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Abstract: This article provides a comprehensive overview of how the funding of consumption at different ages is shared between the State, the individual and the family. By applying the National Transfer Accounts method for France, we developed a unique database to analyze how the funding of consumption is secured at each age, how its structure has changed over time, and how the consumption is financed in France compared to that of a set of other developed countries. We find that the elderly in France finance themselves increasingly by their own means, even though public funding of this age group remains significant in France in comparison to other countries. Conversely, the young rely more and more on the State to finance their consumption. Within our sample, France is the country where the young benefited most from public transfers.

Keywords: Generational Economy, National Transfer Accounts, Inter-Generational Equity, Private and Public Consumption

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1. Introduction

A better understanding of the resource allocation across ages is fundamental to put in place welfare reforms in the context of population ageing. In times of major demographic change and a slowdown of economic growth in developed countries, the redistribution of resources between age groups and the funding of the economically inactive groups remains a recurring topic of public debate and a major public policy concern in OECD countries. Governments constantly search for a policy mix that will improve the quality of life of the elderly while at the same time investing in the future of the young and reducing the burden of the working population. Not only life expectancy and education requirements but often also budget constraints are increasing. This potentially creates conflicts of interest in the allocation of resources between age groups (Preston, 1984; Lee and Mason, 2011a). In particular, some authors have shown the negative impact that a growing share of elderly could have on educational spending for the young (Poterba, 1997, 1998; Harris et al., 2001). The links between generations could therefore be deteriorated (United Nations, 2013b; Chen *et al.*, 2018).

With their contribution to the funding of consumption by the young and the elderly, governments influence the distribution of resources between generations. Policy action in this field therefore plays a crucial role for inter-generational equity. However, the family also plays a major role in intergenerational transfers. The rest of consumption expenditure that is not covered by the State and the family is financed by the individuals themselves. In most developed countries, responsibilities between the State, individuals and the family are shared but the weighting is quite different across countries, and weights have varied quite differently over time within countries. How the funding of private and public consumption at different ages is shared between the State, individuals and the family reveals the relative importance of these institutions in a society. Following the typology of Masson (2009), it could help explaining how far the ideal of 'free agent' is put before the concepts of 'equal citizenship' and 'multi-solidarity'[8] in a country.

[8] The concept of 'free agent' focuses on the responsibility of individuals to care for their own needs on the markets, especially for old age, in terms of savings, insurance, pensions and prolonged working life. This allows the State to concentrate funding on younger generations in order to enhance equality of opportunity. The

By applying the methodology of National Transfer Accounts (NTA), this article analyses for France (i) how the funding of consumption (public and private) is secured at each age, (ii) how the funding of consumption has changed over recent decades and (iii) how the consumption is financed compared to that of other countries (China, Germany, Japan, Sweden, United Kingdom, and United States). We consider three sources for funding consumption: the State (net transfers and in-kind services), the individual themselves (income and assets), and *inter vivos* transfers from family members, excluding bequests, following the NTA methodology (United Nations, 2013a).

To do so, we have built a database that includes age-profiles for 87 variables of the French National Accounts, covering the period 1979-2011. This unique database, which contains 281,184 observations, is consistent with the French System of National Accounts. We use two different kinds of data sources: national surveys and national accounts (see section 2.4. for a complete list).

Our work complements other country-specific studies that have already used the NTA method for analyzing how consumption is funded at different ages[9]. Studies that have used the NTA method for developed countries converge in finding that over the last three decades the general level of consumption, which is a standard indicator of welfare, has continuously increased across all ages, while at different rates[10]. With our analysis of the contribution of the State, the family and the individual to the funding of private and public consumption by age, we contribute to the question whether governments reinforce or counterbalance inequalities in consumption between generations.

Our analysis of the different sources of funding of the consumption reveals that while consumption increases were more important for the elderly than for the young over the 1979-2011 period in France, the elderly were not favored by the State. The consumption of the elderly did not result from a larger share in public transfers, but the elderly were instead more

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concept of 'equal citizenship' favors the bond between individuals and the State, which implies important rights as well as duties for citizens, at the expense of other ties (family, associations and networks, between generations). The objective is to become independent of the family at all ages. The concept of 'multi-solidarity' includes a share of responsibility between individuals, the State, and civil society. Family support is completed by government support for the young and the old.

[9] See for example Sambt and Prskawetz (2011) for Austria, Lai and Tung (2015) for Taiwan and Patxot et al. (2012) for Spain.

[10] See for example Miller (2011), Mason and Lee (2011) and d'Albis *et al.* (2017).

autonomous and financed increasingly their consumption by their own means. On the other hand, the consumption of the young was increasingly funded by public means, especially for two age groups: the very young who received more generous family benefits, and those aged 18-24 who benefited from higher public investment in education. Longer educational enrolment thus reduced the relative private consumption of the young, but increased their relative public consumption.

Our international comparison reveals, however, that public funding of the elderly remained significant in France. Nevertheless, this did not happen at the expense of the young. Even if the baby boomer generations in France may increasingly put pressure on public budgets due to their high numbers and their increasing life expectancy, the public per capita-expenditure for the elderly has kept pace with that of younger individuals, , while their consumption levels have increased. We find that over the last decades in France, the State's contribution to the financing of consumption of the elderly has declined, while it has increased for the young, mainly due to more generous family benefits and education expenditure. Besides, the young increasingly benefit not only from public financing, but also from family transfers, while the elderly increasingly finance themselves.

This article is organized as follows: Section 2 presents the NTA method in more detail. Section 3 presents the funding of consumption at each age by comparing per capita profiles to aggregate levels of consumption. Section 4 presents how the funding of per capita consumption of the young and the elderly has varied over time in France. Section 5 compares France to six other countries for which NTA are available. Section 6 concludes by discussing policy implications, methodological limitations as well as potential avenues for future research.

2. Measuring intergenerational transfers with NTA

2.1. Context

The first researchers who incorporated demographic change (changes in population size and age structure) into macroeconomic modelling were Allais (1947) and Samuelson (1958). They pioneered the overlapping generations model (OLG), where the economy is seen through the lens of several generations, making it possible to take into account intergenerational

transfers. Diamond (1965) then incorporated capital into the model and concluded that public and intergenerational transfers contribute to consumption optimality. This approach was complemented by the life-cycle theory by Modigliani and Brumberg (1954) who argued that individual savings influence national savings and enable exchanges between generations. Lee (1980, 1994) then developed a more comprehensive life-cycle model which includes aggregate consumption, savings, transfers and government debt while accounting for birth and survival rates. On the empirical side, the method of generational accounting was developed first by Auerbach *et al.* (1992) to link macro- and micro-economic variables in past, present and future age structures. To assess fiscal policy's redistributive and savings effects on each generation's financial receipts and obligations, the method incorporates generations' present expected value of lifetime net payments to the government into public deficit, debt and fiscal policy. The generational accounting method initially focused on public transfers leaving out an important aspect of intergenerational transfers resulting from the family (Masson, 2002) and the eventual interactions between them and public transfers. To overcome this, the allocation of economic resources between ages must be quantified in a unified and comprehensive manner. The NTA method meets this challenge and was successively applied to build some Full Generational Accounts that incorporate private transfers (Lee et al, 2017). Another limit in generational accounting is its static approach, which implies that individual reactions to changes in fiscal policy, for example in terms of labor supply and savings, cannot be observed (Haveman, 1994). Developing NTA over a long period of time should thus help computing present expected values of lifetime net payments without relying on necessarily sensitive assumptions. Finally, the generational accounting method does not say much on welfare (Kotlikoff, 1995; Diamond, 1996). We believe that the simple measure of living standard that is given by consumption can nevertheless be understood as a first approximation of aggregate welfare, supposing that private and public consumption are perfect substitutes.

The aim of the NTA method is to disaggregate income, consumption and savings by age and therefore to take into account intergenerational transfers made by the State or the family (Mason *et al.*, 2009; Lee and Mason, 2011b). NTA was developed in 2004 by researchers who met in Berkeley, USA, at a workshop co-chaired by professors Ronald Lee and Andrew Mason.

It is today a well-established empirical tool for understanding the generational economy, with harmonized data available for just under 50 countries (United Nations, 2013a).

2.2. The NTA method

The NTA method is based on an accounting equation whereby private and public resources and consumption are equal. An individual's resources, income from labor and capital plus public and private transfer inflows must be equal to the use made of them, whether for consuming, saving or making public and private transfers. Consumption and production levels are then calculated for each age, both individually and in aggregate. Transfers between ages reallocate the wealth produced during the active ages so that individuals can consume at various times in their lives. There are ages when they consume but do not produce – childhood and retirement – and other ages when they produce significantly more than they consume – adulthood.

More specifically, NTA is based on an age-specific flow identity capturing economic flows at each point in time. Variables are indexed by (a), which denotes the age of an individual. This flow identity is similar to a budget constraint for individuals of age a, as seen in life-cycle models. It can be written as follows by traditionally grouping the inflows (left-hand side of the equation) and the outflows (right-hand side):

$$Y^L(a) + Y^K(a) + T^{G+}(a) + T^{F+}(a) = C(a) + S(a) + T^{G-}(a) + T^{F-}(a) \qquad (1)$$

where Y^L is the value of labor income inflow received for age (or age group) a, Y^K is the asset income inflow (that includes net property incomes), T^G is the flow of public transfers, received as denoted by (+) and spent as denoted by (−), T^F is the flow of family transfers also received and spent, C is consumption and, finally, S stands for savings resulting from the residual between the various types of income net of consumption. These variables capture at the same time flows that are domestic and international.

The life-cycle deficit is a key concept of the generational economy. It is the difference between consumption and labor income for every relevant age (or age group), where consumption includes households' public and private consumption of various goods and services, including public and private education and healthcare for example, and where labor income includes employees' earnings with fringe benefits, as well as self-employment and unpaid family workers' incomes. The flow identity, given by equation (1), can thus be re-

arranged to reveal how the economic life-cycle deficit (or surplus) is funded by (or distributed through) asset-based reallocations (i.e. asset incomes minus savings) and net transfers:

$$\left(C(a) - Y^{L}(a)\right) = \left(Y^{K}(a) - S(a)\right) + \left(T^{G+}(a) - T^{G-}(a) + T^{F+}(a) - T^{F-}(a)\right) \quad (2)$$

In this article, we have decomposed consumption according to our three main sources of funding, namely the individual, the State and the family. To do so, we have split savings into public savings, denoted S^{G}, and private savings, denoted S^{F}. We also have split asset income into public asset income, Y^{KG}, and private asset income, Y^{KF}. We obtain:

$$C(a) = [Y^{L}(a) + Y^{KF}(a) - S^{F}(a)] + [T^{G+}(a) - T^{G-}(a) + Y^{KG}(a) - S^{G}(a)] + [T^{F+}(a) - T^{F-}(a)] \quad (3)$$

The first term refers to individual funding, (labor and capita income minus private savings), the second to State funding (net payments by the State) and the third to net family transfers.

2.3. Construction of aggregates

The profiles by age are constructed so as to be consistent with National Accounts (NA). The first step is to define all the aggregates required. After smoothing, the various mean profiles by age are then fitted to the corresponding NA aggregates (d'Albis *et al.*, 2015). Note that some aggregates, such as private transfer inflows and outflows, have no equivalent in NA.

The State's funding of consumption comprises public transfers and the reallocation of public assets. The public transfer aggregates are calculated in two stages. Firstly, all public transfer inflows and outflows are calculated from general economic tables. Secondly, each component of the public transfer inflows and outflows is calculated from various NA sources, since the aggregates given in general economic tables are not sufficiently detailed. The transfer aggregates that we calculate with the NTA method differ from NA in that they are based on distinguishing between three entities: the private sector, including non-financial companies, financial companies, households and non-profit bodies; the public sector, including government agencies; and the rest of the world. The public transfers correspond solely to

exchanges between private and public sectors, while exchanges with the rest of the world correspond to so-called "net transfers"[11].

Public in-kind transfers are broken down into several headings (education, health, elder care, housing, etc.). This is also the case for public cash transfers (unemployment benefits, higher education grants, family benefits, disability benefits, etc.).

The income from public assets comprises income from capital and income from the property of government agencies. The income from property of government agencies corresponds to income from assets owned by government agencies. The income from capital equals the government's net operating surplus. Public savings is equivalent to the SNA (system of national accounts) concept but is has no exact counterpart in Government Financial Statistics.

An individual's resources include income from work and private asset-based reallocation. Income from work comprises gross salaries including social security contributions, employers' contributions and the share of gross mixed income attributed to labor. Gross mixed income comprises the earnings of labor and capital. The proportions of labor and capital have been estimated by the method proposed by Askenazy *et al.* (2012). Mean income of employees in a sector is obtained by dividing the aggregate figure for wages and salaries in that sector by the number of full-time equivalent employees (FTE). This mean annual salary per FTE is assumed to be the average income of the self-employed. This final figure is multiplied by the number of self-employed FTEs in each sector.

Appendix A provides numbers of and comments on the aggregates (public transfers, labor income, private assets, etc.) in France from 1979 to 2001.

2.4. Construction of individual profiles by age

The NTA method is based on constructing individual profiles of funding of consumption by age from survey questionnaires and public statistical data. The surveys we used are the French Household Expenditure Surveys *('Budget de famille'*) from the French National Statistical Institute (INSEE) for family and other social benefits, compulsory contributions, labor-, property- and capital income, savings and family transfers, the French Health and Social

[11] Public transfers inflows exactly equal public transfer outflows, from the private sector, plus net transfers with the rest of the world. Compulsory contributions from the private sector to the public sector do not necessarily correspond to public transfers from the public sector to the private sector.

