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Quantifying the Impact of Immigration on the Spanish Welfare State

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Abstract

The Spanish population will experience significant aging in coming years. This demographic change will impose a heavy burden on the national budget. In particular, expenditure on pensions and health are expected to rise significantly. The inflow of immigrants could help to alleviate the fiscal burden that future generations will have to bear. In this paper we try to quantify the impact of immigration on the Spanish Welfare State, using the methodology of Generational Accounting. Our results suggest that the impact of immigration will be positive and significant.

Keywords: immigration, fiscal policy, generational accounting, welfare state

JEL Code: E62, F22, H6, J1

1. Introduction

Spain has traditionally been a country of out-migration. In the twentieth century, Spaniards migrated first to America in the 1920's and 1930's, and later to Western Europe in the 1950's and 1960's. Even today, there are approximately two million Spaniards living abroad. However, since the 1980's, Spain has transformed gradually into a host country for workers coming mainly from Africa and South America. In the early 1980's the number of foreign residents in Spain was below 200,000, of which around two-thirds were Europeans, and the annual flow of immigrants was approximately 10,000. In percentage terms, foreign residents were only 0.5% of the total population. In November 2001, according to the Spanish Statistical Office, the number of foreign residents was slightly above 1.5 million, or 3.6% of the total population.[1] This percentage is still well below that of other European countries. The average percentage of foreign residents in the European Union was 5% in 2001, ranging from 1.6% in Greece to 35% in Luxembourg. However, two caveats are in order. First, annual flows have increased steadily while the inflow of Europeans has decreased dramatically. Second, in 2001 Spain was, after Germany, the second preferred choice for immigrants entering Europe, and received a net migration of 231,700 individuals, 20% of the total inflow to the European Union (1.16 million).[2]

Most analysts believe that this inflow will continue in the future, since many sectors in Spain, like agriculture, construction, or housing services are in constant need of unskilled labor. At the same time, natives' sentiments towards immigrants and immigration policy are changing rapidly. In June 2002, more than half of the native population had the opinion that there are too many immigrants living in Spain.[3] Moreover, 85% of natives thought that only those workers "needed" by the labor market should be admitted. It seems crucial, therefore, to analyze the impact that immigration will have in Spain.

Immigration may affect the host country at many different levels. It may affect demographics, the labor markets, public expenditure and even the rate of growth of the economy. Perhaps the most visible impact of immigration in the host country is its impact on demographics. This impact is highly relevant for many developed countries due to the decline in native population that most of these countries will experience in the next decades. According to population projections made by the United Nations, the population in Europe will decrease from 727 million people in 2000 to 603 million by 2050, a 17% loss, while the proportion of people aged 65 and over will rise from 14.7% in 2000 to 29.2% by 2050. For Spain, the prospects are particularly worrying. Total population is projected to decline from 39.9 million in 2000 to 31.2 million in 2050, a 22% loss, and the proportion of people aged 65 and over will rise from 17.0% in 2000 to 37.6% by 2050.[4]

These projected changes in the Spanish population raise serious concerns about the viability of current fiscal policy. The aging of the population negatively impacts the national budget, since the elderly are net beneficiaries of the tax-transfer system. Furthermore, the decline in fertility will reduce the proportion of net tax payers across the population.

There are three main reasons why immigration could attenuate these negative effects. Firstly, a net inflow of migrants raises total population in the host country. In 2001, over 74% of the increase in the population in the European Union came from migration. For Spain, the proportion was even larger, slightly above 80%. Secondly, immigration has an immediate impact on the working-age population, since on average immigrants are younger than natives.[5] Thirdly, immigrants may have a higher fertility rate than that of natives. Nonetheless, these pure demographic effects are not enough to determine the overall effect of immigration. We also need to assess its economic impact, considering the different benefits and costs that the host country can obtain from immigration.

In particular, we want to study the quantitative effect of immigration on Spanish fiscal policy in the long run. We therefore need to adopt a dynamic perspective.[6] Some previous studies have used a dynamic framework to capture the long-run impact of immigration. Most of these studies have focused on the US economy. Borjas (1995) estimates the benefits that the host country derives from immigration, mainly from production complementarities between immigrant workers and other factors of production. According to Borjas, although there are some benefits from immigration, they are relatively small. Smith and Edmonston (1996) thoroughly study the various effects of immigration, including its long-run fiscal impact. They conclude that the effect of an immigrant varies greatly depending on his age on arrival. Immigrants who arrive at the ages of 10 to 25 produce the most positive effects for natives. On average, they find that the net effect is strongly positive at the federal level, but negative at the state and local levels. Lee and Miller (2000) arrive at similar conclusions. Storesletten (2000) calibrates a general equilibrium overlapping generations

model, explicitly taking into account the differences between immigrants and natives. The reason for using a general equilibrium approach is that the inflow of immigrants might well increase interest rates and decrease wages, due to the increase in the labor/capital ratio.[7] He computes the net governmental gain, in present value, of admitting one additional immigrant. He finds that the optimal policy should be to increase the inflow of middle-aged, high- and medium-skilled immigrants. If, however, the age and skills of the new immigrants were at the level of current immigrants already living in the US, an increased inflow of immigrants would not help to balance the budget in the long run.

