IS THE DEFICIT UNDER CONTROL?
A GENERATIONAL ACCOUNTING PERSPECTIVE ON FISCAL POLICY AND LABOUR MARKET TRENDS IN SPAIN

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According to the 2001 Spanish budgetary figures, the government deficit is about to disappear. Within a generational accounting framework we analyse if current fiscal policy is also intertemporally balanced. Furthermore, we extend the standard methodology incorporating tax and transfer age profiles by employment status in order to analyse the intertemporal impact of several future employment developments. First, the effect of the reduction in unemployment is disentangled from the effect of fiscal policy reforms during the period 1996-2000. Second, we assess the fiscal effects of an expected future increase in female labour force participation. Finally, we evaluate the impact of a decline in unemployment to the natural rate of unemployment.

Keywords: Generational accounting, fiscal policy in Spain, public debt, demographic ageing.

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1. Introduction

It seems that the state of government finances in Spain has improved considerably in recent years. By the end of 2000, the overall public deficit, which had reached a disturbing 6.6 percent of Gross Domestic

Product (GDP) in 1995, has fallen to an estimated 0.3 percent of GDP, and public revenue and spending are predicted to be in balance from 2001 to 2003. Government forecasts even predict small budget surpluses for the years to come, amounting to 0.1 and 0.2 percent of GDP in 2004 and 2005, respectively. The perspective of budget surpluses is quite unusual for modern Spain. Ever since 1974, the public sector has been in deficit, accumulating liabilities that reached, in 1999, 63.5 percent of GDP. Spain thus failed to meet one of the convergence targets set for membership in the European Monetary Union, although public debt was still below the average of European Union (EU) member states.

The rapid decline of public deficits in Spain has been ascribed to a combination of public spending containment in the last five years (mainly interest payments, social benefits other than social transfers in kind and compensation of employees), fiscal reforms, including the reduction in personal income tax rates, and improving economic conditions as the country went through the expansive phase of the business cycle. In particular, the favourable economic environment together with an improvement in the labour market (the unemployment rate decreased from 22.2 percent in 1996 to 12.9 percent in the third quarter of 2001) made possible an increase in tax revenue of the public sector while transfer spending decreased (cf. ME, 2001).

Although the economic upturn has certainly affected favourably government finances, one should not easily conclude that public sector deficits would now be under control permanently. In Spain, where fertility rates have ranked among the world's lowest for two decades, the demographic transition to higher old-age dependency could impose particularly severe pressure on government budgets in the longer term. With a diminished ratio of tax payers to economically inactive transfer recipients, spending obligations of the government will increase just when the revenue base is expected to deteriorate. The *demographic cycle* of public finances induced by the strong life-cycle component of individuals' tax payments and benefit receipts will affect in particular the contributory social security system, which at present, after financial rationalisation promoted by the 1997 Pension Reform Act and an increase in the number of affiliates, is exhibiting a surplus.[1]

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[1]This financial rationalisation shifted the past deficit of the contributory social security system to other fiscal programs, as the non contributory benefits changed from being financed by contributions to being financed by other taxes.

Hence, in face of demographic aging, the proper perspective on the possibility of budget surpluses ahead is to ask whether assets accumulating as a consequence could actually be sufficient to keep the government solvent when the financial situation will be worsening due to population aging. Investigation of this problem requires a tool for long-term oriented fiscal policy analysis. This paper applies the intertemporal budgeting concept of generational accounting, suggested by Auerbach *et al.* (1991, 1992). This method, based on the financing constraint of a government that cannot adhere to a Ponzi-strategy indefinitely, is perfectly suited for our purpose. By constructing generational accounts, one can reveal the aggregate deficit or surplus associated with the continuation of current fiscal legislation, which provides an immediate indicator for whether present primary surpluses would offset future primary deficits.

In many respects, the present study continues work by Berenguer *et al.* (1999) who provided a first application of generational accounting to Spain, to study the long-term sustainability of public sector budgets from the perspective of 1995. This analysis is expanded here in a number of directions. First, we provide an overdue update of the generational accounts, considering the fast fiscal improvement unexpected at the time of the earlier study. In some sense, then, our paper could also be read as a contribution to the latent debate among generational accountants about how the method is affected by the business cycle.

Secondly, we have substantially improved upon the micro data set fundamental to the sustainability measures of generational accounting. In particular, we have derived a unique new set of age profiles measuring tax and transfer payments by employment status. This permits us, for the first time in generational accounting, to our knowledge, to reliably evaluate the impact of labour market developments, like rising labour force participation, on fiscal sustainability. Finally, we have tried to reconcile the usually separated worlds of generational and conventional budget accounting, by explicitly decomposing the intertemporal budget imbalance at the core of generational accounting into a sequence of annual primary budget imbalances.

The paper is structured as follows. In the next section, we briefly explain the fundamentals of the generational accounting framework. Section 3 then summarises the demographic and fiscal data underlying the empirical application of the method to public sector finances in Spain. Section 4 explores the sustainability of the current *status quo* of fiscal

legislation, whereas Section 5 reveals the business cycle impact on the sustainability outcome. In Section 6, we discuss the possible effects of labour market changes, in particular changes in labour force participation and unemployment levels, on long-term fiscal balance. Section 7 concludes.

2. The method of generational accounting

If one accepts the life-cycle hypothesis of rational individual decision making, agents react to government policy considering its impact on their remaining lifetime resources. Short-term indicators of fiscal activity, like the annual government deficit or surplus, then fail to indicate whether fiscal policy is expansive or restrictive. Furthermore short-term deficit measures, while suitable for budget execution and planning, neglect that much public revenue and spending has a demographic dependency that dynamically compromises government behaviour. Therefore, they cannot be used to evaluate the sustainability of public finances in a changing demographic environment.

These shortcomings of conventional deficit budgeting led to the proposal of generational accounting, which has by now become a standard tool to evaluate the long-term impact of government fiscal performance.[2] The method starts from the notion that, to remain solvent with a given level of historical debt, the government cannot pursue a Ponzi-strategy –serving liabilities by issuing new bonds– indefinitely.[3] As a consequence, the present value of future primary surpluses must be sufficiently large to redeem historical debt. In technical terms, looking forward from period t, the intertemporal financing constraint of the government can be written as

$$\sum_{y=t}^{\infty} T_y \left(1 + r\right)^{t-y} - B_t = 0, \qquad [1]$$

[2] Collected volumes of empirical applications to specific countries are European Commission (1999) and Auerbach *et al.* (1999). Critical appraisals of generational accounting can be found in the introductory chapters of these volumes, as well as in Buiter (1997), Havemann (1994) and Diamond (1994).
[3] We limit the presentation to the basic principles of generational accounting. See Bonin (2001) for a comprehensive description of the method.

where T_y stands for the primary surplus in period y, which is taken back to period t at a time-invariant annual rate r, and B_t represents the level of government debt in period t.

