FLEMOSI

Tools for ex ante evaluation of socio-economic policies in Flanders

DISCUSSION PAPER 9

GENERATIONAL ACCOUNTING IN BELGIUM: FISCAL SUSTAINABILITY AT A GLANCE

ANDRÉ DECOSTER

XAVIER FLAWINNE

PIETER VANLEENHOVE

December 2011

discussion paper

FLEMOSI DISCUSSION PAPER 9:
GENERATIONAL ACCOUNTING IN BELGIUM

This paper was written as part of the SBO-project "FLEMOSI: A tool for ex ante evaluation of socio-economic policies in Flanders", funded by IWT Flanders. The project intends to build 'FLEmish MOdels of SImulation' and is joint work of the Centre for Economic Studies (CES) of the Katholieke Universiteit Leuven – the Centre for Social Policy (CSB) of the Universiteit Antwerpen– the Interface Demografie of the Vrije Universiteit Brussel – the Centre de Recherche en Économie Publique et de la population (CREPP) of the Université de Liege and the Institute for Social and Economic Research (Microsimulation Unit) of the University of Essex.

For more information on the project, see www.flemosi.be.

GENERATIONAL ACCOUNTING IN BELGIUM: FISCAL SUSTAINABILITY AT A GLANCE

ANDRÉ DECOSTER (*)
XAVIER FLAWINNE (§)
PIETER VANLEENHOVE (*)

December 2011

Abstract: This paper uses generational accounts as an instrument to analyse the fiscal long term sustainability of Belgian public finances. Age-profiles of detailed tax and expenditure categories are derived from microdata and microsimulation models, and then plugged into a long run demographic projection. We assess fiscal sustainability under current fiscal and budgetary policy for the baseyear 2010, and perform simulations of counterfactuals to determine the most important factors of the long run unsustainability.

The generational accounting exercise shows that the budgetary situation in Belgium is untenable in the long run. However, contrary to what is often put forward in public debates, the current level of explicit debt plays only a minor role in explaining this sustainability problem. The ageing of the population and the related increase in age related expenditures are the main drivers of the long run fiscal imbalance and the high implicit debt. We analyse the generational effects of different tax instruments and expenditure reductions to return to sustainability and further disentangle the generational accounts for the three regions separately. Although the fiscal imbalance is biggest in Wallonia due to lower participation rates and higher unemployment, the projected demographic evolution, and more specifically the ageing of the population, has higher budgetary repercussions in Flanders.

Acknowledgements: For useful comments on earlier versions of this paper, we are grateful to Christian Hagist, Stefan Moog, Sergio Perelman, Pierre Pestieau, Lionel Artige, Guy Van Camp (for the MIMOSIS data), Dirk Verwerft and participants of the EUROMOD workshop at the Baltic International Centre for Economic Policy Studies (BICEPS) in Riga, Latvia October 12-14 2011. The usual disclaimer applies. Besides financial support from IWT Flanders in the SBO-project "FLEMOSI: A tool for ex ante evaluation of socio-economic policies in Flanders", we also benefited from funding by Federal Public Service for Science Policy (BELSPO) under contract n° TA/00/39 (BELDEBT).

* Center for Economic Studies, Katholieke Universiteit Leuven

§ Center of Research in Public Economics and Population Economics, Université de Liège

1. INTRODUCTION

Belgium had come a long way since its huge public debt and deficit position of the 1980's and 90's. In percentage of GDP the figures reached their maximum at respectively 16% of GDP in 1981 for the deficit (with a primary deficit of more than 7%), and 134% of GDP in 1993 for the debt. Mainly the 'carrot' of getting the entry ticket for the European Monetary Union in 1999, induced the policy makers to turn Belgium into one of the world's most wilful students to clear the threat of unsustainable public finances by maintaining yearlong austerity policies. The primary deficit was turned into a surplus of 2% from 1987 onwards, and even exceeded 6% for several years since 1998. This allowed public debt to be reduced to 84% of GDP in 2007, its lowest rate for decades.

The financial crisis, with repetitive rescues of big banks, and the ensuing economic crisis following it and leading to a collapse of government revenues brought a sudden stop to this process. As in many other Western countries, the (partial) transformation of the private debt overhang into sovereign debt, caused a U-turn in the time-path of the budgetary situation of Belgium. The current fiscal deficit and debt level forecasts for 2011 are respectively -3.5% and 96.1% (NBB). It certainly would be an understatement that these new fiscal imbalances would not get enough attention. Since the financial crisis turned into the sovereign debt crisis, the public at large in the rich OECD countries has been battered with alarming quotes about widening deficits, rising debt to GDP ratio's, unsustainability of public finances, and ever more harsh austerity plans. Belgium is not an exception to this general picture. The long overdue recent agreement on the budget 2012 was framed within analogous quickly deteriorating public finances.

This paper does not fit in that short term framework. It does not explain why merely one week after the Belgian budget for 2012 was released, the budgetary predictions were already outdated. Indeed, there is little doubt that this is mainly due to another cyclical downturn which is gathering momentum, and which dampens revenues and increases expenditures. But precisely these urgent worries about cyclical and short term problems in the fiscal stance of countries, threaten to conceal the long term picture of structural and long term fiscal imbalances. The more

"because the factors contributing to short-term debt accumulation differ substantially from those that will affect debt accumulation over the longer term" (Auerbach, 2011 p. 1).

And this is where the analysis of this paper comes to the fore.