The study closest to ours is that of Auerbach and Oreopoulos (2000), which also analyzes the dynamic effects of immigration within the framework of Generational Accounting, originally developed by Auerbach, Gokhale and Kotlikoff (1991, 1994). Generational Accounting is a new method to assess the long-term fiscal position of the government, and is a useful tool for assessing the size of the redistribution between present and future generations. It calculates, in present value, what the typical member of each generation and sex can expect to pay in net taxes (taxes net of transfer payments received), in his/her remaining lifetime. Auerbach, Kotlikoff and Leibfritz (1999) presents Generational Accounting analyses for 17 different countries.[8]

There are some previous studies using Generational Accounting in Spain. The first one is Berenguer, Bonin and Raffelhüschen (1999). They use 1995 as their base year and find that, if fiscal policy as of 1995 does not change dramatically, future generations will bear a severe fiscal burden. Bonin, Gil and Patxot (2001) study the Spanish pension system in isolation from the rest of the public budget, also finding large imbalances. Finally, Abío et al. (2001) focus on the evolution of the deficit. They use 1996 as their base year. Our research improves on these previous studies for Spain in several ways. First we use the latest data, using 2000 as our base year. Second, we use new micro data, not available before, including the European Community Household Panel Survey (ECHP). Third, we focus specifically on the role of immigration, which is particularly important in the case of Spain.[9]

In order to assess this issue, we focus on the effects of immigration on the Spanish Welfare State. We simulate alternative scenarios by considering different quotas of immigrants. In particular, we consider three different scenarios: no immigration after the base year, our benchmark scenario of a net migration of 60,000 individuals per year, and a net migration of 200,000 individuals per year. The benchmark scenario represents a compromise between the quota fixed by the government in the last two years (30,000 per year) and the real net flow of roughly 200,000. The other two scenarios try to capture two extreme cases of migration policy. Although the first one with no immigration is unrealistic, it is interesting to compare it with the intermediate case that we take as a benchmark. The last scenario considers an "increased" net immigration of 200,000 individuals per year, slightly below the actual number of immigrants in 2001, and somewhat above the Spanish Statistical Office's estimate of 160,000 immigrants.

The main result of the paper is that increasing the inflow of immigrants would substantially lower the fiscal burden on future natives. This result is in line with evidence for Germany, presented in Bonin, Raffelhüschen and Walliser (2000) but it differs sharply from evidence for the US found by Auerbach and Oreopoulos (2000). The latter authors found that the overall effect of immigration in the US is unclear and depends on the proportion of

government consumption that is considered to be a public good. We believe that there are two main reasons why our results differ from Auerbach and Oreopoulos (2000). The first one is that in the US, the problem of an aging population is less dramatic than in Spain. This implies that the average age of immigrants relative to natives is much lower in Spain than in the US.[10] For a given age structure of immigrants, the impact of immigration will always be more beneficial in countries that have an older population. The second reason is that the average level of education of US immigrants lags behind that of natives much more than in Spain.[11] As the level of education explains the biggest part of the pattern of taxes and transfers, the lower the level of education of immigrants relative to natives, the lower will be their net contribution.

The structure of the paper is as follows: In Section 2, we briefly describe the methodology of Generational Accounting. In Section 3, we present the assumptions concerning population projections and fiscal projections for the period that we are analyzing. In Section 4, we present our main results concerning the overall dynamic effect of immigration in the three scenarios considered. Finally, in Section 5, we summarize and conclude.

2. Methodology

Generational Accounting is based on the government's intertemporal budget constraint:

$$\sum_{s=t}^{\infty} \frac{T_s}{(1+r)^{s-t}} \equiv \sum_{s=t}^{\infty} \frac{E_s}{(1+r)^{s-t}} + B_t, \tag{1}$$

where t is the base year, T_s and E_s are total tax revenue and government expenditure in year s, respectively, B_t is the government's outstanding net debt in year t, and r is the real interest rate. Equation (1) states that all government expenditure will be paid out of taxes, either today or in the future. We split government expenditure into government consumption and government transfers to individuals. Government transfers represent that part of E_s that can be attributed to particular individuals, i.e., pension benefits, unemployment benefits, and also in-kind transfers such as education and health services. All the remaining expenditures (i.e., that cannot be attributed to particular individuals) are included as government consumption.

The next step is to construct the accounts for current and future generations, assigning government transfers and tax payments to every generation by age, sex and nativity.[12] The account in year t of a generation born in year k, $N_{t,k}$, is the present value of the stream of taxes (net of transfers) that they will pay to the government over their remaining life span. If the maximum length of life is D, the accounts of existing generations in the base year are $N_{t,t}$, $N_{t,t-1}, \ldots, N_{t,t-D}$, the first one ($N_{t,t}$) being the account of those born in the base year, etc. The accounts of future generations are $N_{t,t+1}$, $N_{t,t+2}$, etc. As such, we can rewrite identity (1) as:

$$\sum_{s=0}^{D} N_{t,t-s} + \sum_{s=1}^{\infty} N_{t,t+s} \equiv \sum_{s=t}^{\infty} \frac{G_s}{(1+r)^{s-t}} + B_t, \tag{2}$$

where G_s represents government consumption in year s.

The account of a generation born in year k can be written as follows:

$$N_{t,k} = \sum_{j=\max\{t,k\}}^{k+D} P_{j,k} T_{j,k} (1+r)^{-(j-t)}, \tag{3}$$

where $P_{j,k}$ is the number of individuals born in year k who are still alive in year j, and $T_{j,k}$ represents the average net tax payments made in year j by a member of the generation born in year k.

The different terms in equation (2) are estimated as follows. To estimate government consumption, we first calculate per capita government consumption in the base year from the government's accounts. Secondly, we assume that per capita government consumption grows along with productivity at rate g per year. Finally, we use our population projections to calculate $G_t, G_{t+1}, \ldots, G_{t+k}$, etc. Government debt is directly obtained from the government's accounts.