Quite intuitively, one may test the sustainability of current fiscal policy by inspecting the corresponding time path of primary deficits. As soon as continuation of revenue and spending levels violates the intertemporal financing constraint [1], fiscal policy is not sustainable. In particular, if the aggregate primary government surplus is smaller than the initial debt, the government eventually becomes insolvent as debt will accumulate at an ever-faster rate. At some point of time, therefore, public revenue must be increased (or spending reduced), in order to balance primary surpluses and base year debt. In economic terms, the difference between base year debt and aggregate primary surpluses represents an –implicit– intertemporal liability of the government, known in generational accounting as the *sustainability gap.*

Since envisaged tax and transfer levels cannot be sustained, policies inconsistent with the intertemporal budget constraint lead to redistribution across generations. Stressing this distributional impact, generational accountants derive the sustainability gap on the basis of estimated life-cycle net tax payments by generation corresponding to a given fiscal policy. The aggregate primary surplus is computed according to

$$\sum_{y=t}^{\infty} T_y \left(1+r\right)^{t-y} = \sum_{k=t-D}^{t} P_{k,t} GA_k + \sum_{k=t+1}^{\infty} P_{k,k} GA_k, \qquad [2]$$

where $P_{k,t}$ is the size of a generation born in period k and alive in period t, and GA_k denotes the aggregate future net tax payments upon death –in present value terms of period t– of a representative member of generation k, termed the *generational account* of cohort k.[4] The generational accounts are evaluated on the basis of the projected average tax and transfer payments that fiscal legislation allocates to members of specific age cohorts, in combination with individual mortality rates, and are expressed in per capita terms.

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[4] For notational ease, equation [2] assumes no migration. However, the modifications necessary to deal with migration, as developed by Bonin *et al.* (2000), are fully incorporated in our computations.

With individuals' maximum lifetime represented by D, the first right-hand side (RHS) term of equation [2] adds up the net taxes paid by the current population. As the generational accounts are forward-looking, living cohorts do not enter the analysis with their entire life-cycle. The second RHS-term is the sum of net tax payments by cohorts born in the future. In the generational accounting context, net taxes are understood as taxes paid net of transfers received in cash or in kind, where the latter include government purchases of goods and services, which are assigned uniformly on a per capita basis.

How policy would react to balance a sustainability gap is obviously unknown to the analyst. Thus, generational accountants by convention rely on a counterfactual experiment. They assume that generations born after period t will face a uniform proportional change in their tax payments under the initial fiscal policy. This stylised procedure allows us to illustrate the intertemporal fiscal imbalance as the difference in lifetime net tax burdens of base year and future cohort representatives –both traced over their entire life-cycle. If the time path of primary deficits were sustainable, the generational accounts, corrected for income growth, would be identical. Unsustainable fiscal policy, in contrast, is also generationally imbalanced. Different lifetime fiscal burdens must be imposed on future generations and on current newborns.

3. Baseline assumptions and parameter estimates

The computation of the sustainability gap for the entire public sector budget in Spain, incorporating all government levels and social insurance programs, requires a very long-term demographic forecast that determines future cohort size and age- and generation-specific individual mortality rates, and projections of per capita tax and transfer payments by age and generation. Our projections start from year 1996.

Regarding demographics, we have taken the historical 1996 levels of individual mortality and fertility for a starting point, and then broadly followed the demographic hypotheses adopted by Fernández-Cordón (2000). To be specific, the population projection accounts for a –progressively decelerating– increase in individual survival probabilities until 2050. By then, compatible with recent evidence, life-expectancy at birth will have made a gain of about five years, reaching 78.5 years and 85.0 years for males and females, respectively. Total fertility is assumed to recover linearly from the very low 1996 rate of 1.13 to a level of 1.72 by 2021, and to stay constant thereafter. Our demogra-

phic projection predicts old-age dependency –defined as the number of persons aged 65 and above over that of persons aged 20 to 64, in percentage terms– to jump from 25.5 in 1996 to a maximum of 68.2 in 2050. In the long term, due to fertility rates remaining below replacement level and the increase in life-expectancy, the dependency ratio converges to 51, doubling its current value. Immigration, which in our baseline projection is set to a constant influx of 30,000 net migrants per year, is not sufficient to stabilise the dependency ratio.[5]

The most critical part of generational accounting concerns the construction of profiles describing how fiscal legislation assigns individual claims and liabilities against the public sector to specific age groups. To break down aggregate budget figures according to their age distribution, we have adapted the usual three-stage procedure employed by generational accountants.

First, a set of cross-sectional profiles was estimated from micro data indicating the relative fiscal position by age of the current population. Altogether, we constructed age profiles for ten types of taxes and fourteen types of transfers, mostly on the basis of the 1996 Continuous Family Budget Survey.[6] In addition we used statistical sources provided by the Ministry of Labour and Social Affairs, the National Statistical Institute (INE) and the Ministry of Education, and occasionally relied on indirect evidence (see the appendix). If possible, benefit entitlements and tax liabilities were distinguished not only by age, but also by gender and current employment status, i.e., employment, unemployment or non-participation. The use of participation-specific age profiles is a notable improvement over previous generational accounting studies. It is a prerequisite for appropriately computing the impact of changes in labour market conditions on the generational accounts, as is done repeatedly in our calculations. Further details on the construction of tax and transfer profiles by age, including a discussion of our main assumptions and our approach to fiscal incidence, can be found in the appendix.

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[5] We showed in Bonin, Gil and Patxot (2001) that even an endogenous entry of migrants that leaves the working population unchanged would not serve to reach the sustainability of the pension system in isolation, although the number of immigrants in such a scenario is extreme, peaking near 400.000 at the highest point of the demographic crisis. Knowing this, we decided not to include more detailed immigration experiments the fiscal impact of which is not the focus of this paper.
[6] The *Encuesta Continua de Presupuestos Familiares* (ECPF) is conducted by the *Instituto Nacional de Estadística* (INE).

In a second step, correcting for deficiencies in the micro data, we benchmarked all tax and transfer profiles against the corresponding macro aggregates of year 1996, taking into account the age composition of the population. The overall public sector budget employed at this stage is shown in Table 1. Note that not all of the reported figures are immediately comparable with the financial statistics from which the budget data were originally drawn. To avoid multiple accounting of budget positions, some items were corrected for intergovernmental transfers. Moreover, the reported aggregates usually had to be reclassified, in order to fit the specific micro profiles. Among government purchases, we only treated spending on health –including health benefits given by Social Security Administrations– and education as dependent on age. The remaining government purchases, net of revenue that we could not reliably assign to specific cohorts, were allocated as a uniform personal transfer across all cohorts, in line with generational accounting conventions.

TABLE 1
Composition of the Spanish public sector budget in 1996
(millions of euro)

Resources		Uses	
Direct taxes		Contributory pensions[d]	
Personal income tax	26,261	Retirement pensions	25,103
Social security contributions	56,767	Invalidity pensions	11,581
Capital income tax[a]	21,268	Widows pensions	8,480
Taxes on land property[b]	3,598	Orphans pensions	591
Indirect taxes		Pensions in favour of relatives	147
Value added tax	22,843	Non-contributory pensions	
Excise taxes on:		Retirement pensions	534
alcoholic drinks	601	Invalidity pensions	568
beer	150	LISMI benefits	333
tobacco	3,149	Unemployment benefits[e]	10,489
hydrocarbon oil	7,385	Sickness benefits	3,577
Vehicle taxes[c]	1,812	Maternity benefits	474
		Family allowances	612
		Health expenditure	23,910
		Educational expenditure	16,804
		Government purchases[f]	38,790
Deficit	22,962	Interest payments	24,802
Total		Total	
	166,796		166,796

[a]Includes wealth taxes, corporate taxes, capital transfer taxes and personal income taxes attributed to capital.
[b]Includes property taxes and increment of the property value taxes.
[c]Includes vehicle taxes and some transportation vehicle taxes.
[d]Includes pensions paid by institutions other than the Social Security Administrations.
[e]Includes unemployment benefits, wage guaranty funds and market and employment promotion funds.
[f]Non age-specific purchases of goods and services net of non age-specific receipts.