Protection Surveys ('*Enquêtes sur la santé et la protection sociale - ESPS*') ,and the permanent sample of individuals insured under the state health insurance ('*Échantillons permanents d'assurés sociaux* - EPAS)' for public healthcare expenditure, the French Household Disability and Health Survey ('*Enquête Drees Handicap Santé Ménage'*) and the French Institutions Disability and Health Survey ('*Enquête Drees Handicap Santé Institutions'*) for benefits for elder care, as well as the French Wealth Survey ('*Enquête Patrimoine'*) and the French Financial Asset Survey ('*Enquête Actifs Financiers'*) for public pensions. The national accounts we used to obtain information on education expenditure and pupil numbers come from the *French Ministry of National Education, Higher Education and Research*. Appendix B provides a more detailed overview of the different French data sources we used to construct the individual age-specific profiles.

The age profiles of public transfer in-kind inflows were presented in detail in recent work on the life-cycle deficit (d'Albis *et al.*, 2015). Most age profiles for public transfer cash inflows are known at the individual level from family budget surveys (unemployment benefits, retirement payments, etc.[12]).

One exception is family benefits, which are only known at the household level. Taxes and social security contributions are also mostly observed at the household level in the surveys. This is also the case for asset income as well as private transfer inflows and outflows between households. For these in- and outflows that are observed at the household level, consistent allocation keys had to be found in order to individualize them within households. Appendix C provides more information about the particular allocation keys we developed in order to obtain individual age-specific profiles for these items which are only observed on a household basis in the French surveys.

Income from public assets and public savings are allocated according to the profiles of compulsory contributions, using the NTA Manual methodology (United Nations, 2013a).

The labor income profiles by age are determined from household survey data that include information on individual salaries. The age profile for salaries is obtained by calculating for each age the mean salary of all survey respondents of that age, with the salaries of non-

[12] Expenses in first employment are broken down according to the profiles for unemployment benefits, and the profiles for industrial injury and sickness benefits according to the profiles for income from salaries.

working respondent set at zero[13]. A similar methodology with calculation of mean income at each age is applied for employers' contributions and the income of the self-employed.

Transfers to fund consumption within households (hereafter "intra-household cash transfers") and per capita savings are calculated from individual bases using all the previously calculated variables. Appendix D details the method for calculating intra-household cash transfers.

3. Funding of consumption at each age: the role of the State, the family and the individual

The left column of Figure 1 shows the three funding sources (the State, the family and the individual) of per capita consumption provided at each age. These are net values, which correspond to inflows received by the individual minus outflows paid by the individual. To ease the comparisons over the period considered, the per capita value of each component is divided by the per capita labor income of individuals aged 30-49[14].

The right column of Figure 1 shows the aggregate values of the three components in 2011 constant billion euros, which are thus the product of the individual profiles and the population age distribution. The different years (1979 to 2011) correspond to the different waves of the '*Budget de familles'* – surveys that we used to compile this data.

Figure 1

The main trend we observe is a shift to the right between 1979 and 2011 for the individual funding of consumption (labor market income and asset-based income), which can be seen both in the left and the right column. This trend can be explained by two phenomena:

The first concerns the narrowing of the working-age period under the double effect of postponing of age of entry into the labor market and the diminishing age at labor exit. Over the period, the age of entry into the labor market increased with the rise of educational attainment[15] and the increasing difficulties of non-educated young people to enter the labor

[13] See d'Albis *et al.* (2015) for details of the method for calculating salaries.

[14] This normalization is often used in NTA (see Lee and Mason, 2011b, d'Albis *et al.*, 2017). It facilitates both intertemporal and international comparisons.

[15] The number of years of study has increased considerably over the period as a result of policies aiming at raising educational attainment. Schooling life expectancy between the ages of 2 and 29 rose from 16.9 years in 1985-1986 to 18.8 years in 1995-1996, before decreasing slightly until 2013-2014, when it reached 18.3 years (Ministère de l'Education Nationale, 2016).

market: between 1975 and 2015, the unemployment rate of individuals aged 20-24 years increased fourfold in France. The retirement age decreased in the beginning of the observed period, especially following the 1982 reform that allowed for a decrease in the legal retirement age from 65 to 60 years old. However, since the middle of the 1990s, different pension reforms were implemented in France to insure the long-term sustainability of the pension system. In particular, the required contribution period to get a full pension regularly increased over the period, inducing a postponement of the retirement age.

The second concerns the shift to the right of the modal age of the profile of individual funding of consumption by age. This change can mostly be explained by a change in the labor income profiles (d'Albis *et al.,* 2017). However, private asset income net of private savings also plays an increasingly important role in France, especially after age 60, where they represented 64% of the individual source of funding in 2011 (see section 4.2. for more details).

Increasing per capita income combined with the demographic weight of baby-boomers result in a strong effect on the aggregate values of individual funding of consumption by age, as illustrated in the right column of Figure 1. Between the end of the Second World War and the beginning of the 1970s, around 900.000 babies were born per year in France.

Baby-boomers generated high amounts of resources which were transferred to non-working age groups through transfers. In 1995, the baby boomer cohorts born between 1945 and 1965 constituted the heart of the working age. At this time, they generated 75% of the net negative transfers. However, the first baby-boom generations are now starting to retire and they are now less contributing to the public transfer system.

The young benefited the most from the significant private transfers made by the groups of individuals at working age. However, when it comes to State funding of consumption, the per capita net public transfers did not only increase for the young, but also for the elderly over the 32 observed years. In 1979, net public transfers of individuals aged 0-24 accounted only for 14% of the labor income earned by individuals aged 30 to 49, while in 2011, they reached 22%[16]. For the elderly, we observe also a net upward flow of public resources from 1979 to 2011. In 2011, average net public transfers of individuals aged 60+ represented 42% of the

[16] The increasing age of entry into working life explains part of this result. Note that when we constrain the age group to individuals aged 0 to 18, the indicator still increases sharply.

labor income earned by individuals aged 30 to 49, whereas it was only 34% in 1979. The effect is even stronger for individuals aged 75+. The indicator for this age group was 42% in 1979 and reached 56% in 2011.

We can thus conclude that the increase of public transfers for the elderly did not happen at the expense of the young in France, but both age groups benefitted from more and more generous State funding. The young also benefitted from increasing family transfers, which come especially from the groups at working age: we can actually see that while family funding of per capita consumption got less negative for the elderly, it got more negative for the population at working age over the years.

4. Funding the consumption of inactive age groups

The relative weight of individual funding, State funding and family funding of consumption can be measured separately for the periods of economic inactivity during youth and old age. The 0-24 and 60-and-over (60+) age groups have been used for the two periods outside working age for every year from 1979 to 2011. These ages correspond to the earliest and latest ages when individual funding is greater than total consumption (since the year 2000, see Table 1).

Table 1

4.1 Young individuals are less independent in financial terms

Figure 2 shows that in 2011 in France, the State's role in funding consumption during youth (ages 0-24) gradually decreased with age, while private transfers increased between ages 0 and 16, and individual funding set in between ages 16 and 24. In 2011, public transfers fell from 93% of consumption at birth to -18% at age 24. Private transfers rose from 1% at birth to 50% at age 16 and then fell continuously until age 24. Individual funding was 3% at age 16 and 105% at age 24.

Figure 2

Figure 3 shows that the main change in the funding of young people's consumption from 1979 to 2011 was an increase in the State's contribution and a decrease in individual funding . In the 1979-1995 period in particular, there was a significant reduction in individual funding, from 38% to 19% and a steady increase in State funding of consumption from 32% to 45%. In

1979 and 1984, the funding of young people's consumption was relatively evenly balanced between the State, the individual and private transfers. The State supported 32% of this consumption in 1979 and 36% in 1984, the individual 38% and 34%, and private transfers 30% in both years. Subsequently, the State share rose and the individual's share fell[17]. In 2011, the State funded 45% of young people's consumption, the individual 19% and private transfers 36% (34% of transfers within households, from parents to children, and 2% of transfers between households). The increase in the percentage of State funded consumption of the young between 1979 and 2011 is mainly due to the rise in school enrolment and higher education expenditure per capita, reflecting the government's will to invest in human capital, but it is also due to the increase in family benefits and a decrease in taxes paid by the youth. In 2011, education accounted for 37.4% of public transfer inflows. In-kind transfers allocated equally across ages accounted for 27.7% of public transfer inflows and finally, family benefits accounted for 19.5% of public transfer inflows for the age group 0-24 .

Figure 3

The upheaval in the State's share of funding of young people's consumption is most striking for the 0-3 age group. For these children, the State's share rose between 1979 and 2011 from 56.3% to 91.8%, while private transfers fell from 27.5% to a mere 9.1%. This increase in public transfers is mainly due to family benefits, which rose from 24% of infant consumption in 1979 to 50.8% in 2011[18]. This increase reflects a generous family policy in France[19], the effects of which are recognized for maintaining fertility at one of the highest level in Europe (around replacement level) while enabling women to remain in the labor market (Luci-Greulich and Thévenon, 2013).

This increase in public funding of 0 to 3 year old children does not, however, lead to the same extent to an increase in total consumption of children aged 0-3. Certainly, the value of family

[17]The collapse in individual funding from 1984 to 1989 is associated with the decline in labor income for the youngest age groups and on-off features in private transfers in 1989. That year, private intra-household transfers were much higher than the two years before and after 1989.

[18] Cash support to families, investments in childhood education (pre-school from age two and a half on), high level of child care coverage for children aged 0-2 (crèches, subsidies and tax deductions for child minders and nannies), parental leave benefits.

[19] From 1979 to 2011, the increase in family benefit expenditure has been especially due to a rather continuous increase in lump sum cash benefits around childbirth and in public child care coverage, the introduction of child care subsidies (for nannies and child minders) and parental leave benefits during the 1990s, and the increase of child care subsidies and parental leave benefits during the 2000s.

benefits increased steadily over the period from 5,283 euros in 1979 to 17,583 euros in 2011 (2011 constant euros), with an average annual increase of 3.8% over the observed 32 years. However, the consumption of children aged 0-3 has "only" increased from 21,990 euros to 34,615 euros (2011 constant euros) over the period, which represents an average annual increase of only 1.4%, as family benefits have crowded out private family transfers after 2000. Indeed, private transfers for children aged 0-3 decreased by 2% over the period from 6,054 euros in 1979 to 3,156 euros in 2011 (they actually increased by 0.6% annually between 1979 and 2000, but decreased by 6.7% annually between 2000 and 2011).

Remember that according to the NTA decomposition, State funding consists of public transfer inflows and outflows, and public asset-based reallocation, made up of income from public assets and public savings. The increase in the State share of the funding of young people's consumption is associated with changes in *both* public transfer inflows and outflows, as we observe a steady increase from 1979 to 2011 in the share of public transfer inflows and at the same time a decrease in public transfer outflows (Figure 4). Public transfer inflows rose from 57.2% of the consumption of this age group in 1979 to 64% in 2011. Public transfer outflows fell from -23.5% in 1979 to -19.2% in 1995 and then flattened out until 2011.

Figure 4

4.2 Greater financial independence for the elderly

Similar to what we have seen for young people, the funding of consumption for the elderly depends also mainly on the State in France. While being modest at age 60, State funding steadily increases to become the dominant source of funding of consumption after age 65 (Figure 2). In 2011, 61% of consumption of individuals aged 60+ was covered by the State and 44% by the individuals themselves (Figure 5). Individuals aged 60+ consequently funded younger cohorts with 5% of their income (private transfers: -5%). State funding came mostly in the form of retirement pensions, which accounted for 63.2% of public transfer inflows, and healthcare, which accounted for 16.9% in 2011. The funding of dependency by benefits and

grants for elderly individuals[20] represented, with 1.3% of public transfer inflows, a relatively small proportion (2.5% after age 75). The role of retirement pensions is increasing over age. At age 60, gross public pensions (out of taxes) accounted for 41% of the funding of total consumption in 2011. It accounted for 70% at age 75 and for 74% at age 90. Public health consumption is also increasing with age: it accounted for 12% of total consumption at age 60, 20% at age 75 and 26% at age 90 in 2011.

Figure 5

However, Figure 5 also shows that unlike for the young , the share of public transfers in the funding of consumption fell from 1984 to 2011 for individuals aged 60+ from 71% to 61% (while it has risen slightly from 1979 to 1984 from 68% to 71%). The continuous fall of State funded consumption between 1984 and 2011 was compensated by a rise in individual funding of consumption for individuals aged 60 and over. Although individual funding initially fell from 45% to 37% between 1979 and 1989, it rose from 38% in 1995 to 44% in 2011.

Figure 5 further shows that the contribution of family transfers to the consumption of the 60 year-olds in France was negative for the entire study period. On average, the private transfers of the elderly contribute slightly to the consumption of younger cohorts (youth and adults), which means that the consumption of individuals aged 60+ is not funded by private transfers from younger cohorts. However, Figure 5 also reveals a reduction in the share of net private transfers in the funding of consumption for the observed period, from –12% in 1979 to –5% in 2011. Private transfers consist of transfers within and between households. A breakdown of private transfers in the two components shows that the reduction in the share of net private transfers in consumption for individuals aged 60+ is explained both by a reduction in within- and a reduction in between-household private transfers. First, the share in consumption of net transfers between households decreased continuously from 1979 (-7%) to 2000 (-2%), but remained relatively constant thereafter. Second, the share in consumption of net transfers within households decreased from 1979 (-6%) to 1989 (-1%) and remained relatively constant thereafter. One explanation may be the decrease of net transfers from

[20] Elderly individuals in France are eligible for individualized autonomy benefits (named APA) if they need help for daily activities, for elderly individuals's solidarity benefits (ASPA) if their income is low, and for supplementary invalidity benefits (ASI) if they have a disability and are below official retirement age.

husbands aged 60+ to their spouses aged 59 or less, due to the increased financial independence of women[21].

