INTEGRATED RESULTS FOR GA AND NTA FOR SPAIN: SOME IMPLICATIONS FOR THE SUSTAINABILITY OF THE WELFARE STATE*

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ABSTRACT

The aim of this paper is twofold. First, the first estimates for Spanish National Transfers Accounts (NTA) are presented. The excess of total consumption on labour income –the life cycle deficit– and the way it is financed through age reallocations via market, public, or private transfers, is obtained. These estimates are then used to estimate the first demographic dividend. Second, this technique and Generational Accounting (GA) are combined to give a more complete picture of the effects of ageing on the economy. In particular, GA sustainability indicators are extended to include age reallocations which occur through family and market.

JEL Classification: E62, H55

Keywords: National Transfers Accounts, Generational Accounting.

1. INTRODUCTION

There is a broad literature on the effects of ageing on the sustainability of the welfare state using both pure theoretical and applied models. This literature is somehow fragmented, mostly due to the difficulties involved in obtaining testable predictions from sound theoretical models. This kind of difficulty, quite common in empirical economics, is especially strong in this setting as it involves both micro and macroeconomic aspects and intra and intergenerational distributional issues. While the theoretical tool at work in the analysis of the dynamic effects of fiscal policy is the general equilibrium overlapping generation's model (OLG), the applied works tend to deviate from it to some extent. On the one hand, one can find large scale applied general equilibrium OLG, which usually focus on the macroeconomic effects of ageing by taking as endogenous some key variables besides savings. On the other hand, arithmetic or behavioural microsimulation models, which must necessarily incorporate a simulation module of the main macroeconomic aggregates and the productivity level, aim to analyze intragenerational distributional issues[1]. Somewhere in the middle, the so-called aggregate accounting models have been evolving steadily. Usually these models are oriented to macroeconomic issues, abstracting from general equilibrium effects considered in OLG models to avoid their complexities and/or constraints. Their main advantage arises from the fact that they are traditionally designed according to the available statistics and the legal framework in each country and thereafter aim to include a greater level of detail and heterogeneity. Thus, in some cases, accounting models tend to resemble arithmetic dynamic microsimulation models (Baekgaard, 2002).

Generational Accounting (GA) arose in the nineties, precisely to try to design a comprehensive empirical simulation technique avoiding the abovementioned modelling difficulties. It was developed by Auerbach, Gokhale, and Kotlikoff (1991) as a simplification of OLG models – i.e. avoiding general equilibrium considerations[2]. Hence, its structure resembles, somehow, an aggregate accounting model, though the explicit reference to a sound theoretical model –eventually allowing for contrast[3]– gave way to develop internationally

[1] Behavioural models include some behavioural responses, while in arithmetic models all transitions are merely mechanical. Microsimulation models are also classified as static or dynamic, the latter being those that explicitly model the time, as usually occurs in any pensions model (See Dekkers *et al.*, 2009 chapter 2 for a survey).

[2] This is the way the method was first proposed although, clearly, some of the indicators obtained in this method can also be obtained in an OLG model.

[3] Börstinghaus and Hirte 2001 compare GA results in partial and general equilibrium, concluding that results are not so different when the simulated policy reforms are similar enough.

comparable studies of welfare state sustainability (Auerbach *et al.*, 1999 and European Commission, 1999)[4].

Another main drawback to this kind of simulation studies modelling the effects of ageing arises from data constraints. The National Transfers Accounts (NTA) research project started precisely to obtain internationally comparable, reliable estimations of the transfers occurring between age groups in an economy (Lee *et al.* 2003; Lee and Mason, 2004; Mason *et al.* 2006). A cooperative international network was established in order to assure that input data and estimates were fully comparable[5]. This implies not only the availability of a meaningful database but also a substantial improvement in input data for many of the abovementioned modelling approaches.

Interestingly, both applied methodologies –NTA and GA– come from quite different theoretical frameworks, while they turn out to be complementary to a great extent. On the one hand, GA started from the abovementioned dynamic fiscal policy literature. Focused on measuring the sustainability of the public budget in face of ageing, this method abstracts from general equilibrium changes in the factor prices to obtain forward-looking indicators of the implicit government debt. In practice, starting from the base year stock of debt and assuming constant *per capita* net tax payments by age, GA evaluates the sustainability of current fiscal policy using demographic projections. On the other hand, NTA came from the field of Demographic Economics. This methodology converts the whole set of a given base year National Accounts into age-specific flows full of economic meaning. Hence, age profiles are obtained for each aggregate, informing about how resources are transferred across generations through family, public sector or capital market saving. Quite intuitively, these profiles can be used to make predictions on the effects of demographic changes. For instance, the implications of changes in age structures on economic growth, the so-called *demographic dividends*, can be computed using NTA profiles. The *first demographic dividend* measures the increase in *per capita* income due to the rise in the share of working-age population characteristic in a demographic baby boom. The subsequent ageing process can also originate a *second demographic dividend* if capital accumulation is incentivized to meet this challenge. In this second case, population ageing could produce a permanent increase in capital (Mason, 2005; Lee and Mason, 2006; Mason and Lee, 2006).

The aim of this paper is to show the information provided by NTA for Spain in the year 2000 and to discuss how these estimates can complement the

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[4] See Jimeno *et al.* (2006) for a survey comparing aggregate accounting models, general equilibrium models and individual life-cycle profiles – the latter referring to cohort micro simulation models. See also Bonin (2001) and Bonin and Patxot (2005) for a survey focused on GA and related techniques.

[5] See www.ntaccounts.org for details of the project and the participant countries.

projections derived in the GA tradition in order to analyze the direct effects of ageing, not only on the welfare state but also on the whole economy. The paper is organized as follows. Section 2 describes the main features of the NTA methodology, and discusses the way it can be used to analyze demographic dividends. Also, a combination of NTA data with GA is proposed in order to obtain indicators of public and private sustainability and hence some insights into the room left for the second demographic dividend. Section 3 is devoted to explaining the results for Spain. Finally, Section 4 gives some final remarks. The description of the databases employed is left for the Appendix.

2. METHODOLOGY

In this section we describe the methods employed in our analysis. First, we present the recently derived standardized NTA methodology, which mainly focuses on giving a cross-sectional picture of the intergenerational transfers occurring in an economy in a given year, in a manner consistent with National Accounts. Second, the way the so-called demographic dividends have been measured using NTA estimates is stated. Third, after a brief description of the GA method, well known in the literature, we describe the way in which the NTA and the forward-looking GA approach can be combined in order to obtain an illustration of the main trends affecting the demographic dividends in the future.

2.1. The National Transfer Accounts methodology

In all societies, a system to transfer resources across ages is necessary due to the fact that individuals consume throughout their life cycle, while they produce only during a limited period. National Accounts (NA) provides information about the main aggregates of the economic activity in a year, but not about the transfers across ages. NTA basically tries to disentangle those resources that move among the different age groups –called *age reallocations*– either through the capital market –called asset-based reallocations– through government intervention –tax payment and transfers receipts– or through both inter or intra family transfers. In order to do so, it translates all the NA aggregates in a given year into age-specific values as follows. The starting point is a transformation of the base year NA identity as:

$$Y_l + Y_a + \tau_g^+ + \tau_f^+ = C + I + \tau_g^- + \tau_f^- \qquad [1]$$

Where Y stands for labour (l) and asset (a) income, τ for public (*g*) or family (f) transfer inflows (+) or outflows (-), C for consumption and S for saving. Rearranging, we obtain,

$$C - Y_l = Y_a - S + \tau_g^+ - \tau_g^- + \tau_f^+ - \tau_f^- \qquad [2]$$

For the whole economy, though it also holds for each age group (e),

$$C(e) - Y_l(e) = Y_a(e) - S(e) + \tau_g^+(e) - \tau_g^-(e) + \tau_f^+(e) - \tau_f^-(e) \qquad [3]$$

The left-hand side in [3], called *life cycle deficit* (LCD), is the excess of resources consumed by each age group. This must be financed either by asset-based reallocations (ABR) –asset income minus savings– or net public $\left(\tau_g^+ - \tau_g^-\right)$ or family $\left(\tau_f^+ - \tau_f^-\right)$) transfers, called TG and TF, respectively. Hence, we can also express [3] as,

$$LCD = ABR + TG + TF \qquad [4]$$

Or,

$$LCD(e) = ABR(e) + TG(e) + TF(e) \qquad [5]$$

As it holds both for the whole economy [4] and for each age cohort [5]. In the Appendix, the data employed to compute the four NTA profiles for Spain are detailed.

2.2. Measuring the Demographic Dividends using National Transfer Accounts

NTA standardized methodology works basically in a cross-sectional dimension. Nevertheless, some attempts have been made in this setting to obtain forward-looking and backward-looking estimates. The first and second demographic dividends are the main ones. In particular, estimations of the demographic dividends for the past and the future have been obtained by Mason (2005) and Mason and Lee (2006). The basic idea behind the first demographic dividend is that a baby boom generates a higher relative size of the working population and, hence, a demographically driven positive effect on income *per capita*. Starting from the decomposition of GDP or income (Y) *per capita* at year t as,

$$\frac{Y(t)}{N(t)} = \frac{L(t)}{N(t)}\frac{Y(t)}{L(t)} \qquad [6]$$

Where N and L stand for the number of consumers and producers, respectively. The first term on the right-hand side is the so-called *support ratio*, while the other two terms are income *per capita* (income per consumer) and productivity (income per worker), respectively. Equation [6] does indeed show that income *per capita* can rise due to an increase in productivity, but also due to an increase in the demographic support ratio. More specifically, on transforming it into growth rates (g) by taking logs and deriving with respect to time, we obtain:

$$g_{\frac{Y}{N}} = g_{\frac{L}{N}} + g_{\frac{Y}{L}} \qquad [7]$$

Showing that the income *per capita* growth rate is the sum of both productivity and the support ratio growth rates. The latter –the support ratio growth rate– has been called the *first demographic dividend*. Although it seems to be a pure demographical variable, Mason (2005) derives it by weighting the pure demographic variables –the number of people of working age and the total population– with the consumption and labour income age profiles obtained in NTA. Specifically, Mason (2005) uses the NTA profiles to compute the number of effective consumers and effective producers. Interestingly, this approach combines a strictly demographic concept –the demographic support ratio– with its economic counterpart, i.e. the number of effective consumers and workers[6]. Indeed, as Equations [8]-[11] show, the number of workers and consumers in a period t can be computed in a strictly demographic sense (D superscript) or in an economic sense (E superscript), weighting the number of people at each age by its appropriate economic magnitude,

$$L(t)^D = \sum_{e=16}^{75} N(e,t) \qquad [8]$$

$$L(t)^E = \sum_{e=16}^{75} N(e,t) \cdot \eta(e,t) \qquad [9]$$

$$C(t)^D = \sum_{e} N(e,t) \qquad [10]$$

$$C(t)^E = \sum_{e} N(e,t) \cdot \lambda(e,t) \qquad [11]$$

Where $\eta(e,t)$ and $\lambda(e,t)$ are, respectively, labour and consumption weights. In fact, Cutler *et al.* (1990) approached this issue obtaining four different estimates for the support ratio, deriving the four possible combinations of these measures of the number of consumers and producers. Given that combining a strictly demographic measure with a not-weighted measure seems less meaningful, we only obtain two combinations, a strictly demographic support ratio and an *economic* one. In the latter, we follow Mason (2005) in using the abovementioned NTA labour income and consumption *per capita* profiles to weight the population.

