Ageing Europe – An Application of National Transfer Accounts for Explaining and Projecting Trends in Public Finances

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Integrating backward and forward looking techniques to assess intertemporal sustainability of public finances in Spain

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Abstract

In this paper we combine backward and forward looking analysis in order to obtain sustainability indicators of the intertemporal fiscal policy in Spain for the period 1995-2008, corrected by the business-cycle effects. We start from the cyclically neutral budget balance and GDP and then we decompose the changes observed in intertemporal sustainability by extending the Generational Accounting method. Results obtained indicate that cyclical adjustment of GA indicators changes them significantly. Besides, the demographic effect has also a significant impact in worsening fiscal sustainability.

Keywords

Generational Accounting, Demographic Ageing, Cyclically-Adjusted Budget Balance, Spain

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Contents

1 Introduction

Generational Accounting (GA) has proven as a useful tool to predict the effects of population ageing in government finances. This method, developed by Auerbach, Gokhale and Kotlikoff (1991, 1992) and Auerbach et al. (1999), offers a widespread framework for applied fiscal sustainability analysis in a changing demographic environment. Nevertheless, this methodology has a limitation: The sustainability indicators obtained by generational accountants are affected by the business cycle position in the base year of the calculation and potentially by other factors.

In the short term, government revenue and expenditure levels vary over the business cycle even when the underlying fiscal policy parameters are constant. An exact picture of debt policies under way thus requires eliminating cyclical effects from government balances. There are several approaches to disentangle cyclical and structural components in current government balances. These methods generally build upon econometric analysis of correlations between government revenue and expenditure, and some measure of economic activity. The common feature is that de-trending is based on past government experiences. Hence we may speak of backward-looking techniques. Larch and Turrini (2009) review the main shortcomings encountered in implementing this technique as a tool to assess fiscal surveillance.

On the contrary, the various methods for evaluating fiscal sustainability available from the literature, surveyed by Balassone and Franco (2000), are generally forward-looking. The most advanced of these techniques develop projections for the future path of primary imbalances and generate estimates of the fiscal policy adjustments required to stabilize government debt at some predetermined rate of GDP. Balassone et al. (2009) presents different quantitative indicators to assess the sustainability of public finances in the euro area against the backdrop of ageing.

Where measures of fiscal sustainability have been repeatedly calculated, the experience is that the results can vary substantially over very short periods.

However, the swings are only partly due to structural changes in fiscal policy. As the primary imbalance at the start of the projections varies over the business cycle, the inter-temporal fiscal imbalances measured tend to fluctuate cyclically as well. Therefore, in order to determine whether fiscal policy is actually expansive or contractive, it is also necessary to separate the cyclical and structural components in fiscal sustainability measures. Conceptually this is also a prerequisite for meaningful cross-country comparisons, as individual country data, in a given year, are likely to be captured at different stages of the business cycle.

In this paper, we follow the method proposed by Bonin et al. (2014), which expands the standard forward-looking analysis of fiscal imbalances by integrating backward-looking de-trending procedures. Specifically, they incorporate the method by Girouard and André (2005), which is the basis for the standardized measure of the cyclically-adjusted budget balance reported by the European Commission, into GA. In particular we slightly simplify the calculation routine proposed by Bonin et al. (2014), updating the results for Spain for a longer period. Interestingly, besides the cycle effect, other sources of mismeasurement of the pure policy effect – the demographic effect and the wealth effect – are found.

The time period analyzed for Spain -1995 to 2008- is especially interesting as it covers a complete cycle wave. In preparing for EMU the deficit-to-GDP ratio fell from 7.2 per cent in 1995 to 0.1 per cent in 2004. It continued to improve, reaching a surplus between 2005 and 2007 (1.27, 2.37 and 1.92 per cent, respectively), but in 2008 the trend reversed and a period of important deficits arose again because of the financial and housing market crises. As a result, according to conventional GA measures, it seems that the sustainability of Spanish fiscal policy has improved by a wide margin in preparing for EMU. However, if one relies on cyclically neutral generational accounting, the picture becomes quite different: as we show in Section 3, some signals of the current fiscal sustainability problems were already present before the crisis.

The remainder of the chapter is organized as follows. In the next section, we outline the standard GA method and the modifications needed in order to disentangle pure policy effects from the cycle and other effects hiding them.

Section 3 illustrates the method by means of an application to the Spanish case over the period 1995-2008. Finally, Section 4 is devoted to conclusions and further remarks.

2 Methodology

This section presents the method developed in order to correct the effect of the business cycle and other sources of mismeasurement in the sustainability indicators obtained using the Generational Accounting technique. This method was first proposed by Bonin et al. (2014).

Generational Accounting emerged in the context of the analysis of the dynamic effects of fiscal policy. Auerbach, Gokhale and Kotlikoff - who worked on the field of applied large scale general equilibrium Overlapping Generations models-, proposed GA (1991, 1992) to assess redistribution between current and future generations through public debt in the face of demographic changes. The method measures the present value of tax payments –net of transfers- of current generations and uses it to obtain a projection –assuming policy stays constant- of the net payments of future generations. This way, it evaluates the extent to which the intertemporal budget constraint of the government holds, assuming there are no changes in fiscal policy.

The method, as it was proposed from the beginning, is developed in partial equilibrium setting. In particular, the currently observed tax and transfers profiles –usually obtained from cross-sectional data- are assumed to be constant and are projected into the future using the expected growth rate of per-capita real GDP. Despite its limitations, those age profiles, combined with population projections are quite informative. On the one hand, the lifetime net payments of the living generations can be compared to net payments of future generations. Note that the payments of the living –obtained from the observation of a cross-sectional - will differ from those left to future generations, to the extent that the government is accumulating implicit debt, by promising transfers to an increasingly aged population. On the other hand, an estimate of annual government surplus or deficit is obtained, which allows for keeping track of the expected path of revenues

and expenditures along the demographic transition. Specifically, GA defines a sustainable fiscal policy as the one capable of meeting the intertemporal budget constraint of the government in absolute terms:

$$D_{t_0} = \sum_{t=t_0}^{\infty} S_t (1+r)^{t_0 - t} \qquad (1)$$

Where S_t is the primary public surplus in period t, D_{t_0} is the value of public debt in the base period t_0, and r is the discount rate applied to take the value of future payments back to the base period. In other words, a sequence of future primary surpluses is considered sustainable, if its aggregate present value is sufficient to pay for the initial level of government liabilities. Otherwise the so –called sustainability gap (SG) arises –as the residual of Equation (1)- and payments of the future generations need to be adjusted in order to meet intertemporal budget constraint of the government. We follow Auerbach (1997) in expressing this sustainability gap in terms of the aggregate discounted value of future GDP. This value is projected in the same spirit as the sustainability gap – GDP per worker in the base period is updated for labor productivity growth, and linked to a projection of the future labor force. The resulting relative sustainability indicator, *SI* in the following, represents the share of intertemporal liabilities in intertemporal economic resources. It is the change in the primary balance (as a share of GDP) in each future period that would ensure repayment of past debt.