The increase in the share of individual funding of the consumption of those aged 60 and over, illustrated in Figure 5, is largely due to increasing private asset income net of private savings. This income rose sharply as a proportion of individual funding from 1979 to 2005 (Figure 6). It went from 32% in 1979 to 72% in 2005, and then fell back to 64% in 2011. The increased share of net income from savings is mainly due to a steady increase in asset-based income from 1979 to 2000.

Figure 6

Figure 7 shows the evolution of the share of the State, the individual and the family in the funding of consumption of the elderly over time, for the age groups 60-64, 65-69, 70-74, 75-79 and 80+.

Figure 7

The reduction in the share of public transfers in the funding of consumption affected all the older age groups fairly evenly. Along with this reduction, funding from labor income also fell from 1979 to 1984 for the 60-64 group and from 1979 to the early 2000s for those over 65. We also note a slight increase in funding from labor income in the early 2000s for both groups, as a result of successive reforms of the retirement pension system by the Balladur government in 1993 and the Raffarin government in 2003. The increase in the share of private asset-based reallocation involves the age groups from ages 60 to 79 in a similar manner, except for the 60-64 age group at the start of the period, when the older groups were catching up from 1979 to 1989. The share of private asset-based reallocation for the 60-64 group rose from 1% in 1979 to 27% in 2011, whereas that of private asset-based reallocation for the 65-69 group rose from 15% in 1979 to 39% in 2011. Public asset-based reallocation only accounts for a very small share of total consumption in France[22].

[21] In a gender decomposition of net private transfers, Renteria *et al.* (2016) highlight that among the elderly population, women are net private transfer recipients while men are net donors.

[22] This is also the case in the United States, Germany and Sweden. On the contrary, public asset-based reallocation plays a significant role in China, and to a lesser extent also in Japan and the United Kingdom. Therefore, it is important to include public asset-based reallocation when we conduct international comparisons (see section 5).

In terms of intergenerational comparisons, d'Albis and Navaux (2016) computed the per capita amounts of public transfers received by individuals aged 60+ and compared them to the ones received by individuals aged 25 to 59. They showed that individuals aged 60+ received 3.2 times more public transfers than individuals aged 25 to 59 in 1979. This ratio remained remarkably stable over 32 years as in 2011, individuals aged 60+ received 3.1 times more public transfer inflows than individuals aged 25 to 59. The authors also showed that the increasing aggregate share of public transfer inflows received by individuals aged 60+ between 1979 and 2011 (which increased from 35.7% to 44.9% of total public transfer inflows) was entirely due to the change in the age structure of the population. Hence, the increase of relative per capita consumption of the elderly has been financed by individual resources rather than public transfers from other age groups.

Similarly, we now compute the shares of our three different sources of our three different sources of funding for the different time periods for the two age groups (25 to 59, 60+), this time by supposing that the profiles by age (consumption, income, savings etc.) do not change over time but only the age structure does. We find that with this calculation, the funding shares do almost not change over time for both age groups. We derive from this result that the changes over time in the shares of the State, the individual and the family in the funding of consumption by age, which were illustrated in Figure 3 and Figure 5, are not caused by demographic changes. Our finding that in France, the young got increasingly dependent and the elderly got increasingly independent in financial terms over the period 1979 to 2011, is therewith due to changes in individual behavior and to public policies rather than to changes in the age structure of the population.

5. International comparison

Internationally, France stands out in its funding of the consumption of young and elderly individuals. Most notably, compared with six other members of the NTA project (China, Germany, Japan, Sweden, United Kingdom, United States[23]), France is the country where the young benefited most from public transfers. Indeed, in 2005, the French State funded 43% of

[23] We used the NTA data available on May 18, 2018 on ntaccounts.org: Germany (2003), Sweden (2003), United Kingdom (2012), United States (2006), Japan (2004), and China (2002).

the consumption of the 0-24 age group, well ahead of Sweden, which came second with 38% of consumption funded by the State (Figure 8). The United States came third with 36%, followed closely by Japan with 35%. China came last in the panel with 15%. France is the only one of the seven countries where the State's share of funding is the largest of the three sources. In the other countries, private transfers are largest for the young, particularly in China where private spending on education is very important. In this country, private transfers reach 65% of the consumption of the 0-24 age group.

Figure 8

The funding of the consumption of the elderly depends mostly on the State in the three continental European countries on the panel. In Sweden, 77% is funded by the State, 62% in France and 56% in Germany (Figure 9). The rest is individual funding, namely 50% of consumption in Germany, 42% in France, and 35% in Sweden. All three countries display downward private transfers, much higher in Sweden (–12%) than in Germany (–6%) and France (–4%). In all the other panel countries, individual funding is largest. It is 86% of consumption in the United States, 67% in China, 61% in the United Kingdom and 58% in Japan. Like the continental European countries, the United States and Japan have downward private transfers, and only China has significant upward private transfers (9%) to fund the consumption of the elderly. In the United Kingdom, upward private transfers account for 1% of consumption.

Figure 9

The analysis of the funding of consumption at each age reveals each country's special characteristics. In most European countries, governments support programs (public pension and healthcare programs) for the elderly. Indeed, in France, Germany and Sweden, from the age of 65, the State provides most funding, whereas it plays only a minor role, even after age 70, in the United Kingdom, United States and China. Sweden is the country where the State share rises fastest from 65 to 70. In all panel countries, the State's share in funding consumption rises with age, except for China, where it rises until age 74 and then regularly declines (Figure 10).

Figure 10

6. Conclusion

In this article, we have applied the NTA method to France to gain a comparative understanding of economic flows between generations. Our particular interest lies in the question how far the State and individuals share the responsibility of ensuring the consumption of different generations.

By comparing the funding of consumption of the young (ages 0-24), the adults (ages 25-59) and the elderly (ages 60+), we find that, while consumption of the elderly increased compared to the younger generations over the 1979-2011 period, the funding of the consumption of the elderly does not result from more public transfers (per capita) to the elderly. The elderly are instead more autonomous and finance themselves increasingly by their own means, not only due to less public transfers, but also due to less financial transfers that they are giving towards younger generations (adults and the young).

At the same time, the financial dependence of the young has been increasing over the observed period. Decreasing relative private consumption levels of the young (of their total consumption) are found to go with decreasing individual funding of consumption of the young. They receive more public, but also –albeit to a much lesser extent- more family transfers to finance their consumption. Increases in the State-funded consumption of the young concern especially two age groups: the very young who receive more generous family benefits, and those aged 18-24 who benefit from higher public investment in education. Longer educational enrolment thus reduces the relative private consumption of the young, but increases their relative public consumption.

Despite the decrease over the last decade in the relative contribution of the State to the funding of consumption of the elderly, public funding of the elderly remains significant in France in comparison to other countries. In comparison to Germany, Sweden, the United Kingdom, the United States, Japan, China, we find that France is the second country, just behind Sweden, where the State plays the largest role for the elderly. Our results show that these public spending to the elderly have not reduced the relative importance of the State in financing the consumption of the young. For the age group 0-24 years, France is the country where the State plays the largest role, especially for children under the age of 15.

Indeed, in France, a massive change in the age structure of the population could have been observed over the last decades, in particular due to the baby boomer cohorts. We find, however, that the public per capita-expenditure for the elderly has remained relatively stable in France, while their consumption has increased. The increasing financial autonomy of the elderly, combined with a decreasing financial independence of the young, is thus a result of changes in individual behavior rather than demographic changes. We find, however, that demographic changes play an important role for the aggregate levels of consumption.

We therewith conclude that despite a potential conflict of interest in the allocation of public resources between the elderly and the young, population aging in France does not imply a withdrawal of public responsibility when it comes to invest in the future of the young generations. In comparison to the other countries in our analysis, both the elderly and the young depend less on family solidarity, even if family transfers have increased for the young over the last decades in France. As individual and public funding seem to complement each other, the system of national solidarity is neither at the expense of individuals nor at the expense of family solidarity. Consequently, the funding of consumption in France is most similar to the concept of "multi-solidarity", as it cannot be said that either individual or public responsibility is placed above the other. When it comes to the funding of the young generations, the US, Japan, Sweden, and Germany may also be classified as countries rather in favor of "multi-solidarity". Only in the UK and China, individual responsibility largely dominates in the structure of the funding of consumption by the young. When it comes to the funding of the elderly, Sweden, Germany and Japan join France in the concept of "multi-solidarity" with a relatively balanced responsibility between public and private funding. In the United States and United Kingdom, but also in China, the funding structure of the consumption of the elderly corresponds more to the concept of "free agent", giving more importance to the responsibility to care for one's own needs in old age.

Despite "multi-solidarity" in France for both the young and the elderly, our finding points to a decreasing relative importance of public funding of consumption for the elderly in France and an increasing necessity for the elderly of funding their needs by their own means. This evolution may induce three risks. First of all, it might increase their dependency on other family members. Second, the increasing need to take financial precautions for oneself lowers

the capacity of inter-generational transfers. This is likely to come hand in hand with consumption levels that are more unequally distributed among individuals.

The third risk may come from an increasing focus on individual financial responsibility for the elderly, which brings France closer to a "free agent" model. Consequently, even though France succeeds quite well in sharing responsibilities between different agents in comparison to other countries, there is a clear risk that welfare inequalities will increase in the near future, especially for the elderly. Those inequalities would add –and potentially reinforce– health and longevity inequalities across socio-economic groups. According to Murtin et al. (2017), the gap in life expectancy at age 25 between low educated and highly educated groups is already quite high: it ranged for French men between 51.4 years for low educated to 58.2 years for highly educated. In addition, wealth and heritage are already relatively unevenly distributed in France in comparison to many other developed countries (Piketty, 2014). For the young (and thus the future adults), the situation is ambiguous: the increasing importance of family transfers increases inequalities, while the increasing importance of public transfers reduces them. The potential impact of the funding of consumption of the young on their future socio-demographic outcomes (levels and socio-economic differentials in fertility, life expectancy …) in France is therewith quite unclear, but represents a highly interesting field of future research.

While the NTA approach contributes significantly to the understanding of the impact of demographic change on the broader economy in France, it faces nevertheless several limitations and challenges. First, it must be mentioned that the NTA age profiles are a cross-sectional analysis of individuals observed at various time periods, which means we do not trace individuals throughout their lives. As profiles change over the years, the extent to which the NTA profiles can be used to forecast economic behavior of future generations is limited. A possibility to overcome this difficulty is to create pseudo-panels as proposed by d'Albis and Badji (2017).

Second, the accuracy of the NTA profiles depends on the quality of the survey data used. Even though all surveys used in this study are representative of the population, the attribution of observed funding and consumption items to different household members turned out to be a difficult undertaking when these items were not observed on an individual but a household basis. It encourages us to develop attribution tools that are less accurate than if public

transfers had been continuously observed on an individual basis in all waves. In general, the lack of data also leads us to apply a common sharing rule for the consumption of goods and services inside the household, which might not always correspond to reality (see d'Albis and Moosa, 2016, for a more detailed discussion of this criticism).

Third, the non-observed process of intra-household sharing also leads us to leave aside issues relating to the quantification of home production and time transfers. This runs the risk of underestimating the age profiles. Some groups are particularly affected by this bias, for example women of certain cohorts, the elderly, the rural population or certain socio-economic categories. Including time-use surveys into the NTA analysis would make it possible to take into account the allocation of time, and emerges thus as a promising avenue for future research. Some projects going in this direction are already on their way, such as the National Time Transfer Accounts (NTTA).

Fourth, and most importantly, the NTA profiles present averages per age, but we do not distinguish between different populations. We find that on average, the elderly increasingly finance their needs with their own means, especially relying on a steady increase in asset-based income. But we should keep in mind that wealth is unevenly distributed. Besides, certain individuals aged 65+ are dependent on private transfers from their families and some others contribute to financing the needs of younger family members. Elderly women might be more in need of private transfers than elderly men, and differences between socio-economic categories, regions, etc. are certainly also worth taking into account. For European countries, the use of EU-SILC (Statistics of Income and Living Conditions) – a survey covering 31 countries and providing a large set of harmonized socioeconomic measures - would be a conceivable way of integrating the NTA approach in a cross-country perspective.

To conclude, integrating further survey data represents a major advancement for the NTA approach, allowing it to develop further as a powerful empirical tool to understand the generational economy. Continuous efforts are needed to build a global database that enhances our knowledge of generational flows and inspires public debate about effective policies in times of demographic and economic change.

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References

Albis (d') H., Badji I. (2017): "Intergenerational inequalities in standards of living in France. *Economie et Statistique / Economics and Statistics*, vol. 491-492, pp. 71-92

Albis (d') H., Bonnet C., Navaux J., Pelletan J., Toubon H., Wolff F.-C. (2015): "The Lifecycle Deficit for France, 1979-2005", *Journal of the Economics of Ageing*, vol. 5, pp. 79-85.

Albis (d') H., Bonnet C., Navaux J., Pelletan J., Wolff F.-C. (2017): "Lifecycle Deficit in France: An Assessment for the period 1979-2011", *Economie et Statistique / Economics and Statistics*, vol. 491-492, pp. 47-70.

Albis (d') H., Moosa D. (2016): "Generational Economics and the National Transfers Accounts", *Journal of Demographic Economics*, 81, 2015, 409–441.

Albis (d') H., Navaux J. (2016) : "La répartition par âge des transferts publics en France", in Lorenzi J.-H. (Ed.), Choc démographique, rebond économique. Editions Descartes et Cie, Collection Chaire Transitions Démographiques, Transitions Economiques.