[6] An even more refined measure can be obtained by decomposing Equation [6] further by introducing participation and employment rates. However, this is not helpful if appropriate age-specific data for the whole period analyzed are not available. Therefore, clearly, it is important to keep in mind that changes in Equation [7] ignore changes in unemployment and participation rates, which are kept constant in the NTA profile computed per person for the base year.

Going a step forward, it is worth considering that the increase in income *per capita* driven by the first demographic dividend allows –usually helped by an increase in longevity– for an increase in savings that might also foster productivity growth (Mason, 2005 and Cutler *et al.*, 1990)[7]. This so-called *second demographic dividend* is not as direct as the first. Besides, it is very much dependant on the way in which intergenerational transfers are financed. The second demographic dividend has also been measured by the same authors (Mason, 2005; Mason and Lee, 2006). In particular, they derive a life cycle forward-looking exercise, based on the available NTA cross-sectional profiles. They aim to estimate the present value of the wealth needed to finance the excess of future consumption over the labour income in each cohort of people aged 50 and older[8]. This is obtained as the excess of the present value of future consumption over the present value of future production. This estimation requires more elaboration and stronger assumptions referring to a steady state situation, which is far beyond what occurs during a demographic transition. Clearly, a general equilibrium approach is needed in order to obtain a sensible measure of the second demographic dividend. Hence, in our analysis we opt for using the NTA estimates in a more transparent way in order to give some insights into the expected trends shown by savings and other age reallocation devices, emphasizing the effect of a detailed demographic evolution. In Section 3 we show the results obtained by extending the GA projection method, obtaining a more intuitive illustration of the second demographic dividend.

2.3. Comparing National Transfer Accounts and Generational Accounting

As explained above, NTA and GA come from different theoretical frameworks. Nevertheless, given the coincidence of the phenomena analyzed –the interaction between Economics and Demography– both methods end up sharing very common features. Furthermore, the disparities due to their different focus, far

[7] Cutler *et al.* (1990) pointed out the question in similar terms. They argue that the changing age-structure has the potential to yield benefits to a society for two reasons. First, it lowers the dependency ratio, which means that more resources can be invested in the economy. Together with this they mentioned a consumption dividend to be enjoyed while the labour force is relatively abundant. They were basically arguing that what Mason (2005) calls the first demographic dividend can be either consumed or invested. Second, the increase in longevity improves the population's savings behaviour, thus creating positive effects on income levels. See also Bloom and Williamson (1998), who showed that part of the Asian economic miracle was explained because the working-age population grew at faster rates than the dependent population from 1960 to 1995.

[8] The justification comes from the fact that at age 50 one can assume that individuals are at a moment of higher capital accumulation, where their responsibilities from childbearing are over and their earnings have arrived at a peak (Mason, 2005).

from being an obstacle to combine them, give way to complementarities. Below we outline the fundamentals of GA in order to show how these potential complementarities can be exploited to shed some light on the debate on the economic consequences of ageing.

GA was shaped in order to measure the sustainability of the overall fiscal policy –especially the welfare state programmes– in the face of demographic ageing. In practice, it evaluates the extent to which the intertemporal budget constraint of the public sector holds, i.e. the extent to which the outstanding debt in the base year (B_t) will be covered by future net surpluses (S_s), assuming a constant discount rate (r),

$$B_t = \sum_{s=0}^{\infty} S_s (1+r)^{t-s} = \sum_{k=t-D}^{t} N_{t,k} + \sum_{k=t+1}^{\infty} N_{t,k} \qquad [12]$$

Besides, the last expression in Equation [12] indicates that future surpluses are, in turn, raised from net payments (N) from present and future generations. With D being the maximum life span, by adding $N_{t,k}$, the first term adds up net payments from currently living generations –born from the base year t to the last D years– while the second groups the net payments of generations born from the base year on.

The estimation procedure starts from the aggregate net payments of living generations obtained by imputing the base year budget aggregates by age and gender. The assumption of constant fiscal policy permits these payment profiles to be maintained constant for future generations and, hence, to obtain the value of the right-hand side in Equation [12]. A positive (negative) residual means an implicit debt (wealth) called *sustainability gap*. The method keeps the age profiles constant for all tax payments and transfer receipts. Note that these profiles are very similar to those derived to obtain TG in NTA. Then, in order to properly account for the fact that subsequent cohorts are, in principle, more productive, a constant productivity growth rate is applied to obtain the longitudinal profiles.

The basic sustainability indicator obtained in the GA tradition is the present value of total liabilities –the residual estimated in equation [12]– in relation to the payment capacity – the present value of predicted future GDP[9]. Other indicators usually produced in GA studies are *generational accounts*, i.e. the *per capita* net payment made by each of the presently living generations and the representative of the future generations. Similar indicators could be derived

[9] The first GA studies used to show future liabilities as a share of base year GDP, but this indicator was subsequently refined. Given that the sustainability gap –the measure of intertemporal implicit debt– refers to the future, a similar figure is included for payment capacity: the sum of the present value of future expected GDP.

using NTA information, but for our purpose we will mainly focus on the cross-sectional indicators.

Hence GA and NTA share some basic elements. Both methods start from a given base year *t*, and analyze the interaction among some basic macroeconomic aggregates and the age structure of the population. Also, in both cases the incidence of the aggregates is reflected in age profiles extracted from micro data which are considered somehow constant. The following are the main differences between the two techniques. First, in GA the interest in obtaining long-term projections necessarily implies a forward-looking perspective by projecting the estimates obtained for the base year to the future, while NTA only focus on the base year. Second, NTA apply the same imputation method to all the National Accounts aggregates in the base year, while GA does so only to public sector aggregates. In this respect, both methods turn out to be complementary. Though for the moment standard NTA sticks to the base year, it takes a more comprehensive perspective of this. It can thus complement the picture of the future given by GA. On the one hand, both methods might be helpful to derive backward-looking and cohort analysis as long as data are available[10]. On the other hand, the cross-sectional estimates obtained in NTA can enrich the forward-looking estimates obtained in GA[11].

Following the GA procedure we can hold the age structure of the four basic NTA profiles constant in Equations [4-5] and project them to the future by using a given productivity growth rate. Thus, the projection of all the NTA profiles complements the picture given by GA projections. Clearly, the mere projection of the age profiles with productivity is less reliable in the case of capital income and savings –the two components of the *ABR*. Hence, we will take this into account when interpreting the results. Basically, one should bear in mind that the main limits of the GA approach apply– in particular, the failure to capture the general equilibrium changes in prices due to changes in the population structure. Indeed, these changes can be non-negligible although some of them, like the change in the interest rate due to the change foreseen in capital intensity, might be reduced in an open economy framework. In any case, as shown in the next Section, a battery of informative economic indicators, in the spirit of the demographic dependency rate, can be obtained.

[10] In fact, in GA it is usual to obtain life cycle indicators of the net payments of each cohort though those are all based on cross-sectional data. There are also some attempts to use NTA estimates both for backward and forward-looking analysis. The former has been basically employed to compute the first demographic dividend (Mason, 2005). The latter has been used to obtain a future forecast of different welfare state programmes.

[11] Another technical similarity is that both methods aim to obtain both flow and stock estimates. Specifically, GA estimates the implicit stock of debt by means of adding future net surpluses to the initial outstanding debt. The NTA standard method has only established clear bases to estimate the flow account while it is aiming to estimate a stock account.

Furthermore, this might give interesting insights regarding the first and the second demographic dividends.

3. RESULTS FOR SPAIN

Below we show the results obtained in our analysis for Spain. First, the NTA estimates are presented taking 2000 as the base year. Second, the evolution of the first demographic dividend during the Spanish demographic transition is shown. Third, by integrating the NTA age profiles into the GA projection method, several economic indicators of the impact of demographic evolution on the economy are obtained.

3.1. National Transfer Accounts for Spain (2000)

As explained above, NTA disentangle aggregate transfer flows among ages in the economy for a given year in a way consistent with National Accounts (NA). Table 1 shows the main aggregates of Spanish National Accounts for 2000, and their correspondence to NTA aggregates. Most of the rearrangements are for the purpose of assigning all those aggregates that can be attributed by age to one of the main NTA aggregates summarized in Equation [1]. The detailed procedure and micro data sources employed in estimating the age profiles are summarized in the Appendix. Only two specific NTA assumptions are applied to the aggregate accounts. First, indirect taxes are imputed either to capital or consumption, adopting a standardized hypothesis: all indirect taxes are overconsumption except those on financial transactions and 1/3 of the residual category "other taxes on consumption." Second, in order to disaggregate labour and non-labour income it is assumed that 1/3 of the mixed income is capital income, the other 2/3 being labour income. This is also a common hypothesis in NTA methodology.

As shown in Table 1, the aggregate life cycle deficit represents more than 10% of the net national disposable income in year 2000. This excess of consumption over labour income is covered mainly through private asset-based reallocations. Public asset reallocations are negative because the net public asset income is negative and higher than the –positive– public saving. The aggregate value of family transfers should be equal to zero in a closed economy, while it is equal to the net transfers –a relatively small negative amount– from the rest of the world in Spain, in an open economy. The same happens for *TG* as the excess of taxes over transfers –the *transfers surplus*– equals public *ABR*. *TG* is then equal to the rest of the world net public current transfers. As seen above, in this case it is devoted to paying net asset income and to saving.

Table 1

FROM NATIONAL ACCOUNTS TO NATIONAL TRANSFER ACCOUNTS, SPAIN (2000) (in million of current euros)

A) National Accounts: Net National Disposable Income			
Consumption	484,359	Compensation of Employees (CE)	312,176
Government Final Consumption	108,360	Net CE from ROW	-156
Private Final Consumption	375,999	Operating Surplus (OS)	255,488
Net Saving	54,235	Net Prop & Entrep Income from ROW	-6,983
Public Saving	9,103	Indirect Taxes Less Subsidies (NIT)	62,599
Private Saving	45,132	NIT from ROW	1,831
		Net Current Transfers from ROW	-304
		Consumption of Fixed Capital	86,057
Total	**538,594**	**Total**	**538,594**

B) National Accounts: Public Sector Accounts			
Property income, payable	20,424	Taxes on production and imports	64,430
Social benefits other than in kind	75,470	Property income, receivable	6,979
Other current transfers	7,960	Current taxes on income and wealth	64,002
Government final consumption	108,360	Social contributions	81,146
Saving, net	9,103	Other current transfers	4,760
Total	**221,317**	**Total**	**221,317**
Net lending (+)/Net borrowing (-)	-6,283		

C) National Transfer Accounts Aggregates	
Lifecycle Deficit (*LCD*)	**56,955**
Consumption (*C*)	427,361
Private Consumption [(1)]	319,001
Public Consumption	108,360
Less: Labour Income (Y_l)	370,406
Age Reallocations ($AR = ABR + TG + TF$)	**56,955**
Asset Based Reallocations (*ABR*)	57,259

C) National Transfer Accounts Aggregates	
Public *ABR*	-22,548
Public Income on Assets	-13,445
Less: Public Saving	9,103
Private *ABR*	79,807
Private Income on Assets	124,939
Less: Private Saving	45,132
Transfers (*TG* + *TF*)	-304
Public Transfers (*TG*)	358
Private Transfers (*TF*)	-662

(1) Private consumption in NTA is obtained as Private Final Consumption in National Accounts less net indirect taxes on consumption.