Going back to equation (1), it is worth mentioning that the value of the observed S_t -the current primary surplus (deficit)- turns out to be crucial for the results. Note that this reflection of the current situation of the government –shown in the current net taxes- is assumed constant forever, while it might be affected by many conjuncture factors. Indeed the sustainability indicators derived from GA have been found to be sensitive to the business cycle. In general, government tax revenue increases and transfer spending falls during a boom, whereas the opposite happens during a recession. Accordingly, life-time net tax burdens measured by the generational accounts and the sustainability gap develop pro-cyclically. As a consequence, fiscal policy might appear more or less sustainable, depending just on the macroeconomic stance in the base period of the projection.

There could be different solutions to avoid business-cycle bias in the generational accounts. A first approach would be to take a period with average utilization of economic capacity as the starting point for the calculations. This idea has not yet been applied by generational accountants, who generally aim at evaluation of contemporaneous fiscal policy, which might be different from that in the period that was neutral with respect to the economic cycle. Another option, applied by Feist et al. (1999) to Finland, consists of departing from the contemporaneous government budget as a starting point, but making discrete adjustments during the forecast that design a return to what is considered a cyclically neutral state. The typically ad hoc nature of the required assumptions on the transition could be a serious point of criticism against this approach.

In the following we explain the systematic procedure proposed by Bonin et al. (2014), slightly simplified. First, it should be noted that it relies in a previous adjustment of the initial budget according to a homogenous procedure, like the Cyclical Adjustment of Budget Balances (CABB) method developed by the European Commission since 2002. In this way, it can be aimed at international comparisons. Appendix A.1 gives an overview of the CAAB method and data employed to obtain the output gap and the corresponding cyclically adjusted budget balance (*S**).

Second, we describe the decomposition procedure. By rewriting equation (1) replacing *S* with the cyclically neutral surplus *S**, we can compute cyclically neutral GA, obtaining the SG from,

$$D_{t_0} = \sum_{t=t_0}^{\infty} S_t^* (1+r)^{t_0 - t} + SG_{t_0} \qquad (2)$$

Where the cyclically neutral surplus is the result of the product of the per capita cyclically adjusted taxes, net of transfers (τ_{jt}^*) paid by each cohort aged and the size of this cohort (p_{jt}). And P_t and T_t^* are the same variables expressed as vectors, as shown in equation (3).

$$S_t = \sum_{j=0}^{J} p_{jt}\tau^*_{jt} = \mathrm{P}_t\mathrm{T}^*_t \qquad (3)$$

Nevertheless, the resulting series of sustainability indicators are not yet informative enough about the evolution of sustainability over time. Equation (2) can be rewritten for t_0+1 and the successive "base" years as,

$$D_{t_0+1} = P_{t_0+1}T^*_{t_0+1} + \sum_{t=t_0+2}^{\infty} + S^*_t(1+r)^{t_0+2-t} + SG_{t_0+1} \qquad (4)$$

For simplicity, in the following we assume that there is no discounting ($r=0$) and that there is no growth updating of tax payments ($g=0$), so that T remains constant, once it is rescaled to the budget aggregates. The last period considered being infinite, postponing the calculations by one year should not in principle change results by a big amount. Yet in practice several effects can occur that change the sustainability measures from year to year, even if pure policy parameters remain constant.

Once the cycle effect is corrected, the effect of the change in population structure between two subsequent years can be measured. As suggested by equation (3), the primary surplus in a given starting period depends not only on the policy parameters reflected in the vector of net tax payments but also on the population structure of the base year. In particular, if equation (4) is rewritten using equation (3) and starting with the population vector of the previous year, instead of the one in the same year, we obtain equation (5). By subtracting equation (4) from equation (5) we can obtain a measure of the effect of a change in population structure.

$$D_{t_0+1} = \sum_{t=t_0+1}^{\infty}\sum_{j=0}^{J} p_{j,t_0}\tau_{j,t_0+1}(1+r)^{t_0+1-t} + SG_{t_0+1} \qquad (5)$$

Then, it is possible to isolate what we will call the wealth effect. Note that, in the absence of other changes, the evolution of debt should hold the following equation:

$$D_{t_0+1} = D_{t_0}(1+r) - S_{t_0} \qquad (6)$$

Nevertheless, the evolution of debt might be affected by some other factors, like valuation changes, variation in public assets, and the like. What we call wealth effect tries to measure these changes as the difference between the right hand side and the left hand side of equation (6) which stem from the windfall gains or losses.

Note that in addition, a discounting effect may obscure the pure policy effect. Ceteris paribus, if one moves from one starting year to the next the effect of discounting changes the weight of future positive of negative monetary flows. To grasp this effect, suppose a positive primary surplus for some years at the beginning of the projection, but primary surpluses falling below zero in later years. As moving the starting year brings the period of negative surpluses closer, they are discounted by less, and accordingly, everything else equal, the measured sustainability gap must become larger. Of course, the discounting effect will be very small if one just compares GA indicators for two consecutive periods. But if one aims at comparing a longer time series of GA indicators, it may require attention. In the following, we try to avoid the discounting effect by only comparing sustainability indicators referring to the same base year. This is possible when we measure the cycle and the population effect, but it is not possible when we measure the wealth effect and the policy, which will be inevitably affected by the discounting effect.