The left-hand-side of equation (2) is estimated using two different approaches. The first one consists of estimating the accounts for existing generations under the assumption that current fiscal policy will remain fixed for those generations. This approach implies that future generations will absorb the entire adjustment required to fill the gap in the intertemporal budget constraint. Although we believe that it is highly implausible that fiscal policy will change only for those generations born after the base year while it remains unchanged for those generations born in the base year or earlier, there are two reasons to follow this approach. Firstly, this is a useful benchmark, since it provides information on the size of the existing imbalance. Secondly, this is the approach followed by most of the literature on Generational Accounting. In this way our results can be compared with previous work. We also explore a second approach proposed by Auerbach and Oreopoulus (2000), in which fiscal policy is assumed to change immediately, so that any imbalance arising from equation (2) will be paid by both current and future generations.

Under both approaches, we first estimate the average net tax payments for all living generations in the base year using micro-data and the aggregate figures derived from the government's accounts.

In the first approach, per capita net tax payments for currently living generations are projected based on productivity growth.[13] We then use population projections together with these estimates to calculate the accounts for all living generations in the base year. Once we have estimated the present value of government consumption, government debt and the accounts for currently living generations, we obtain the sum of the accounts for future generations as a residual. The next step is to divide the burden among the future generations. We calculate how much fiscal policy should be changed in order to meet the government's intertemporal budget constraint. In particular, we calculate the proportional increase in all taxes and/or the cut in all transfers that future generations will pay and/or receive to balance the intertemporal government budget constraint.

Under the second approach, fiscal policy is assumed to change immediately. We first calculate the burden on existing and future generations under the current fiscal policy. Then, we consider a proportional increase in all taxes and/or a cut in all transfers that all generations will pay and/or receive until the intertemporal government budget constraint is balanced.

3. Assumptions Underlying Generational Accounts Calculations

To produce generational accounts for Spain, we require population projections, tax and transfer profiles in the base year, government expenditure and government debt in the base year. Our definition of government includes the central, the regional and the local governments. We have chosen 2000 as our base year, due to data availability. This was a booming year for the Spanish economy with GDP growth of 4.2%.

3.1. Population

We construct population projections for the period 2000–2199, assuming that the population remains stationary thereafter. To construct these projections, we need to make assumptions about future life expectancy and fertility rates, as well as assumptions about the age structure of future immigrants. We do not distinguish between immigrants and natives in terms of life expectancy and fertility rate, as there are no available data on the life expectancy and fertility rate of immigrants in Spain.[14]

We use United Nations projections for life expectancy in Spain for the period they are available (2000–2050).[15] For the remaining period, we assume that life expectancy will increase linearly, so that it will coincide with the UN projections for Europe in 2150.

We also assume that the fertility rate will rise over time. In 2000, the fertility rate in Spain was 1.24,[16] the lowest in the European Union. We use two projections for the fertility rate. Under the low fertility scenario, we assume that the fertility rate will rise to 1.5 in the year 2015 and will stay at that level thereafter. This is our benchmark scenario and it corresponds, roughly, to the current average fertility rate in the European Union. We also present a high fertility scenario, in which the fertility rate reaches 1.8 in the year 2020, and from that year onward, it remains constant. We choose this particular value because it corresponds approximately to the current average fertility rate in the Scandinavian countries. We study this second scenario to check the sensitivity of the main results to a change in fertility.

The next set of assumptions concerns the characteristics of the future inflow of immigrants. One possibility would be to infer their characteristics from those of the current foreign residents in Spain. But this has an important drawback. In recent years the flow of immigrants has diverged sharply from the existing stock of foreign residents in terms of their country of origin. In particular, most immigrants are currently coming from underdeveloped countries, mainly from Africa and South America, while immigrantion from the European Union has declined significantly. Accordingly, we use the characteristics of only current foreign residents from those countries which are the source of most recent immigration. Moreover, we consider all current foreign residents from the remaining countries as natives, because their tax and transfer profiles are similar to those of native Spaniards.[17] As such, our procedure amounts to saying that future immigrants to Spain will arrive only from a set of countries that include South and Central America, Africa, Asia (with the exception of Japan) and Eastern Europe.

The Spanish Statistical Office provides information on the number of immigrants by age group and country of origin. In 2000, there were 556,861 legal foreign residents from

our list of countries. However, as far as we know, there are no official figures on the number of immigrants according to age and sex. The other source of information about immigrants in Spain is the Spanish Labor Force Survey (Encuesta de Población Activa, EPA). The EPA is a large survey that has been carried out each quarter since the early seventies, and is representative of the Spanish population. The sample size is around 60,000 households (200,000 people) and one sixth of the households is renewed each quarter. We pool together all the data for 1999 (four quarters) and the available data for 2000 (the first three quarters). The total number of observations is 1,318,708. The number of immigrants from underdeveloped countries is 7,085. Then, we combine both sources of data on immigration to get the characteristics of the current immigrants. We first calculate the proportion of immigrants within this sample by age-sex groups and then use the official figures for legal immigrants by age groups to allocate the 556,861 immigrants that were living in Spain in 2000 to age-sex cohorts. Finally, we consider as natives all the children that the immigrants will have, after settling in Spain. That is, we assume that the characteristics of the second generation of immigrants are indistinguishable from those of natives.[18] Under these assumptions, we construct population projections for the period 2000–2199, both for natives and for those immigrants who were residents in Spain in 2000.

To complete our population projections, we need to make assumptions about the number of future immigrants arriving in Spain. As noted above, we will consider three different scenarios regarding future annual net immigration: 0, 60,000 and 200,000 individuals. Under the second and third scenarios, we have to construct population projections for future immigrants. New immigrants are on average younger than those already living in the country; therefore, we cannot use the age-sex profiles that we have calculated for immigrants living in Spain in 2000 to allocate future immigrants to age-sex groups. Instead, we calculate the net flow of immigrants by age groups using the stock of immigrants in different years (1997, 1998, 1999, 2000 and 2001),[19] calculate the proportion of new immigrants by age groups in each year, and then compute the average. Finally, we combine these average proportions with the age-sex profiles derived from the EPA to obtain the age-sex profile for future immigration in Spain.