Source: Panel A from INE (*Contabilidad Nacional de España*) and Panel B from own elaboration.

In Table 2, the NTA aggregates by age groups are presented. One can observe that young LCD is mainly financed with private transfers. Old people use public transfers and asset income to cover their excess consumption, but also to make transfers to the young, a particular characteristic for Spain. Probably, the relatively high co-residence of elderly has a role in the explanation of this phenomenon.

Table 2

NTA AGGREGATES BY AGE GROUP (in million of current euros)

	0-15	16-64	65 and more	Total
LCD	53,978	-67,238	70,214	56,955
TG	21,193	-65,338	44,503	358
TF	33,418	-24,811	-9,269	-662
ABR	-633	22,912	34,981	57,259

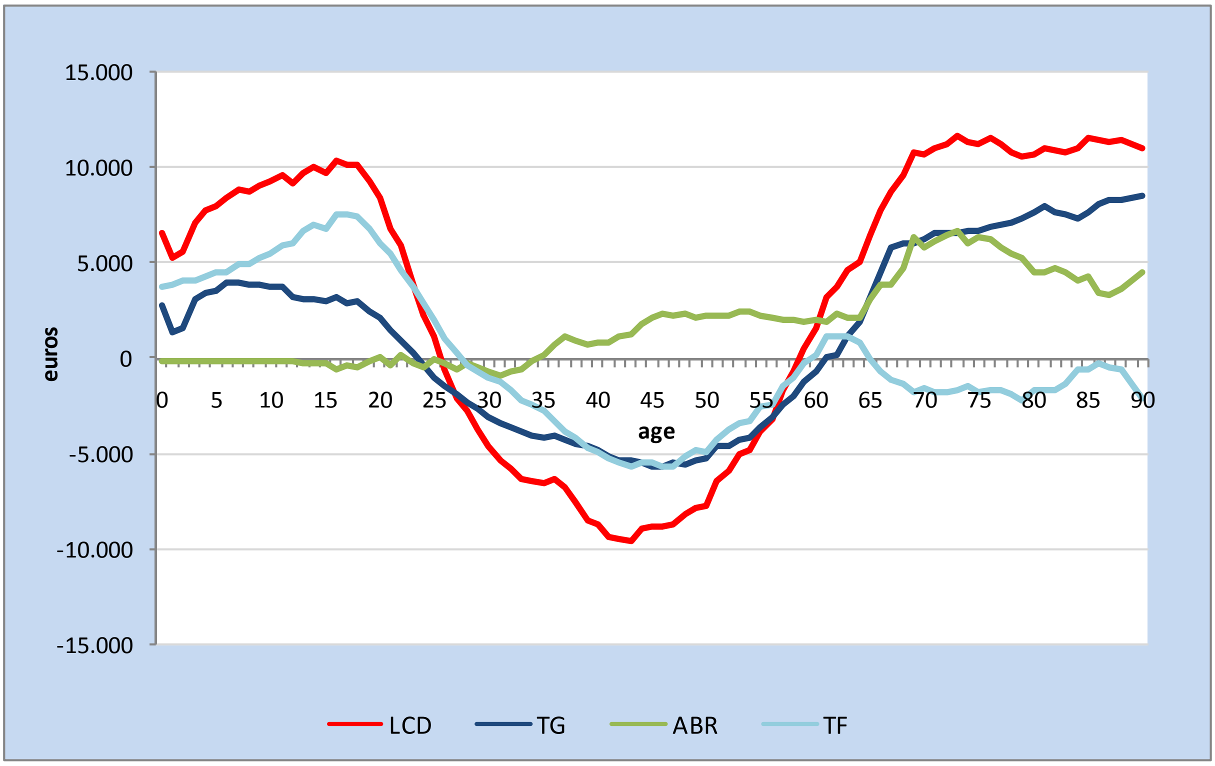
Source: Own elaboration.

In Figure 1, the National Transfer Accounts age profiles obtained for Spain in 2000 are shown. It plots the four main *per capita* age profiles as in Equation [5], i.e. the life cycle deficit (LCD), together with the three possible ways of reallocating resources between age groups: public transfers (TG), private transfers (TF) or asset-based reallocations (ABR). The figure is quite illustrative. First, as expected, LCD is positive outside working age (from 26 to 58 in this case), that is, individual consumption exceeds labour income for those ages, while it is negative during working age. Second, as a consequence of their economic dependence, the young and the old receive net transfers from the government –TG is positive– while they contribute –TG becomes negative– during the productive ages. Note that the cut-off ages for LCD and TG are not exactly the same – TG is negative from 24 to 60. This is due to the role of the other age reallocation devices, i.e. asset-based reallocations and private transfers.

If we consider strictly lifecycle savings, omitting bequests, the natural age shape of ABR is zero until age 15, as there are neither assets, nor asset income. Later, as individuals can enter the labour market and start saving, ABR becomes negative and stays so, as long as savings exceed asset income. ABR becomes nil if all asset income is saved and starts being positive when saving is overtaken by asset income. The absence of a negative initial ABR can be due either to a bequest received that generates Y_a higher than S or to the fact that adults become indebted to finance their consumption or transfers to their children. Intergenerational transfers can interact in many more ways as, together with bequests, *inter vivos* transfers from grandparents to children or grandchildren, or from children to parents can occur. For Spain, ABR is clearly positive only from age 35 and it is especially high from age 65. This could contribute to the positive transfers of elderly shown in the TF profile.

Figure 1

***PER CAPITA* NATIONAL TRANSFER ACCOUNTS, SPAIN (2000)**



Source: Own elaboration.

3.2. The first demographic dividend: pure demography and NTA approaches

The main trends of the Spanish population during the XX century and its expected future evolution are shown in Figure 1. It plots the dependency rate obtained for total population (TDR) as well as for the young (YDR) and the old (ODR) separately. Population data are obtained as follows. On the one hand, past population is taken from the Human Mortality Database (HMD) containing population data by age and gender from 1908 to 2006, though some adjustments are needed[12].

On the other hand, future population is projected using Leslie projection matrices. These projections are based on assumptions similar to the most recent Eurostat population projections (Eurostat, 2008). First, future fertility is taken from projections developed by INE, detailing age-specific fertility rates for the period 2002-2031. The total fertility rate thus goes from 1.34 in 2006 to 1.53 children per woman in 2030 and stabilizes from then on. Mortality is assumed to increase linearly, so that average life expectancy increases by three years. Finally, in line with Eurostat assumptions, future immigrants –the observed level is taken until year 2008– are assumed to decrease first sharply until 2020 and later more steadily. The final value is 130,000 from 2060 on[13].

Clearly, uncertainties in demographic projections are not as serious as they are in other economic settings. It might seem irresponsible to say this in the Spanish case, given the recent immigration flow which increased the population by more than 5 million from 2000 to 2008. Nevertheless, although the absolute number of people can vary quite erratically, the indicators shown in Figure 2 are much more predictable. In fact, one can observe the effect of the abovementioned migration inflow in a scarce increase in ODR from 25.01% in 2000 to 24.55% in 2007, also reflected in the other two ratios (TDR and YDR)[14]. It does not seem possible to escape from the doubling of the dependency rate from 2010 to 2060 – the ODR increases by 268% while TDR increases by 189.19%. Even considering a sizeable entry of migrants, the retirement of the baby boom generations will imply a huge increase in the dependency rate.

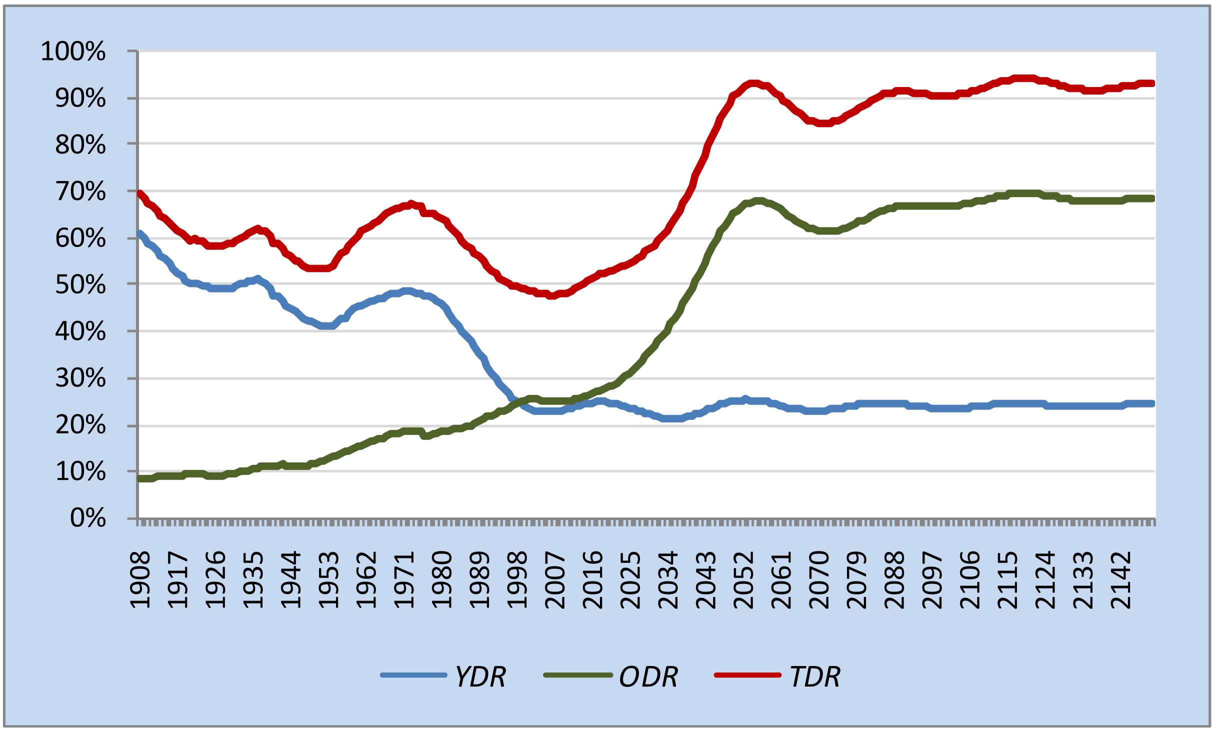
[12] For the first decades –until the year 1960– an unrealistic peak is observed in ages finishing in “9”. Hence, a smoothing procedure is applied using inverse projection matrices.

[13] The last official projections derived by INE (2005) assumed in the baseline a gradual reduction of the annual net immigrants, from the current more than half a million to a constant value of 260,000 in 2060. A low immigration hypothesis (tending to 100,000) was derived in order to give a similar outcome to the past European projections (Eurostat, 2006). The new Eurostat projections are more realistic in the initial value of immigrants but still assume a lower long-term level.