Summarizing, in order to isolate the pure policy effects in the GA sustainability indicators from the other abovementioned effects, it is necessary to proceed in several steps. First, subtract the SG, computed on the basis of equation (1) from the cyclically neutral SG, computed on the basis of equation (2). This first step controls for the business cycle effect in the budget aggregates. Second, estimate the SG by replacing P_{t_0+1} with P_{t_0} in equation (4), i.e., subtracting the estimates obtained from equation (5) from those obtained from equation (4). Third, by adding/subtracting the difference between the right and left hand side in equation (6) we correct the wealth effect. The pure policy effect –which inevitably includes the discounting effect-, can then be obtained as a residual, by subtracting all the

isolated effects from the total effect. In the following section we show an illustration of this disentangling procedure applied to the Spanish case for the period 1995-2008.

3 Disentangling the pure policy effect from Generational Accounting indicators

In this section we apply the methodology explained above to the Spanish case. First, a description of demographic projections and age profiles needed is given. In the second Subsection we give a panoramic view of the public finances in Spain, while the third is devoted to show the results.

3.1 Demographic projections and age profiles

Estimating generational accounts requires a very long-term demographic forecast to determine future cohort size, projections of per capita tax payments and transfer receipts by age and gender and aggregate figures for these categories. In this paper we mostly use the same data as Abio et al. (2015). Our projections start from year 1995 while aggregates are updated along the period (1996-2008). Given that our time horizon exceeds that adopted by official population projections, we extend it for a longer period by setting the same assumptions using the usual component method. We start from the observed population structure and the levels of individual mortality and fertility. Then, future population is projected using Leslie projection matrices. Those projections are based on assumptions similar to the Eurostat population projections (Eurostat, 2008). Future fertility is taken from projections developed by INE, detailing age specific fertility rates for the period 2002-2031. This way, the total fertility rate 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. Those demographic projections indicate that it does not seem possible to escape to the doubling of the dependency rate from around 25% in the first decade of the XX century to more than 65% in the 2050 decade, during the retirement of the baby boom generation.

Aggregate ppublic accounts informing on the initial situation of the country regarding public taxes and transfers are obtained from official statistics. Nevertheless, it is necessary to obtain the set of age profiles catching the incidence of each tax and transfer by age and gender is also necessary. These age profiles would be preferably directly obtained from official publications from the corresponding Ministry, referring to the total population, but in most cases they are not available. In these cases, age profiles are estimated from micro data surveys and scaled to meet the corresponding aggregates. This usually implies some reclassification of the aggregates obtained from the official public accounts.

Profiles can be divided in two groups: Inflows and outflows. Public inflows, in this case transfers, refer to all public transfers received by people from the government. They can be divided in in-kind transfers -like education and health-, and cash transfers -like pensions and other social transfers. We start explaining the in-kind transfer profiles estimation, derived from public consumption and continue with cash transfers. To estimate the age allocation of public education expenditures we used the information from the Ministry of Education on average expenditure per student and from the National Statistics Institute on student enrolment by age and sex. This information is disaggregated by type of studies. Hence, the final average consumption of each age group is obtained, by grouping the expenditure of members of the age group in each course. Finally, we divided the total education expenditures of each age group among total population of the same age group to obtain per capita profiles.

Public health transfers needed further disaggregation as they can be divided in four parts: Hospital expenditures, Primary care, Pharmacy and Others. Different data sources are used to estimate the age profile of each one of those services.

To obtain the hospital expenditure age profile we followed the methodology presented in Ahn et al. (2003). As the authors suggest, we used diagnosis-related group information (DRG), published by the National Health System and presented by the CMBD (Conjunto Mínimo Básico de Datos al alta hospitalaria). These are hospital discharges information registers that include all discharges performed inside Public General Hospitals in Spain, with information of their cost and the age and sex of the patient. Combining this data we can obtain age profiles by sex of hospital costs. To allocate primary care expenditures and pharmacy it was not possible to use direct information on consultation costs and primary care. The 2006 National Health Survey was used to derive a service utilization age and gender profile. The survey gives information on the number of visits on the last year, or last month, (depending on their frequency) to doctors, specialists, nurses, physiotherapists and all kind of health care professionals. As the cost of these professionals can differ greatly, we decided to apply a very simple allocation rule, giving double weight to family doctors and specialists assuming they would imply a higher cost than nurses and other professionals. Medicaments don´t have any distinction in the survey and it is only possible to know if the person is using several kinds of medicaments, but not the quantity or frequency. We had to use this simplified information to estimate the profile to allocate pharmaceutical expenditures. For the rest of health expenditures we assumed a simple flat per capita profile among all population.

Regarding cash transfers, age profiles for pensions and other social transfers were estimated. Most of these age profiles – retirement benefits, survivorship pensions, maternity benefits and other marginal social transfers, all of them contributory and non-contributory – were obtained from the annual publications of the Social Security and Employment Ministry. The information published is usually the average benefit of five-years age groups by sex of beneficiaries and the amount of beneficiaries. To estimate the per capita age profile it is necessary to obtain the total value of benefits received by each age group and divide it by the amount of population in each age group. However, there are two benefits, unemployment and temporal disability, that are published using very broad age groups and the benefit amount is not specified. We decided, in these two cases, to use another

survey instead. The survey is the European Union Statistics on Income and Living Conditions (EU-SILC) which gives information on all kind of income benefits that the person receives, and it allows for obtain the average benefit received by each person in a single year profile. As the single age profile was not very clean and had a lot of distortion, we applied the super smoothing technique implemented in the R statistical package with a span of 0.01 to estimate the final profile by sex.

Once all the inflow profiles are estimated, they are rescaled to the aggregates observed in 2005 (See Table 5.1). Regarding public outflows profiles, they include all kind of current transfers from the population to the government like taxes on income and wealth, but also social contributions and other current taxes. Each of these transfers needs a different age profile, which can be obtained either directly, or indirectly from the tax base –the latter being consumption and income profiles from labor, assets and property. We will describe here the estimation of each of these profiles, showing later the correspondence between those age profiles and aggregates in the public accounts.