This paper analyses the long term sustainability of the Belgian public finances by applying the method of generational accounting on the data of 2010. Generational accounting was introduced by Auerbach, Gokhale and Kotlikoff (1991) as an alternative way of looking at the fiscal stance of countries. They launched the methodology as a response to the shortcomings of deficit accounting. The main criticism against the use of the current deficit as a measure of fiscal sustainability of government finances is that it focusses exclusively on the annual flows of expenditures and receipts. The obvious example is a change in legislation which increases (or decreases) future pension entitlements. It does not show up in the current deficit, but may seriously affect the long run fiscal prospects. Generational accounts are precisely designed to take into account the effects of policies on current and future generations. They report, in present value, the amount of net taxes a representative member of each generation will have to pay during his or her remaining lifetime, given fiscal and social policy of the baseyear. Actually, two different types of generational accounts can be constructed: the “rest of life” generational accounts, which evaluate the remaining net taxes a representative member of each cohort will have to pay for the rest of his or her life, and the “life cycle” generational accounts, which not only take the remaining net taxes into account but also the past net taxes paid. In this paper we only develop and calculate “rest of life” generational accounts.

Generational accounts are not uncontroversial. Haveman (1994) nicely summarizes the most important criticisms and limitations. Generational accounts are calculated under the assumption of the persistence of current policy. However, governments will change taxation, spending and borrowing policy in response to changes in the economic, social and political environment. Haveman (1994) argues that this is not the government which appears on the scene of generational accounting. A second criticism concerns the sensitivity of the estimates to the discount and growth rates used in the intertemporal calculations. To overcome this to a certain extent arbitrary choice, most generational accounting studies conduct sensitivity analyses. However, Auerbach, Gokhale and Kotlikoff (1994) admit that the use of a constant discount rate might be an oversimplification and that the methodology can be improved in this respect. A third comment concerns the lack of behavioural change. The method of generational accounting does not allow for consumption or labour supply responses to taxes and transfers reflected in the accounts, let alone more general macro-economic interactions between sectors or general equilibrium effects. As such, the calculation of generational accounts is a pure arithmetic exercise and fully respects its designation as generational ‘*accounting*’. In addition to that, standard generational accounting studies do not make any normative statements in which the welfare of current and future generations is traded-off in an elaborate and explicit ethical framework of intergenerational justice.

It is not surprising therefore that generational accounting has never succeeded in replacing the current budget deficit as the main focus of sound fiscal policies. Yet, even Haveman (1994, p.106) concludes in a nuanced way:

> “*The idea of tracking the monetary effect of fiscal policy measures on representative members of all present and future age groups is enormously attractive. Indeed, what legislator or economist –indeed, what citizen – would not desire such information? In principle, a version of generational accounts could be a valuable public finance tool*”.

This nicely summarizes our own motivation to update the Belgian generational accounts, since the latest ones date back more than a decade ago (Stijns 1999 and Dellis and Lüth 1999 with 1995 as base year).[1]

---

[1] Cattoir, P. and Docquier, F. (2004) also calculate generational accounts for Belgium for the year 1999. However, they use them for a complete different purpose as they try to find a new debt-sharing rule between seceding regions and they not consider the issue of sustainability of public finances.

In the course of the update, we have also tried to improve the quality of the calculations of generational accounts, by introducing some new elements. First, and most important is the use of microdata and microsimulation models to derive age profiles of the most important taxes and benefits, and to simulate the effect on the generational accounts of higher employment rates. Secondly, we also disentangle the Belgian generational accounts into regional accounts for Flanders, Wallonia and Brussels. Finally, we investigate the main determinants of the long term unsustainability of Belgian public finances, by simulating counterfactuals such as the removal of initial debt, of ageing, or of rising health expenditures.

As far as this sustainability is concerned, several other recent studies investigate the Belgian situation. Saintrain (2010) calculates, among other things, a sustainability indicator which reflects the permanent and immediate increase in primary balance in order to have sustainable public finances in the long run. This indicator is similar to the S2-indicator which is frequently used by the European Commission in their yearly sustainability reports (European Commission 2010). Both studies conclude that public finances are not sustainable in the long run and primary balances have to adjust by respectively 6.2 and 6.5 percentage points. The way in which they derive their results differs quite substantially from the method of generational accounting. Both studies do not rely on micro statistics but use a macro model to estimate future receipts and expenditures of the government. Auerbach (2011) and Raffelhüschen and Moog (2011) also look at the Belgian fiscal situation and draw the same conclusions as Saintrain (2010) and the European Commission (2010). Their methodology is based on the OECD-method and differs in some ways from the generational accounting method.[2] Needless to say that we consider our paper not as a substitute for these existing studies but as a valuable complement based on a different methodological framework and essentially using microdata.

The rest of the paper is structured as follows. Section 2 starts with the derivation of the debt dynamics relationship from which the intertemporal budgetconstraint is obtained. This constraint is then further decomposed into the contributions of different generations in order to build the generational accounts. The different sustainability indicators are derived and discussed in section 3. Readers only interested in the empirical results for Belgium can easily skip the first two sections without any loss of further understanding of the paper. Section 4 reports the data requirements and sources which have been used and section 5 presents the generational accounts and sustainability indicators at the Belgian level for base year 2010. We also determine the important factors of unsustainability by means of the simulation of counterfactuals, such as a higher employment rate of elderly workers in Belgium. In section 6 we briefly discuss the decomposition of the regionalized generational accounts and look more in detail at the different effects of demographic changes in the three regions. The last section concludes.

[2] There are two main differences. First, the projection of non-age related expenditures differs substantially from the generational accounting method and secondly, the OECD method works with a finite time horizon. For a detailed comparison of the OECD method and the Generational accounting methodology, see Benz and Fetzer (2006).