Note: The main aggregates in Table 1 are based on ESA-95 methodology.
Sources: Own elaboration on basis of IGAE (1998b), IGAE (1996, 1997, 1998a,) and IGAE (1999). The aggregates in IGAE (1998b) and IGAE (1999) are elaborated according to ESA-95 methodology.

The micro profiles reflect the cross-sectional impact of fiscal legislation for a particular base period –the year 1996– while generational accounts take a longitudinal perspective over different periods. Generational accountants, in a final step, usually solve this problem by subjecting the set of initial cohort tax and transfer profiles to a uniform, time-invariant growth rate measuring labour productivity growth. Applied strictly, this procedure, for a benchmark, maintains the relative current incidence of fiscal policy by age indefinitely.

Our projection generally follows this *status quo* approach. More specifically, we apply a single annual growth rate of two percent, which seems to be in line with the long-term growth perspectives for Spain, to most individual tax and transfer payments.[7] It was necessary, however, to modify the procedure of constant growth adjustment, to accurately incorporate various fiscal trends. In detail, our baseline projection of net taxes accounts for:

− The actual evolution of the budget aggregates during the period 1996-2000. This implies that primary deficits fall substantially at first. In order to reveal the effects of the expansive phase of the business cycle experienced during 1996-2000 on the generational accounts, we assign the aggregates according to the tax and transfer age profiles by employment status. In doing so, we take into account changes in labour market status among the population by age and gender, as reported in INE (2000). The procedure will allow us to disentangle two different sources of changing primary deficits: fiscal policy reforms and improving labour market conditions. Note that our somewhat *ad hoc* approach neglects possible effects of these sources on the age distribution of payments. This is necessary, as there is naturally a lack of substantial evidence on the age-specific effects of what are very recent developments.

− The fact that the pension system insures against inflation rather than preserving the income position of pensioners relative to workers. Consequently, regarding contributory and non-contributory pensions, we assumed that only the primary insurance amount of successive cohorts entering retirement or becoming eligible for derived pension

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[7]Herce and Alonso (2000), FBBV (1997) and MTSS (1995), have opted for similar values, within a range going from 1.1 to 2.5 percent. We have of course conducted a comprehensive sensitivity analysis, which brought out no qualitative changes in our findings.

benefits increases at the rate of productivity growth, whereas cohort-specific benefits remain constant upon death in real terms.

− The maturing of retirement pensions, which are still substantially lower for the oldest males, compared to men who retired more recently. We keep the initial cross-sectional pension levels constant upon death for all current retirees.

− The elimination of the possibility to retire early, which was to come into effect over the next decade. But this feature has been recently abolished.[8] Hence we exclude it from the benchmark scenario, although we will assess the effects of eliminating early retirement as an experiment. We do not include, however, the long-term impact of the 1997 Pension Reform Act, since it strongly depends on the exact shape of the wage profile in the final years of the working career, as shown by Abío *et al.* (1999) and Bonin *et al.* (2001).

4. The sustainability of current fiscal legislation

Tables 2 and 3 display the generational accounts by gender for cohorts alive in 1996, given the baseline assumptions discussed above, and using a constant real annual discount rate of four percent to take future tax and transfer payments back to the base year.[9] Tables 2 and 3 also split the overall net tax burden into its various tax and transfer components.

For both men and women, the net payments to the public sector upon death exhibit a characteristic cohort pattern due to the forward-looking construction of the accounts and the distribution of tax liabilities and benefit entitlements across age groups. Lifetime net tax burdens gradually increase among the age cohorts in the first decades of their life. The generational accounts reach a maximum for the cohort of age 25 which has left the large educational transfers through the schooling system behind, but faces wage taxes and social insurance

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[8] The current law allows early retirement only for those who were affiliated in 1967. This implied that the possibility of early retirement was about to disappear. However, the government has approved a new legislation (*Real Decreto-Ley 16/2001 de 27 de diciembre*) based on an April 2001 Agreement ("*Acuerdo para la Mejora y el Desarrollo del Sistema de Protección Social*") that gives again way to the possibility of early retirement (see also footnote 16).

[9] The discount rate is markedly lower than the return on riskless bonds in the past decade. We expect, however, that Spanish interest rates, in the long-term, decline to levels similar to those in western Europe. An even lower interest rate is not justified, as the discount factor must include a premium for risk.

TABLE 2
Composition of the Spanish generational accounts, male population of 1996
(thousands of euro)

Age in 1996	Genera-tional account	Tax payments						Tranfer receipts						
		Labour income taxes	Capital income taxes	Taxes on land property	Value added taxes	Excise and veh. taxes	Social security contributions	Contributory pensions	Other contributory benefits[a]	Non contributory benefits[b]	Unem-ployment benefits	Health care	Edu-cation	Govern-ment purchases
0	36.2	34.1	21.7	4.1	31.0	18.2	71.0	32.1	3.8	1.8	5.6	23.5	27.0	50.2
5	59.1	37.7	24.0	4.6	34.1	20.2	78.4	34.9	2.8	1.6	6.1	18.9	26.7	48.7
10	81.6	41.5	26.4	5.0	37.6	22.2	86.4	38.2	3.1	1.3	6.8	20.1	20.9	47.0
15	107.2	45.6	29.0	5.6	41.2	24.5	95.1	41.8	3.4	1.1	7.6	21.4	13.5	45.1
20	132.2	50.1	32.0	6.1	44.5	26.3	103.0	45.6	3.6	0.8	7.9	22.7	6.0	43.2
25	145.9	53.7	35.3	6.4	46.3	26.2	106.7	50.0	3.2	0.8	7.0	24.0	2.6	41.1
30	144.6	55.1	39.0	6.4	46.2	24.9	103.0	54.9	2.7	0.8	5.7	25.1	1.7	38.8
35	130.0	53.6	42.2	6.2	44.0	21.9	93.4	60.1	2.2	0.8	4.5	26.0	1.4	36.2
40	106.9	50.9	43.8	5.7	40.4	18.3	81.3	65.7	1.7	0.7	3.8	26.8	1.2	33.4
45	74.4	44.8	45.6	5.0	35.3	14.4	64.9	71.8	1.3	0.7	3.1	27.4	1.0	30.4
50	32.3	36.0	45.0	4.2	29.7	10.9	44.9	78.8	0.9	0.6	2.5	27.8	0.8	27.1
55	-25.9	24.8	33.4	3.2	23.8	7.2	23.6	87.4	0.4	0.6	1.6	27.7	0.6	23.8
60	-66.8	17.3	27.8	2.5	19.0	4.8	8.1	97.6	0.2	0.6	0.4	26.9	0.3	20.5
65	-99.9	12.8	26.8	1.8	14.9	2.4	0.2	115.8	0.0	0.6	0.0	25.4	0.0	17.1
70	-102.2	8.5	17.2	1.0	11.0	1.2	0.0	103.5	0.0	0.6	0.0	23.1	0.0	13.9
75	-82.2	6.4	15.7	0.6	8.4	0.4	0.0	82.3	0.0	0.4	0.0	20.3	0.0	10.9
80	-60.4	3.6	11.5	0.2	5.6	0.2	0.0	55.4	0.0	0.3	0.0	17.6	0.0	8.3
85	-52.2	2.0	2.6	0.1	3.6	0.1	0.0	39.1	0.0	0.2	0.0	15.0	0.0	6.1
90	-42.6	0.6	0.1	0.0	2.4	0.0	0.0	28.6	0.0	0.2	0.0	12.5	0.0	4.4
95	-27.3	1.0	0.0	0.0	1.2	0.0	0.0	17.7	0.0	0.1	0.0	9.0	0.0	2.6
100	-12.5	0.0	0.0	0.0	0.0	0.0	0.0	7.1	0.0	0.0	0.0	4.3	0.0	1.0

[a]Includes sickness and maternity benefits. This, together with contributory pensions constitute the contributory social insurance system which is in the process of financial rationalisation since the 1997 Pension Reform Act. [b]Includes non-contributory pensions, LISMI benefits and family allowances. *Note*: Baseline assumptions; growth rate: 2 percent; discount rate: 4 percent. *Source*: Authors' calculations.