To estimate tax and transfers profiles it was necessary to use several surveys, as not all profiles can be found in a single survey. First, consumption age profiles were needed in order to indirectly estimate age profiles for taxes on consumption - the Value Added Tax (VAT) and separated profiles for special taxes: Alcohol, Tobacco and Oil. Consumption age profiles were retrieved from the Household Budget Survey (Encuesta de Presupuestos Familiares - EPF). This survey carries out a detailed documentation of household expenditures, being its principal objective estimating the total and disaggregated annual household consumption expenditure at the national and regional level. This was not available for 2005. But, as this information is crucial to estimate outflow age profiles, the 2008 survey was used and afterwards the 2005 aggregates were applied to rescale those profiles.

Consumption is in general collected in the survey EPF at a household level, so it is not possible to know the real consumption of each member. Therefore, to estimate the age profile it is necessary to apply an allocation rule. There are several methods in the international literature that could be used, but we will be

using the equivalence scale presented by the NTA methodology, based on an extensive literature review (www.ntaccounts.org). The formula for the scale assumes that adults aged twenty and older are equal to 1, while this number declines linearly from age 20 to 0.4 at age 4, and is constant at 0.4 for those age 4 or younger. For special goods that are forbidden for children, like alcohol and tobacco, the equivalence scale was only applied to individuals being 18 years old or over, assuming that those under this age do not consume anything.

Second, some other profiles for public outflows were indirectly obtained from income profile –the corresponding tax base. In particular age profiles are obtained for labor income, asset income and property income. All these profiles can be estimated with EU-SILC data, as it has information on several sources of income for each individual or household. In the case of labor income, it is important to separate earnings from self-employment, as the aggregate figure applied to each profile comes from different sources. The information of income in the survey is at the individual level but only for people over 16 years-old. It was assumed that younger people were not receiving any labor income. Moreover, among those self-employed there were 366 people reporting negative benefits that we changed as receiving no labor income. This information is individualized in the survey, so the age profile is estimated automatically, once labor income is identified. Finally, we estimated age profiles as the mean labor income among people of each age group.

Other income sources (asset and property) are also collected in the EU-SILC survey at the household level. Following NTA methodology, those should be assigned to the household head. Here, the household head is the person with higher individual income in the household, and in case of equal income levels, the oldest one. Being the household head identified, the age profile is estimated directly.

Once outflow profiles are estimated, the next step is to assign them to the correspondent aggregate public transfer outflow. Outflow transfers include taxes on production or on income and wealth, subsidies, social contributions or others. In the case of value added type taxes (VAT), taxes and subsidies that are based

in products or import taxes and subsidies, we assigned the general consumption profile. However, separated profiles were done for special taxes like alcohol, tobacco and oil. For export taxes and subsidies or other taxes and subsidies that rely on production, the profile assigned would be a combination of labour income and asset income profiles. Regarding taxes on income, the assignment will depend on the kind of income specified, but the profiles used would be labour income, asset income and property income. Labour income profile is used for aggregate social contributions and for other current taxes, a combination of labour income and assert income profiles is used.

3.2 Public finances in Spain

Since the 1980s Spain has experienced a fast economic growth. In 1980 per capita GDP in Spain represented only 78.4% of the OECD average, while in 2008 it had increased until 96.5%. Public finances were substantially altered: the welfare system was consolidated at the same time that deep fiscal reforms were developed. Between 1977 and 1985 public expenditure increased from 25% to 40% of GDP, while tax revenues grew from 15% to 33%. As shown in Figure 1, during the eighties and the beginning of the nineties, Spain experienced huge deficits which led public debt over 65% of GDP. The good behavior of public balances after 2000 allowed for a substantial reduction of public debt, which represented only 40% of GDP in 2005 (20 points less than the EU15 average). Nevertheless, the deep economic crisis started in 2008 has dramatically changed the situation.

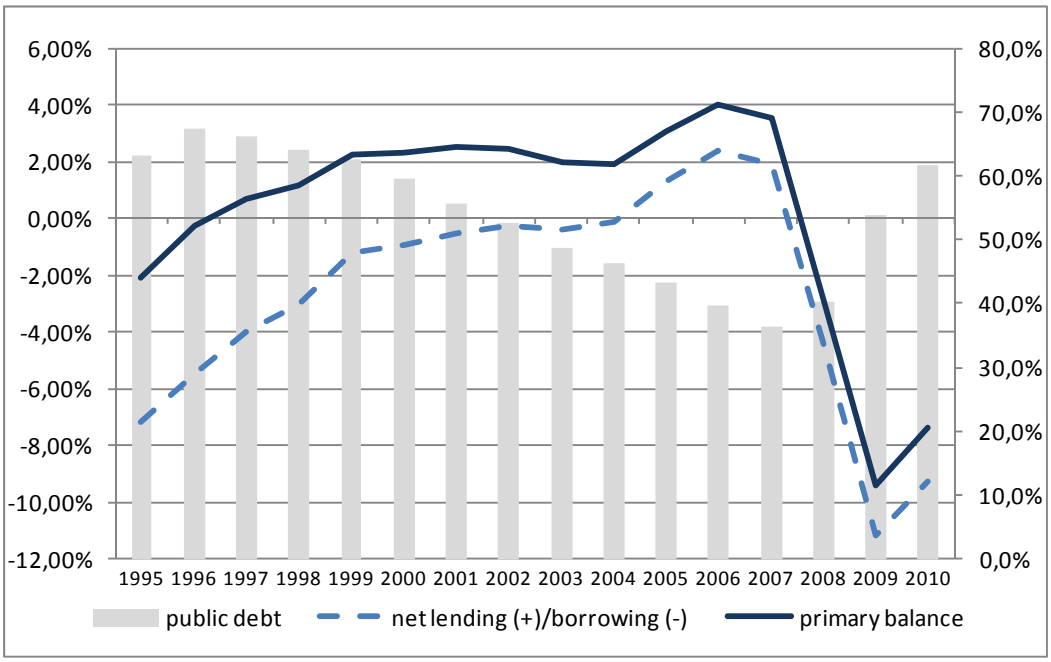

Figure 1: Evolution of public debt and deficit in Spain (% of GDP)
Source: Eurostat and IGAE