2. DEBT DYNAMICS, THE INTERTEMPORAL BUDGET CONSTRAINT AND GENERATIONAL ACCOUNTS

Generational accounts are one specific way to express the intertemporal budget constraint of the government. This budget constraint is itself intimately related – though not at all identical - to the debt dynamics relationship. We therefore start from this debt dynamics relationship to derive the intertemporal budget constraint. We then decompose the intertemporal budget constraint into the contributions of different generations to build generational accounts. The main purpose of this section is to highlight the underlying assumptions which will be made in the empirical application in sections 5 and 6.

2.1 Debt Dynamics

The law of motion of the level of debt states that, starting from a level of debt B_t at the end of period *t*, the level of debt at the end of next period B_{t+1} equals previous debt, augmented with interestpayments $r \cdot B_t$, and reduced by the primary balance in the next period, PB_{t+1}:

$$B_{t+1} = B_t + r \cdot B_t - PB_{t+1}, \tag{1}$$

where we assume that the interest rate *r* remains constant. A negative primary balance denotes a primary deficit, a positive value a primary surplus.

Denoting GDP of period *t* by Y_t, and the growth rate of real GDP, also assumed to be constant, by *g*, we can re-express (1) in percentages of GDP:

$$\begin{aligned} \frac{B_{t+1}}{Y_{t+1}} &= \frac{1+r}{1+g}\frac{B_t}{Y_t} - \frac{PB_{t+1}}{Y_{t+1}} \\ b_{t+1} &= \frac{1+r}{1+g} b_t - pb_{t+1}, \end{aligned} \tag{2}$$

using small letters to denote ratio's to GDP. Repeated application of relation (2) up to point *T* in the future allows to write the future debt ratio b_T as:

$$b_T = \left(\frac{1+r}{1+g}\right)^{T-t} b_t - \sum_{s=t+1}^{T} \left(\frac{1+r}{1+g}\right)^{T-s} pb_s, \tag{3}$$

where b_T is expressed in values of period *T*, the end of this finite horizon. The first term summarizes the role of the current debt level b_t on the future level of debt, the second term collects the future developments by means of the cumulated primary surpluses or deficits.

Expression (3) is often used to study the conditions under which the debt ratio converges or diverges. It reveals e.g. that, under the assumption of a constant primary deficit, say pb, the condition $g > r$ is sufficient to guarantee the debt level to converge to a finite value, but that, under that same assumption of a constant primary balance, the debt explodes when $r > g$. On the other hand, even with $r > g$ the debt level b_T can stay finite, if the path of future primary surpluses is such that the second term in (3) sufficiently counteracts the divergence of the first term.

Transforming (3) into present values of current period t, gives:

$$\left(\frac{1+r}{1+g}\right)^{-(T-t)} \cdot b_T = b_t - \sum_{s=t+1}^{T}\left(\frac{1+r}{1+g}\right)^{t-s} pb_s. \tag{4}$$

As such, (4) only re-expresses the dynamics of debt under the assumptions made (i.e. constant growth and interest rate), and not a 'constraint' whatsoever. Take e.g. the case of convergence of the debt level to a finite value, either because pb is constant and $g > r$, or the future path of pb's is such that, even with $r > g$ the debt level converges. Since this can be any finite value, even an extremely high one, this is in fact not constraining the government of borrowing permanently higher amounts to finance an ever increasing deficit. There is even no reason why the government would not step into a Ponzi scheme where she would borrow to pay the interest payments. Therefore, to transform (4) into a budget constraint one most often imposes the so-called transversality or 'no Ponzi game'-condition: [3]

$$\lim_{T\to\infty}\left(\frac{1+r}{1+g}\right)^{-(T-t)} \cdot b_T = 0, \tag{5}$$

which can e.g. be satisfied by having b_T converging faster to zero, than $(1+g)/(1+r)$ is diverging in case $g > r$. With $r > g$, condition (5) even allows b_T to diverge, provided that this divergence is not too fast, and the transversality condition is certainly satisfied with $r > g$ and finite b_T. In fact this transversality condition for an infinite horizon, is the analogue of the condition that in a finite horizon model, debt at the end of the period equals zero.

2.2 The intertemporal budget constraint

Substituting the transversality condition (5) into the debt dynamics equation (4), gives the intertemporal budget constraint:

$$b_t = \lim_{T\to\infty}\sum_{s=t+1}^{T}\left(\frac{1+r}{1+g}\right)^{t-s} pb_s, \tag{6}$$

---

3 See Chalk (2000), Chalk and Hemming (2000) and O'Connell and Zeldes (1988) for interpretations of this transversality condition in the context of debt dynamics.

which states that current debt at time t has to be covered by future primary surpluses. We say that the current debt level is *unsustainable* when the LHS of (6) exceeds the RHS:

$$b_t > \lim_{T\to\infty} \sum_{s=t+1}^{T} \left(\frac{1+r}{1+g}\right)^{t-s} pb_s, \tag{7}$$

since it then violates the intertemporal budget constraint.

A first sustainability indicator will be easily derived from (7) by calculating the amount by which the future primary surpluses have to increase, to bend the inequality in (7) into an equality. We present this sustainability indicator in section 3 below. First we derive the generational accounting framework by decomposing the primary balances into the contributions of different age cohorts.

2.3 Decomposition of the primary balance into age-groups, or cohorts

Generational accounting (GA) is intimately related to the intertemporal budget constraint presented in (6) because it further disentangles the primary surplus of each period s in the RHS-term of equation (6) into the contributions of all living cohorts in period s.