[14] This decrease in dependency is also due to a decrease in the elderly as a result of the smaller generations born during the Spanish Civil War and post-war period.

Figure 2

DEMOGRAPHIC DEPENDENCY RATES IN SPAIN (1908-2150)



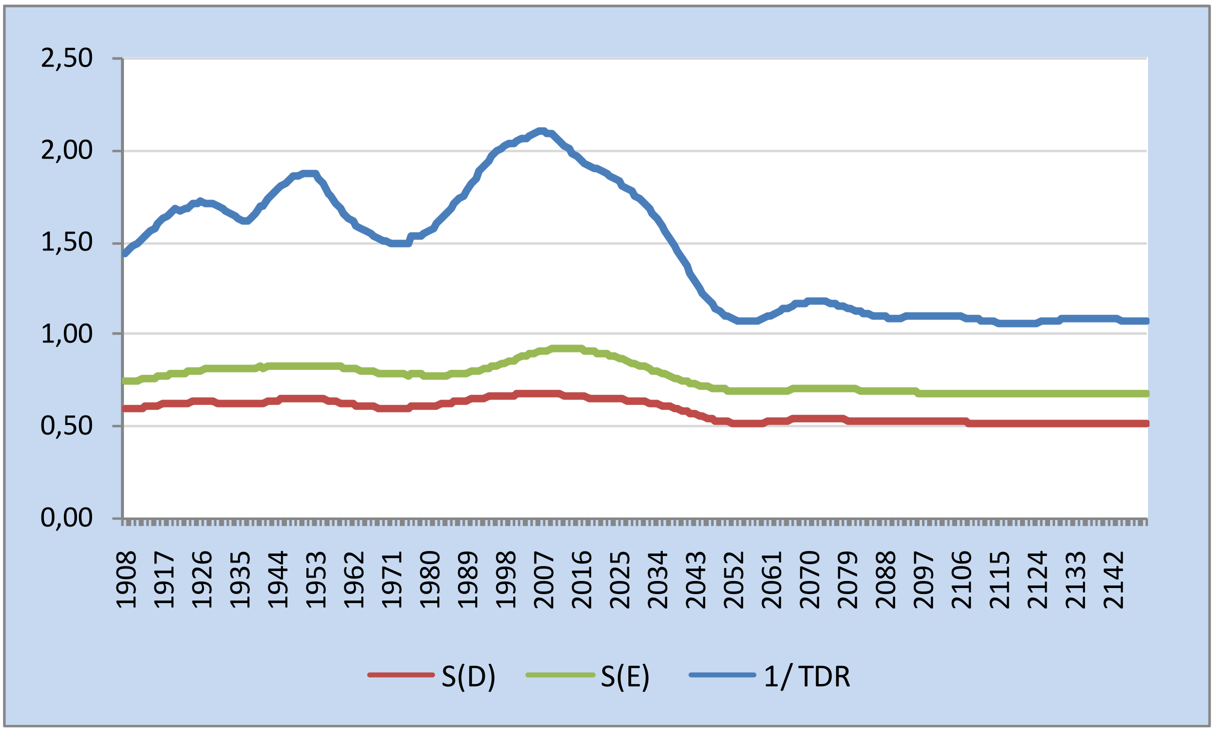
Source: Own elaboration

But the positive counterpart of this ageing, giving way to the first demographic dividend, is an often forgotten striking demographic fact. According to Figure 2, the present situation is, in terms of demographic dependency, the best possible in more than two centuries. On the one hand, despite the constant increase in ODR over the period analyzed, around 2000, the rate of increase was still moderate. On the other hand, the YDR has reached a stable value after a whole century of steep decrease. Hence, total dependency is the lowest in the first decade of the XXI century, and will become the worst once the steep increase in ODR starts in 2020. Moreover, its final value will be clearly worse than the initial one at the beginning of the XIX century. Overall, the TDR has gone from a high value at the beginning of the XX century - due to young dependency - to a low value at the beginning of the next century - due to a huge increase in the working age population. In the coming decades, it will go up to a constant higher level, once the baby boom generations pass away and stable population is reached with higher life expectancy and lower fertility.

These well-known purely demographic indicators can be enriched by using NTA estimates. In particular, as seen in Section 2.2, one can weight producers and consumers as in Equations [9] and [11], using the labour income $\left(Y_l\right)$ and consumption $\left(C\right)$ age profiles. Figure 3 compares this *economic support ratio* $\left(S^E\right)$ to the strictly demographic indicator $\left(S^D\right)$ obtained from Equations [8] and [10] and to the inverse of the total dependency ratio shown above. By construction, the inverse of TDR is higher and changes more than S^D. The time path of S^E and S^D is quite similar though some differences remain. The level of S^E is above the one of S^D. Also, the main peaks of S^E occur after the corresponding peaks of S^D. The evolution of the S^D is slightly smoother. The maximum and minimum values due to the ageing of the baby boom generations go from 0.68 in 2007 to 0.52 in 2055 for S^D, while for S^E they go from 0.92 to 0.69 in the same period. Hence, the consideration of the NTA profiles does not at all reduce the threats ageing poses on the economy and on public finances.

Figure 3

DEMOGRAPHIC S(D) AND ECONOMIC S(E) SUPPORT RATIO IN SPAIN (1908-2150)

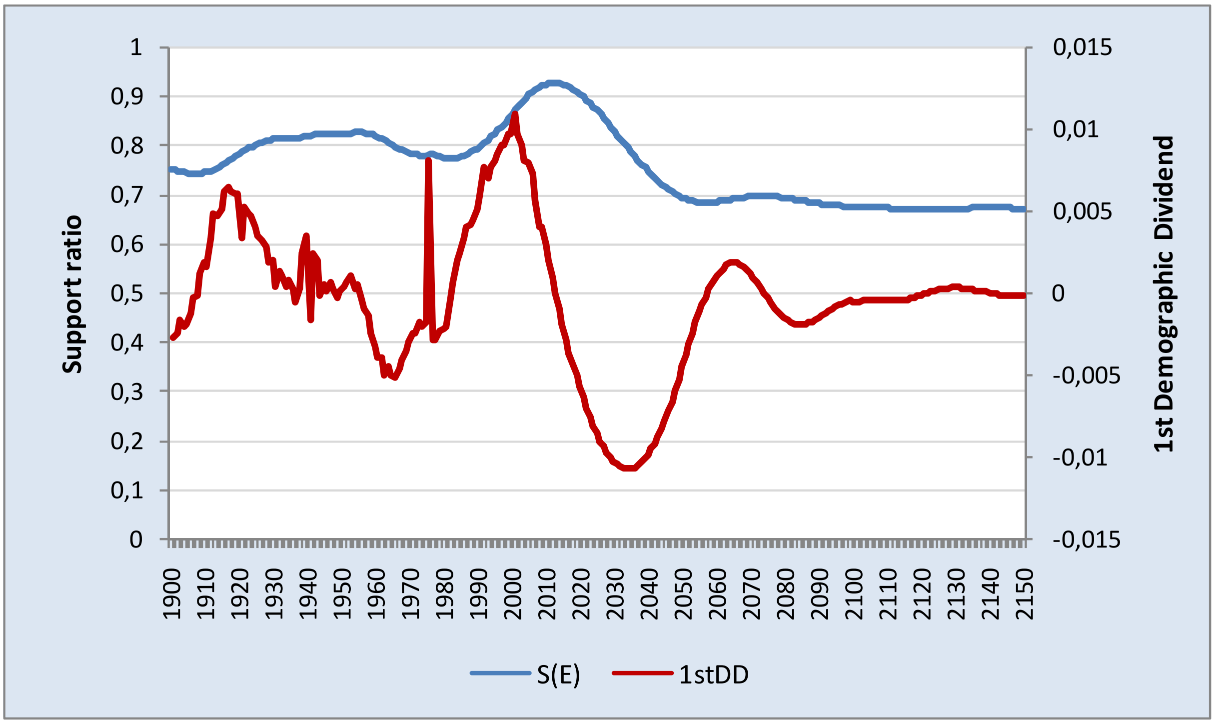


Source: Own elaboration.

As explained in Section 2, Mason (2005) measured the first demographic dividend as the increase in the economic support ratio estimated using the NTA age profiles for consumption and labour income. Figure 4 shows the evolution of the S^E ratio together with its increase –the first demographic dividend– obtained for Spain. One can observe that there have been some periods of positive demographic dividend during the past century in Spain, but the longest one is the demographic dividend due to the working period of the baby boom generation, occurring from 1982 to 2013. Clearly, this golden period would have been precious in terms of reform opportunities, but it is coming to an end.

Figure 4

ECONOMIC SUPPORT RATIO AND FIRST DEMOGRAPHIC DIVIDEND IN SPAIN (1908-2150)



Source: Own elaboration.

3.3. NTA and GA integrated results: Sustainability indicators

The combination of NTA and GA methods as set forth in Section 2.3 allows some informative indicators to be extracted on the effects of demographic changes on the economy. Indeed, the application derived above for the first demographic dividend is an example of how the cross-sectional information given by NTA profiles might be used to derive forward and backward looking projections. Below we show how some other indicators in the spirit of the demographic dependency rate can be derived using the NTA age profiles to give them economic meaning[15].

The computation starts from the four NTA *per capita* age profiles shown in Figure 1, assuming they remain constant in *per capita* terms though updated by a given productivity rate[16]. As mentioned above, this procedure is far from reliable

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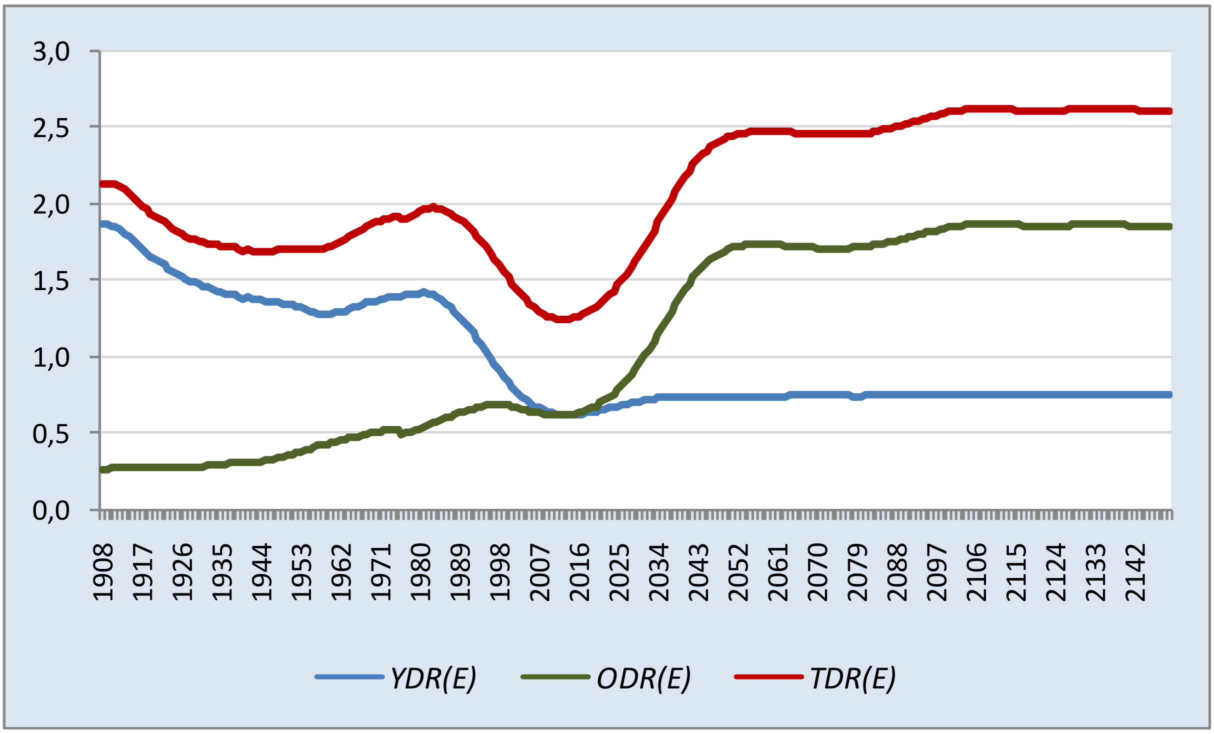
[15] These indicators are built similarly to the demographic dependency rate, but it should be noted that the assumptions included in economic indicators are far stronger that those included in the strictly demographic indicator.