TABLE 3
Composition of the Spanish generational accounts, female population of 1996
(thousands of euro)

Age in 1996	Generational account	Tax payments						Transfer receipts						
		Labour income taxes	Capital income taxes	Taxes on land property	Value added taxes	Excise and veh. taxes	Social security contributions	Contributory pensions	Other contributory benefits[a]	Non contributory benefits[b]	Unemployment benefits	Health care	Education	Government purchases
0	-61.5	10.1	11.3	2.1	14.3	7.1	29.8	21.6	3.9	2.6	7.5	20.5	27.7	52.3
5	-49.4	11.2	12.4	2.3	15.7	7.9	32.9	23.8	2.8	2.5	8.2	15.8	27.4	51.1
10	-38.2	12.3	13.7	2.5	17.3	8.7	36.3	26.3	3.1	2.3	9.1	16.8	21.7	49.6
15	-25.2	13.6	15.1	2.8	19.1	9.5	39.8	28.8	3.5	2.2	10.1	18.0	14.4	48.0
20	-11.8	14.8	16.6	3.0	20.4	10.1	42.9	31.5	3.7	2.2	10.4	19.3	6.4	46.2
25	-7.6	15.4	18.1	3.0	20.8	9.2	42.8	34.6	3.2	2.2	9.1	20.5	2.8	44.3
30	-12.9	14.4	19.9	2.9	19.7	8.0	37.6	37.8	2.7	2.4	7.0	21.6	1.8	42.2
35	-24.0	12.2	21.8	2.7	18.0	6.2	30.3	41.5	2.2	2.6	5.1	22.6	1.5	39.8
40	-35.4	10.1	22.6	2.4	16.2	4.4	23.6	45.1	1.8	2.7	3.6	23.4	1.2	37.2
45	-48.7	7.6	22.6	2.1	14.3	3.3	15.8	48.6	1.3	2.8	2.2	24.1	1.0	34.3
50	-63.5	5.3	19.4	1.7	12.5	2.3	9.2	52.4	0.9	3.0	1.2	24.4	0.8	31.2
55	-70.1	4.1	19.3	1.6	11.8	1.7	4.8	56.6	0.5	3.0	0.6	24.6	0.6	27.9
60	-76.0	3.3	19.0	1.5	10.7	1.2	1.6	61.1	0.2	2.8	0.2	24.4	0.3	24.4
65	-86.7	3.0	17.3	1.3	9.9	0.8	0.1	71.9	0.0	2.8	0.0	23.6	0.0	20.7
70	-82.0	2.4	12.0	0.9	8.2	0.6	0.0	64.7	0.0	2.5	0.0	21.9	0.0	16.9
75	-69.6	1.7	9.3	0.6	6.6	0.3	0.0	53.9	0.0	1.6	0.0	19.4	0.0	13.2
80	-52.3	1.4	9.0	0.3	5.1	0.2	0.0	40.5	0.0	1.4	0.0	16.6	0.0	9.9
85	-40.1	1.3	7.5	0.1	3.7	0.1	0.0	30.4	0.0	1.2	0.0	14.0	0.0	7.1
90	-34.9	0.7	2.6	0.0	2.3	0.0	0.0	23.3	0.0	1.0	0.0	11.6	0.0	4.9
95	-24.8	0.0	0.0	0.0	0.9	0.0	0.0	14.0	0.0	0.5	0.0	8.2	0.0	2.8
100	-10.3	0.0	0.0	0.0	0.0	0.0	0.0	5.3	0.0	0.1	0.0	3.7	0.0	1.0

[a]Includes sickness and maternity benefits. This, together with contributory pensions constitute the contributory social insurance system which is in the process of financial rationalisation since the 1997 Pension Reform Act. [b]Includes non-contributory pensions, LISMI benefits and family allowances. *Note*: Baseline assumptions; growth rate: 2 percent; discount rate: 4 percent; discount rate: 2 percent. *Source*: Authors' calculations.

contributions over the full working life. For older generations living in 1996, rest-of-life net tax payments to the government decline, as remaining working life shortens and retirement approaches. The maximum net transfer from the government is observed for cohorts around age 70 which bear a low tax burden on income, while expecting high pension and health care benefit transfers. For older living generations, the generational accounts approach zero, in line with shorter life-expectancy.

Closer inspection of Tables 2 and 3 indicates that current fiscal legislation might imply substantial redistribution among genders. On average, men born in 1996 will face a positive life-cycle tax burden of 36,200 €, whereas women receive a lifetime net transfer that is even larger, amounting to 61,500 €. Females pay substantially less taxes, which reflects the low labour force participation of Spanish women, but they receive welfare benefits and education very similar to men.[10] A particular source of gender redistribution appears to be the social insurance system. For the newborn generation of the base period, social insurance contributions of men exceed benefits received from the contributory social security system, health and unemployment insurance by an amount of 6,000 €. Women who receive a life-cycle transfer of 23,700 €, on the contrary, are net beneficiaries. These plausible observations notwithstanding, one should be wary, however, of drawing any definite conclusions on the subject of gender redistribution from the generational accounts. Our perspective neglects the uneven distribution of pre-tax income among men and women, and, more fundamentally, private intra-gender redistribution, only cursorily treated in the underlying fiscal profiles by age.

The generational accounts displayed in Tables 2 and 3 enter into the long-term financing constraint of the public sector. Negative generational accounts indicate claims against the government that together with current government debt, must be serviced, at some future point of time, through positive net taxes drawn from other cohorts. To illustrate this, note that the rest-of-life transfers measured for a representative current Spaniard of age 70 –amounting to 91,000 €– mainly consist of pension claims acquired through contributions in the past. The government will stay solvent only if cohorts with positive gene-

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[10] Note that as we are working with representative individuals, age profiles are constructed in the following way: average tax payments/transfer receipts per eligible agent are divided by total population. Although it might seem that this overstates the gender differences, this is the relevant approach when analysing the sustainability of fiscal policy.

rational accounts service these unprinted liabilities. For representative agents, these are the age cohorts younger than 45. At the maximum, a representative 25-year old person contributes 70,700 € to service intertemporal government liabilities.

As female's net transfer receipts outweigh male's net tax payments, the lifetime net tax payments of a representative newborn in 1996 amount to a receipt of 11,100 €. From this result, considering that the generational account of the future newborn would be quite similar to that of a current newborn if current fiscal policy were maintained, it is quite clear that in the aggregate, the fiscal claims of future generations will enlarge the sustainability gap. Assessing the sustainability of current fiscal legislation, the main question is then whether, adding up over all cohorts, aggregate revenue from the younger living cohorts is sufficient to finance aggregate claims by the older living and future cohorts, and to cover government bonds.