To connect more closely with the way in which we have empirically calculated the GA's, we first rewrite the intertemporal budget constraint in levels, by noting that each term of the summation at the RHS-term of equation (6) can be written in levels as follows:

$$\begin{aligned}\left(\frac{1+r}{1+g}\right)^{t-s} pb_s &= \left(\frac{1+r}{1+g}\right)^{t-s} \frac{PB_s}{Y_s} \\ &= \frac{(1+g)^{s-t}}{Y_t(1+g)^{s-t}} \frac{PB_s}{(1+r)^{s-t}} \\ &= \frac{1}{Y_t} \frac{PB_s}{(1+r)^{s-t}},\end{aligned} \tag{8}$$

where we use capital letters to denote levels. Omitting for notational simplicity the limit to the infinite time horizon, the intertemporal budgetconstraint in levels therefore reads as:

$$B_t = b_t Y_t = \sum_{s=t+1}^{T} \frac{PB_s}{(1+r)^{s-t}}, \tag{9}$$

which simply restates that the current level of debt has to be covered by future primary balances, expressed in present values of the current period.

We now disentangle each term $\frac{PB_s}{(1+r)^{s-t}}$ into the contributions of different age-cohorts living in period s, by denoting the primary balance of a subpopulation k in period s as $PB_{s,k}$. The subscript k denotes the cohort of individuals born in period k, or an age-group in period s. In practice this primary balance of this specific age group, $PB_{s,k}$ is simply the difference between all government revenues and all primary government expenditures for this specific age group or cohort. We decompose each PB_s into the contributions of the cohorts living in period s in an arithmetic way:

$$PB_s = \sum_k PB_{s,k}. \tag{10}$$

Note that the cohort born in period k has age s-k in period s. Since the life span can be expected to last longer than one period, we therefore have for at least a number of future periods ($s > t$), cohorts born before $t+1$ (hence already alive in period t) and cohorts born from period $t+1$ onwards. We call the first group of cohorts, the *currently living* generations, and the second group the *future* generations. This allows to decompose the primary balance in any future period s in (10) into:

$$PB_s = \sum_{k \le t} PB_{s,k} + \sum_{k>t} PB_{s,k}, \tag{11}$$

which, when plugged into the intertemporal budget constraint of (9) gives:

$$B_t = \sum_{k \le t} \sum_{s=t+1}^{T} \frac{PB_{s,k}}{(1+r)^{s-t}} + \sum_{k>t} \sum_{s=t+1}^{T} \frac{PB_{s,k}}{(1+r)^{s-t}}. \tag{12}$$

We will abbreviate the contribution of cohort k to the primary balance over the complete time horizon as:

$$N_{t,k} = \sum_{s=t+1}^{T} \frac{PB_{s,k}}{(1+r)^{s-t}}. \tag{13}$$

Note that, for the generations, already alive in period t, this approach neglects their contribution to primary balances in the past. In a model with infinite horizon, all future cohorts complete their entire life spans. In practice, in line with Benz and Fetzer (2006), we assume an infinite time horizon for our calculations.

The intertemporal budget constraint of (12) can now be written as:

$$\begin{aligned} B_t &= \underbrace{\sum_{k \le t} N_{t,k}}_{\text{current generations}} + \underbrace{\sum_{k>t} N_{t,k}}_{\text{future generations}} \\ &= CU_t + FU_t, \end{aligned} \tag{14}$$

where CU_t denotes the sum of the discounted future primary balances of the currently living generations, and FU_t the corresponding concept for the future generations.

For future reference, we note that:

$$CU_t = \sum_{k \le t} N_{t,k} = \sum_{k \le t} \sum_{s=t+1}^{T} \frac{PB_{s,k}}{(1+r)^{s-t}} \tag{15}$$

$$FU_t = \sum_{k > t} N_{t,k} = \sum_{k > t} \sum_{s=t+1}^{T} \frac{PB_{s,k}}{(1+r)^{s-t}}. \tag{16}$$

The whole empirical exercise consists of computing the $PB_{s,k}$'s. Before explaining this, we first define the generational accounts themselves.

2.4 Generational accounts

Generational accounts for currently living generations are defined as the average net payment of an individual of cohort *k*, where the average is calculated by dividing the primary balance of cohort *k* over the whole time span t up to T by the number of individuals of that cohort *k*. Since the number of people of some cohort *k*, living at time period *s*, of course varies over time, the question arises how to define the "number of individuals of cohort *k*".

Since for the currently living generations, we limited their contributions to the primary balances to the contributions which will be made during their remaining lifetime in the future, it is natural to define the generational account by dividing the contribution of each currently living cohort, by the number of members of this cohort still alive at time *t*:

$$GA_{t,k} = \frac{N_{t,k}}{P_{t,k}} \quad for \quad k \le t. \tag{17}$$

It are these $GA_{t,k}$'s which are displayed in Table 5-1 below.[4] Combining (15) and (17) then gives:

$$CU_t = \sum_{k \le t} N_{t,k} = \sum_{k \le t} P_{t,k} \cdot GA_{t,k}. \tag{18}$$

For future generations, it seems natural to divide the primary balance of cohort *k* over the entire future time horizon by the number of newborns of that cohort at their time of birth. Let us denote the number of individuals from cohort *k* living in period *s* as $P_{s,k}$, with $P_{k,k}$ the number of newborns of generation *k*. We then define the generational account of a future cohort *k* at the time of birth, denoted as $GA_{k,k}$ as:

4 In line with the literature, we derive these generational accounts for both genders. In order to keep the notation as simple as possible, we do not include a gender specific index in this section.

$$GA_{k,k} = \frac{N_{k,k}}{P_{k,k}} \quad for \quad k > t. \tag{19}$$

Note carefully that this future generational account is not expressed in present values at time t but in terms of the year of birth of these future generations, i.e. year k. Combining (16) and (19) and keeping in mind that FU_t is expressed in present value at time t then gives:

$$FU_t = \sum_{k>t} N_{t,k} = \sum_{k>t} P_{k,k} \cdot \frac{GA_{k,k}}{(1+r)^{k-t}} \tag{20}$$

for the second term (the contribution of the future generations) in the intertemporal budget constraint.