[16] The productivity up-rating transforms the cross-sectional age profiles into longitudinal profiles. Note that, as long as all profiles are projected using the same rate, the ratios obtained are not affected by the value chosen.

in the case of the ABR profiles, but this is only done in hypothetical terms. It is equivalent to assuming that there is no limit to public or private indebtedness. Then, these *per capita* profiles are combined with the past and future demographic evolution. Once the aggregate profiles have been obtained, we add them up and analyze their relative aggregate evolution. First, starting from the shape of the LCD –again in the year 2000– and assuming it evolves with productivity, we can obtain an *economic dependency rate* $\left(\text{TDR}^E\right)$ as the aggregate value of positive LCD (the deficit, registered for ages 0-25 and 59 and more), divided by the aggregate value of negative LCD (the surplus, for ages 26-58). It is obtained for the whole economy, as well as for the young $\left(\text{YDR}^E\right)$ and the old dependants $\left(\text{ODR}^E\right)$. As Figure 5 shows, not surprisingly, the time path of these ratios is quite similar to the one followed by their demographic counterparts in Figure 2, although some differences remain. Interestingly, while the demographic TDR ratio rises by 96% from 2007 to 2055, the TDR^E rises by 100% from 2013 to 2059.

Figure 5

EVOLUTION OF ECONOMIC DEPENDENCY RATES (1908-2150)

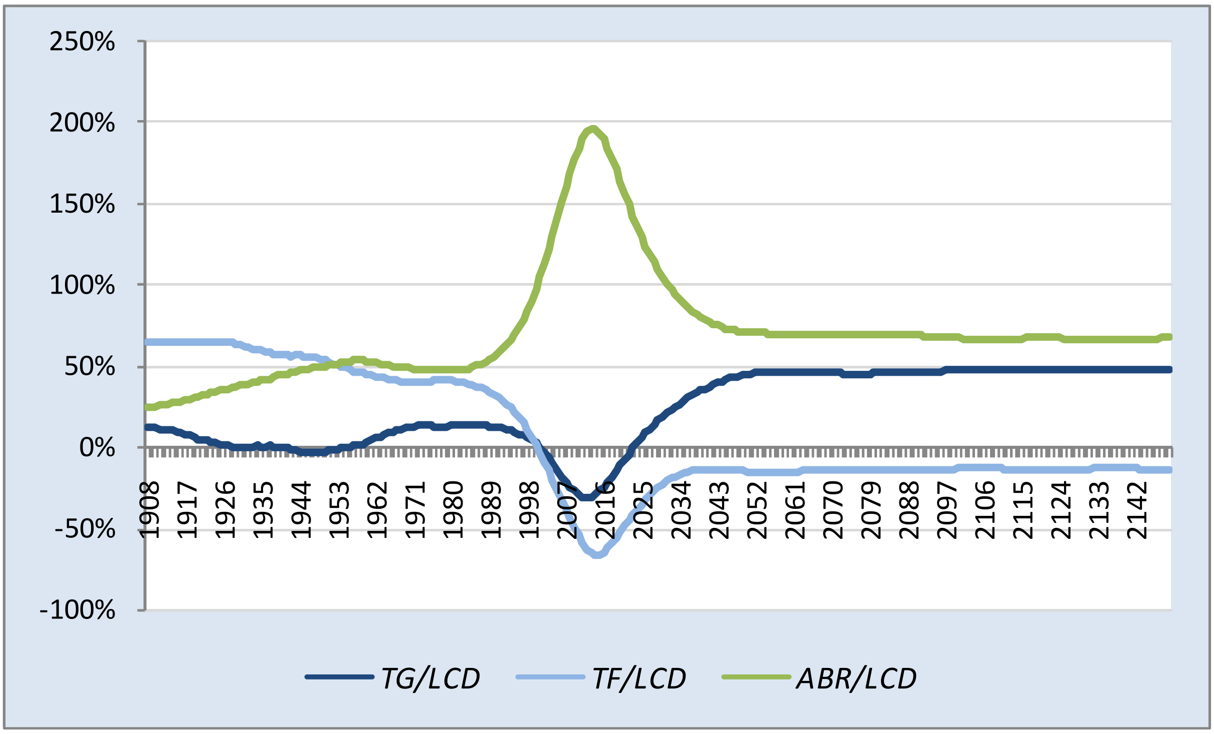


Source: Own elaboration.

Going a step forward, one can analyze how the share of LCD financed by each of the available age reallocations evolves with demographic changes. If one applies the same projection method used above to the NTA profiles for TG, TF and *ABR*, one can observe the evolution of the so-called *share of family transfers* (TF/LCD), *share of public transfers* (TG/LCD) and *share of asset-based reallocations* (ABR/LCD) on financing the aggregate LCD. In order to interpret these indicators, it is important to note that only their value in 2000 is true and feasible, while the rest are projected, their feasibility being conditional on the evolution of the stock of capital and wealth. Figure 6 shows their evolution over time due to demographic change. As seen above, in 2000 the share of family transfers in LCD is near zero. The same happens with public transfers, so that more than 100% –100.53%– is financed through asset-based reallocations. Then, assuming that the present fiscal and economic age flows remain constant, we move across the past and future considering changes in the population age structure. Going back to the past, the young dependency ratio increases. Hence, given that the young dependants are mainly sustained by TF (as shown by the *per capita* profiles in Figure 1), the share of TF in LCD also increases. This pattern continues until 2015 when TF/LCD increases due to the slight fertility recovery and to the increase in the elderly – who give positive transfers to the rest of the family. From 2040 on it stays stable at a negative value around 13-15%.

Figure 6

EVOLUTION OF THE SHARE OF TG, TF AND ABR IN LCD (1908-2150)



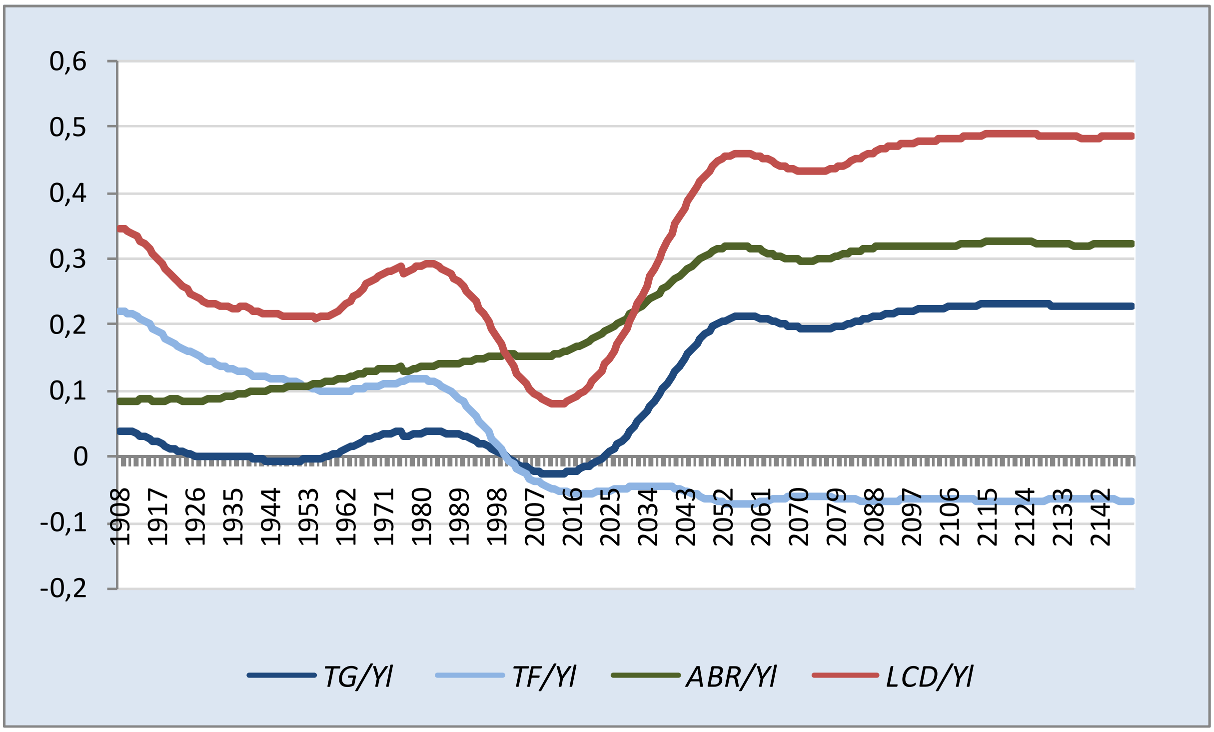
Source: Own elaboration.

The pattern is quite different for TG. Before 2000 there is not a clear pattern. On the contrary, when moving from 2000 to the future, the opposite happens: the ODR is increasing and, given that it is mainly financed by TG (see Figure 1), the share of TG in LCD increases sharply until the baby boom generations end their retirement period, stabilizing at a higher level. The latter is due to the higher life expectancy of baby boomers and the lower fertility fixed in the final stable population. The share of ABR simply closes the gap between LCD and the other financing sources explaining the huge increase, which is far from being feasible. Clearly, a thorough analysis of the feasible evolution of the four NTA profiles requires a general equilibrium framework. The development of the stock of NTA would also complement the analysis, but this is still work in progress in the project work plan[17].

Finally, to complete the picture shown, we can still construct a set of sustainability indicators, in line with the Generational Accounting (GA) tradition. By dividing equation [4] by the aggregate value of labour income (Y_l), we relate the total LCD and its components to the total labour income –or payment capacity. In this way a measure of the *economic sustainability* is obtained on the left-hand side (LCD/Y_l). Then, using the right-hand side, this indicator is split into three components. First, we obtain a *public sustainability* indicator by relating aggregate public net transfers to labour income (TG/Y_l), similar to the sustainability indicators obtained in GA. Its value starts from 0.03% in 2000 (Figure 7). In the past, the effects of demographic evolution never led this figure to be far from 3%, but this is not so in the future due to the demographic transition. A golden period brings it down to -2.47% in 2012– while the baby boomers are working –and then it rises to 21.34% in 2058– during their retirement.

