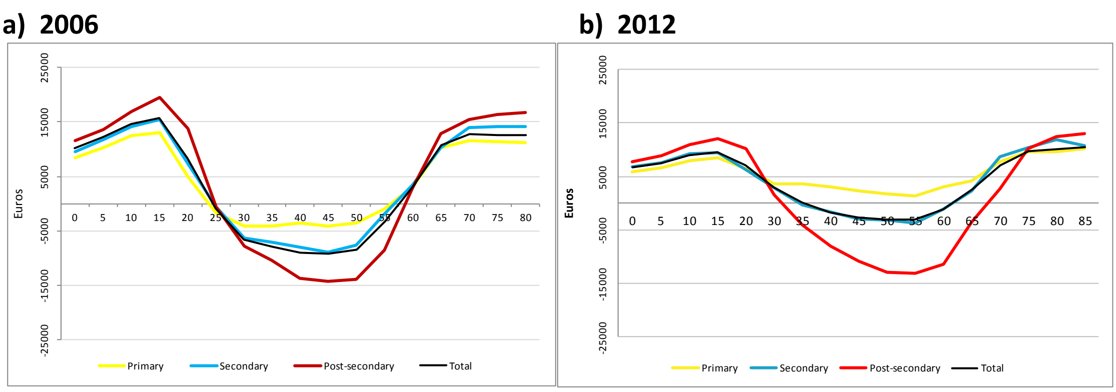
Source: Authors' elaboration

Figure 14 Lifecycle deficit financing with alternative population distributions by level of education



Note: *TG* are public transfers, *TF* private transfers and *ABR* asset-based reallocations
Source: Authors' elaboration

Figure 15 Per capita *LCD* profiles by level of education in 2006 and 2012 (in 2006 euros)



Source: Authors' elaboration

Table 1 Education categories in EPF and EU-SILC surveys, and final classification of education groups

EPF	EU-SILC	Final classification
Illiterate Incomplete compulsory Compulsory*	Primary	Primary
Professional training stage 1 Second stage secondary education	First stage secondary Second stage secondary	Secondary
Professional training stage 2 University	Professional training stage 2 University	Post-secondary

*Compulsory education refers to 'only primary' for generations born before 1982, and refers to 'primary + first stage of secondary education' for generations born after 1982.

Table 2 Labor status of household heads by education and age group in Spain 2006 (in % of total population)

AGE	education level	non-participant	employed	unemp.	retired
15-24	primary	23%	67%	10%	0%
	secondary	10%	83%	7%	0%
	post-second	19%	73%	8%	0%
25-34	primary	4%	82%	15%	0%
	secondary	2%	91%	7%	0%
	post-second	1%	95%	3%	0%
35-44	primary	2%	87%	8%	3%
	secondary	2%	94%	4%	1%
	post-second	1%	97%	3%	0%
45-54	primary	6%	85%	5%	4%
	secondary	3%	90%	4%	3%
	post-second	2%	96%	2%	1%
55-64	primary	11%	59%	6%	24%
	secondary	8%	61%	7%	24%
	post-second	3%	75%	1%	22%
65+	primary	18%	2%	0%	80%
	secondary	13%	4%	1%	82%
	post-second	5%	7%	0%	88%

Source: Authors' calculations from EU-SILC 2006

Table 3 NTA aggregates under alternative population distributions by level of education (in percentage of real distribution)

	YL	C	LCD
all-primary	72%	82%	154%
all-secondary	95%	98%	121%
all- post secondary	129%	123%	76%

Source: Authors' estimations