2.5 How to calculate the generational accounts?

The above has shown that calculation of generational accounts amounts to compute primary balances $PB_{s,k}$'s in each period for each cohort. The assumptions, on which these calculations are based, are expressed in terms of per capita tax payments and per capita expenditures in each period. We therefore write the total primary balance $PB_{s,k}$ as:

$$PB_{s,k} = \tau_{s,k} \cdot P_{s,k}, \tag{21}$$

where $\tau_{s,k}$ refers to the per capita net payment in period *s* of a representative individual from cohort *k* living in period *s*. The primary balance of this cohort *k* over the entire future time horizon in present value of period *t* then amounts to:

$$N_{t,k} = \sum_{s=t+1}^{T} \frac{\tau_{s,k}}{(1+r)^{s-t}} \cdot P_{s,k}. \tag{22}$$

The number of people of cohort *k* still alive at time *s*, $P_{s,k}$, is the demographic input of the model.

A crucial assumption in generational accounting concerns the projection of the net per capita tax payment $\tau_{s,k}$ for future generations. These future net tax payments are based on the assumption that the per capita tax payment of a currently living age-cohort is informative of the per capita net tax payment of a future cohort when it has reached the same age. Remember that the cohort born in period *k* has age *s*-*k* in period *s*. The assumption underlying the computations can hence be expressed as:

$$\tau_{s,k} = \tau_{t,t-(s-k)} \cdot (1+g)^{s-t}, \tag{23}$$

where the second factor is introduced to have the net tax payments growing with the real rate of growth g.[5] Expression (23) highlights the crucial role of the so-called age-profiles of taxes and expenditures.

In practice the use of these age-profiles is refined by decomposing the per capita net tax $\tau_{s,k}$ into different revenue and expenditure categories such as personal income taxes, social security contributions, indirect taxes, capital taxes, corporate taxes, unemployment benefits, pensions, child benefits, health-care, general public goods, etc… Denoting each element with the subscript *i* we then have:

$$\tau_{s,k} = \sum_{i=1}^{n} \tau_{s,k,i}, \tag{24}$$

with an age profile for each specific $\tau_{s,k,i}$. We retrieve these age profiles of different tax and benefit components from microdata and microsimulation models, as described in section 4.3.

To sum up, for the currently living generations, we calculate each $GA_{t,k}$ as follows:

$$\begin{aligned} For \quad k \le t: \quad GA_{t,k} = \frac{N_{t,k}}{P_{t,k}} &= \sum_{s=t+1}^{T} \frac{PB_{s,k}}{(1+r)^{s-t}} \cdot \frac{1}{P_{t,k}} \\ &= \sum_{s=t+1}^{T} \frac{\tau_{s,k}}{(1+r)^{s-t}} \cdot \frac{P_{s,k}}{P_{t,k}} \\ &= \sum_{s=t+1}^{T} \frac{\tau_{t,t-(s-k)} \cdot (1+g)^{s-t}}{(1+r)^{s-t}} \cdot \frac{P_{s,k}}{P_{t,k}} \\ &= \sum_{s=t+1}^{T} \left[\frac{1+g}{1+r}\right]^{s-t} \cdot \frac{P_{s,k}}{P_{t,k}} \cdot \tau_{t,t-(s-k)} \end{aligned} \tag{25}$$

where we have omitted the decomposition into the different components *i* for notational simplicity.

Since each cohort has a different expected length of their remaining lifetime, the interpretation of these $GA_{t,k}$ ‘s for the current generations is problematic when comparing different cohorts. Note also that the number of individuals for the very old cohorts might become quite small. The $GA_{t,k}$ ’s for the current generations are useful however, when intra-cohort comparisons are made, e.g. for different socio-demographic groups or, as illustrated in this paper, for cohorts in different regions or gender.

5 In an empirical application which distinguishes between different components of the net tax payment, it is of course reasonable and easy to differentiate the growth rate for the different components.

In principle, we could calculate the generational accounts for future generations in a similar way as expressed in (25), except for the fact that we now use the number of newborns $P_{k,k}$ to calculate the per capita amounts and that these accounts are expressed in present value of their time of birth:[6]

$$\begin{aligned} For \quad k > t: \quad GA_{k,k} = \frac{N_{k,k}}{P_{k,k}} &= \sum_{s=k}^{T} \frac{PB_{s,k}}{(1+r)^{s-k}} \cdot \frac{1}{P_{k,k}} \\ &= \sum_{s=k}^{T} \frac{\tau_{s,k}}{(1+r)^{s-k}} \cdot \frac{P_{s,k}}{P_{k,k}} \\ &= \sum_{s=k}^{T} \frac{\tau_{t,t-(s-k)} \cdot (1+g)^{s-t}}{(1+r)^{s-k}} \cdot \frac{P_{s,k}}{P_{k,k}} \end{aligned} \tag{26}$$

3. SUSTAINABILITY INDICATORS

As announced above, a first sustainability indicator is easily derived directly from the violation of the intertemporal budget constraint in (7). It calculates the amount by which the future primary surpluses have to increase, to bend the inequality in (7) into an equality:

$$b_t = \lim_{T\to\infty} \sum_{s=t+1}^{T} \left(\frac{1+r}{1+g} \right)^{t-s} \left(pb_s + \sigma \right), \tag{27}$$

where the necessary adjustment in the primary balance of each period *s* is labelled σ in (27). For a given projection of future primary surpluses, we will report this sustainability indicator σ in Table 5-2 below. This sustainability indicator is similar to the S2 indicator frequently used by the European Commission in their yearly sustainability reports.

Since generational accounts decompose the primary surpluses pb_s into the contributions by each age-group, the sustainability indicator derived from the intertemporal budget constraint can also be reformulated into the GA-framework. The literature provides two different interpretations for this purpose, namely the *Sustainability Approach* and the *Residual Approach*.