Allais, M. (1947) : « *Economie et Intérêt: Présentation nouvelle des problèmes fondamentaux relatifs au rôle économique du taux de l'intérêt et de leur solutions* », Vol. 2. Paris, France: Imprimerie Nationale.

André M., Biotteau AL., Duval J., 2016, « Module de taxation indirecte du modèle Ines - HYPOTHÈSES, PRINCIPES ET ASPECTS PRATIQUES », Document de travail, Série sources et méthodes, n°60, Drees, novembre.

Askenazy P., Cette G., Sylvain A. (2012): « Le partage de la valeur ajoutée », *La Découverte*, Collection Repères - n°576.

Auerbach A. J., Gokhale J., Kotlikoff L.K. (1992): "Generational accounting: A new approach to understanding the effects of fiscal policy on saving." *The Scandinavian Journal of Economics* 94(2), 303–318.

Chen T., Hallaert JJ., Pitt A., Qu H., Queyranne M., Rhee A., Shabunina A., Vandenbussche J., Yackovlev I., 2018, "Inequality and Poverty across Generations in the European Union", IMF Staff Discussion Notes No. 18/01

Diamond, P. (1965): "National debt in a neoclassical growth model." *The American Economic Review* 55(5), 1126–1150.

Diamond, P. (1996): "Generational Accounts and Generational Balance: An Assessment." *National Tax Journal* 49(4), 597-607.

Harris A. R., Evans W. N., Schwab R. M. (2001): "Education spending in an aging America". *Journal of Public Economics* 81, 449–472.

Haveman, R. (1994): "Should generational accounts replace public budgets and deficits? *Journal of Economic Perspectives* 8(1), 95–111.

Kotlikoff, L. J. (1995): "*Generational accounting."* NBER Reporter.

Lai M.S., Tung A-C. (2015): "Who supports the elderly? The changing economic lifecycle reallocation in Taiwan, 1985 and 2005", *Journal of the Economics of Ageing,* vol. 5, pp. 63-68.

Lee, R.D. (1980): "Age structure, intergenerational transfers and economic growth: An overview", *Revue économique*, 31(6), p. 1129-1156.

Lee, R.D. (1994): "Population Age Structure, Intergenerational Transfer, and Wealth: A New Approach, with Applications to the United States". *The Journal of Human Resources* 29.4 (1994): 1027–1063.

Lee R., Mason A. (2011a): "Generational Economics in a Changing World", *Population and Development Review* 37 (supplement): 115-142.

Lee R., Mason A., eds., (2011b): *"Population Aging and the Generational Economy: A Global Perspective*", Edward Elgar, Northampton, Massachusetts.

Luci-Greulich A., Thévenon O. (2013): "The impact of family policy packages on fertility trends in developed countries." *European Journal of Population*, Vol. 29 N° 4, pp.387-416.

Lee R., McCarthy D., Sefton J. and Sambt J. (2017): "Full Generational Accounts: What Do We Give to the Next Generation?", *Population and Development Review*, Volume 43, Issue 4, pp. 695-720.

Mason A., Lee R., Tung A-C., Lai M-S., Miller T. (2009): *"Population Aging and Intergenerational Transfers: Introducing Age into National Accounts",* in D. A. Wise (ed.), Developments in the Economics of Aging, pp. 89-122.

Mason A., Lee R. (2011): "*Introducing age into national accounts."* In R. Lee and A. Mason (eds.), Population Aging and the Generational Economy, pp. 55–78. Cheltenham, UK: Edward Elgar Publishing.

Masson, A. (2002), « Méthode et usages des comptes générationnels : un regard décalé », *Économie et Prévision*, vol. 154(3), pp. 1-24.

Masson, A. (2009): *« Des liens et transferts entre générations. »* Editions de l'EHESS.

Ministère de l'Education Nationale (2016): « L'Etat de l'école », n° 26

Miller, T. (2011): "*The rise of the intergenerational state: Aging and development."* In R. Lee and A. Mason (eds.), Population Aging and the Generational Economy, pp. 161–184. Cheltenham, UK: Edward Elgar Publishing.

Modigliani F., Brumberg R. (1954): "*Utility analysis and the consumption function: An interpretation of cross-section data."* In The Collected Papers of Franco Modigliani, vol. 2, pp. 3–46. New Brunswich, NJ, USA: The MIT Press.

Murtin F., Mackenbach J., Jasilionis D., Mira d'Ercole M. (2017): "Inequalities in longevity by education in OECD countries: Insights from new OECD estimates", OECD Statistics Working Papers, 2017/02, OECD Publishing, Paris.

Patxot C., Rentería E., Romero M., Souto G. (2012): "Measuring the balance of government intervention on forward and backward family transfers using NTA estimates: the modified Lee arrows," *International Tax and Public Finance,* Springer, vol. 19(3), pages 442-461.

Piketty, T. (2014): "*Capital in the Twenty-First Century*", Harvard University Press, 816p.

Poterba, J. M. (1997): "Demographic Structure and the Political Economy of Public Education." *Journal of Policy Analysis and Management* 16, 48-66.

Poterba, J. M. (1998): "Demographic change, Intergenerational Linkages, and Public Education." *The American Economic Review* 88(2), 315–320.

Preston, S. H. (1984): "Children and the Elderly: Divergent Paths for America's Dependent." *Demography* 21, no. 4 (1984): 435–457.

Rentería E., Scandurra R., Souto G., Patxot C. (2016): "Intergenerational money and time transfers by gender in Spain: Who are the actual dependants?", *Demographic Research*, 34(24): 689-704.

Sambt J., Prskawetz A. (2011): *"National Transfer Accounts for Austria: low levels of education and the generosity of the social security system",* in Lee R.D., Mason A., (eds.), Population Aging and the Generational Economy: A Global Perspective, Edward Elgar, Northampton, Massachusetts.

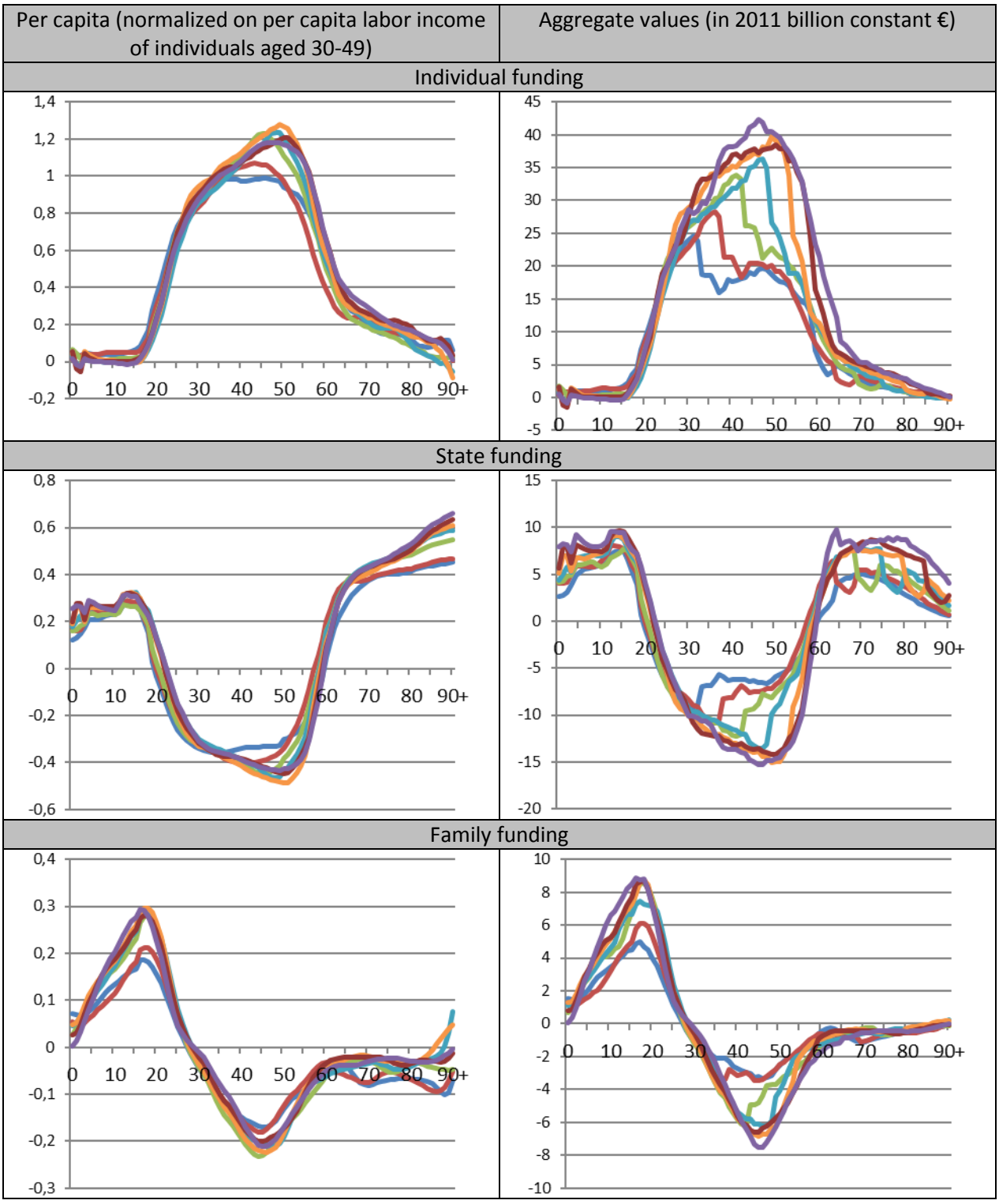
Samuelson, P. (1958): "An exact consumption-loan model of interest with or without the social contrivance of money." *Journal of Political Economy* 66(6), 467–482.

United Nations (2013a): *"National Transfer Accounts manual: Measuring and analyzing the generational economy"*, Department of Economic and Social Affairs, Population Division.

United Nations (2013b): "*Intergenerational solidarity and the needs of future generations*", Report of the Secretary-General, 5 August 2013.

Tables and Figures

Figure 1. Funding sources for consumption - France 1979-2011



Coverage: France.
Source: French Household Expenditure Survey (*Enquête Budget de Famille*), French Wealth Survey (*Enquête Patrimoine)*, French Financial Asset Survey (*Enquête Actifs Financiers*), French Health and Social Protection Survey (*Enquête santé et protection sociale, ESPS*), *permanent sample of people insured under the state health insurance scheme* (*Échantillon Permanent d'Assurés Sociaux, EPAS*), 2008 French Household Disability and Health Survey (*Enquête Drees Handicap Santé Ménage*) and 2009 French Institutions Disability and Health Survey (*Enquête Drees Handicap Santé Institutions)*, National Accounts. Calculations by the authors.

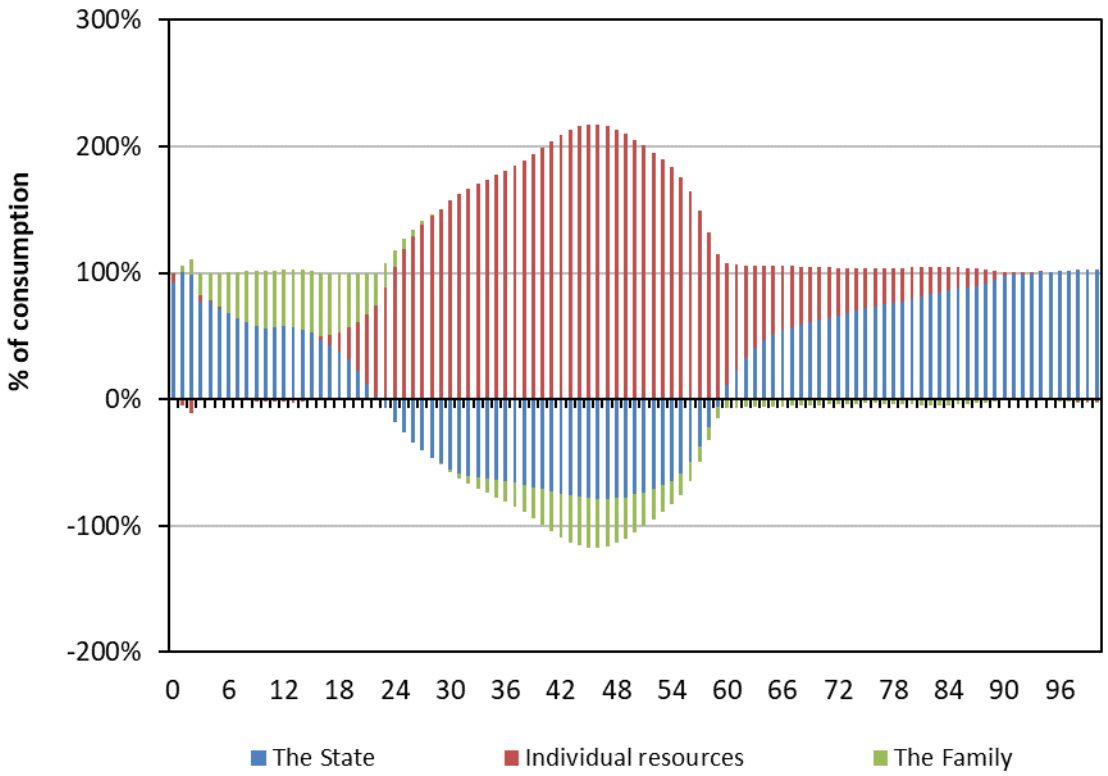
Table 1. First and last age for which individual resources (labor income and asset income) are higher than total consumption

	1979	1984	1989	1995	2000	2005	2011
First age to which $C(a) < \left(Y^L(a) + Y^K(a) - S(a)\right)$	22	23	23	25	24	24	24
Last age to which $C(a) < \left(Y^L(a) + Y^K(a) - S(a)\right)$	59	57	59	59	59	59	59

Coverage: France.