3.2. Fiscal Projections

Aggregate taxes and transfers are taken from several sources. Most of them come from the report "Actuación económica y financiera de las Administraciones Públicas," published by the Ministerio de Hacienda-Intervención General de la Administración del Estado (IGAE). Table 1 summarizes the public budget in the base year 2000.

We distinguish between four main categories of taxes: direct taxes, value added tax (VAT), excise taxes and social security contributions. Direct taxes include the income tax, property tax and corporate tax. Following the "small-open economy" assumption, we assume that taxes on mobile corporate capital are borne by local fixed factors. Transfer payments are categorized into direct monetary transfers (pensions, unemployment benefits, etc.), health and education. For each of these items, the aggregate amounts are distributed according to age, sex, and nativity profiles. The remainder of government expenditure, after subtracting all tax payments not allocated to particular individuals, is labelled as government consumption.

Table 1. Public revenue and expenditure in Spain 2000 (Millions of Euros and percentage of GDP).[a]

Revenue		Expenditure	
Direct taxes	66,282 (10.9)	Monetary transfers	75,143 (12.3)
Social contributions	81,124 (13.3)	Pensions	60,821 (10.0)
Indirect taxes	71,295 (11.7)	Unemployment benefit	8,278 (1.3)
VAT	35,491 (5.8)	Other mon. transfers	6,044 (1.0)
Excise	17,577 (2.9)	Health	32,942 (5.4)
Insurance	0,849 (0.1)	Education	26,735 (4.4)
Other indirect	17,378 (2.8)	Government consumption	84,498 (13.9)
Other revenue[b]	5,588 (0.9)	Interest payments	20,011 (3.3)
Other[c]	11,359 (1.8)		
Deficit	3,681 (0.6)		
Total	239,329 (39.3)	Total	239,329 (39.3)

Source: Authors' calculations from IGAE (Intervención General de la Administración del Estado) and Ministerio de Educación, Cultura y Deporte.

[a]According to IGAE, total revenue in 2000 was 241.436 millions of Euros (39.6% of GDP). From that amount we have substracted some items that represent transfers among public institutions. These items amount to 5,788 millions (0.9% of GDP). We have added the deficit to balance revenue with expenditure.

[b]It includes revenue from state lotteries, fines, etc.

[c]It includes government production and transfers from the European Union.

To construct the accounts, we also need the value of the outstanding public debt which, in 2000, amounted to 368,913 million Euros, 60.5 percent of GDP, according to IGAE. Finally, we assume an annual productivity growth rate of 2 percent and a discount rate of 5 percent in the long run. We have chosen these figures as they are comparable to those used in most of the studies included in Auerbach, Kotlikoff and Leibfritz (1999). We test the robustness of our results by repeating the simulations under alternative discount and growth rate assumptions (1.5 and 2.5 percent for the productivity growth rate, and 3 and 7 percent for the discount rate).

3.3. Construction of Relative Age-Profiles

Relative age-profiles for taxes paid and transfers received are calculated using microdata. Our two main sources of data are the European Community Household Panel Survey (ECHP) and the Spanish Consumer Expenditure Survey (Encuesta de Pre-supuestos Familiares, EPF). The ECHP survey presents micro-level (persons/households) data on income, living conditions, housing, health and work in the EU. This survey covers all EU member states and it follows the same private households over consecutive years from 1994 onward. For our study, we use data on 5,485 Spanish households in the 1998 wave. The EPF is a large cross-sectional survey and provides detailed information on family expenditures, household characteristics and personal income. This survey was carried out in 1990/91 on a sample of 21,155 households and is representative of the Spanish population.

The age-profiles are calculated as follows. First, we calculate initial profiles of average taxes paid or transfers received by sex and age for immigrants and natives, using the micro-data. We then derive the micro-based total taxes paid or transfers received by each group, by multiplying the averages by the number of people in the population on each age-sex-nativity cohort. Typically, when we add-up the micro-based figures for the entire population, we find that they do not coincide with the corresponding government budget figures represented in Table 1. We therefore construct our final profiles of taxes paid or transfers received by each group by allocating the excess amounts, proportionally, to the initial profiles.

3.3.1. Direct Taxes. The age-profiles for direct taxes (Income Tax and Social Security Payments) are calculated from income data taken from the ECHP. The personal income data recorded in this survey are net of taxes and social security payments. As an approximation, we calculate the age-profiles by sex and nativity for income tax, proportional to total personal net income, and for social security payments, proportional to labor income.

The ECHP is not a very large survey and the number of immigrants is therefore rather small. As such, the figures for average income by sex and age for immigrants are not very reliable.[20] For this reason, we use an alternative approach to calculate average income by sex and age for immigrants. We use the ECHP to calculate the average labor income for employed immigrants and employed natives,[21] and the ratio between the two is 0.75.[22] To estimate average labor income by age, sex and nativity for the entire population (not only for employed people) we use the EPA survey to calculate employment rates by age, sex and nativity. We find that employment rates for immigrants are higher than for natives, for young cohorts and for those close to retirement age, and are very similar for middle age cohorts. We then use employment rates from the EPA survey and labor income data from the ECHP to estimate average labor income, by sex and age, for both natives and immigrants. Using the ECHP we first calculate average labor income, by sex and age, for employed natives from 16 to 64 years of age. As noted above, according to the ECHP, average labor income, by sex and age, for employed immigrants is 75 percent of the average for natives. Finally, we multiply these averages by the employment rate for each cohort obtained from the EPA to obtain their average labor income by age, sex and nativity, for the entire population.