3.1 Intertemporal public liabilities

A first way to express the unsustainability in the long run is by observing that the intertemporal budget constraint (14) can be written as:

$$B_t - \left(CU_t + FU_t \right) = 0. \tag{28}$$

6 Section 3.2 discusses in detail how these future generational accounts are calculated under different circumstances. If current policy remains unchanged, the future generational accounts are given by equation (26) .

The left hand side of (28) is denoted IPL_t in the following and stands for the intertemporal public liabilities. They consist of explicit debt (B_t), future assets (or liabilities) incurred by net tax payments of currently living generations (CU_t), and future assets (or liabilities) incurred by net tax payments of future generations (FU_t). We calculate the actual IPL_t by using future liabilities incurred by net taxes of the future generations FU_t under the assumption that *current and future generations face the same fiscal policy*.[7]

Substituting (18) and (20) into equation (28) yields:

$$IPL_t = B_t - \left[\sum_{k \le t} P_{t,k} \cdot GA_{t,k} + \sum_{k>t} P_{k,k} \cdot \frac{GA_{k,k}}{(1+r)^{k-t}} \right], \tag{29}$$

in which the generational accounts of the current and future generations are derived respectively according to formula (25) and (26). We report these intertemporal public liabilities relative to the present value of all future GDP.[8] Assuming that output per worker increases over time with the productivity growth g, we project future GDP by combining output per worker with a forecast of the workforce of each year, which we retrieve out of the demographic evolution.

3.2 Residual approach: intergenerational gap

A sustainability gap will reveal itself as

$$IPL_t = B_t - \left(CU_t + FU_t \right) > 0. \tag{30}$$

Therefore, a frequently used indicator of unsustainability calculates the adjustment in the future generational account which would restore the equality in (30). We denote this required future generational account as

$$FU_t^* = B_t - CU_t, \tag{31}$$

7 Because this approach proceeds 'as if' both current and future generational accounts are sustainable, this is called the *Sustainability Approach*. However, this is a confusing notation as this does not mean that public finances are sustainable, it only calculates the future generational accounts under the same fiscal policy as the current generations in order to be able to calculate the total intertemporal public liabilities.

8 In some papers, see for example Raffelhüschen (1999), these intertemporal public liabilities are presented relative to current GDP. However, we represent liabilities relative to the present value of all future GDP's, as is frequently done in studies of the Congressional Budget Office (CBO). This way of representing the sustainability problem allows us to compare sustainability gaps between different countries with other population evolutions. Different population projections influence the future ability of countries to face the sustainability problem. Working with the present value of all future GDP's takes this caveat into account.

which is easily calculated as a residual from calculations based on the information of the current debt level, and the generational accounts of the currently living generations only. It expresses how the primary surpluses of the future generations have to be adjusted to comply with the intertemporal budget constraint, given the primary surpluses induced by the current fiscal policy for the currently living generations over the rest of their lifetime.

To interpret FU_t^*, we apply equation (20), using the superscript '*' to denote the adjustment of net taxes to be paid by the future cohorts and we apply this to equation (26). This yields:

$$\begin{aligned} FU_t^* &= \sum_{k=t+1}^{T} P_{k,k} \cdot \frac{GA_{k,k}^*}{(1+r)^{k-t}} \\ &= \sum_{k=t+1}^{T} P_{k,k} \cdot \sum_{s=k}^{T} \frac{\tau_{s,k}^*}{(1+r)^{s-t}} \cdot \frac{P_{s,k}}{P_{k,k}}. \end{aligned} \tag{32}$$

We assume that all tax payments made by the future generations are adjusted proportionally with a factor λ in order to solve the sustainability problem. This implies the following:

$$\tau_{s,k}^* = \lambda.\tau_{t,t-(s-k)}.(1+g)^{s-t}. \tag{33}$$

Inserting (33) in (32) and using (16) yields:

$$\begin{aligned} FU_t^* &= \sum_{k=t+1}^{T} P_{k,k} \cdot \sum_{s=k}^{T} \frac{\lambda.\tau_{t,t-(s-k)}.(1+g)^{s-t}}{(1+r)^{s-t}} \cdot \frac{P_{s,k}}{P_{k,k}} \\ &= \lambda. \sum_{k=t+1}^{T} \sum_{s=k}^{T} \frac{.\tau_{t,t-(s-k)}.(1+g)^{s-t}}{(1+r)^{s-t}} .P_{s,k} \\ &= \lambda.FU_t. \end{aligned} \tag{34}$$

The necessary increase in net taxes for all future generations is therefore equal to:

$$\lambda = \frac{FU^*}{FU}. \tag{35}$$

Including this increase in the generational account of a newborn in $t+1$ yields:

$$GA_{t+1,t+1}^* = \sum_{s=k}^{T} \cdot \frac{\lambda.\tau_{t,t-(s-k)}.(1+g)^{s-t}}{(1+r)^{s-k}} \frac{P_{s,k}}{P_{k,k}}. \tag{36}$$

The difference between this required generational account of future generations, $GA_{t+1,t+1}^*$ and the generational account of a newborn in period *t*, $GA_{t,t}$ is called the *generational imbalance*. If this difference appears to be positive, public finances are untenable in the long run and future generations will have to pay higher net taxes to satisfy the intertemporal budget constraint.

3.3 The revenue and expenditure gap

Equation (35) represents the increase in net taxes for all future generations, without taking into account the currently living generations. However, the government might have the possibility to change taxes for all generations, both currently living and future ones. This leads to two additional indicators, the revenue and expenditure gap. These gaps represent respectively the immediate and permanent change in revenues and expenditures for both living and future generations in order to have sustainable public finances.