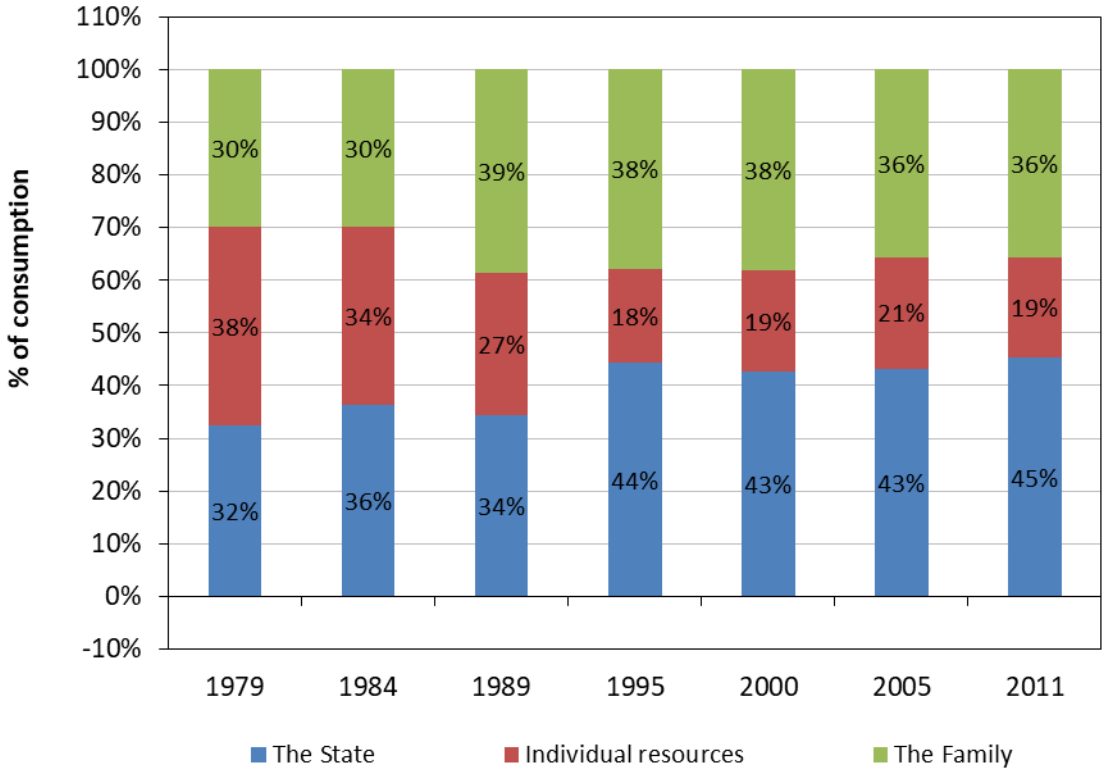
Source: French Household Expenditure Survey (*Enquête Budget de Famille*), French Wealth Survey (*Enquête Patrimoine)*, French Financial Asset Survey (*Enquête Actifs Financiers*), French Health and Social Protection Survey (*Enquête santé et protection sociale, ESPS*), *permanent sample of people insured under the state health insurance scheme* (*Échantillon Permanent d'Assurés Sociaux, EPAS*), 2008 French Household Disability and Health Survey (*Enquête Drees Handicap Santé Ménage*) and 2009 French Institutions Disability and Health Survey (*Enquête Drees Handicap Santé Institutions)*, National Accounts. Calculations by the authors.

Figure 2. Funding sources of consumption - France -2011



Coverage: France.
Source: French Household Expenditure Survey (Enquête Budget de Famille), French Wealth Survey (Enquête Patrimoine), French Financial Asset Survey (Enquête Actifs Financiers), French Health and Social Protection Survey (Enquête santé et protection sociale, ESPS), permanent sample of people insured under the state health insurance scheme (Échantillon Permanent d'Assurés Sociaux, EPAS), 2008 French Household Disability and Health Survey (Enquête Drees Handicap Santé Ménage) and 2009 French Institutions Disability and Health Survey (Enquête Drees Handicap Santé Institutions), National Accounts. Calculations by the authors.

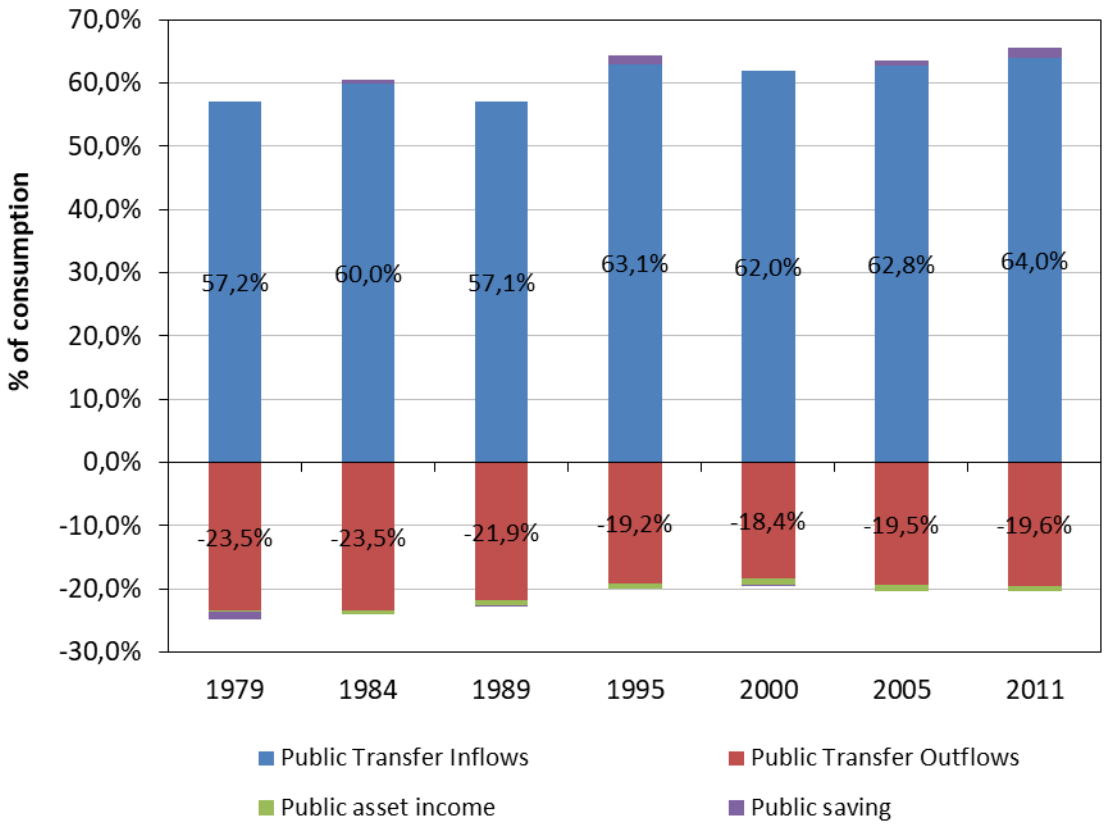
Figure 3. Funding sources for consumption before the age of 25 - France 1979-2011



Coverage: France.

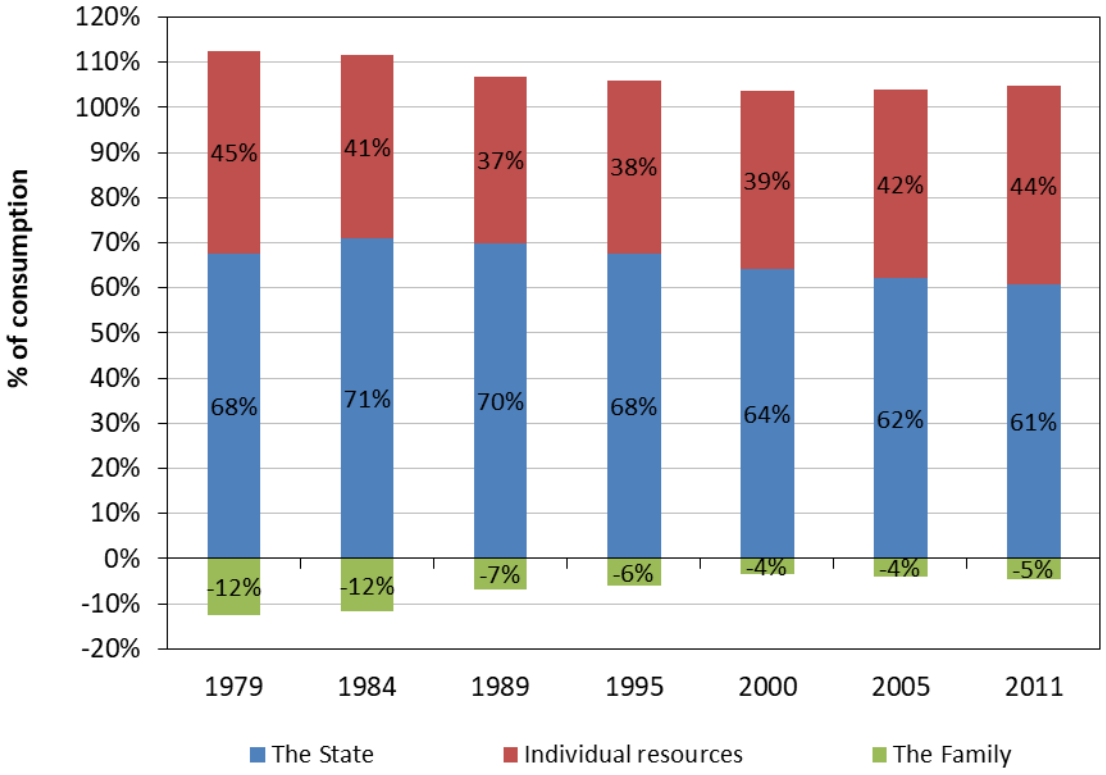
Source: French Household Expenditure Survey (Enquête Budget de Famille), French Wealth Survey (Enquête Patrimoine), French Financial Asset Survey (Enquête Actifs Financiers), French Health and Social Protection Survey (Enquête santé et protection sociale, ESPS), permanent sample of people insured under the state health insurance scheme (Échantillon Permanent d'Assurés Sociaux, EPAS), 2008 French Household Disability and Health Survey (Enquête Drees Handicap Santé Ménage) and 2009 French Institutions Disability and Health Survey (Enquête Drees Handicap Santé Institutions), National Accounts. Calculations by the authors.

Figure 4. Sources of public funding for consumption before the age of 25 - France 1979-2011



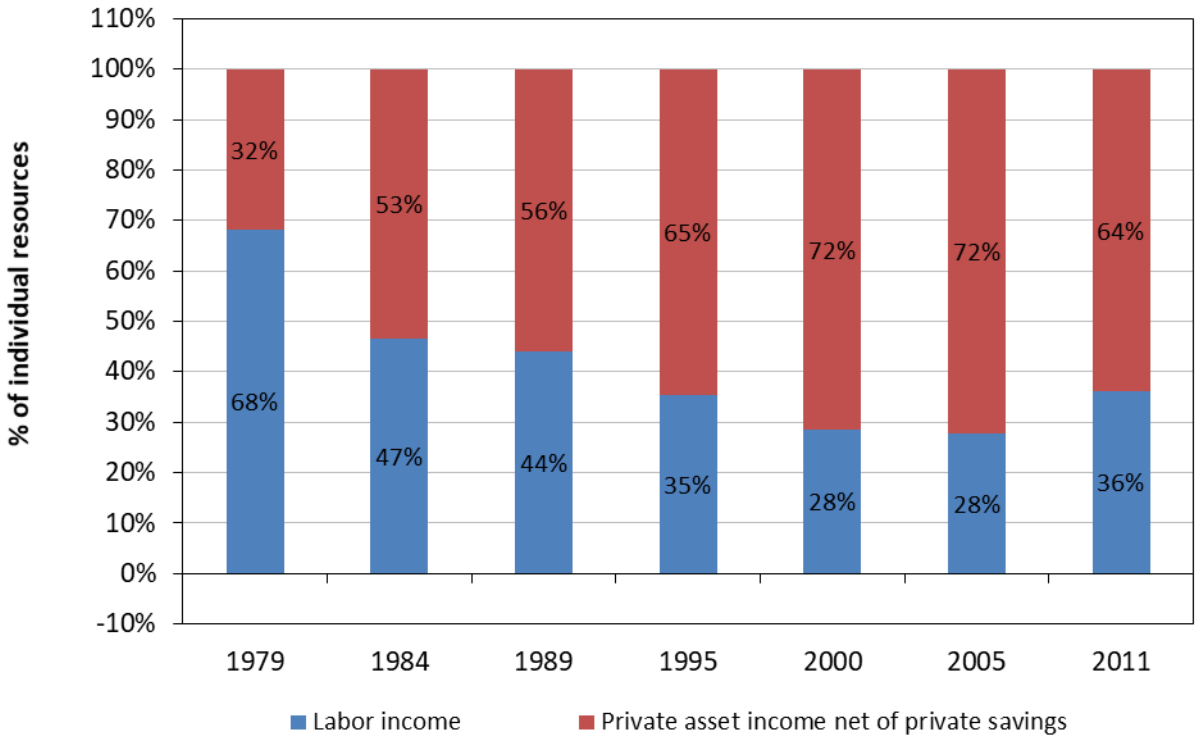
Coverage: France.
Source: French Household Expenditure Survey (Enquête Budget de Famille), French Wealth Survey (Enquête Patrimoine), French Financial Asset Survey (Enquête Actifs Financiers), French Health and Social Protection Survey (Enquête santé et protection sociale, ESPS), permanent sample of people insured under the state health insurance scheme (Échantillon Permanent d'Assurés Sociaux, EPAS), 2008 French Household Disability and Health Survey (Enquête Drees Handicap Santé Ménage) and 2009 French Institutions Disability and Health Survey (Enquête Drees Handicap Santé Institutions), National Accounts. Calculations by the authors.