We also calculate average non-labor income for immigrants and natives, and find that there are no substantial differences between these two figures. Therefore, we calculate average non-labor income, by age and sex, for the entire sample, and assign these averages to both immigrants and natives. Average total income for each cohort, is then the sum of average labor and non-labor income.

3.3.2. Indirect Taxes. For indirect taxes we use the EPF data. As already mentioned, the EPF data provide detailed information on household expenditure (covering 918 goods). Different goods are taxed at different rates and the exhaustive good classification of the EPF allows us to calculate VAT and excise taxes[23] paid by each family quite well.[24] Hence, we first calculate VAT paid by each household using appropriate rates for each good. Then, the amount paid by a household is divided equally among its adult members. Unfortunately, there is no information on nativity in this survey, so we could not directly derive VAT profiles for immigrants and natives. Instead, we calculate average VAT paid by sex and age

using the EPF, and treat these figures as the relative VAT profile for natives. We then use the ratio of average total income for immigrants and natives, by sex and age, from the ECHP, and multiply the profile for natives by these ratios, to estimate the relative VAT profile for immigrants. We use the same approach to calculate the excise taxes profiles.

3.3.3. Transfers. Direct monetary transfers received by each group are calculated using the ECHP data. This data set provides information on direct transfers received by each adult member of the family. Direct transfers are disaggregated into unemployment benefits, pensions, family allowances and other transfers. However, in this study we consider total transfers received by each adult and calculate the age-profile for total transfers for immigrants and natives, using a similar approach to that used for direct taxes. We use the ECHP to calculate average total transfers for immigrants and natives,[25] and the ratio between the two is 0.75. Secondly we compute the average total transfers, by sex and age, for natives. Finally, we multiply the profile for natives by 0.75, to estimate average total transfers, by sex and age, for immigrants. To check the robustness of our results we also consider the extreme case where direct transfers to immigrants, by sex and age, are 90% of direct transfers to natives.[26] The results are qualitatively similar to those presented in Section 4, although the effect of immigration is less important.[27]

To construct the profile for education we need per capita expenditure by level of education, and enrollment rates by age, sex and nativity. We first calculate per capita expenditure by level of education, using data from the Spanish Ministry of Education. We then use the enrollment rates, by age and sex, provided by the OECD. Unfortunately, these enrollment rates do not distinguish between immigrants and natives. According to the EPA survey, the proportion of students differs sharply between immigrants and natives, and we use the proportion of students by age, sex and nativity, derived from the EPA survey, and the enrollment rates provided by the OECD, to estimate enrollment rates by age, sex and nativity. Finally, we combine per capita expenditure, by level of education, with enrollment rates by age, sex and nativity, to derive the education profile.

We could not find reliable Spanish data to construct the health profile. Instead, we use the profile for Belgium.[28] Since Belgium and Spain have similar age structures, the distribution of health expenditures by age and sex should be similar in both countries. However, we also use data contained in Alonso and Herce (1998) to check for consistency.[29] We find that both profiles were roughly similar, except for the case of children below one year. In the data in Alonso and Herce, health expenditure per capita for children below one year was twice the expenditure using the data from Belgium. The reason for this discrepancy is that the data used by Alonso and Herce only includes health expenditure within hospitals. Therefore, due to the large amounts spent on premature babies, per capita expenditure on newly borns is very large compared to per capita expenditure in any other age group. On the contrary, the health data for Belgium include both expenditures within hospitals and outside hospitals and, therefore, per capita expenditure on newly borns is not that large compared to other age groups.[30] The health profile is assumed to be identical for immigrants and natives. As for the rest of the profiles, we assume that the profile of health transfers per capita will rise every year along with productivity growth. This assumption needs some justification in the case of health expenditure, since some people believe that health expenditure per capita could increase much more than productivity in the near future. There are several reasons

why we believe that this will not be the case for Spain. First, total public health expenditure as a percentage of GDP has been roughly constant in Spain since 1990.[31] Second, the same assumption is used by the European Commission in their study of the effect of an aging population.[32] Third, population aging does not necessarily imply a deterioration of health status; for example, the average health status of a 60 year old male today is very different from that of a 60 year old male in 1900.[33]

4. Results

We consider three different immigrants quotas and two different fertility projections. Our benchmark scenario is that of low fertility and 60,000 immigrants per year. In addition, we study two different approaches to the implementation of the necessary changes in fiscal policy.

Tables 2–5 show the results of the paper. The upper part of Table 2 shows per capita Generational Accounts for existing generations by sex and nativity. The first four columns correspond to the standard approach of Generational Accounting, in which the whole existing imbalance is paid only by future generations, while in the last four we explore the alternative approach, by considering an immediate change in fiscal policy that affects both current and future generations. The accounts present the typical life-cycle pattern found for other countries. The accounts increase during childhood and youth, peaking at around the age of 25. Above that age, accounts start to decrease, because the remaining period within the labor force gets shorter and social security transfers are less discounted. Around the age of 55, accounts become negative (50 for women), and they reach a minimum at around 65. Above that age, they rise again, due to the short period of the remaining life-span. The very large differences between men and women are primarily due to the low participation of women in the labor market. Differences between natives and immigrants, which arise both from taxes paid and from benefits received, are also significant.