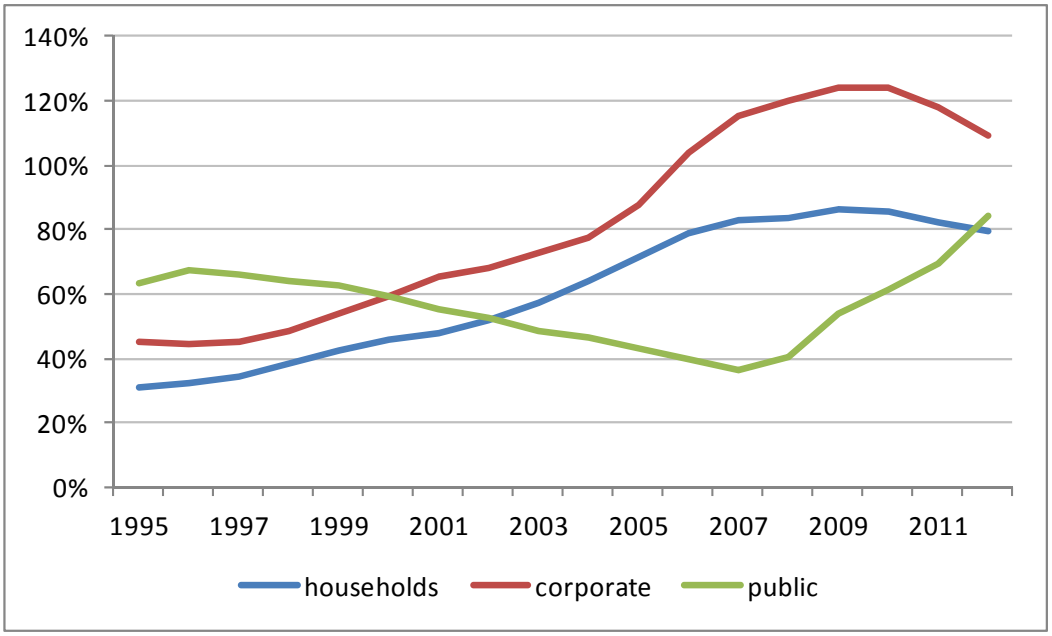

Figure 2: Evolution of public and private debt in Spain (% of GDP)
Source: Banco de España

The crisis has forced a deep restructuring of the Spanish financial system, which has needed public aid in order to guarantee the country solvency. At the same time, both businesses and families have had restricted access to credit, and the

government has been forced to reduce expenditures trying to contain public deficit, which has increased dramatically since 2008 (4.5% in 2008, 11.2% in 2009, 9.7% in 2010, 9.4% in 2011 and 7% in 2012). Despite the efforts in budget control, public debt is growing year by year and at the end of 2013 is more than 90% of GDP. When private debt is taken into account, the situation is even worse (see Figure 2). In 2008 only family debt doubled the public one, and total private debt was more than five times the public. In 2012 figures changed basically due to the sharp increase of public debt, while private has been reduced much more slowly.

Table 1 shows the evolution of the budget aggregates as a percentage of GDP for the period 1995-2008, the time period we focus on. Although positive tendencies can be observed in some budget aggregates especially until 2007 (e.g., unemployment expenditures, age-related expenditure due to certain pension cuts), these are outweighed by growth in non-age-related expenditures. Probably the decentralization process, in which Spain was involved at that time, had a role in this trend. Moreover, the trend changes dramatically in the last year of the observation period, 2008, when the financial crisis hit the Spanish economy.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Taxes														
VAT	-4.87	-5.03	-5.31	-5.62	-6.18	-7.23	-6.12	-6.15	-6.37	-6.69	-7.03	-7.06	-6.44	-5.39
Personal income tax	-5.97	-6.12	-6.06	-5.92	-5.52	-5.46	-5.59	-5.72	-5.27	-5.32	-5.45	-5.86	-6.25	-5.95

Social Security Contributions	-12.7	-12.9	-12.9	-12.8	-12.8	-12.9	-13.0	-13.0	-13.0	13.0	-12.9	-12.9	-13.0	-13.2
Excise taxes	-2.39	-2.41	-2.52	-2.65	-2.60	-2.46	-2.35	-2.30	-2.22	-2.17	-2.06	-1.95	-1.93	-1.84
Capital Income Tax and other taxes	-6.19	-6.35	-6.33	-6.34	-6.63	-6.85	-6.63	-7.20	-7.09	-7.65	-8.39	-9.01	-9.48	-6.82
Total Age-Specific Revenue	-32.1	-32.8	-33.1	-33.3	-33.7	-34.9	-33.7	-34.3	-34.0	-34.8	-35.9	-36.8	-37.1	-33.2
Transfers														
Contributory pensions	9.44	9.65	9.50	9.35	9.19	9.09	8.83	8.82	8.63	8.60	8.50	8.37	8.50	8.75
Non-contributory pensions	0.22	0.23	0.25	0.27	0.24	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.19	0.19
Unemployment and temporary disability	3.72	3.35	3.04	2.64	2.48	2.42	2.44	2.55	2.61	2.67	2.66	2.64	2.70	3.29
Health expenditure	4.86	4.94	4.77	4.73	4.73	4.74	4.63	4.64	4.70	4.96	5.11	5.05	5.10	5.46
Family and long-term care	0.56	0.58	0.59	0.60	0.58	0.59	0.59	0.59	0.59	0.59	0.59	0.60	0.62	0.65
Educational expenditure	4.60	4.60	4.45	4.38	4.42	4.29	4.29	4.36	4.34	4.40	4.28	4.29	4.38	4.61
Total Age-Specific Expenditure	23.4	23.4	22.6	22.0	21.6	21.0	21.0	21.2	21.1	21.4	21.4	21.1	21.5	22.9
Non age-specific expenditure	11.3	10.1	10.2	10.5	10.2	10.4	10.4	11.0	11.1	11.7	11.6	11.8	12.2	13.6
Primary Balance	-2.52	-0.66	0.24	0.77	1.84	3.03	2.29	2.18	1.76	1.70	2.86	3.85	3.37	-3.40
Interest Payment	5.13	5.23	4.69	4.21	3.51	3.24	3.05	2.71	2.37	2.04	1.79	1.64	1.61	1.60
Current Balance	-7.65	-5.89	-4.45	-3.43	-1.67	-0.21	-0.77	-0.54	-0.61	-0.35	1.07	2.21	1.76	-5.00
Initial-past year-debt/ GDP	63.3	67.5	66.1	64.1	62.4	59.4	55.6	52.6	48.8	46.3	43.2	39.7	36.3	40.2
Output Gap	-2.90	-2.70	-1.40	0.00	1.30	2.60	2.40	1.40	0.90	0.80	1.00	1.80	2.10	0.50
Ciclically Adj primary Balance	-1.27	0.46	0.80	0.77	1.36	2.07	1.41	1.65	1.43	6.97	7.93	3.17	2.54	-3.62