Figure 5. Funding sources for consumption for ages 60+ - France 1979-2011



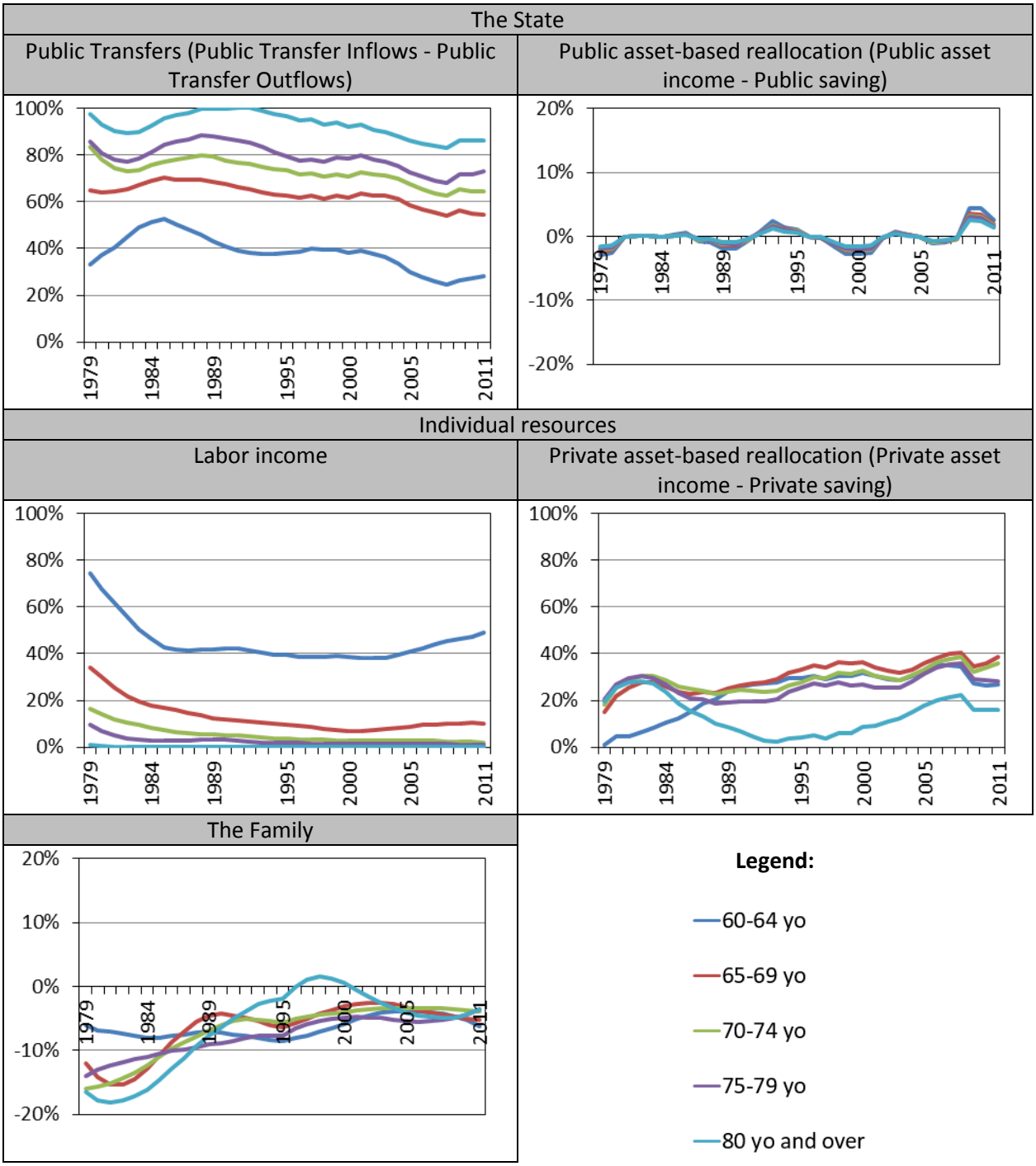
Coverage: France.
Source: French Household Expenditure Survey (Enquête Budget de Famille), French Wealth Survey (Enquête Patrimoine), French Financial Asset Survey (Enquête Actifs Financiers), French Health and Social Protection Survey (Enquête santé et protection sociale, ESPS), permanent sample of people insured under the state health insurance scheme (Échantillon Permanent d'Assurés Sociaux, EPAS), 2008 French Household Disability and Health Survey (Enquête Drees Handicap Santé Ménage) and 2009 French Institutions Disability and Health Survey (Enquête Drees Handicap Santé Institutions), National Accounts. Calculations by the authors.

Figure 6. Sources of individual resources ages 60+ - France 1979-2011



Coverage: France.
Source: French Household Expenditure Survey (Enquête Budget de Famille), French Wealth Survey (Enquête Patrimoine), French Financial Asset Survey (Enquête Actifs Financiers), French Health and Social Protection Survey (Enquête santé et protection sociale, ESPS), permanent sample of people insured under the state health insurance scheme (Échantillon Permanent d'Assurés Sociaux, EPAS), 2008 French Household Disability and Health Survey (Enquête Drees Handicap Santé Ménage) and 2009 French Institutions Disability and Health Survey (Enquête Drees Handicap Santé Institutions), National Accounts. Calculations by the authors.

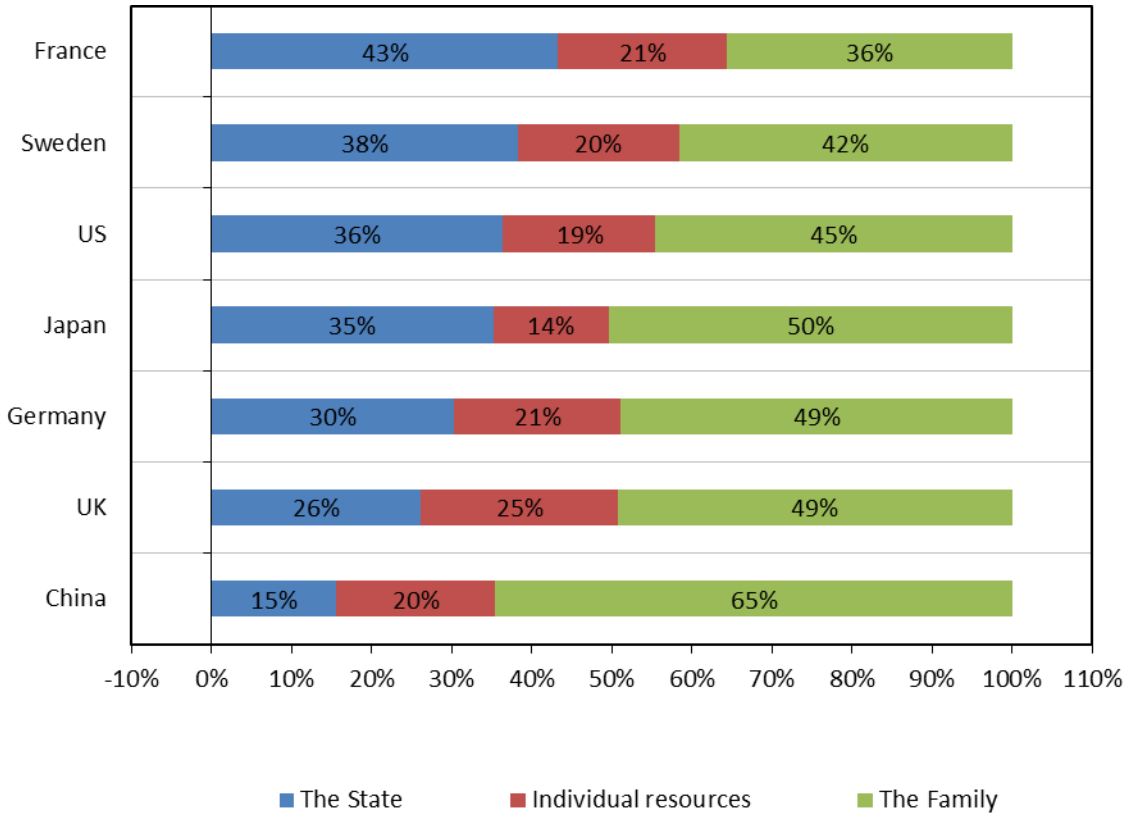
Figure 7. Share of each funding source in total consumption for ages 60+ - France 1979-2011



Coverage: France.

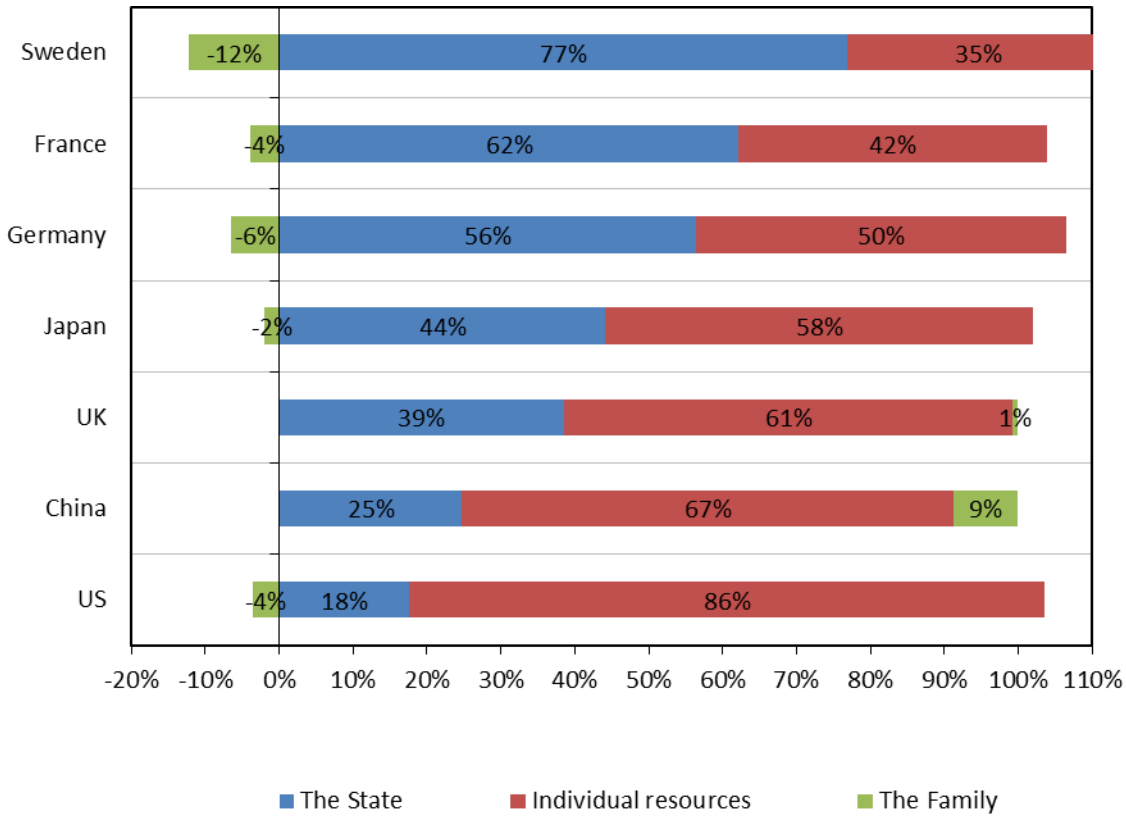
Source: French Household Expenditure Survey (Enquête Budget de Famille), French Wealth Survey (Enquête Patrimoine), French Financial Asset Survey (Enquête Actifs Financiers), French Health and Social Protection Survey (Enquête santé et protection sociale, ESPS), permanent sample of people insured under the state health insurance scheme (Échantillon Permanent d'Assurés Sociaux, EPAS), 2008 French Household Disability and Health Survey (Enquête Drees Handicap Santé Ménage) and 2009 French Institutions Disability and Health Survey (Enquête Drees Handicap Santé Institutions), National Accounts. Calculations by the authors.

Figure 8. Funding sources of consumption before age 25– cross-country comparison



Source: French Household Expenditure Survey (Enquête Budget de Famille), French Wealth Survey (Enquête Patrimoine), French Financial Asset Survey (Enquête Actifs Financiers), French Health and Social Protection Survey (Enquête santé et protection sociale, ESPS), permanent sample of people insured under the state health insurance scheme (Échantillon Permanent d'Assurés Sociaux, EPAS), 2008 French Household Disability and Health Survey (Enquête Drees Handicap Santé Ménage) and 2009 French Institutions Disability and Health Survey (Enquête Drees Handicap Santé Institutions), French National Accounts, International data from the National Transfer Accounts. Calculations by the authors.

Figure 9. Funding sources for consumption for ages 60+ – cross-country comparison



Source: French Household Expenditure Survey (Enquête Budget de Famille), French Wealth Survey (Enquête Patrimoine), French Financial Asset Survey (Enquête Actifs Financiers), French Health and Social Protection Survey (Enquête santé et protection sociale, ESPS), permanent sample of people insured under the state health insurance scheme (Échantillon Permanent d'Assurés Sociaux, EPAS), 2008 French Household Disability and Health Survey (Enquête Drees Handicap Santé Ménage) and 2009 French Institutions Disability and Health Survey (Enquête Drees Handicap Santé Institutions), French National Accounts, International data from the National Transfer Accounts. Calculations by the authors.