Equations (37) and (38) represent these gaps, where Rev stands for the revenues and Exp for the expenditures:

$$\lambda_{rev} = \frac{IPL_t}{\sum_{s=t}^{T} \frac{Rev_t}{(1+r)^{s-t}}}, \tag{37}$$

$$\lambda_{Exp} = \frac{IPL_t}{\sum_{s=t}^{T} \frac{Exp_t}{(1+r)^{s-t}}}. \tag{38}$$

4. DATA REQUIREMENTS

As set out in the previous section, the method of generational accounting requires various inputs such as reliable population projections reflecting future demographic changes, the base year government budget with all the different types of expenditures and receipts, age-profiles to allocate these amounts among all age categories of population, and growth and discount rates. The next subsections discuss each of these requirements in detail.

4.1 Population projections

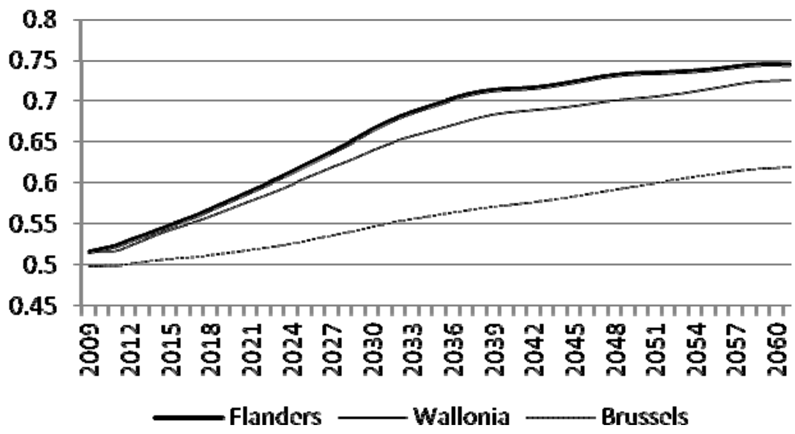
The method of generational accounting is useful to analyse the repercussions of future demographic evolutions, like ageing. This paper uses the official population projections for 2007-2060 of the Federal Planning Office and the National Institute of Statistics.[9]

Figure 4-1 displays the dependency ratio for the three different regions in Belgium. The dependency ratio is defined as the ratio of the inactive citizens (0-16 year old and older than 65) over the active part of the population. Clearly, the problem of ageing is not uniformly spread over the three parts in Belgium. First, the dependency ratio is higher in Flanders and Wallonia than in Brussels, where this ratio grows slower over time. Second, the population in Flanders is ageing

9 Since the method of generational accounting assumes an infinite horizon, the calculation of generational accounts and the sustainability indicators necessitate population forecasts for more than 50 years. In practice, we use demographic projections up to 2060 and then continue the calculation with a constant population up to 2310. Finally, we also add a remainder term determined by a geometric series of the remaining net tax payments to account for the infinite horizon (as in Hagist et al. 2009).

faster than the population of Wallonia. In section 6.3 we will investigate the consequences of this differential demographic change across the regions within a regionalized generational accounting framework.

Figure 4-1: Dependency ratio (Federal Planning Office, 2010)



4.2 Government expenditures and receipts

The second input for generational accounts is the aggregate amount of taxes and expenditures in the base year, which in our case is 2010. Since the philosophy of generational accounting is to investigate and expose structural elements in the long term evolution of the government budget, it makes of course no sense to contaminate the calculations by cyclical elements in the base year revenues and expenditures. Therefore we use counterfactual structural figures, where the cyclical component has been taken out. According to the Belgian High Council of Finances (2011), the total structural Belgian primary balance was equal to 0% compared to a non-adjusted primary deficit of 1%, or approximately 4 billion euro.[10]

Table 4-1 shows how we disaggregated all revenues into 6 categories, and all expenditures into 9 groups. Revenues include taxation on income and capital, corporate taxation, indirect taxation, social security contributions and other contributions. The expenditures consist of birth and family allowances, education and health-care benefits, wages in the public sector, sickness and disability benefits, unemployment benefits, pensions and a residual group.

10 For revenues, we assumed that each category had a cyclical component and adjusted all of them into structural figures. However, for some expenditure categories we could not find information on the structural component. Therefore, we only adjusted unemployment benefits, sickness-disability benefits and early retirement benefits for their cyclical component. Sensitivity analysis regarding these assumptions showed that the impact on the results was of minor importance.

Table 4-1: Belgian structural receipts and expenditures in 2010

Revenues	Amount (bn €)	Expenditures	Amount (bn €)
Capital taxation	2.388	Wages public sector	32.696
Income taxation	42.927	Birth allowances	0.127
Corporate taxation	9.703	Family allowances	5.767
Indirect taxation	43.598	Education	15.804
Social security contributions	47.925	Health-care	24.514
Non-fiscal non-parafiscal revenues	18.462	Sickness and disability benefits	4.313
		Unemployment benefits	5.580
		Pension benefits	29.221
		Other expenditures	46.981
Total	165.003		165.003

Source: National Bank of Belgium, Higher Council of Finances

4.3 Age-profiles

In order to derive the generational accounts, revenues and expenditures from Table 4-1need to be allocated across age groups. It is here that one of the main contributions of our paper lies, since in contrast to most other studies which produce generational accounts, we retrieve the age-specific profiles for different kind of taxes and expenditures from microdata and microsimulation models. For social security contributions, sickness and disability benefits, unemployment and pension benefits, we generated gender specific age-profiles by using the microsimulation model MIMOSIS.[11] The age-profile of personal income taxation also comes from MIMOSIS, but it is not gender specific since the tax liability is calculated at the household level. We assumed the age-profile for personal income taxes to be the same for men and women. The age-profiles for indirect taxation are based on the household budget survey which contains information on expenditures made by the households.[12] For capital and corporate taxation we could not find updated information, and therefore used the age-profiles from Delli and Lüth (1999).