Table 2: Budget aggregates 1995-2008 (%GDP)

3.3 Results

Table 2 shows the series of sustainability indicators obtained from the previous analysis. The first column in panel (a) corresponds to the standard indicator (i.e. using the current budget figures), while the next columns show the results after the cycle correction, the population correction, and the debt correction.

YEAR	Current Budget (1)	Cyclically Neutral (CN) (2)	CN previous population (3)	(3) + Wealth effect (4)
1995	6,61	5,23		

1996	4,97	3,68	3,49	3,46
1997	4,08	3,43	3,20	3,14
1998	3,90	3,90	3,68	3,67
1999	2,68	3,25	2,98	2,97
2000	1,76	2,91	2,61	2,58
2001	2,91	3,94	3,55	3,53
2002	3,09	3,72	3,36	3,36
2003	3,92	4,31	3,95	3,94
2004	4,23	4,50	4,18	4,19
2005	3,03	3,40	3,09	3,08
2006	1,99	2,82	2,52	2,51
2007	2,63	3,63	3,44	3,41
2008	11,66	11,88	11,61	11,60

a): Series of Sustainability Indicators (%)

YEAR	Cyclical Effect	Demographic Effect	Wealth Effect	Policy Effect	Total Effect
1996	-0,1002	0,1836	0,0365	-1,7678	-1,6479
1997	-0,6369	0,2279	0,0582	-0,5353	-0,8861
1998	-0,6506	0,2222	0,0026	0,2442	-0,1816
1999	-0,5712	0,2704	0,0059	-0,9235	-1,2184
2000	-0,5817	0,3046	0,0258	-0,6673	-0,9186
2001	0,1216	0,3908	0,0177	0,6207	1,1508
2002	0,4085	0,3562	0,0051	-0,5866	0,1832
2003	0,2334	0,3597	0,0081	0,2227	0,8239
2004	0,1197	0,3141	-0,0087	-0,1158	0,3094
2005	-0,1000	0,3104	0,0069	-1,4186	-1,2012
2006	-0,4659	0,3012	0,0186	-0,8909	-1,0370
2007	-0,1625	0,1840	0,0283	0,5886	0,6384
2008	0,7756	0,2731	0,0137	7,9712	9,0337
1996	-0,1002	0,1836	0,0365	-1,7678	-1,6479

b) Decomposition of the changes in sustainability indicators (with respect to the previous year)

Table 2: Intertemporal fiscal sustainability in Spain 1995-2008

Figure 3 shows the evolution of the standard Generational Accounting sustainability indicator together with the cyclically neutral indicator for each year

in the period 1995-2007. In graphical representations we omit the results for year 2008, since it represents an outlier in the calculations –probably it is soon to obtain an accurate estimation of the output gap given the strength of the current crisis. As said above, the intertemporal sustainability gap is expressed, as usual, as a percentage of the present value of GDP forecasted for the future. The figure indicates the size of the annual average adjustment of the primary government budget surplus required to achieve fiscal sustainability, in terms of annual GDP. The standard measure shows a substantial variation over a relatively short period. It starts at 6.6% in 1995 and falls almost monotonically to 1.8% in 2000, reaching its minimum value. From then on it increases, reaching a value of 4.2% in 2004. Then, it goes down again in the two subsequent years until 2.0%, and increases to 2.6% in 2007. By contrast, the value of the sustainability indicator once the budget balance is cyclically-adjusted varies to a lesser extent, ranging from a maximum of 5.2% in 1995 to a minimum of 2.8% in 2006.

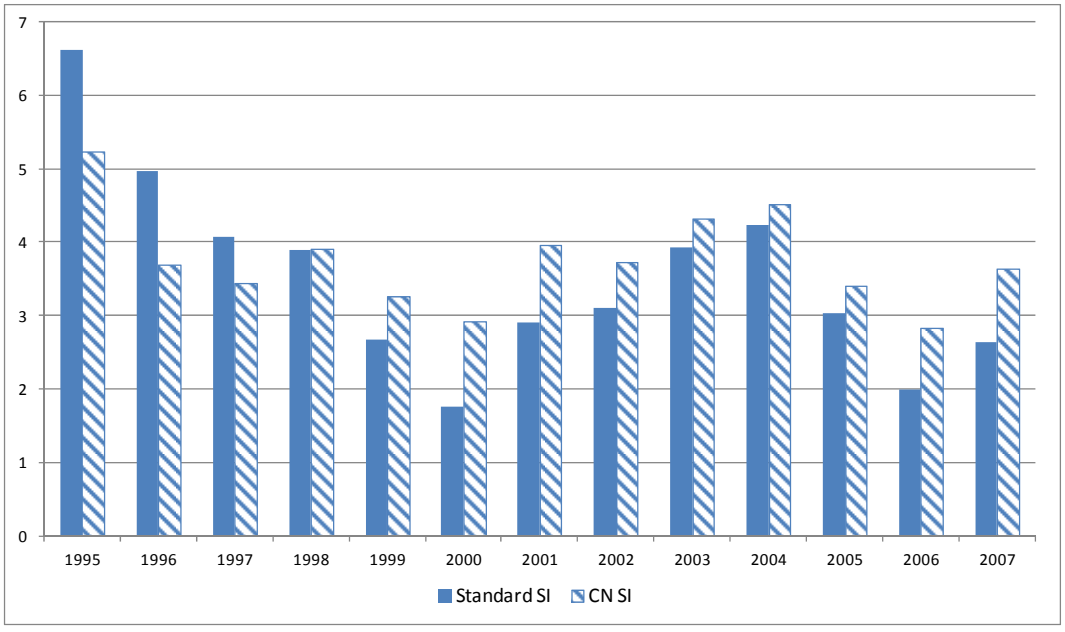

Figure 3: Evolution of Standard and Cyclically Neutral (CN) Generational Accounting Sustainability Indicators 1995-2007