Figure 10. Funding sources for consumption – cross-country comparison

Source: French Household Expenditure Survey (Enquête Budget de Famille), French Wealth Survey (Enquête Patrimoine), French Financial Asset Survey (Enquête Actifs Financiers), French Health and Social Protection Survey (Enquête santé et protection sociale, ESPS), permanent sample of people insured under the state health insurance scheme (Échantillon Permanent d'Assurés Sociaux, EPAS), 2008 French Household Disability and Health Survey (Enquête Drees Handicap Santé Ménage) and 2009 French Institutions Disability and Health Survey (Enquête Drees Handicap Santé Institutions), French National Accounts, International data from the National Transfer Accounts. Calculations by the authors.

Appendix A. Aggregates in France

In 2011, public transfer inflows in France, from the public sector to the private sector, were €909.4 billion, of which 53.5% in-kind[24] and 46.5% cash. Of the in-kind support, 64.6% was individual aid and 35.4% collective (Table A). Public transfer outflows were €938.7 billion in 2011, in which €29.3 billion were transferred to the rest of the world. In 2011, compulsory contributions were €898.1 billion, namely €40.6 billion less than public transfers received[25]. In the period from 1979 to 2011, this figure in France was in surplus until 2005. Then it fell from a surplus of €1.5 billion in 2005 (constant 2011 euros) to a deficit of €40.6 billion in 2011.

Most of the in-kind public transfer expenditure goes on the public consumption of education and healthcare and on collective transfers in-kind (such as police, justice or national defense), respectively 18.8%, 29.8% and 35.4% of all public transfer inflows in-kind in 2011 (Table B). As public consumption of healthcare rose as a share of all transfers in-kind from 24.2% in 1979 to 29.8% in 2011, so the share of public expenditure on education fell from 22.9% to 18.8%. The share of collective transfers in-kind also fell over this period, from 41.1% of total transfers in-kind in 1979 to 35.4% in 2011.

In terms of public transfer cash inflows, retirement pensions, including old-age minimum income, basic pensions and supplementary pensions were almost exactly two-thirds (66.8%) of cash public transfers in 2011. This proportion had risen from 60.3% in 1979. Compulsory contributions are broken down into fourteen headings. In 2011, social security and employers' contributions were 41.9% of the total, VAT 15.7% and CSG and CRDS surcharges 10.4%.

Public savings were a negative figure of €76.4 billion in 2011. In 2011, the income from private property was €352.1 billion, whereas the figure for the income from public assets was a negative one of €35.7 billion. In the same year, private savings were €141.1 billion and public savings a negative figure of €76.4 billion. Private net transfers with the rest of the world were a negative figure of €40.6 billion in 2011.

[24] The aggregates and profiles of public in-kind transfers correspond to the aggregates and profiles of public consumption.

[25] This difference corresponds to the concept of transfer deficit specific to NTA, not to be confused with the concept of public deficit. Transfer deficit is the difference between transfer received by household from the public sector and taxes that are transferred by household to the public sector, whose purpose is to finance public transfer inflows. It does not includes all the taxes and all public expenses, as public operating expenses or public capital expenditure.

Table A1: Aggregates – France 1979-2011 (Constant euros 2011)

	1979	1984	1989	1995	2000	2005	2011
Public Transfer							
Public Transfer Inflows (billions euros)	427,7	501,8	561,6	657,2	717,2	812,5	909,4
Public Transfer Inflows, in-kind (%)	56,8%	55,8%	55,3%	54,8%	55,3%	54,9%	53,5%
Individual (%)	58,9%	58,4%	59,0%	61,2%	61,5%	63,9%	64,6%
Collective (%)	41,1%	41,6%	41,0%	38,8%	38,5%	36,1%	35,4%
Public Transfer Inflows, cash (%)	43,2%	44,2%	44,7%	45,2%	44,7%	45,1%	46,5%
Public Transfer Outflows (billions euros)	438,8	513,4	578,4	677,3	741,0	839,8	938,7
Taxes and duties (billions euros)	463,0	515,2	600,9	663,4	778,0	841,3	898,1
Transfer deficit (+) / surplus (-) (billions euros)	-24,2	-1,8	-22,6	13,9	-37,0	-1,5	40,6
Net Public Transfers with the rest of the world (billions euros)	-11,1	-11,7	-16,7	-20,1	-23,8	-27,2	-29,3
Public asset–based reallocations							
Asset income (billions euros)	-2,3	-11,5	-16,4	-31,3	-36,2	-37,2	-35,7
Saving (billions euros)	21,9	-9,7	6,2	-45,2	0,7	-35,7	-76,4
Labor Income							
Gross wages (billions euros)	165,401	288,9087	376,0861	475,8141	580,962	702,8425	830,8289
Employer's contributions (billions euros)	58,68457	107,806	143,9671	179,4733	210,3253	250,8246	300,6853
Gross Mixed Income – Labour share (billions euros)	35,34767	60,17248	70,32011	65,61061	66,10027	79,99823	82,56264
Private asset–based reallocations							
Asset income (billions euros)	123,6	123,6	250,6	272,6	363,7	364,4	352,1
Private property income inflows (billions euros)	246,7	362,3	460,4	502,7	570,0	636,2	667,4
Private property income outflows (billions euros)	241,1	361,7	446,8	479,6	517,0	582,5	604,4
Interests on loans (%)	0,1	0,1	0,1	0,1	0,0	0,0	0,0
Other private property income outflows (%)	0,9	0,9	0,9	0,9	1,0	1,0	1,0
Capital income (billions euros)	118,0	123,0	237,1	249,5	310,7	310,7	289,1
Imputed rents (%)	0,3	0,2	0,2	0,3	0,3	0,3	0,4
Gross Mixed Income – Capital share (%)	0,1	0,0	0,0	0,1	0,1	0,1	0,1
Profit and non-profit institutions (%)	0,6	0,7	0,7	0,6	0,6	0,6	0,5
Saving (billions euros)	99,6	64,2	109,2	135,4	152,7	150,4	141,1
Household – net saving (billions euros)	114,4	82,8	65,2	105,5	109,8	112,6	129,5
Household – gross saving (billions euros)	155,2	127,7	115,0	156,6	163,7	176,1	204,5
Consumption of fixed capital (billions euros)	40,8	44,9	49,8	51,1	53,8	63,4	75,0
Other private sectors – net saving (billions euros) (1)	-14,8	-18,6	44,0	29,9	42,8	37,8	11,6
Private Transfers							
Private Transfers from the rest of the world	-15,6	-14,7	-18,1	-20,2	-28,4	-33,1	-40,6

Source: data from public statistics, calculations by the authors.

Table A2. Aggregates of public transfers – France 1979-2011 (Constant euros 2011)

	1979	1984	1989	1995	2000	2005	2011
Public Transfer Inflows, in-kind (en milliards d'euros)	**143,2**	**163,6**	**183,4**	**220,5**	**243,9**	**285,4**	**313,8**
Education	22,9%	22,0%	20,5%	22,0%	22,0%	20,6%	18,8%
Health	24,2%	24,1%	25,7%	26,1%	26,4%	29,2%	29,8%
Benefits for elder care (*Aide personnalisée pour l'autonomie, APA*)	0,0%	0,0%	0,0%	0,0%	0,0%	1,0%	1,1%
Other elder care	3,8%	3,8%	4,0%	4,0%	3,7%	2,9%	3,1%
Housing benefits (*Aide personnalisée au logement, APL*)	2,1%	3,1%	3,5%	4,1%	4,0%	3,5%	3,4%
Other individual in-kind public transfer inflows	5,9%	5,5%	5,3%	5,0%	5,4%	6,7%	8,3%
Collective in-kind public transfer inflows	41,1%	41,6%	41,0%	38,8%	38,5%	36,1%	35,4%
Public Transfer Inflows, cash (en milliards d'euros)	**184,6**	**221,9**	**250,9**	**296,9**	**320,4**	**366,2**	**423,3**
Unemployment benefits	7,9%	12,0%	10,6%	8,9%	9,1%	9,7%	8,0%
Higher education grants	0,3%	0,3%	0,3%	0,4%	0,4%	0,4%	0,4%
Family benefits	15,5%	15,0%	13,6%	12,7%	12,7%	12,1%	10,9%
Disability benefits (*Allocation adulte handicapé, AAH*)	1,6%	1,5%	1,4%	1,4%	1,5%	1,5%	1,7%
Solidarity benefits (RMI, RSA)	0,7%	0,6%	1,2%	2,4%	2,8%	3,0%	3,6%
Public pensions	60,3%	59,2%	62,4%	63,6%	65,4%	64,3%	66,8%
industrial injury and sickness benefits (*Accident du travail et maladie professionnelle, ATMP*)	6,7%	5,3%	4,6%	3,8%	3,5%	3,5%	3,0%
First employment grants	1,4%	1,2%	1,6%	2,5%	1,5%	0,9%	0,9%
Other cash transfers	5,5%	4,9%	4,1%	4,3%	3,1%	4,6%	4,7%
Taxes and duties (thousand euros)	**463,0**	**515,2**	**600,9**	**663,4**	**778,0**	**841,3**	**898,1**
Income tax (*Impôt sur le revenu des personnes physiques, IRPP*)	8,9%	9,3%	8,0%	7,9%	7,4%	6,5%	5,7%
Contribution sociale généralisée (CSG) et Contribution pour le remboursement de la dette sociale (CRDS)	0,0%	0,0%	0,0%	2,8%	9,7%	9,9%	10,4%
Property and residence taxes (*Taxe d'habitation et taxe foncière*)	2,6%	3,0%	3,3%	3,9%	3,9%	4,1%	5,4%
Employees' contributions (*Cotisations sociales*)	13,5%	15,5%	16,7%	16,5%	11,2%	11,8%	11,9%
Employers' contributions (*Cotisations patronales*)	33,8%	32,8%	31,4%	30,4%	28,8%	29,1%	30,0%
Value added tax	17,9%	17,3%	17,8%	15,7%	16,5%	16,6%	15,7%
Petroleum tax (*Taxe intérieure sur les produits pétroliers, TIPP*)	4,0%	3,3%	4,1%	4,1%	3,7%	3,2%	2,7%
Tobacco (*Droits d'accises sur le tabac*)	0,6%	0,7%	0,8%	1,2%	1,1%	1,2%	1,3%
Movable capital (*Prélèvements sur les capitaux mobiliers*)	1,2%	1,5%	1,2%	0,4%	0,3%	0,3%	0,6%
Corporate income tax (*Impôt sur les sociétés, IS*)	4,4%	3,8%	5,2%	4,0%	6,3%	5,5%	4,7%
Business tax (*Taxe professionnelle*)	2,7%	2,5%	2,3%	3,3%	3,0%	2,7%	0,0%
Tax on wages (*Taxe sur les salaires*)	1,2%	1,5%	1,2%	1,3%	1,2%	1,2%	1,3%
Taxes on wealth transfers (*Droits de mutation à titre gratuit*)	0,6%	0,6%	0,8%	0,8%	1,1%	1,2%	0,9%
Other	8,8%	8,3%	7,2%	7,7%	5,8%	6,8%	9,5%

Source: data from public statistics, calculations by the authors.

Appendix B: Data sources used to obtain individual profiles of the funding of consumption by age

Table B. Statistical sources for age profiles

		Variable	Age profiles	Source / Hypothesis	Periodicity
The State	Public Transfers	Public Transfer Inflows, in-kind	Education	National accounts for education and pupil numbers from the French Ministry of National Education, Higher Education and Research *(Comptes nationaux de l'éducation et effectifs du ministère de l'Éducation nationale, de l'Enseignement supérieur et de la Recherche)*	Yearly
			Health	French Health and Social Protection Survey (*Enquête santé et protection sociale, ESPS*), permanent sample of people insured under the state health insurance scheme (*Échantillon Permanent d'Assurés Sociaux, EPAS*)	ESPS: 1992 et 1998; EPAS: 2000, 2002, 2004, 2006 et 2008
			Benefits for elder care (*Aide personnalisée pour l'autonomie, APA*)	French Household Disability and Health Survey (*enquête Drees Handicap Santé Ménage*) and French Institutions Disability and Health, Survey (*enquête Drees Handicap Santé Institutions)*	One wave: 2008-2009
			Other elder care	Allocated equally from 60 years old	Yearly
			Housing benefits (*Aide personnalisée au logement, APL*)	French Household Expenditure Survey (*Budget de Famille*), INSEE	1978-1979, 1984-1985, 1989, 1994-1995, 2000-2001, 2005-2006, 2010-2011
			Other	Allocated equally to everyone	Yearly
		Public Transfer Inflows, cash	Unemployment benefits, including early retirement payments	French Household Expenditure Survey (*Budget de Famille*), INSEE	1978-1979, 1984-1985, 1989, 1994-1995, 2000-2001, 2005-2006, 2010-2011
			higher education grants		
			Family benefits		
			Disability benefits (*Allocation adulte handicapé, AAH*)		1984-1985, 1989, 1994-1995, 2000-2001, 2005-2006, 2010-2011
			Solidarity benefits (RMI, RSA)		1989, 1994-1995, 2000-2001, 2005-2006, 2010-2011
			Public pensions	French Wealth Survey (*Patrimoine)*, French Financial Asset Survey (*Actifs Financiers*) - French Household Expenditure Survey (*Budget de Famille*), INSEE	Enquête Budget de Familles: 1978-1979; Enquête Patrimoine: 1986, 1991, 1997-1998, 2003-2004, 2009-2010
			Industrial injury and sickness benefits (*Accident du travail et maladie professionnelle, ATMP*)	French Household Expenditure Survey (*Budget de Famille*), INSEE: Allocated according to the age profiles of real asset income unemployment benefits	1978-1979, 1984-1985, 1989, 1994-1995, 2000-2001, 2005-2006, 2010-2011
			First employment grants	French Household Expenditure Survey (*Budget de Famille*), INSEE: Allocated according to the age profiles of real asset income unemployment benefits	
			Other cash transfers	Allocated equally to everyone	Yearly
		Compulsory contributions	Income tax (*Impôt sur le revenu des personnes physiques, IRPP*)	French Household Expenditure Survey (*Budget de Famille*), INSEE	1978-1979, 1984-1985, 1989, 1994-1995, 2000-2001, 2005-2006, 2010-2011
			Contribution sociale généralisée (CSG) et Contribution pour le remboursement de la dette sociale (CRDS)		
			Property and residence taxes (*Taxe d'habitation et taxe foncière*)		
			Employees' contributions (*Cotisations sociales*)		
			Employers' contributions (*Cotisations patronales*)		
			Value added tax	French Household Expenditure Survey (*Budget de Famille*), INSEE: Allocated according to the rate of the VAT (COICOP level 5)	
			Petroleum tax (*Taxe intérieure sur les produits pétroliers, TIPP*)	French Household Expenditure Survey (*Budget de Famille*), INSEE: Allocated according to the age profiles of consumption of petroleum products	
			Tobacco (*Droits d'accises sur le tabac*)	French Household Expenditure Survey (*Budget de Famille*), INSEE: Allocated according to the age profiles of consumption of tobacco	