The answer to this question is provided by inspection of Figure 1, which shows the evolution over time of public sector liabilities, in present value terms of year 1996, that corresponds to the set of generational accounts explained above. Starting from historical public sector debt which was 280 thousand million euro (or 60.2 percent of GDP) in 1996, the sequence on display was generated by adding, in each period, the predicted primary surplus (or deficit) to the level of public liabilities in the previous period. Equation [2] corresponds to this procedure.
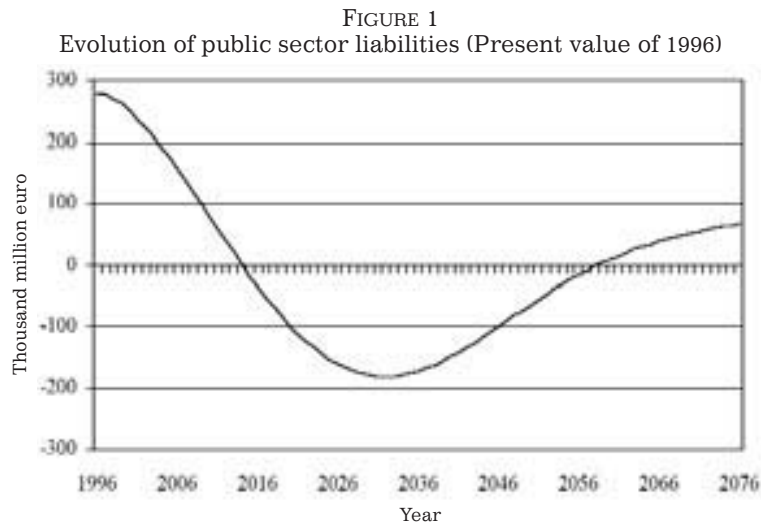
FIGURE 1
Evolution of public sector liabilities (Present value of 1996)

Note: Baseline assumptions; growth rate: 2 percent; discount rate: 4 percent.
Source: Authors' calculations.

FIGURE 2
Evolution of primary surpluses
(Percent of current GDP)
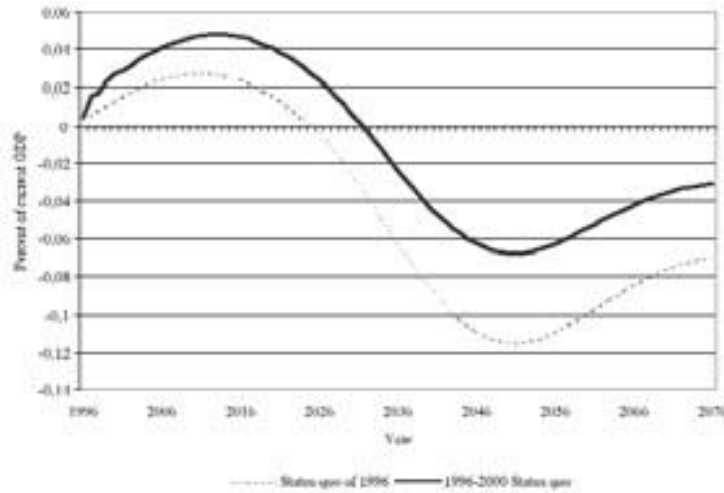
Note: Growth rate: 2 percent; discount rate: 4 percent.
Source: Authors' calculations.

As is evident from Figure 1, we predict that the Spanish government sector will run substantial primary surpluses throughout the next decades, assuming current tax and transfer levels are maintained. The small primary surplus of 1,840 million euro occurring in the initial budget –this figure can be easily checked in Table 1 and Figure 2– rapidly expands. Surpluses then reach a maximum close to five percent of GDP throughout the 2010s. This process not only reflects the substantial improvement of public finances observed very recently. In the longer term, it is also attributable to demographic changes leading to a particularly favourable ratio of tax payers to benefit recipients in the first years of the new century.

According to the favourable development of primary surpluses, public liabilities fall dramatically at first. Provided that primary surpluses are fully employed to redeem government bonds, historical debt vanishes as early as 2010. Afterwards, as primary surpluses prevail, the government starts accumulating assets, which reach a maximum at about 180 thousand million euro in 2032. Subsequently, however, demographic aging hits the government budget. Transfer spending largely increases while tax revenue is reduced substantially. With primary surpluses permanently turning into primary deficits public assets are rapidly liqui-

dated. From the year 2050, to maintain tax and transfer levels despite increased demographic dependency, government debt again accumulates, converging to a present value of 145 thousand million euro as soon as the population reaches a steady state. This amount represents the sustainability gap induced by current fiscal legislation.

The sustainability gap being positive, we conclude that current fiscal legislation is unsustainable. Government must change the net tax burden of at least one generation. However, according to our *status quo* projection, the liabilities of the Spanish public sector not yet funded appear to be rather small. Expressed as a fraction of the aggregate future GDP, the intertemporal financing requirement amounts to 0.72 percent.[11] In terms of the 1996 budget, this corresponds, e.g., to a 13.6 percent increase in labour tax revenue, or, alternatively, to a 9.2 percent cut in government expenditure not related to age. Consequently continuation of current fiscal policy would not lead to a very serious intergenerational redistribution. If the burden to close the sustainability gap were levied exclusively on future birth cohorts, they would face a generational account of -2,500€. The net lifetime transfer received by current newborns is 8,600 € higher.

The finding that intergenerational redistribution through current fiscal policy is modest holds for a range of reasonable growth and discount rates. The sustainability gap takes larger values if the interval between the growth and the interest rate is small, because this gives a more weight to deficits in the distant future. For example, for a 2.5 percent growth rate combined with a 3 percent discount factor, the sustainability gap amounts to a 1.57 percent of predicted yearly GDP. It is worth noting that even in this extreme scenario the sustainability gap stays below the 1996 situation level. At the other extreme, when the distance is greater (discount rate is 5 percent and the growth rate is 1.5 percent), the sustainability gap decreases to 0.37 percent. Similarly, employing a slightly lower fertility increase (reaching only 1.52 in 2021), the sustainability gap is only reduced to 0.64.

[11] To report the sustainability gap in terms of the discounted sum of predicted future GDP has been suggested by Auerbach (1997). The resulting measure can be interpreted as the additional fraction of GDP that needs to be transferred to the public coffers, in each future year, in order to balance the intertemporal budget. To obtain a forecast of GDP, we linked initial output per worker, updated for constant labour productivity growth, to a projection of the future labour force.

To summarise, if the *status quo* benchmark describes future government policy properly, Spanish public sector finances appear to be in fairly good shape not only in the short-term, but also from an intertemporal point of view. However, generational balance requires considerable fiscal prudence. As Figure 1 has illustrated, to smooth fiscal burdens across present and future generations, the public sector must accumulate a substantial, transitory fund of assets that can accommodate deficits due to increased demographic dependency in the long term.[12] Unfortunately, from the viewpoint of political economy, it does not seem very likely that political decision makers would actually introduce such a strategy. The debate on the recent budget improvements in Spain rather indicates that decision makers, faced with large and rising budget surpluses, are forced –and willing– to loosen fiscal policy. This is all the more worrying, as fiscal sustainability in Spain is by no means a certain outcome. Various developments could drive the intertemporal budget into more serious imbalance, which will be discussed in the following section.

5. Threats to fiscal sustainability

The observation that Spanish public finances are very much in balance intertemporally provides a marked contrast to earlier generational accounting results for Spain reported by Berenguer *et al.* (1999). According to their study, continuation of fiscal legislation would seriously redistribute private resources to the disadvantage of future generations, who must bear a doubling in tax levels to cope with a substantial sustainability gap. In comparison, in our benchmark, a 7.1 percent increase in future cohorts' tax levels is enough to balance intertemporal public sector liabilities.