Figure 7

EVOLUTION OF ECONOMIC SUSTAINABILITY INDICATORS FOR SPAIN (1908-2150)



Source: Own elaboration.

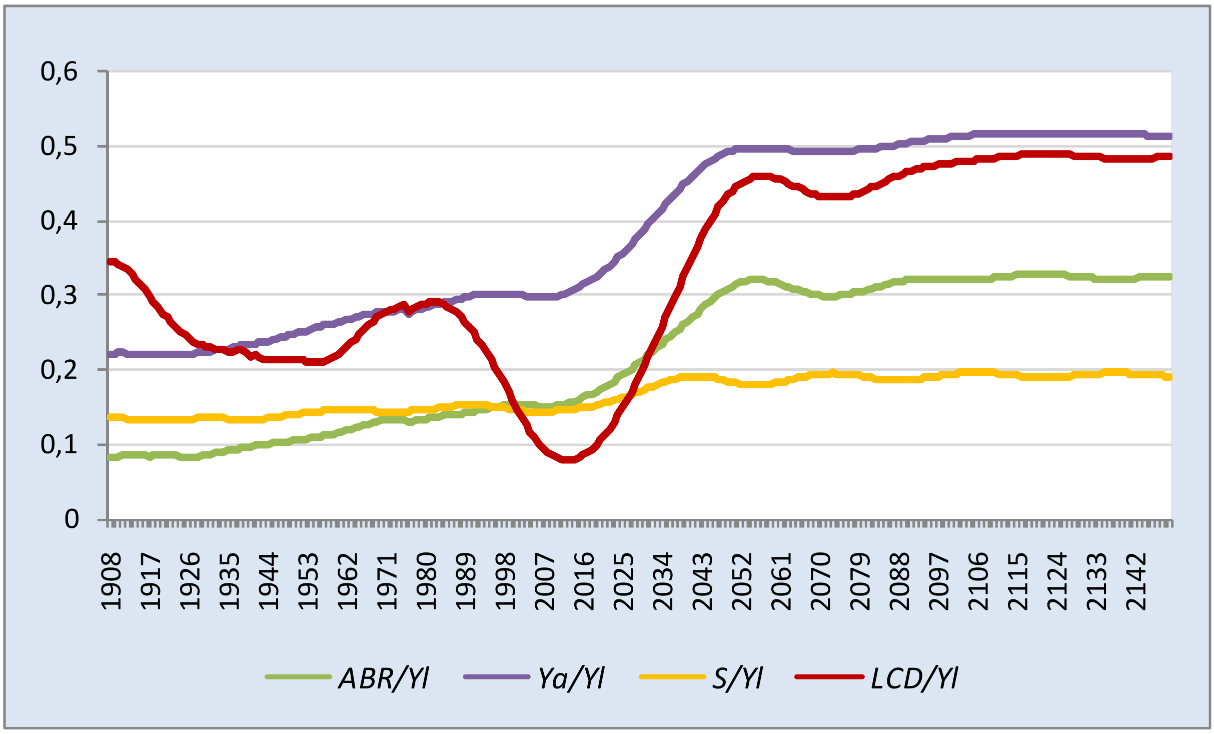
[17] See http://www.ntaccounts.org for details on the state of the project.

Second and very interesting, an indicator for the private side of the economy is obtained, the *sustainability of private transfers,* which relates the total amount of private transfers to the total aggregate value of labour income (TF/Y_l). Extrapolating the age structure of family transfers in 2000 forward in the future and backward in the past (Figure 7), one can see how the weight of net family transfers would go down during the XX century and the first quarter of the XXI, stabilizing around 2025 at a negative value of around 5%.

Finally, the other indicator for private sustainability –the evolution of the ABR in relation to Y_l– gives a measure of the resulting need for private resources during the retirement of the baby boom. Given the tendencies observed for TG and TF, the need for resources is sharply increasing, even before 2000, and becomes clearly unfeasible from 2020 on. Figure 8 completes this picture by reproducing the total economic dependency rate and those affecting the asset-based reallocations. Clearly, the evolution of the saving rate (S/Y_l) can give us a measure of the room left to the second demographic dividend. Nevertheless, the trends shown in Figure 8 do not seem to give great perspectives. The increase in the saving rate due to the saving of the baby boomers is moderate so that the ABR needed is hypothetically covered by the increase in asset income (Y_a) due to the projection of this NTA profile with productivity. Serving as an illustration, the latter path is by no means unfeasible.

Figure 8

EVOLUTION OF THE ABR AGGREGATES (1908-2150)



Source: Own elaboration.

4. CONCLUDING REMARKS

In this paper, first the NTA results for Spain for year 2000 are presented. In particular, we conclude that the life cycle deficit (LCD) in *per capita* terms is negative (indicating a surplus of labour income overconsumption) while individuals are between ages 26 and 58, while it is positive (deficit) when they are younger or older. Furthermore, we obtain the share of LCD financed through the three possibilities of age reallocations (public transfers, private transfers and asset-based reallocations). These shares are very small for public transfers and family transfers, with the result that more than 100% of the aggregate LCD is financed through asset-based reallocations.

Second, the consumption and labour income NTA age profiles are used, as in the NTA tradition, to illustrate the evolution of the first demographic dividend. We obtain the conclusion that it is especially strong during the period 1982-2013, reflecting the fact that the demographic dependency rate between 1970 and 2010 is the lowest of both the past and present centuries. This is explained by the continuously declining fertility in this period, and the baby boomers entering the labour force. This temporary positive effect of the demographic transition is often forgotten, although it would have given a substantial margin for policy responses.

Third, the NTA *per capita* profiles are combined with population data, in the GA tradition, to derive several economic sustainability indicators and to analyze their hypothetical evolution during the demographic transition. As a first step, an *economic dependency ratio* is defined, as the ratio between the total positive LCD (deficit) and the total negative LCD (surplus). Interestingly, this economy indicator varies slightly more than the strictly demographic one. While the total demographic dependency ratio rises by 96% from 2007 to 2055, the economic dependency rises by 100% from 2013 to 2059.

Fourth, the projected evolution of the way in which the LCD is financed by age reallocations during the demographic transition is obtained. We start from the 2000 situation where ABR finance more that 100% of LCD, covering the small negative balance between TG and TF. Then, the mere changes in the age population structure imply that from 2000 on, the share of TG financing LCD falls from near zero to -30.95% in 2010, and then increases sharply to 46.42% in 2059. In the case of TF, its participation in LCD decreases strongly in the period 1980-2015, becoming negative in 2000, around the middle of the fertility period of the baby boomers. Then it recovers slightly to stabilize at a negative amount around 2040. The extra resources needed during the ageing of the baby boomers from 2020 to 2050 are hypothetically raised from ABR, which must rise sharply to close the increasing financing needs.

Finally, our economic sustainability analysis is complemented by indicators of fiscal and private sustainability. Summarizing, the huge increase in the public unsustainability during the ageing of the baby boomers is not compensated by the small decrease in the unsustainability of private transfers. Hence, there is an increasing need for ABR, which seems far from being feasible. Definite conclusions on the extent of the second demographic dividend in Spain require a general equilibrium analysis, but the indicators derived for the sustainability of public and private transfers illustrate the small margin left for policy responses. Given their transparency, those indicators can be obtained and compared in international terms. Hence, they could contribute to meet the need for sustainability indicators raised by the so-called Stiglitz commission.

Clearly the indicators proposed and the age profiles from which they are derived, can give way to policy conclusions. It is often forgotten that the threats the ageing process pose on the welfare state have been preceded by decades of relatively numerous working age cohorts –the first demographic dividend– that can give the economy some margin to overcome the ageing process, by implementing policies that foster a second demographic dividend. Operationally, there is no doubt that policy responses are limited once this period has gone and ageing starts hitting the economy. But, in any case, it is worth analyzing this issue and the NTA estimates provide a precious basis for this. Unfortunately, our results indicate that Spain has probably wasted the first demographic dividend and does not have much room left for the second one. Nevertheless, definite conclusions can only be properly derived by developing the stock NTA and through a general equilibrium contrast, considering the changes in factor prices during the demographic transition.

APPENDIX: NATIONAL TRANSFER ACCOUNTS PROFILES FOR SPAIN 2000

Below we detail the data used to estimate the NTA age profiles for Spain in the year 2000, according to:

$$LCD = C - Y_l = TG + TF + ABR \qquad [A.1]$$

With LCD being the life cycle deficit, defined as the difference between the consumption (C) and the labour income (Y_l). At the same time, LCD must match the sum of the three possible age reallocations of income, i.e. public transfers (TG), private transfers (TF) and the asset-based reallocations (ABR). Equation [A.1] holds both for the whole economy and for each age cohort. The different data sources are also detailed in Table A.1[18].

Table A.1

DATA SOURCES USED IN NATIONAL TRANSFERS ACCOUNTS AGE PROFILES

Age profiles	Data source
Lifecycle deficit (LCD)	
Private consumption	
Private health consumption (CF)	INE: ECPF, 2000
Private education (CFH)	INE: ECPF, 2000
Private housing (CFR)	INE: ECPF, 2000
Other private consumption (CFX)	INE: ECPF, 2000
Public consumption	
Public health consumption (CG)	MSC: Estadística del Gasto Sanitario Público, 2002 MSC: Encuesta Nacional de Salud, 1997
Public education (CGH)	MEC: Estadística de Enseñanzas no Universitarias MEC: Estadística del Gasto Público en Educación INE: Estadística de la Enseñanza Superior en España
Other public consumption (CGX)	*Per capita*

[18] For a first approximation to these estimates, see the chapter devoted to Spain in Lee, R. and A. Mason, eds. (2010) by the same authors (Patxot *et al.*, 2010). In that case the whole ABR profile was obtained as a residual while here asset income is obtained from micro profiles and only savings are obtained as a residual. Some other novelties of this version are the corresponding details in the aggregates and the closing of the accounts. Some other changes are mentioned in the following.

Age profiles	Data source
Labour Income (YL)	Eurostat: EU Household Panel, 2000
Self-employed (YLS)	Eurostat: EU Household Panel, 2000
Earnings (YLE)	Eurostat: EU Household Planel, 2000
Public transfers (outflows)	
Social Security contributions	Eurostat: EU Household Panel, 2000
Personal income tax	Eurostat: EU Household Panel, 1998
Capital tax	Eurostat: EU Household Panel, 2000
Value-added tax (VAT)	INE: ECPF, 2000
Property tax	INE: ECPF, 2000
Excise taxes (except tobacco)	INE: ECPF, 2000
Excise tax on tobacco	INE: ECPF, 2000
Public transfers (inflows)	
Contributory pensions (retirement, disability, widowhood, survivors)	MTAS: Informe Estadístico del INSS, 2000
Non-contributory pensions (retirement, disability); unemployment and temporary disability benefits	MTAS: Anuario de Estadísticas Laborales y Asuntos Sociales, 2000
Social Security family benefits	MTAS: Informe Estadístico del INSS, 2000
Health benefits (hospital and primary care, pharmaceuticals)	MSC: Encuesta Nacional de Salud, 1997
Education expenditure	MEC: Estadística de Enseñanzas no Universitarias. MEC: Estadística del Gasto Público en Educación. INE: Estadística de la Enseñanza Superior en España
Long-term care	CIS: Encuesta sobre la soledad de las personas mayores, 1998
Private transfers	
Interhousehold transfers (inflows)	Eurostat: EU Household Panel, 2000
Interhousehold transfers (outflows)	INE: ECPF, 2000
Intrahousehold transfers (in/outflows)	Eurostat: EU Household Panel, 2000. INE: ECPF, 2000
Asset Based Reallocations	
Asset income profiles	Eurostat: EU Household Panel, 2000
Interest profiles	Eurostat: EU Household Panel, 2000

Source: Own elaboration.

a) Consumption (C)

Total consumption is divided between public and private, both categories being further broken down into various parts depending on data availability.