		Variable	Age profiles	Source / Hypothesis	Periodicity
The State	**Public Transfers**	Compulsory contributions	Movable capital (*Prélèvements sur les capitaux mobiliers*)	French Wealth Survey (*Patrimoine)*, French Financial Asset Survey (*Actifs Financiers*), INSEE: Allocated according to the age profiles of real asset income	1986, 1991, 1997-1998, 2009-2010
			Corporate income tax (*Impôt sur les sociétés, IS*)		
			Business tax (*Taxe professionnelle*)		
			Tax on wages (*Taxe sur les salaires*)		
			Taxes on wealth transfers (*Droits de mutation à titre gratuit*)	French Wealth Survey (*Patrimoine)*, French Financial Asset Survey (*Actifs Financiers*), INSEE: Allocated according to the age profiles of wealth transfers.	1991, 2003-2004, 2009-2010
			Other	Allocated equally to everyone	Yearly
	Public asset–based reallocations		Asset income	Allocated according to the age profiles of taxes and duties	
			Saving		
Individual resources	Labour income		Gross wages	French Household Expenditure Survey (*Budget de Famille*), INSEE	1978-1979, 1984-1985, 1989, 1994-1995, 2000-2001, 2005-2006, 2010-2011
			Employer contributions		
			Gross Mixed Income – Labour share		
	Asset-based reallocations	Property income	Financial assets	French Wealth Survey (*Patrimoine)*, French Financial Asset Survey (*Actifs Financiers*), INSEE	1986, 1991, 1997-1998, 2009-2010
			Real assets	French Household Expenditure Survey (*Budget de Famille*), INSEE	1978-1979, 1984-1985, 1989, 1994-1995, 2000-2001, 2005-2006, 2010-2011
			Property income inflows – Asset owned by Profit and Non-profit institutions	Allocated according to the age profiles of financial assets and real assets	
			Interests on loans	French Household Expenditure Survey (*Budget de Famille*), INSEE	1978-1979, 1984-1985, 1989, 1994-1995, 2000-2001, 2005-2006, 2010-2011
			Other property income outflows	Allocated according to the age profiles of property income inflows	
		Capital income	Imputed rents	French Household Expenditure Survey (*Budget de Famille*), INSEE	1978-1979, 1984-1985, 1989, 1994-1995, 2000-2001, 2005-2006, 2010-2011
			Gross Mixed Income – Capital share		
			Profit and Non-profit institutions	Allocated according to the age profiles of property income inflows	
		Saving	Household – gross saving	French Household Expenditure Survey (*Budget de Famille*), INSEE	1978-1979, 1984-1985, 1989, 1994-1995, 2000-2001, 2005-2006, 2010-2011
			Consumption of fixed capital	French Household Expenditure Survey (*Budget de Famille*), INSEE	1978-1979, 1984-1985, 1989, 1994-1995, 2000-2001, 2005-2006, 2010-2011
			Other private sectors – net saving	Residual	
The Family	Inter-household transfers		Occasional cash support	French Household Expenditure Survey (*Budget de Famille*), INSEE	1994-1995, 2000-2001, 2005-2006, 2010-2011
			Regular cash support	French Household Expenditure Survey (*Budget de Famille*), INSEE	1984-1985, 1989, 1994-1995, 2000-2001, 2005-2006, 2010-2011
			In-kind support	French Household Expenditure Survey (*Budget de Famille*), INSEE	1994-1995, 2000-2001 (transfer outflows only), 2005-2006, 2010-2011
	Intra-household transfers		Consumption	French Household Expenditure Survey (*Budget de Famille*), INSEE	1978-1979, 1984-1985, 1989, 1994-1995, 2000-2001, 2005-2006, 2010-2011

Appendix C. Allocation keys to obtain individual age-specific consumption profiles for items observed at the household level

Family benefits

The precision of the breakdown of family benefits varies according to the year of the family budget survey. For example, the 2005-2006 survey comprises fifteen variables for these benefits, whereas the 2010-2011 survey divides them into two headings only. Consequently, the hypotheses applied to each family benefit are not identical from one survey to another. This problem mainly concerns the comparison between 2005/2006 and 2010/2011, since the benefits reported in earlier surveys are relatively precise. The two headings of the 2010-2011 survey do, however, distinguish between benefits for infants and the rest, ensuring some continuity between the hypotheses in the last two surveys.

In accordance with the NTA methodology, each item of family benefits was allocated among the children in the household potentially eligible to that item, as illustrated in Table C.

Table C. Hypothesis for the allocation of family benefits for the 2006 and the 2011 French Household Expenditure Survey (*enquête Budget de Famille*)

Available variables in 2006	Age group in 2006	Available variables in 2011	Age group in 2011
allocation pour jeune enfant (APJE)	0-2	prestation d'accueil du jeune enfant (Paje)	0-5
aide à la garde d'enfant (versée directement au ménage)	0-5		
allocation parentale d'éducation (APE)	0-2		
allocation à la famille pour l'emploi d'une assistante maternelle agréée (AFEAMA)	0-5		
allocation d'adoption (ADA)	birth		
allocation prestation d'accueil du jeune enfant (PAJE : base, prime naissance et adoption, CLCA, CLCMG)	0-5		
allocations familiales de base	0-21	Other family benefits	0-21
complément familial	4-21		
allocation de rentrée scolaire (ARS)	6-18		
allocation de soutien familial (ASF)	0-21		
allocation d'éducation spéciale (enfant handicapé)	0-19/21		
allocation pour garde d'enfants à domicile (AGED)	0-5		
allocation de présence parentale pour enfant handicapé (APP)	0-19/21		
aide de la mairie, d'un organisme social type UDAF	0-21		
allocation de parent isolé (API)	0-21		

Adult disability benefits, higher education grants and solidarity benefits

The adult disability benefits, higher education grants and solidarity benefits were known at the individual level until 2005-2006, and at the household level in 2010-2011. As with family benefits and housing benefits, these cash benefits are allocated equally among the potential recipients in households. Eligibility for these benefits is assessed according to the ages of household members.

Taxes and social security contributions

The profiles for VAT paid are not known from the family budget surveys. However, each household's consumption is accurately known at COICOP[26] 5 level. The relevant VAT rate has to be applied to each consumption item to obtain the VAT paid by the household[27]. The allocation of that VAT within the household is identical to the method used for allocating consumption within the household, according to the individual's age (d'Albis *et al.*, 2015). Property and residence taxes at household level are taken from the family budget survey. Individualizing them depends on each individual's income in the broad sense (from self-employment, a salaried job, retirement pension or unemployment benefit). Income taxes (IRPP) are also reported at household level. First, a virtual individual tax is calculated for each individual in the household by applying an effective tax rate to their "reference taxable income" (RFR). The tax rates applied are those for the specific survey year. These rates and tax bands are taken from the Institut des Politiques Publiques[28] (IPP).

Once this virtual individual tax is calculated, an allocation rule is deduced to break the total tax down individually. This rule is then applied to the tax reported for the household as a whole in each of the surveys used. Social security contributions and CSG-CRDS surcharges were calculated by reconstituting the gross earned income from family budget surveys and applying the employees' and employers' social security contribution rates for each income band (to allow for reduced charges on low salaries and exemptions above social security maxima) and type of employment. For the social security contribution rates, we assumed five notional categories of individual: non-supervisory private employee, supervisory private

[26]Classification of Individual Consumption According to Purpose.

[27] VAT by item of consumption was calculated in partnership with the DREES, which carried out an initial estimate of VAT per household on the basis of the 2010-2011 family budget survey as part of a research project using the Ines model (André, Biotteau, Duval, 2016).

[28]http://www.ipp.eu/

employee, civil servant, self-employed, and independent professional. The rates applied were those for the survey date and are taken from the IPP database. For CSG-CRDS surcharges, the relevant CSG rates were simply applied to gross earned income and other income subject to CSG (replacement income and income from capital). Other compulsory contributions were allocated using the allocation by age rules for other profiles. The domestic petroleum products tax (TIPP) was allocated according to the consumption profile for TIPP products (electricity, gas, oil and other fuels). Excise duty on tobacco was allocated according to tobacco consumption. Levies on investment assets, corporation tax, professional tax and salary tax were calculated with the allocation rule for income from financial assets. Gift tax was calculated from the profiles for inheritance and gifts in the family budget survey.

Capital income

Income from financial assets, income from property assets, income from imputed rents and interest repayments on loans are also reported at the household level only. This income is allocated equally between the respondent and the spouse. The profile curve of the self-employed's income from capital is that of the self-employed's income from capital as calculated in the first stage concerning the life-cycle deficit (d'Albis *et al.*, 2015). The savings profiles for asset-based reallocation are applied according to the assumptions made in the NTA Manual (United Nations, 2013a).

Private transfer inflows and outflows between households

All private transfer inflows and outflows between households, i.e., regular cash support, occasional cash support and in-kind support, are reported at household level. The allocation rule makes no distinction between the respondent and their spouse, since it is not known if the transfer was an inflow or outflow for the respondent, their spouse or some other household member. The profiles of inter-household transfers are not all available for the earliest survey years. In that case, the profile curve of the first available year is used for the previous years. The age profiles of transfers of imputed rents are calculated from the per capita consumption of imputed rent. The transfer inflows of imputed rent correspond to the consumption of imputed rent by household members other than the respondent and spouse. The origin of these transfers is ascribed to the respondent and their spouse in proportion to their individual available incomes

Appendix D. Intra-household calculation algorithm in mathematical notation

Savings before intra-household transfers corresponds to the difference between per capita available income and per capita consumption. The items making up available income and consumption were adjusted to the NA aggregates before intra-household transfers and individual savings were calculated. Intra-household cash transfers arise when those in surplus help those in deficit. The funding of people in deficit depends on the savings of the household as a whole. If the household's savings are positive or zero, the individual savings of those in surplus corresponds to the difference between savings before intra-household transfers and transfer outflows within the household. If the household's savings are negative, those in surplus transfer all that surplus to those in deficit. The remaining deficit needs to be financed by borrowing. Each household member borrows in proportion to their available income to cover the entire remaining deficit for the whole household. The loans taken out by those in surplus are transferred to those in deficit. This outside loan is thus an intra-household transfer.

Individual-level variables, adjusted to macro controls, household with n individuals i:

y_i : Labour and capital income

tgi_i : Cash public transfers inflows

tgo_i : Taxes and duties

tfb_i : Nets inter-household transfers

c_i : Private consumption

$cred_i$: Interests on loans

Calculate Disposable income less private consumption:

$$X_i = y_i + tgi_i - tgo_i + tfb_i - c_i - cred_i$$

$$def_i = -X_i \; if \; X_i < 0$$

$$sur_i = X_i \; if \; X_i > 0$$

$$def = \sum_{i=1}^{n} def_i$$

$$sur = \sum_{i=1}^{n} sur_i$$

Case 1: $def \leq sur$

$Transfer\ inflows: ti_i$

$ti_i = def_i$

$Transfer\ outflows: to_i$

$to_i = (sur_i / sur) * def$

$Saving: s_i$

$s_i = sur_i - to_i$

Case 2: $def > sur$

Step 1: Calculate net transfers before credit (ti_bc_i et to_bc_i) by calculating the share of household deficits that can be financed by surpluses of household members (α)

$\alpha = sur / def$

$ti\_bc_i = \alpha * def_i$

$to\_bc_i = sur_i$

Step 2: Calculate the residual deficit (def_net_i)

$def\_net_i = def_i - ti\_bc_i$

$$def_{net} = \sum_{i=1}^{n} def\_net_i$$

Step 3: The amount borrowed by each member of the household is calculated ($saving\ s_i$) according to the disposable income (di_i)

$di_i = max(0, y_i + tgi_i - tgo_i)$

$$di = \sum_{i=1}^{n} rd_i$$

$$s_i = \left(\frac{di_i}{di}\right) * def_{net}$$

Step 4: Calculate transfer inflows (tsi_i *et* tso_i) and transfer outflows due to saving

$$tso_i = s_i - def\_net_i \ iff \ s_i > def\_net_i$$

$$tsi_i = -s_i + def\_net_i \ iff \ s_i < def\_net_i$$

Step 5: Calculate ***transfer inflows*** and ***transfer outflows*** financed by household surplus and by loans

$$ti_i = ti\_bc_i + tsi_i$$

$$to_i = to\_bc_i + tso_i$$