The comparison of the two indicators illustrates the fact that the standard measure appears to be very sensitive to the business cycle. Furthermore, it can lead to misleading conclusions. For example, from year 1997 to 1998 the standard

indicator decreases, indicating that the sustainability of public finances has improved, while the cyclically neutral indicator increases, leading to the opposite conclusion. If we compare the figures for 2001 and 2002, the reverse is true. Similarly, if we consider the period 1997-2007, the comparison of the standard indicator in these two years would lead to the conclusion that the fiscal sustainability stance of Spain improved –as some voices in Spain were claiming-, whereas the cyclically neutral indicator reveals that actually the opposite was the case.

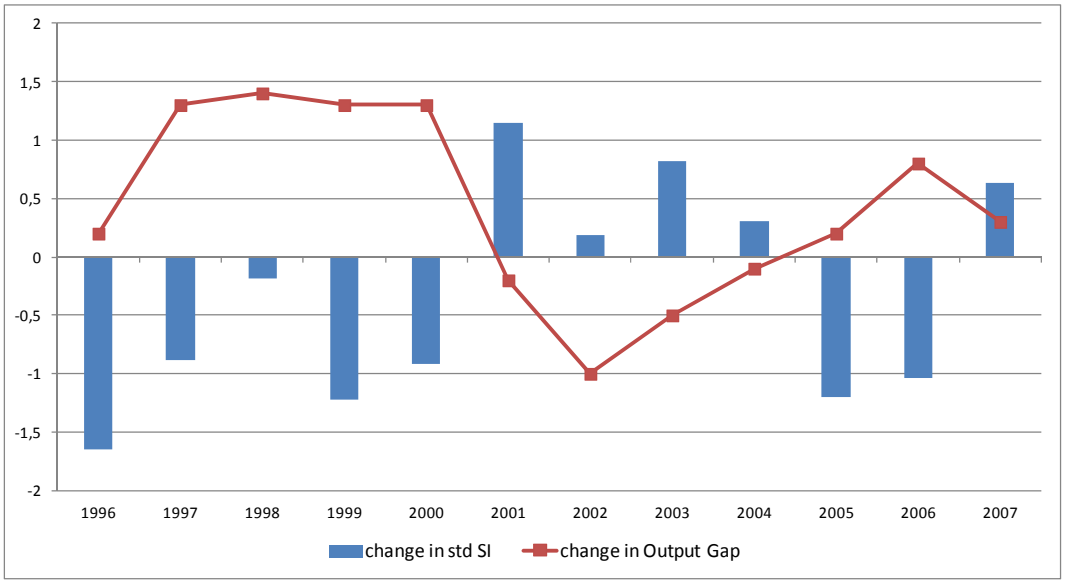

Figure 4: Correlation Between year-to-year variation in the Standard Generational Accounting Indicator and the variation in the Output Gap (with respect to the previous year)

In Figure 4 the correlation between the change in the standard sustainability indicator for each year with respect to the previous one and the change in the corresponding output gap is illustrated. It can be observed that when the output gap decreases, the sustainability indicator increases. On the contrary, positive values for the change in the output gap –reflecting improvements in the development of the economy– are associated with negative values for the change in the sustainability indicator. This is true throughout the period 1995-2006; in year 2007, on the contrary, the sustainability of the Spanish public finances deteriorated despite having a larger output gap than the previous year, mainly due to the policy effect, as discussed below.

Overall the total change in fiscal sustainability is higher that the variation of the cyclically adjusted figure. In the following the change in fiscal sustainability from one year to the next is decomposed in the various effects mentioned above. Recall that the first and second columns in Table 2 panel (a) correspond to the standard and the cyclically neutral sustainability indicator, respectively. The third column shows the cyclically neutral sustainability indicator calculated using the population vector of the previous year and the last column adds to the previous column the correction of the wealth effect. Table 2 panel (b) shows the decomposition of the total change (i.e. the total effect) into the cyclical, demographic, wealth and policy effects. This clarifies to what extent this variation is due to structural changes in fiscal policy.

First, in column 1 the cyclical effect is measured as the difference between the change in sustainability before and after the cycle correction. This effect is significant in the period 1997-2000. In particular, in 1997 the cyclical effect accounts for 72% of the total effect. In 2002 and 2006 the cyclical effect is also strong. Hence, the first conclusion of our analysis is that the cyclical adjustment of the GA indicators matters, as was suggested by Figure 4.

Second, the demographic effect is calculated as the difference between the cyclically neutral indicator and the same indicator obtained using the population in the previous year (i.e. column 2 minus column 3 in Table 2 panel (a)). This effect is always positive, indicating that the annual demographic evolution throughout the period of analysis tends to deteriorate the sustainability of the Spanish public finances. It is increasing in the first part of the period, ranging from 0.18 in 1996 to 0.39 in 2001, and then decreases progressively until the end of the period to 0.18. This is probably due to the combination of changes in immigration and the fact that the retirement of the baby boom cohorts is approaching.

Third, the wealth effect is computed subtracting column 4 (the cyclically neutral indicator using the previous population and debt –accounting for the wealth effect-), from column 3 (the original cyclically neutral indicator using previous population. In general this effect if rather small (below 0.1 percent points of

present value GDP), and aggregating it over the entire observation window, it is equivalent to 0.21 percent of present value GDP.

Finally, the policy effect can be obtained as a residual, i.e. subtracting the cyclical, demographic and wealth effects from the total effect. Alternatively and equivalently, it can be obtained by using the third stage SG. Note that during the procedure we successively eliminate the cyclical effect (Equation 2), the demographic effect (Equation 5) and the wealth effect (Equation 6). Hence, we can compute the change in the SG between two subsequent years by subtracting the value of these last series –which contains only the policy effect– from the cyclically neutral SG estimated from Equation (2). The policy effect evolves quite erratically. It is positive –worsening sustainability– in 1998, 2001, 2003 and 2007, while for the rest of the period this effect is negative, being notorious in 1996, 2005 and 2006. Thus it seems that in these three years the policy measures of the government were in the right direction to improve sustainability. In the latter year it is especially significant, accounting for more than 90% of the total effect, probably reflecting a mismeasurement of output gap in 2008.