In the bottom part of Table 2 we present the burdens on future generations when the change in fiscal policy is a proportional increase in all taxes and a decrease in all transfers. Under the standard approach, the account for a male born in 2001 is 107,160 Euros, which is 78 percent higher than the account for a male born in 2000. The accounts for females and immigrants born in 2001 are also much higher than the corresponding figures for those born in 2000. The proportional change in all taxes and transfers to restore the balance is 20.4 percent. This results show the unsustainability of the current fiscal policy. Compared to the results for other countries in Auerbach, Kotlikoff and Leibfritz (1999), we see that the imbalance in the Spanish economy is similar to those in Germany and Italy, but higher than in the remaining countries covered in that study, except Japan. Under the alternative approach, as fiscal policy is assumed to change immediately, the accounts for those born in 2001 are very similar to the accounts for those born in 2000, and the increase in taxes and the decrease in transfers for current and future generations needed to fill the gap is 4.7 percent.

In Table 3, we present the contribution of the generations born in 2000 and 2001, for different quotas on immigrants and alternative changes in fiscal policy. The alternative fiscal tools that we consider are: A proportional increase in all taxes, a proportional decrease in

Table 2. Generational accounts (Low fertility, 60,000 immigrants per year Spain 2000 (Euros)).

	All burden on future generations				Immediate change			
	Natives		Immigrants		Natives		Immigrants	
Age	Men	Women	Men[a]	Women	Men	Women	Men[a]	Women
0	60188	6436	45267	4298	71654	14631	54757	11263
5	78338	15257	60969	12727	91223	24402	71566	20447
10	108684	36378	88660	33397	122614	46062	99964	41436
15	144536	61593	121476	58090	159614	71851	133542	66452
20	172322	79740	141571	69918	188428	90259	154373	78583
25	183101	86717	144900	72154	199975	97327	158308	81041
30	173473	74905	135741	65830	190626	85187	149348	74656
35	147450	55156	115842	52887	164299	64922	129233	61425
40	111529	31950	89298	36008	127698	41196	102220	44214
45	65013	5461	55057	16543	80189	14176	67287	24406
50	9388	−17778	13548	−2403	23323	−9542	24875	5061
55	−44118	−39575	−25270	−22753	−31351	−31635	−14730	−15648
60	−80551	−56887	−50630	−40510	−69156	−49198	−41043	−33801
65	−97866	−67353	−67309	−51486	−87859	−59967	−58991	−45141
70	−83175	−65396	−57986	−50990	−74960	−58799	−51148	−45305
75	−67215	−59799	−47665	−47488	−60753	−54140	−42271	−42587
80	−52891	−56052	−39286	−46259	−48053	−51205	−35192	−42010
85	−35536	−39031	−26433	−31752	−32200	−35604	−23604	−28763
90	−26158	−27135	−19292	−22021	−23703	−24752	−17228	−19948
95	−16941	−16827	−12291	−13750	−15351	−15349	−10976	−12456
100	−7130	−6906	0	−5611	−6461	−6300	0	−5083
Generation born in 2000[b]	60188	6436	98652	43251	71654	14631	111162	51513
Generation born in 2001	107160	40973	153855	80436	69652	14184	112481	53102
% Difference	78.0	536.6	56.0	86.0				
% Change (Taxes and transf.)	20.4				4.7			

[a]In 2000 there were no male immigrants in Spain with a hundred years of age.
[b]The figures for immigrants correspond to the average contribution of an immigrant.

all transfers, and the combination of both. The left-hand side of the table corresponds to the case in which all the burden falls on future generations while, on the right-hand side, we present the results for an immediate change in fiscal policy. If we compare the alternative immigration policies, we see that immigration alleviates the burden on future generations under all the different fiscal policies that we have considered in our analysis. For instance, under the standard approach, in the scenario with 200,000 immigrants per year, the per

Table 3. Burdens on newborns and future generations low fertility (Alternative immigration policies Spain 2000 (Euros)).

	All burden on future generations				Immediate change			
	Natives		Immigrants		Natives		Immigrants	
	Men	Women	Men	Women	Men	Women	Men	Women
				60,000 immigrants per year				
Generation born in 2000	60188	6436	98652	43251	71654	14631	111162	51513
Generation born in 2001	107160	40973	153855	80436	69652	14184	112481	53102
% Change (Taxes and transf.)		20.4				4.7		
Generation born in 2000	60188	6436	98652	43251	72323	13657	113202	51990
Generation born in 2001	109800	36720	162920	82764	70301	13235	114613	53668
% Change (Taxes only)		34.5				7.9		
Generation born in 2000	60188	6436	98652	43251	70698	16024	108247	50830
Generation born in 2001	103354	47106	140783	77079	68725	15540	109435	52294
% Change (Transfers only)		49.8				11.3		
				No immigration after 2000				
Generation born in 2000	60188	6436	98652	43251	72793	15445	112404	52333
Generation born in 2001	124381	53272			70759	14975		
% Change (Taxes and transf.)	27.6				5.1			
Generation born in 2000	60188	6436	98652	43251	73585	14407	114715	52899
Generation born in 2001	129487	48425			71528	13965		
% Change (Taxes only)	47.8				8.8			
Generation born in 2000	60188	6436	98652	43251	71673	16912	109136	51533
Generation born in 2001	117394	59904			69672	16404		
% Change (Transfers only)	65.4				12.4			
				200,000 immigrants per year				
Generation born in 2000	60188	6436	98652	43251	69415	13031	108719	49899
Generation born in 2001	87084	26634	131713	65806	67473	12628	110082	51515
% Change (Taxes and transf.)		12.0				3.8		
Generation born in 2000	60188	6436	98652	43251	69873	12198	110264	50225
Generation born in 2001	87895	23696	136134	66628	67917	11818	111701	51913
% Change (Taxes only)		19.8				6.3		
Generation born in 2000	60188	6436	98652	43251	68748	14244	106466	49424
Generation born in 2001	85841	31142	124932	64544	66827	13810	107720	50935
% Change (Transfers only)		30.3				9.2		

capita burden on future generations is reduced by 18.7 percent compared to our benchmark. This is because the average new immigrant arrives when he is 34, and, at that age, his remaining lifetime contribution is very large.[34] However, the contribution of one additional immigrant is comparatively higher when the number of new immigrants changes from zero

to 60,000, than when it changes from 60,000 to 200,000. The contribution of immigrants has, therefore, decreasing returns. Another factor to be considered is that a cut in all transfers increases the burden on females more than an increase in all taxes, and the opposite can be said for males. The reason is that there are large differences in the tax profiles between women and men, while differences in the transfer profiles are much smaller.