Two aspects distinguish our sustainability analysis so far from the generational accounts constructed by Berenguer *et al.* (1999). First, we use a very different –presumably far more accurate– set of micro profiles in order to compute the age dependency of individual tax and transfer payments. It is known in generational accounting, however, that the sustainability outcome is rather insensitive to changes in the

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[12]We note that it is not by necessity that the government has to accumulate this fund. In principle, primary surpluses might as well be transferred to private agents, for instance in the form of tax deductions on investments in private funded pension plans.

underlying micro structure of net taxes.[13] More importantly, our benchmark incorporates the positive budget developments from 1996 to 2000, whereas the analysis by Berenguer *et al.* follows rigidly the status quo of the 1995 fiscal legislation.[14]

There is little doubt that besides a substantial fall in interest burdens, steady and substantial economic growth is an important factor behind the rapid recent improvement in Spanish public finances (ME, 2001). The expansive phase of the business cycle, in combination with various structural reforms in the labour market, might have helped reducing unemployment. Correspondingly, the transfer obligations of the government have fallen, and taxes received increased. In this situation, one might of course expect that the sustainability of public finances is improving. Our benchmark scenario, therefore, invites criticism as being overly optimistic. Taking off in an expansive economic environment, and forecasting public revenue and spending according to a rule that focuses on demographic changes, our projection has indeed no room for a rainy day in the future.[15]

In order to assess how fiscal sustainability would develop with more moderate economic prospects, we have also analysed a scenario that excludes the improvement in primary deficits observed in recent years. By continuing the tax and transfer levels implied by the public sector budget of 1996 when the business cycle was still well off its peak, we try to better capture what might be the long-term average of economic conditions hitting government budgets. Note that this stricter *status quo* approach eliminates the current decline in unemployment levels from the calculations.

Figure 2 illustrates how permanently less positive economic conditions, in comparison to the benchmark, would affect the future development of primary budget surpluses entering into the intertemporal financing constraint of the government. Without the recent economic upswing, the primary budget surpluses would have taken on a substantially less favourable time path. Even during the demographically most advanta-

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[13] CBO (1995) provides the most elaborate discussion of this issue.

[14] In this context it is worth noting that the primary deficit decreased from a value of -6,157 million euro in 1995 to a positive 1,840 million euro in 1996. This improvement causes another difference between the results by Berenguer *et al.* (1999) and the present calculations.

[15] It is an established result that the sustainability indicators provided by generational accounting are not immune against cyclical effects. Feist *et al.* (1999) have provided a discussion of this problem.

geous second decade of the new century, primary surpluses do not exceed three percent of GDP, more than two percentage points less than for the benchmark. Accordingly, primary surpluses turn into permanent deficits earlier. With worsening demographic conditions, deficits rapidly increase and exceed eleven percent of GDP at the peak around 2050. In the very long-term, primary deficits converge at a level about four percentage points below that in the optimistic benchmark.

One explanation for the substantially higher structural primary deficit observed is that agents with less favourable economic conditions receive a bigger net transfer form the fiscal system. In contrast to the benchmark, the generational account of each newly born is more negative. As shown in Table 4, which summarises the generational accounts for the different economic scenarios investigated in this section, the per capita life-cycle net transfer from the government approximates 17,400 €.

TABLE 4
Generational accounts and sustainability gap for
different economic scenarios (euro)

	Benchmark scenario	Changes in unemployment rates (scenario with no fiscal policy)	Status quo of 1996	Status quo of 1996 (scenario without early retirement)
Generational accounts:				
Birth cohort of 1996	-11,100	-6,700	-17,400	-15,500
Birth cohorts after 1996	-2,500	8,400	25,600	20,400
Change in fiscal burden	8,600	15,000	43,000	35,900
Sustainability gap (percentage of annual GDP):				
	0.72	1.19	3.61	3.02

Note: Growth rate: 2 percent; discount rate: 4 percent.
Source: Authors' calculations.

It is obvious from Figure 2 that net tax revenue from current working-age cohorts cannot be large enough to finance the increased net transfer to young and future generations. With primary surpluses always smaller and primary deficits constantly larger than under benchmark conditions, intertemporal fiscal imbalance must increase. The extra revenue required to close the larger sustainability gap is substantial. To remain solvent the government must extract, in each year, additional resources worth 3.61 percent of GDP from the private sector. In terms of generational accounts, assuming this burden is entirely levied on future cohorts, each representative agent would have to pay 25,600 € to the public coffers, 43,000 € more than a current newborn. Thus, as soon as the positive economic conditions observed today are not permanent, fiscal legislation is well in danger of tolerating substantial redistribution across generations.

The results in Table 4 also show that assuming the status quo of 1996, the elimination of early retirement that was implicit in the current law would have reduced the sustainability indicator by 0.59 percentage points. Thus, with the recent decision to maintain the possibility of early retirement the government missed an important opportunity to reduce intertemporal liabilities in a worsening demographic environment.[16]

Finally the second column in Table 4 separates the impact of changing fiscal policy from the impact of changing unemployment during the period 1996-2000 on the intertemporal government budget. To do this, the budget forecast is based on the status quo of 1996, but incorporates the aggregate effects of changing employment conditions. The result of this experiment indicates that labour market improvement was perhaps the main factor behind the substantial reduction of the sustainability gap in recent years. Indeed between 1996 and 2000, while the population of working age increased only moderately, at an average rate of 0.2 percent, the population employed –due to an increase in female participation and a decrease in unemployment–did grow much faster, at an average rate of 4.3 percent. As a result, even with the fiscal policy of 1996, the intertemporal government liabilities would have fallen from 3.61 to 1.19 percent of yearly GDP. Corres-

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[16] In the recent Barcelona Summit (March 2002), the member states in the European Union reached an agreement to defer the effective retirement age in the forthcoming years. This would have an impact on the results, leading to a nearly balanced intertemporal budget.

pondingly, it turns out that the recent changes in fiscal policy have improved sustainability only very moderately. They account for only 0.47 percentage points of the decline in the sustainability gap.

6. Labour market trends and fiscal sustainability

The major switch in fiscal sustainability over the business cycle revealed by the above sensitivity test seems largely related to the recent changes in individual employment rates. This observation makes it worth analysing to what extent future labour market developments could affect long-term government finances, which still seem to be on the verge of inducing substantial intergenerational redistribution as soon as current economic conditions do not prevail. Employment rates of the representative agent may change either due to variation in individual participation rates in the labour market, or due to changing unemployment levels. In what follows, we use generational accounts to analyse the specific impact on intertemporal government finances of these two different labour market developments.

To compute the effect of labour market changes, we have taken advantage of the fiscal age profiles by employment status, i.e., employment, unemployment or non-participation, available to us. In the projections of primary deficits, we corrected the level of income taxes, social insurance contributions, value added taxes and, of course, unemployment benefits, for changes in labour market conditions, by proportionally adapting the corresponding fiscal micro profiles to the assumed variation in individual participation or unemployment rates by age and generation.[17] As a consequence, the relative change in aggregate revenue and expenditure levels is different from the change in average employment rates. Our calculations also reproduce the fact that the age distribution of tax and transfer levels is not the same for the different categories of labour market status.

Based on this principle, we first simulate a future improvement in labour force participation. There are good reasons to assume that labour force participation will rise substantially over the next decades.

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[17] One might argue that this procedure is misleading in the case of indirect taxes. In fact, considering that according to the neo-classical consumption model, the representative consumer should distribute an increase in wage income over the life-cycle, we might overstate the immediate revenue effect for the government. This limitation –the absence of behavioural changes– is always present, however, when doing generational accounting.