Figure 5 illustrates how the year-to-year changes in the standard fiscal sustainability indicator decompose into the different effects. It can be observed that in some years the total effect and the policy effect go in opposite directions. For example, in 1998 (with respect to 1997), the sustainability indicator decreases while the policy effect is positive. This happens because the cyclical effect counteracts the other effects. The opposite is true in 2002 and 2004. On the other hand, in some occasions the cyclical effect is positive and goes in the same direction than the policy effect, as happens in years 2001 and 2003. In this case all the effects have the same sign and reinforce each other.

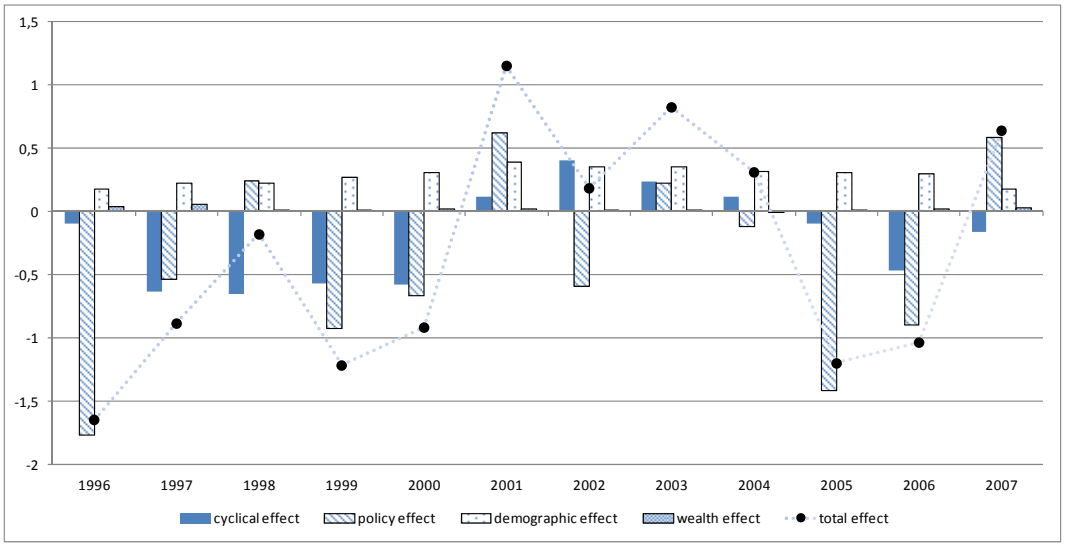

Figure 5: Decomposition of year-to-year changes in the Standard Sustainability Indicator

It is also interesting to note that sometimes the total change in sustainability is rather small while the different effects may be significant. For example, this is the case from 1997 to 1998, in which the total effect accounts for -0.18 percentage points, while the cyclical effect is quite significant (-0.65) as indicated above. In this case the policy and demographic effects act in the opposite direction and the overall outcome is a small change in the sustainability indicator.

Our results contradict the perception at that moment of Spain being an outstanding example of fiscal consolidation in the EU. In contrast to what conventional generational accounting would tell us, Spain did not manage to consolidate its intertemporal liabilities along the expansive phase occurred between 1998 and 2007 before the crisis. The SI decreased from 3.90 to 2.63 while the cyclically corrected figure went from 3.90 to 3.63%. In fact, one may claim that the current public debt crisis in Spain is to some extent a reflection of insufficient budgetary discipline –both in the private and the public sector- during the previous decade of above average growth and declining interest payments on public debt, which seemingly improved fiscal sustainability. By looking at Table 1, we can see that positive tendencies in some budget aggregates (e.g., unemployment expenditures, age-related expenditure due to certain pension cuts)

are outweighed by growth in non-age-related expenditures. Probably the decentralization process, in which Spain was involved at that time, had a role in this trend.

Nevertheless, if one considers the slight overall improvement in fiscal sustainability associated with the pure cyclical effect, it is also true that things could have gone even worse if Spain had wasted the improvement in short term fiscal balances during the expansive phase of the business cycle.

4 Concluding Remarks

In this paper we obtain a series of generational accounting indicators for Spain for the period 1995-2008. Following the procedure developed by Bonin et al (2014) we combine backward and forward looking analysis in order to obtain sustainability indicators of the intertemporal fiscal policy in line with those provided by standard GA, adjusting for several effects. First, we use the backward looking technique employed by the European Commission in order to obtain a cyclically neutral budget balance (CABB) and GDP. Second, we use the Generational Accounting forward looking technique to decompose the changes observed in intertemporal sustainability in four components: business cycle, demographic changes, wealth evolution and policy. Results obtained indicate first, that cyclical adjustment of GA indicators changes them significantly. Specifically, during 1996-2000 and 2005-2007 the correction contributes to improve fiscal sustainability, while it has the opposite effect the rest of the years. Overall, along the period, the total change observed in fiscal sustainability is higher than the one obtained once the cycle is adjusted.

Second, the demographic effect is also important, but in this case it acts always in the same direction, worsening fiscal sustainability. This probably reflects the gradual deterioration of demographic background in Spain, as the baby boom generation approaches its retirement, despite the huge entry of immigrants occurred before the crisis. Third, the importance of the wealth effect seems low.

Only for 2004 it produces a slight improvement of sustainability, while during the rest of the period it acts in the opposite direction.

Finally, the policy effect which results once isolated the rest of the components turns out significant, while it does not act always in the same direction. In years 1998, 2001, 2003, 2007 and 2008 it acts worsening sustainability, while the rest of the period has the opposite sign.

The results obtained in this update, with respect to Bonin et al. (2014) go in general in the same direction. Some differences remain, which can be explained by the corresponding updates in population projections and budget aggregates. By analyzing a longer period, the need for cyclical adjustment and further decompositions of sustainability indicators is confirmed.

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5 Bibliography

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