In Table 4 we compare the burden on future generations under different fertility scenarios. The total effect of higher fertility on future generations is, at best, quite modest. The reason is that an increase in the fertility rate has two opposite effects on the per capita burden of future generations. On the one hand, an increase in the population implies an increase in total government consumption, since we are assuming that government consumption per capita is constant.[35] On the other hand, the larger is the population the lower the per capita contribution will be for a given total burden. In the benchmark scenario, an increase in the fertility rate reduces the burden on future generations by 2.7 percent. In the scenario with no immigration the burden is reduced by 4.9 percent. Finally, in the scenario with high immigration the burden is increased by 0.06 percent. The reason is that, as shown in the table, the average amount that an immigrant pays is larger than the amount paid by a

Table 4. Burdens on newborns and future generations (All burden on future generations Spain 2000 (Euros)).

	Men	Women	Men	Women
Generation born in 2000[a]	60188	6436	98652	43251
		Low fert., 60,000 immig. per year		
Generation born in 2001	107160	40973	153855	80436
% Difference	78.0	536.6	56.0	86.0
		High fert., 60,000 immig. per year		
Generation born in 2001	104287	38921	150686	78343
% Difference	73.3	504.7	52.7	81.1
		Low fert., no immig. (after 2000)		
Generation born in 2001	124381	53272		
% Difference	106.7	727.7		
		High fert., no immig. (after 2000)		
Generation born in 2001	118282	48916		
% Difference	96.5	660.0		
		Low fert., 200,000 immig. per year		
Generation born in 2001	87084	26634	131713	65806
% Difference	44.7	313.8	33.5	52.1
		High fert., 200,000 immig. per year		
Generation born in 2001	87138	26674	131774	65846
% Difference	44.8	314.4	33.6	52.2

[a]The figures for immigrants correspond to the average contribution of an immigrant.

Table 5. Sensitivity analysis (Percentage change in taxes and transfers).

Interest rate	0.03	0.03	0.03	0.05	0.05	0.05	0.07	0.07	0.07
Growth rate	0.015	0.020	0.025	0.015	0.020	0.025	0.015	0.020	0.025
	All burden on future generations								
No inmigration after 2000	21.6	20.2	19.4	30.5	27.7	25.2	47.7	42.0	37.3
60,000 immigrants per year	16.6	15.9	15.6	22.3	20.4	18.8	33.8	30.0	26.8
200,000 immigrants per year	11.5	11.9	12.7	12.6	12.0	11.6	17.8	15.9	14.4
	Immediate change								
No inmigration after 2000	7.1	8.4	10.7	4.8	5.1	5.6	4.2	4.3	4.4
60,000 immigrants per year	6.7	8.0	10.4	4.3	4.7	5.2	3.8	3.9	3.9
200,000 immigrants per year	6.0	7.6	10.1	3.4	3.8	4.3	2.9	2.9	3.0

new-born native. Therefore, when the number of new immigrants is large, the first effect mentioned above offsets the second.

Finally, we present in Table 5 the results of our simulations for alternative discount and productivity rates for all six scenarios.[36] We want to stress that, for all the combinations that we have considered, generational accounts remain unbalanced. Furthermore, in all cases, an increase in the number of immigrants significantly lowers the per-capita fiscal burden paid by current and future generations. Under the assumption of an immediate change in fiscal policy, the percentage change in taxes and transfers increases when either the interest rate decreases or the growth rate increases. However under the assumption that all the imbalance is paid by future generations, the effect is the opposite when the ratio $(1 + g)/(1 + r)$ is very large.

5. Conclusions

The main purpose of this study is to analyze the impact of immigration on the Spanish Welfare State. We use the Generational Accounting methodology to address this issue. We calculate the accounts for existing generations in 2000 (our base year) and the main conclusion is that the imbalance under current fiscal policy is rather large and is comparable to the imbalance in other European countries, such as Germany and Italy. We consider alternative immigration policies. The main conclusion is that, contrary to the results for the US in Auerbach and Oreopoulos (2000), a higher number of immigrants will substantially help to alleviate the fiscal burden on future generations in Spain. This evidence is in line with the results for Germany in Bonin, Raffelhüschen and Walliser (2000).

The main drawback of this paper is the lack of data on the characteristics of immigrants in Spain, mainly about their incomes. Hopefully, in the near future, the Spanish Statistical Office will carry out an exhaustive survey on immigrants, which will allow us to verify our results.

Women's participation in the labor market in Spain has increased substantially in the last two decades. However, it is still quite low compared to other European countries. Most

of the empirical research in the area points to a further increase in female labor force participation in the near future. Therefore, it will be particularly interesting to analyze the effect of an increase in female labor force participation on the Spanish Welfare State within the Generational Accounting framework, since this increase in female participation might offset the positive effect of immigration found in our paper. Nevertheless, under the current pension system, this is not clear. Abío et al. (2001) perform a similar exercise and find that an increase in female labor force participation in fact deteriorates Generational Accounts. The main reason is that an increase in female labor force participation has two opposite effects. On the one hand, it increases social security contributions, which helps to alleviate the imbalance. On the other hand, future pensions also increase, offsetting the first effect (Fernández, 1999). This is an interesting issue which, along with the question of whether Spain should try to attract immigrants of a particular type, of a particular educational level, age or sex we leave to future research.