Analysts of the trends in labour participation seem to agree that the traditionally marked gender gap in the Spanish labour market is in the process of closing. In fact, in the current cross-section of labour force participants, females younger than age 30 are hardly less present than males already. If this trend continues, from a cohort perspective, the gender gap in participation rates would become irrelevant over the next three decades. To implement such a development in the generational accounts, we have used projections of participation rates previously employed by Fernández-Cordón (1996) and Blanes *et al.* (1996). In these, the existing gender gap almost disappears as of the year 2025, as female participation gradually approaches the usual hump-shaped age profile observed for men– the latter falling slightly, reflecting joint household labour supply decisions.

Of course, the projected variations in labour force participation should have an impact on the expenditure side of government finances not only with regard to unemployment benefits. In fact, the current participation gap among genders turns out to be well reflected in many of the transfer profiles related to labour that we could not break down according to employment status directly. We have used the correspondence between more and less employed cohorts to predict the labour market impact on benefits. In detail, we adapted contributory widow pensions, contributory and non-contributory invalidity benefits and LISMI benefits contemporaneously to the labour force participation changes. Regarding contributory and non-contributory retirement pensions, we considered that after a time lag, primary insurance amounts must be altered, if cohorts that on average work more enter into retirement.[18]

Assuming benchmark conditions hold, we observe that the sustainability gap becomes larger in response to the predicted increase in average labour force participation (Table 5). The revenue requirements for the public sector to remain solvent grow substantially, from 0.72 to 1.76 percent of annual GDP. The result that higher employment levels worsen the sustainability of current fiscal legislation might appear counterintuitive at first. However it implies that, provided that our simulation of the impact on benefits is appropriate –and that the exogenous adjustment of female labour force participation is not too unrealistic– the catching up of female generations in the labour market increases benefits to a greater extent than tax payments. The higher

[18]Note that as the gender participation gap decreases, female contributory benefits increase while the non-contributory decrease.

tax payments of females are not sufficient to balance their rising entitlement to labour-related transfers (and to compensate the lower net tax payments of men who are predicted to work slightly less). Consequently, then, intergenerational redistribution increases, with future cohorts required to pay 24,100€ more to keep the government solvent.

TABLE 5
Generational accounts and sustainability gap for
different economic scenarios (euro)

	Changes in labour force participation				
	Benchmark scenario	Including transfer effect	Actuarially fair pension system	Excluding transfer effect	Full employment scenario
Generational accounts:					
Birth cohort of 1996	-11,100	-10,300	-6,900	-3,900	-3,200
Birth cohorts after 1996	-2,500	13,800	-10,700	-14,400	-13,100
Change in fiscal burden	8,600	24,100	-3,800	-10,500	-9,900
Sustainability gap (percentage of annual GDP):					
	0.72	1.76	0.24	-0.74	-0.72

Note: Growth rate: 2 percent; discount rate: 4 percent.
Source: Authors' calculations.

A key reason for the decline in generational accounts despite female cohorts working more is that the current social insurance system is not actuarially fair. This means that, from a life-cycle perspective, the increase in benefits corresponding to an increase in contributions – explained by rising labour force participation, in our case– is larger, in present value terms, than the increase in contributions itself. A necessary policy to avoid rising intertemporal imbalance when labour force participation is increasing, therefore, is to move social insurance contributions and benefits closer to actuarial fairness. In order to evaluate the effects of such a policy, we simulate an *actuarially fair scenario* assuming that the additional contribution revenue due to increased female participation is exactly spent on additional female pensions. As shown in the third column of Table 5, this scenario would bring

the sustainability gap back close to the benchmark situation. Hence actuarial fairness of the pension system is revealed as an important measure for maintaining fiscal sustainability with an improving labour market.

As an extreme case, we have also computed the sustainability gap assuming that the predicted changes in labour force participation rates would be without expenditure effects at all, which provides an upper bound of what could be the positive impact on fiscal balance. Including tax effects only, generational accounts obviously improve, although, as shown in the fourth column of Table 5, the generational accounts of the newly born are still negative. The increased tax payments to the public coffers of living generations nevertheless lead to a sizeable inter-temporal surplus to the public coffers, worth 0.74 percent of aggregate future GDP. This surplus is even large enough to raise the aggregate transfer to future birth cohorts. In this most optimistic scenario, fiscal policy could assign a life-cycle net transfer of 14,400 € per capita to future generations without violating the intertemporal financing constraint of the public sector.

It is frequently argued that a shrinking labour force in the future could lead to a reduction in unemployment. Therefore, as an alternative labour market scenario, we have tried to simulate the effects of a further decline in individual unemployment rates. By doing so we do not claim that there would actually exist a correlation between population size and unemployment conditions. In fact, there is theoretical and empirical evidence that there does not exist a clear-cut link between these two variables. Our purpose then is to illustrate to what extent continuation of the current favourable labour market development in Spain can reduce the chance that fiscal policy is caught in a sustainability gap. Consequently we have chosen an obviously counterfactual scenario. We assume that the natural rate of unemployment, set to four percent of the labour force, is reached immediately –and permanently– after 2001.

Computing the impact of this scenario on taxes and transfers, we again followed the strategy outlined above. Contrary to the labour force participation experiment, lacking satisfactory empirical facts to measure the necessary adjustments, we excluded any effects on transfers besides those on unemployment benefits, however.[19] The unemployment

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[19] The easiest way to compute the impact of falling unemployment on entry pension levels seems to be to evaluate the primary insurance amount explicitly, on the basis

experiment, therefore, is only comparable to the participation scenario excluding transfer adjustments. The findings reported in Table 5 indicate that full employment could provide an even better insurance against long-term insolvency of the public sector than rising labour force participation. Intertemporal government wealth, if current fiscal legislation is maintained, reaches as much as 0.72 percent of yearly GDP. Interpreting this outcome one should bear in mind, though, that full employment, despite the current economic upswing, is hardly a realistic perspective for the Spanish economy even in the medium term. Moreover, parallel to what we have shown in the participation experiments, as long as social insurance is actuarially unfair, the long-term fiscal gain from falling unemployment could be substantially smaller than is indicated by our last experiment.

7. Conclusions

With budget deficits rapidly falling, and the perspective on public finances improving further in the years to come, political decision makers in Spain might come under serious pressure to relax fiscal policy. As in other countries where the reduction of deficits has made substantial progress recently, one might expect that the public debate on whether to spend budget surpluses on higher net transfers to the private sector, or on the redemption of historical debt, will become more intense. The generational accounting viewpoint, which forces the attention to the long-term prospects of public finances, can contribute a number of important insights to this debate.

First, although the sustainability of government finances has clearly improved in the course of the recent economic expansion, one should be careful before assuming that a path of future primary surpluses can be taken for granted. As soon as the Spanish economy grows only at a more moderate pace in the long term, or if unemployment cannot be kept at the current level, the probability of redistribution across generations via the intertemporal government budget increases alarmingly.

Second, due to the strong life-cycle component of net revenue, government budgets in Spain will come under very severe demographic pressure by the middle of the new century. Even if decision makers

of the pension formula, which takes into account the wage history and the number of contribution years. Unfortunately, this is a very difficult approach in practice, because while receiving benefits, the unemployed go on paying contributions in relation to their last wage.

can maintain the remarkable present balance of individual life-cycle tax payments and benefit receipts, primary deficits temporarily might exceed six percent of GDP. To avoid redistribution to the disadvantage of future generations, the generational accounts show that it is necessary to direct the surpluses ahead into a –public or private– fund that can accommodate the structural budget deficits due to rising old-age dependency. In contrast, a policy to increase net transfers to the private sector, i.e. to reduce generational accounts, is clearly not sustainable.