Private consumption

Age profiles have been estimated for expenditure on health, education, housing and other consumption[19]. In all cases, the database used was a household budget survey (ECPF 2000)[20].

Information about private consumption of health care in ECPF includes out-of-pocket expenditure on specialist doctors, hospitals and medicines. However, in Spain private health insurance is quite usual. It was therefore necessary to include the insurance premiums as part of private health expenditure. Information in the survey is reported by household, and was allocated by age using a simple regression analysis[21].

Information about private education expenditure available in ECPF is not very complete. Only tuition, fees and tutoring expenses are included. Books and school supplies are only registered as bookstore expenditure. Thus, families with students enrolled in public schools do not report any private education expenditure. Furthermore, there is no information about school enrolment before age 16. In order to allocate education consumption to household members who are at school, the official enrolment rate among people younger than 16 years within households was used. Once this was done, a regression among students and non-students was performed, allocating expenditure only among those people that were between 4 and 26 years old. The results turned out to be quite erratic, but this could be due to the lack of information about expenditure of public school students and to the enrolment rates in private schools.

The age profile of private housing expenditure was also obtained from information in ECPF on imputed rent for owner-occupied housing. The equivalence scale proposed by NTA to allocate the household expenditure by age was applied.

Finally, the category "other private consumption" groups together the remaining private consumption categories. Those items only consumed by adults, such as alcoholic drinks and tobacco, are separated and imputed only to adults in the household[22]. For the rest of the items, the equivalence scale proposed by the NTA methodology is used.

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[19] The latter includes the estimated consumption flow of owner-occupied housing, while the actual rent paid is considered as other private consumption following NTA methodology.

[20] Encuesta Continua de Presupuestos Familiares.

[21] All profiles were smoothed using R with a 0.01 span.

[22] In Spain in 2000, beer and tobacco is legally consumed from 16 years old. We therefore divided household consumption on these items by all household members older than 16 years. Other alcoholic drinks were divided per capita among household members older than 18 years.

Public consumption

Public consumption is broken down into three main categories: health and long-term care, education and other public expenses. Information on public health consumption is further disaggregated into four items. Hospital utilization and specialist assistance, primary healthcare and pharmaceutical products, represent more than 90% of total health expenditure. The rest is due to general services and other general expenditure. The Ministry of Health and Consumption (MSC) provides information about this expenditure, but not by age. The age allocation was made following Ahn *et al.* (2003). In particular, hospital care expenditure is allocated by age combining the estimated cost of the different Diagnostic Related Groups (DRG) and the entry rates by age and sex with those processes. Although the estimated cost of DRG only represents 50% of total public health expenditure, the profile based on entry rates is used to allocate the other expenditure categories as well. The other two categories, pharmaceutical expenditure and primary healthcare, are retrieved from a health survey – the *Encuesta Nacional de Salud* (ENS) carried out by the Ministry of Health (MSC) for 1997. The information given by this survey is rather limited as it only asks individuals if they use this kind of services, omitting any information on the number of units/visits or their cost. Nevertheless, this information allows the total expenditure on pharmaceuticals and on primary healthcare to be imputed by age[23]. The long-term care age profile was obtained following Costa and Patxot (2004) and Comas-Herrera *et al.* (2006). Both dependency rates and service utilization rates were estimated by age and gender from CIS (1998). This information, together with the cost of each type of service, allows an age profile to be obtained for long-term care expenditure. The services considered were residential care, home care and day care.

Regarding educational public expenditure, age allocation was carried out using information provided by the Ministry of Education and Culture (MEC). It provides data on public expenditure in public and private schools by level of education, on the number of students enrolled by school type (private, state-subsidized private and public and also on the cost per student enrolled at university. Using these data, first the public cost per student enrolled in public and in semi-private schools, including universities, was calculated. Second, the age profile of public consumption in education was obtained by multiplying this cost by the number of students, and then dividing by the total population in each age group.

Finally, the aggregate public consumption not allocated by age in the abovementioned categories was divided among the total population to calculate the simple *per capita* amount of "other public consumption".

[23] As information from MSC is reported by 5-year age groups, we smoothed data using span of 0.01, excluding expenditure from newborns that should be clearly higher.

b) Labour income (Y_l)

There is no reliable information about individual income in the ECPF[24]. To find this information, the 2000 wave of the European Union Household Panel (PHOGHE) was used. This survey has information about all kinds of income on an individual and household level, although it does not have any information about consumption. Following NTA methodology, labour income is broken down into earnings –for salaried workers– and self-employed income. Earnings declared by individuals working as employees were extracted directly from the survey, calculating the mean by age. For self-employed income, NTA methodology recommends using –both in the aggregate value and in micro profile– 2/3 of declared self-employed earnings, as it is assumed that 1/3 of these earnings are due to capital, and not to labour income. As Figure A.1 shows, the earnings profile rises quite quickly and peaks at 42 years old. Self-employment income starts later and rises very slowly with age, having its peak at 58. It is also important to remark that the share of self-employment income in total labour income is quite high for Spain compared with other European countries. It represents 17% of the total labour income, and is usually less than 10% in northern and central European countries.

c) Net public transfers (*TG*)

Inflows: public transfers received by individuals

Public transfers can be in kind or in cash. The former show the same age profile as public consumption in education, health and other public consumption, as explained above. The latter are broken down into several items, following Abío *et al.* (2005). In Spain there are different kinds of social benefit, some of them contributory and others non-contributory. Among the contributory social security benefits, there are all the Social Security benefits – retirement, disability, survivors, family and maternity - and unemployment benefits. Profiles of average pension receipts by age are directly available from administrative data (MTAS, 2000) for the main categories (retirement, permanent disability and survivors). Similarly, data provided by INEM (2002) on average monthly gross unemployment income by age are used to obtain unemployment benefit profiles. Regarding maternity benefits, given the absence of information by age, the imputation procedure relies on observed age-specific fertility rates[25]. Similarly, as direct evidence on sickness benefits is unavailable, transfers are assigned using age-related data on industrial accidents during the working day and the average period of discharge reported by MTAS (2002). Finally, child benefits group together both contributory and non-

[24] As explained above, ECPF has no reliable information on income. There is only a variable reporting total household labour income that seems to be strongly underreported.

[25] We follow the standard NTA assumption. Alternatively, one could consider newborns as the ultimate beneficiaries.

contributory payments and are imputed using the total amount given to those below and above 18 years old – the latter relating to handicapped children. Concerning other non-contributory transfers, we considered the number of beneficiaries by age, the monthly uniform insurance amount for each type of benefit taken from MTAS (2002) and the underlying population structure, to derive age-profiles for non-contributory old age and disability pensions[26].

Retirement benefits are clearly the most important (Figure A.1), being received by people over 55 years, but especially over 65. Survivor's pensions are the second source of public transfers for people over 60. Unemployment and disability benefits are received by working age individuals. Other types of public benefits, such as non-contributory pensions, family aids or maternity benefits have little importance in the Spanish system.

Outflows: Public taxes paid by individuals

The control aggregates are in the aggregate values from National Accounts published by the INE. The age profiles are extracted either from ECPF or PHOGUE, as explained below.

Regarding Valued Added Tax, the allocation procedure was based on the above-described consumption profiles extracted from ECPF. In particular, those items with both an identifiable separate aggregate and a micro-based age profile were separated. This was possible for excise taxes (tobacco, beer, other alcoholic drinks and oil).

The personal income tax profiles were obtained following Abío *et al.* (2005) aimed at reproducing the 1998 individual personal income tax return using data from PHOGUE. First, net wage earnings, as well as pension and unemployment benefits (also taxed as personal labour income in Spain) were converted into gross terms by considering the respective income retention and the corresponding worker social security contribution rates. Second, disposable income was determined by application of the appropriate allowable expenses. Third, adding up disposable income from different sources, the total tax liability for each taxpayer was inferred from the tax rate schedule. The tax finally paid was derived after accounting for tax allowances related to rent, healthcare, dependent relatives and children, housing and mortgage interest (all imputed to the head of the household) and labour earnings.

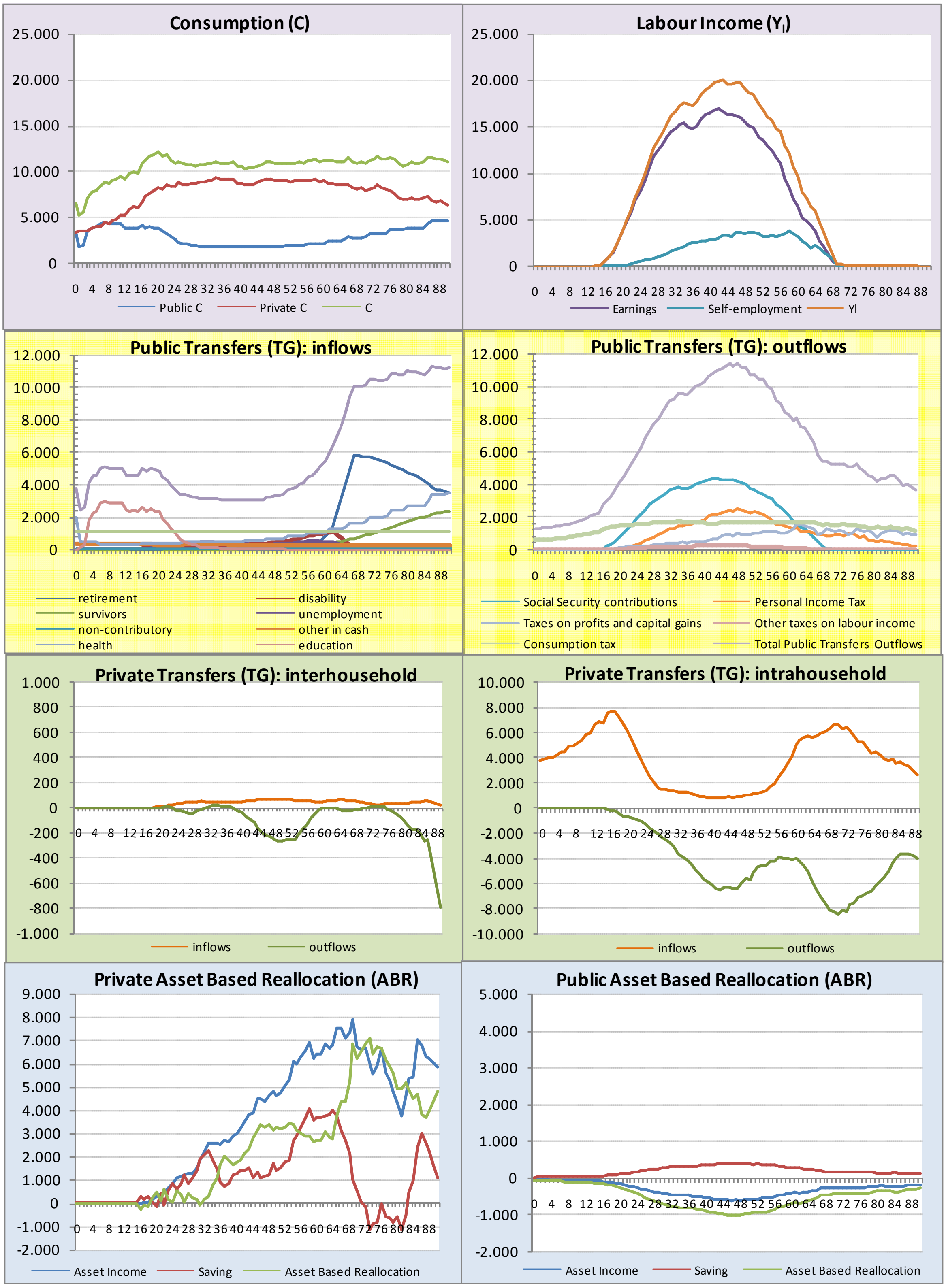
The rest of taxes were derived from some of the other profiles described. Social Contributions were obtained using the labour income age profile, given that the contribution rate is almost proportional – except for those affected by the upper and lower thresholds. For the other taxes and transfers we used age profiles of labour income, consumption or asset income, depending on where taxes are imposed. For the rest of the world transfers, we calculated the net transfers, and applied the total taxpayers' profiles.