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Notes

1. First estimates from the Spanish Population Census, INE (2001b).
2. See Eurostat (2002).
3. Monthly Barometer Surveys (CIS, 2002).
4. See United Nations (2002).
5. In 2000, working-age people in Spain represented 67% of the native population and 83.4% of the non-native population.
6. Surveys on the effects of immigration on the host country are provided by Borjas (1994), Lalonde and Topel (1996) and Smith and Edmonston (1996).
7. However, the empirical evidence seems to suggest that the effect of immigration on wages and unemployment rates of natives is negligible. See Lalonde and Topel (1996) and Smith and Edmonston (1996) and Dolado, Jimeno and Duce (1997) for the case of Spain.
8. Generational Accounting has been criticized, among other, by Haveman (1994). The main criticisms are that it ignores general equilibrium effects, that the choice of the discount rate is ad hoc, and that it treats fiscal policy as if it could last forever. Auerbach, Gokhale and Kotlikoff (1994) reply to most of these criticisms, claiming that the impact of general equilibrium effects is likely to be small, but recognizing that the use of a single discount rate is a simplification. Regarding the third point, we think that the aim of this methodology is precisely to point out that current fiscal policy is unsustainable.

9. As the last OECD Economic Survey of Spain (OECD, 2003) points out: "Today, and despite the strong increase in recent years, immigration remains relatively low . . . However, the increase in immigration is likely to continue in the future and may become more important. In this context, it is important to assess the various economic impacts of immigration, notably how it affects . . . the sustainability of public finances in the long run."
10. In the US, in 2000, 20.5% of the native citizens and 20.2% of the foreign-born population were older than 55 (see US Census Bureau, 2001). In Spain the corresponding figures for the same year were 37.8% for natives and 13.7% for immigrants (see INE, 2001a).
11. In the US, in 2000, 25.6% of the native citizens had a Bachelor's degree or higher and 61% were high school graduates without a Bachelor's degree. These percentages were 25.8% and 41.2% among the foreign-born population (see US Census Bureau (2001)). In Spain, the proportion of native citizens with a Bachelor's degree or higher was 12.1% and the proportion of native citizens who were high school graduates and did not have a Bachelor's degree was 12.2%. These percentages were 15.7% and 22.6% among the immigrants (authors' calculations from the EPA survey, 2000).
12. To ease notation, we will skip sex and nativity subscripts in this presentation.
13. The average net tax payment of an individual aged s in year $t + k$ ($T_{t+k,t+k-s}$) is calculated as the average net tax payment of an individual aged s in year t ($T_{t,t-s}$) multiplied by $(1 + g)^k$.
14. To test for the robustness of our results, we have repeated our simulations using a value for the fertility rate of immigrants that is a 50% higher than the fertility rate of natives in the base year. The impact on the results is rather small. The reason is that immigrants are always a small fraction of the total population.
15. See United Nations (2000).
16. See INE (2002).
17. Most of the residents in Spain who were born in developed countries are from the EU.
18. This assumption rests on empirical evidence from the US (Chiswick, 1977, 1978) and Germany (Gang and Zimmermann, 2000).
19. Data from "Anuario estadístico de extranjeria," published by the Ministerio del Interior-Observatorio Permanente de la Inmigracion (OPI).
20. Once we divide the sample of immigrants by sex and age, the number of individuals in each cell is rather small. The total number of immigrants in the sample is 117.
21. Average annual labor income for employed natives is 9,210 Euros and for employed immigrants is 6,936 Euros.
22. Schmidt (1997) finds approximately the same ratio for Germany.
23. Excise taxes are paid on certain goods such as beer, spirits, tobacco, electricity, vehicles, gasoline, and some types of insurance.
24. The EPF data for food and alcohol that we have used have been corrected for the bulk purchases effect (Peña and Ruiz-Castillo, 1998).
25. Average annual transfers are 1,698 and 1,267 Euros for natives and immigrants, respectively.
26. Notice that this assumption can be consider as a very extreme case because, in Spain, most of the direct monetary transfers are earnings-related (See Economic Survey of Spain, OECD, 2003).
27. The results under this alternative assumption are available upon request.
28. These data were kindly provided by Arnaud Dellis.
29. Alonnso and Herce (1998) report data on per capita health expenditure by age. However, their data are aggregated into a few large age intervals.
30. Health expenditures outside hospitals for newly borns are low compared to other age groups.
31. See OECD (2002).
32. See European Commission (2001).
33. See Shoven (2002) and the references therein for a discussion.
34. In 2000, we estimate that the present value of the average contribution of a male immigrant during his remaining life-time is 98,652 Euros, while the corresponding figure for a female immigrant is 43,251 Euros.
35. Auerbach and Oreopoulos (2000) performed an exercise in which defense expenditure is a "pure" public good and found that immigration reduces the fiscal imbalance. We think that this exercise is interesting for the US, where military expenditure represents a large fraction of total public expenditure. In contrast, in Spain, military expenditure amounts to 1% of GDP (4.5% of total public budget). The rest of government

expenditure are congestible government provided goods and services. It seems reasonable, therefore, to assume that government consumption grows along with productivity.

Nevertheless, to check the sensitivity of our findings to these assumptions we repeated our simulations for the polar assumption that all government consumption is a "pure" public good growing with productivity independently of the size of the population. The result is that the effect of immigration is much stronger than under the assumption that per-capita government consumption grows along with productivity. These findings reinforce our results.

36. Notice that the relevant figure is the ratio $(1 + g)/(1 + r)$.

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