Reform in the pension system is already in process. Although the measures cutting expenditure enacted with the 1997 Pension Reform Act seem to be far from sufficient, one of its main achievements has been the financial separation of the contributory system. Owing to this process, the implicit surpluses of the system have been made evident. In the current political debate on how to the use this surplus, the suggestion to endow a fund has to compete with proposals of cutting contributions or improving benefits.

The generational accounts indicate that the fund solution –either public or private– could be superior in avoiding intergenerational fiscal imbalance, and that current surpluses should not distract the attention from further reforms during the future revisions of the Toledo Agreement.

In particular, decision makers should make steps toward actuarially fairer social insurance. The results of our labour market experiments can be interpreted as indicating that the present imbalance, over the lifetime, of contribution payments and corresponding entitlements to benefits, adds to an intertemporal fiscal deficit and hence intergenerational redistribution. Without an actuarially fairer system, it might be that neither the expected improvement of female labour force participation, nor a possible further reduction in unemployment, could substantially remove demographic pressure from government budgets.

Finally, it is worth noting that the reform of the pension system might not be enough to ensure the viability of fiscal policy against the demographic cycle. There are other main programs like health care provision relying on general taxes, which are also heavily dependent on demographics. Only if prudent decision makers successfully cope with these challenges, our generational accounting results, perhaps in contrast to earlier findings (Berenguer *et al.,* 1999), give some hope

that Spain might pass through the demographic transition without too severe a financial crisis.

Appendix A1: Tax and transfer profiles

In this appendix we describe the improved set of age-related micro data underlying our re-calculation of generational accounts for Spain. We summarise the construction of age-specific tax profiles, before describing how we derived the profiles for age-specific transfers. More details on the construction of the micro profiles are available from the authors upon request.

A1.1 Tax Profiles

Micro profiles measuring the relative payments by age and gender of personal income taxes, social security contributions and most indirect taxes were retrieved on the basis of the 1996 *Encuesta Continua de Presupuestos Familiares* (ECPF), which contains quarterly information on about 3,200 households. The age profiles were obtained separately for the employed, unemployed and non-participants in the labour market, i.e. they are also participation-specific.

In order to correct the well-known problem of income underreporting in the ECPF, we assumed that the degree of underreporting depends on the source of income and, following Gil and Patxot (2002), inflated reported net income to the corresponding observed macro magnitudes taken from the Spanish National Accounts (INE, 1996a), and other statistical sources (IEF, 1996). As a result, the reported net wage was increased by a factor of 1.22, unemployment income by 1.284, and pension income by 1.098. Other income categories were not corrected due to the lack of reliability of the correcting factors. These inflated figures are relatively similar to those found by Calonge and Manresa (2001).

Constructing the personal income tax profiles, we aimed at reproducing the 1996 individual personal income tax return. 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 withholding and 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,

health care, dependent relatives and children, housing and mortgage interest (all of them imputed to the head of the household) and labour earnings.

In calculating social security contribution profiles we differentiated between salaried, self-employed and unemployed income for each contributor. Having converted the relevant net income into gross income we applied an average 24 % contribution rate for the whole pension system (Herce *et al.,* 1996), and a 6.4 % contribution rate for unemployment incomes. This implies that the incidence of employer and employee contributions is on the employee, as seems realistic for Spain, according to Argimón and González-Páramo (1987) and Escobedo (1991).

With respect to capital taxation, we consider the personal capital income tax and other capital taxes and taxes linked to land property. Being fully aware of the poor performance of capital earnings records in the ECPF, we imputed age- and gender-specific tax payments on capital income by converting reported net capital and property income into gross terms. The tax burden on land property was distributed according to reported taxes on principal and secondary housing. Concerning indirect taxes, we computed VAT profiles grouping consumption reported in the ECPF into categories according to the legal tax rates applied– 0, 4, 7 and 16 %. As the ECPF only provides the consumption structure of the household, we assigned household consumption to individual household members proportionally to their income share in the household, abstracting from intra-household transfers. Similarly, profiles for duties on hydrocarbon oil and vehicles (including some transportation vehicle excise taxes), were constructed by imputing their revenues according to household spending on gasoline, diesel oil and other fuel expenditures and on the acquisition of new and second-hand vehicles as well as other transportation vehicles, respectively. Finally, profiles for excise taxes on alcohol (divided into beer and other alcoholic beverages given the availability of both micro and macro data) and tobacco (distinguishing cigarettes, cigars and pipe tobacco) were derived by considering frequency and quantity of drug use as reported in the 1997 National Health Survey, to estimate the respective age-specific consumption patterns. Tax incidence is assumed to be directly on the consumer, which seems uncontroversial, given that the demand for these goods is comparatively price-inelastic.

A1.2 Transfer Profiles

Among the contributory social security benefits, we consider pensions, and maternity and sickness benefits. Profiles of average per capita pension receipts by age and gender are directly available from administrative data (MTAS, 1996a) for different categories (old-age, invalidity, widows, orphans and in-favour-of-relatives pensions). We only had to correct the original data in order to have it in terms of the base year total population. With respect to maternity benefits, despite parents being the recipients of the cash transfer, we established the assumption that newborns are the ultimate beneficiaries. Finally, as direct evidence on sickness benefits is unavailable, we assigned transfers using age-related data on labour accidents during the working day and the average period of discharge reported by MTAS (1998).

Concerning non-contributory transfers, we considered the number of beneficiaries by age and gender, the monthly uniform insurance amount for each type of benefit taken from MTAS (1996b) and the underlying population structure, to derive age-profiles for non-contributory old age and invalidity pensions and four out of seven LISMI (*Ley de Integración Social de Minusválidos*) benefits. Similarly, we used data provided by INEM (1996) on average monthly gross unemployment income by age and gender for the construction of unemployment benefit profiles.

To derive age profiles assigning public health care spending, we computed, as Alonso and Herce (1998), a synthetic indicator weighting data on actual hospital stays sojourn by age, gender and final diagnostic reported by INE (1996b), taking into account the base year population composition. Thus, we obtained the expected J-shaped curve for public health spending.

Finally, to assign government expenditure on education we used data from MEC (1998a,b) and the Consejo de Universidades (1998). We first derived spending per student by dividing, on each educational level, total spending by the aggregate number of pupils enrolled. Then we used the enrolment rates by age and gender in the different levels of education to construct, for each age group, a weighted average of per student spending. In a few cases, where we could not construct enrolment rates by age, we distributed students uniformly (or exponentially, in the case of graduate education) across the age groups compatible with the corresponding level of education.

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Resumen

Se prevé un déficit nulo para el conjunto de las administraciones públicas en el ejercicio 2001. Este artículo analiza la viabilidad intertemporal de la actual política fiscal por medio de la contabilidad generacional. Con el fin de analizar el impacto de la futura evolución del empleo, se extiende la metodología estándar incorporando el status laboral en los perfiles de impuestos y transferencias. En primer lugar, al analizar la mejora de la situación financiera del sector público, se separan los efectos de las reformas fiscales de los debidos a la disminución del desempleo. En segundo lugar, se valoran los efectos del aumento esperado de la participación laboral femenina. Finalmente, se evalúa el impacto de un descenso del desempleo a la tasa natural de paro.

Palabras clave: Contabilidad generacional, política fiscal española, deuda pública, envejecimiento demográfico.