[26] Again, as information is reported by 5-year age groups, data are smoothed.

As expected, tax profiles (Figure A.1) are concentrated especially at working ages, when individuals contribute to the social security system and start having assets and labour income.

Figure A.1

NATIONAL TRANSFER ACCOUNTS AGE PROFILES



Source: Own elaboration.

d) Net private transfers (*TF*)

Private transfers are decomposed between those occurring within (intrahousehold) and between (interhousehold) households. According to NTA standards, interhousehold transfers were estimated first, as they are necessary to obtain intrahousehold transfers. For this it is necessary to turn to the two main surveys referred to above, as information on inflows is only available in PHOGUE while information on outflows is only available in ECPF.

Regarding intrahousehold transfers, data availability constrains their estimation for Spain to a greater extent. According to standard NTA methodology, it is crucial to have a single survey providing both income and consumption data, but this is not the Spanish case in 2000. Hence, it is necessary to derive an estimation procedure to start from a survey containing all the information needed. Specifically, consumption information from ECPF and income information from PHOGUE are combined, the PHOGHE being the reference survey[27].

The imputation procedure consists of two steps. First, the average *per capita* profiles by age groups of consumption and public transfer outflows (taxes paid), not recorded in the PHOGUE database, are imputed to each household member. The average income by age groups and the total cash transfer inflows are also imputed in the same way to each member, although this information already exists in the database. The aim of this latter imputation is to use the ratio between the average income and public transfers and the real ones as a household-specific scaling factor. Second, consumption and taxes paid are revaluated using the abovementioned scaling factor. As a result of this procedure, the standard NTA methodology can be applied to obtain the age profile of intrahousehold transfers[28].

The estimated age profiles of intrahousehold transfers for Spain show that only children and people younger than 28 are net recipients of family transfers (Figure A.1). The elderly, despite not having labour income, give more transfers to other family members than they receive, especially over age 80. This negative net transfer flow for the elderly can possibly be explained by the fact that elderly household arrangements in Spain present a high share of cohabitation if compared with other countries of Europe.

e) Asset-based reallocations (*ABR*)

Asset-based reallocations profiles are estimated separately for the public and private sector. As a consequence of the standard NTA assumption that

[27] It was also decided to use all variables needed from PHOGUE in order to avoid further distortions. In particular, all income variables and public cash transfer inflows are taken from the micro data set. The alternative would be to use the estimated age profiles, but this could eliminate variability and hence produce unreliable results.

[28] A similar process was used in order to impute the average profile of inter-household transfer outflows to Phogue, as information on this item is available only for inflows.

households own public debt, public asset-based flows are assigned to age groups in proportion to each age group's general (non-earmarked) tax payments. Private asset flows must be separated into two components, asset income profiles and savings. The first one is estimated through the property and capital income profiles plus the imputed rent from owner-occupied households and the portion of mixed income of the household sector profiles. In addition, it is important to notice that, in NTA, assets and, therefore, asset income, are assigned to the age group of the household head[29]. Finally, only private savings remain to be estimated and this is obtained as a residual of all the other components of the National Transfers Accounts equation presented earlier (taking into account Equations [2] and [3] in the text).

[29] With respect to Patxot *et al.* (2010) there is a change in the assumption of the household head. It was the eldest in the household, while it is now the main income earner. Additionally, for coherence with the assumption that savings are done by the household head, a small amount of savings obtained for the youngest are adjusted to zero and redistributed to adults.

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SÍNTESIS

PRINCIPALES IMPLICACIONES DE POLÍTICA ECONÓMICA

A menudo se olvida que la amenaza que supone el envejecimiento demográfico para el estado del bienestar tiene, o ha tenido, algunos aspectos positivos. En primer lugar, el envejecimiento es precedido por décadas del llamado *primer dividendo demográfico*: un aumento del ratio entre productores y consumidores que aumenta la renta per cápita y genera un margen para realizar posibles reformas que eviten los efectos negativos en el futuro. En segundo lugar, si la política de transferencias generacionales lo permite, este primer dividendo demográfico de carácter claramente transitorio puede preceder a un *segundo dividendo demográfico:* una mayor acumulación de capital, que puede tener, además, efectos permanentes.

Este artículo persigue dos objetivos fundamentales. El primer objetivo es presentar las primeras estimaciones de cuentas de transferencias nacionales (NTA) para España en el año 2000. Este método parte de los agregados de contabilidad nacional y los imputa por edades con el fin de estimar los flujos de recursos que se dan entre los distintos grupos de edad y por las distintas vías disponibles: mercado, familia y sector público. El trabajo se enmarca en un proyecto de alcance internacional cuyo objetivo es obtener estimaciones plenamente comparables para países con distintos grados de desarrollo económico y social.

Los resultados permiten obtener, a cada edad, el llamado déficit de ciclo vital (LCD) –el exceso del consumo total, suma del consumo público y privado, respecto a la renta laboral. En el caso español, para el año 2000 y en términos per cápita, se observa que esa magnitud es positiva excepto entre las edades 26 y 58 en que la renta laboral excede las necesidades de consumo. Asimismo, los perfiles por edad del consumo y la renta laboral pueden emplearse para medir el peso del primer dividendo demográfico. En el caso español, a lo largo del siglo XX y de cara al futuro, se obtiene que es especialmente relevante en el período 1982-2013, reflejando el hecho de que es el período de menor dependencia demográfica del siglo XX y previsiblemente del siglo XXI. Por el contrario, a partir de 2020 la dependencia demográfica comenzará a aumentar como resultado de la continua caída de la fecundidad y la entrada de la generación de la explosión demográfica en el mercado de trabajo.

La metodología NTA permite, también, desagregar las fuentes de financiación del LCD en tres tipos de reasignaciones de recursos entre edades: reasignaciones basadas en activos (ABR) –que, a su, vez resultan de restarle el ahorro a la renta de los activos–, transferencias públicas (TG) y transferencias privadas (TF) –si bien estas últimas no constan explícitamente en la contabilidad nacional se estiman a partir de micro datos. En términos agregados, para la España del año 2000 se obtienen un valor reducido y negativo tanto de las transferencias públicas como privadas, de modo que más del 100% del déficit de ciclo vital es financiado con reasignaciones basadas en activos.

En términos operativos, está claro que el margen de actuación política de cara al envejecimiento es reducido una vez pasado el primer dividendo demográfico. Pero, en cualquier caso es necesario analizarlo y las estimaciones de NTA ofrecen un punto de partida valioso al respecto. Lamentablemente nuestros resultados indican que España ha desperdiciado buena parte del primer dividendo demográfico y no queda mucho margen de actuación para fomentar el segundo. Con el fin de profundizar en esta cuestión, el segundo objetivo del trabajo es explotar las complementariedades que se dan entre NTA y las proyecciones al futuro realizadas en contabilidad generacional (GA). En particular se extienden los indicadores de sostenibilidad futura de GA –basados únicamente en datos de transferencias públicas– incluyendo las reasignaciones que se dan vía mercado y familia provenientes de las estimaciones de NTA. Así, en primer lugar se obtiene un ratio de dependencia económica, como el ratio entre el agregado de LCD positivo (déficit) y LCD negativo (superávit) y se obtiene un aumento del mismo entre 2007 y 2055 del 96%. Asimismo se obtiene la proyección al futuro, teniendo en cuenta la evolución demográfica, de las reasignaciones entre edades observadas en 2000. Partiendo de que en 2000 más del 100% del LCD se financia con ABR, siendo la fracción de TG y TF negativa y reducida, la mera evolución demográfica esperada en el futuro provoca una reducción de la fracción financiada vía TG. Ésta cae de un valor cercano al cero, al -30.95% en 2010, para desde ahí aumentar bruscamente alcanzando un +46,42% en 2059. En el caso de las trasferencias familiares (TF) cuyo peso en el LCD venía decreciendo desde 1980 para llegar a cero alrededor de 2000 –en medio del período fértil de la generación del baby boom–, se observa una leve recuperación hasta que se estabiliza en un valor negativo alrededor de 2040. Los recursos extras necesarios durante el envejecimiento de los baby boomers se lograrían hipotéticamente aumentado el ABR, que para ello deben crecer drásticamente.

Finalmente cabe complementar los indicadores de sostenibilidad fiscal –similares a los obtenidos en GA– con indicadores de sostenibilidad privada, poniendo los agregados obtenidos en relación a la renta laboral agregada. Los resultados muestran que el enorme aumento del indicador de insostenibilidad de la política pública no se compensa por la leve reducción del indicador de sostenibilidad de las transferencias privadas. Por tanto, se produce una necesidad creciente de ABR, que no parece factible. Es necesario recurrir a un análisis de equilibrio general y la obtención de la cuenta de stock de NTA para sacar conclusiones definitivas respecto a la importancia del segundo dividendo demográfico en España. En cualquier caso, los indicadores obtenidos y los perfiles por edades de los que provienen, ofrecen una información muy valiosa e ilustran el margen que queda para la actuación política. Además, dada su transparencia, estos indicadores pueden obtenerse de modo asequible y comparable internacionalmente y son, por ello, candidatos claros a la necesidad de indicadores de sostenibilidad reivindicada por la llamada Comisión Stiglitz.

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