11 MIMOSIS stands for Microsimulation Model for Belgian Social Insurance Systems. This microsimulation model was developed at the University of Leuven (CES), University of Liège (CREPP) and the University of Antwerp (CSB) in partnership with and funded by FPS Social Security and Federal Science Policy. The model is based on administrative data for more than 300,000 individuals and 100,000 households from 2001 and is now in use and maintained by FPS Social Security. For more information, see Decoster, De Swerdt, Maréchal, Orsini, Perelman, Rombaut, Van Camp and Verbist (2007).

12 We used the Belgian Household Budget Survey (HBS) of 2003 and indirect tax liabilities by means of the indirect tax extension of the microsimulation model EUROMOD (see Decoster, De Swerdt, Loughrey, O'Donoghue, and Verwerft, 2009, Decoster, Loughrey, O'Donoghue and Verwerft (2010), and Sutherland, Decoster, Matsaganis and Tsakloglou, 2009 for details).

The gender specific health-care age-profile is based on the Vademecum of Financial and Statistical information about Social Security in Belgium of the Federal Public Service Social Security of 2011. This report gives a detailed overview of the distribution across age groups. The expenditures for education, family and birth allowances are attributed to the targeted age-groups: to the children and the students from nursery to tertiary education. The education age-profile has been constructed with the data available from the Flemish and French communities. The age-profiles for the family allowances are retrieved from the website of the Federal Service of Family Allowances. The age-profile for the birth allowances is straightforward, as the amount can be imputed directly on the newborn.

Finally, for "Wages in the public sector", "Other expenditures" and "Non-fiscal and non-parafiscal revenues" it is difficult to link them to a specific age group. We therefore distributed these categories uniformly across age groups.

In the appendix (Figure 8-1 to Figure 8-10) we show the age-specific averages for all expenditures and revenues for the base year 2010. In line with the literature, we assume that the age-profiles remain constant over time.

4.4 Growth and discount rates

We use an annual real productivity growth per capita of 1,5%, which is the rate used by the Ageing Commission in its 2010 report. We assume this growth rate to remain constant over time. However, due to medical technological growth, one assumes that health-care costs per capita will increase faster than productivity.[13] Therefore, in order to account for this evolution in health-care expenditures, we assume that health-care costs per capita increase by 2,2% per year, i.e. 0,7 percentage points higher than the real productivity growth rate.[14] To avoid that total health care costs evolve to a level which is higher than GDP, we assume that this increased growth of health care expenditures stops after 40 years. From 2050 onwards, health care costs grow again in line with the productivity growth g.[15] In the baseline scenario we assume a real interest rate of 3%. We examine the robustness of our results by conducting a sensitivity analysis concerning these assumptions which is included in the appendix in Table 8-1.

13 This is often referred to as the "Newhouse conjecture", see Newhouse, 1992.

14 This growth rate is derived from the 2010 report of the Ageing Commission. This report gives an overview of the share of health care costs in GDP over time. Taking our own population projections and real income growth into account, we calculated the average required percentage point adjustment for health care expenditure needed to re-produce the projected evolution of health care cost as a share of GDP by the Ageing Commission. We are aware that this method has its limitations since this additional growth is kept constant over time. Yet, it can be considered to be an improvement over the case where health care costs simply increase in line with income. For another study that includes an increased health care cost per capita growth rate, see Hagist et al (2005).

15 In section 5.3 we look at the effects on sustainability of this increased health care costs by comparing the results once with and without increased health care costs.

5. Generational accounts at the Belgian level

This section derives the gender specific generational accounts for Belgium in 2010. After a brief discussion of the composition of these accounts, the second subsection applies these accounts to investigate the long term fiscal sustainability of Belgian public finances. The third subsection analyses the importance of explicit debt, ageing and employment on the different sustainability concepts. The last part examines the different generational effects of specific policy reforms in order to return to sustainability in the long run.

5.1 Generational accounts for Belgium

The second, third and fourth column of Table 5-1 display the gender specific generational accounts for the currently living generations of Belgium in 2010. Due to the forward looking assumption of generational accounting, these figures are not comparable across different age groups (within each column). Since the accounts only measure the average amount of net taxes a representative individual of a given age group has to pay for its remaining lifetime, they only reveal intra-generational differences in the net tax burden of different subgroups, e.g. men and women.

A negative generational account means that this representative agent of this specific age cohort receives for its remaining lifetime, in present value of 2010, more expenditures or benefits from the government than he or she has to pay taxes. In line with many studies in the literature, we observe this negative GA for newborns in the base year (the first row in Table 5-1). On average it amounts to €-119196. The difference between both genders is striking, and in line with findings in other studies in the literature (see for example Bonin, 2000). For a male newborn the present value of what he gets from the government exceeds the present value of taxes and contributions he pays by € 55.504. For a female this is three times as much:€ 186.029.

As explained above, generational accounts are influenced by both the absolute age-profiles of taxes and benefits, and by the expected demographic evolution. To assess the relative importance of both factors in the gender difference, we have simulated the female GA under the assumption that both genders have the same, male, age profile. That means that we take out all other differences except for both the longer life expectancy of women in the baseline, and the divergent projected increase in life expectancy. The results are displayed in the fourth column of Table 5-1. The reduction of the female GA of -186029 to -90805 shows that different demographics are only partially responsible for the gender difference. The initial difference was mainly driven by the different age-profiles, which are primarily related to participation rates on the labour market.

Table 5-1: Generational accounts for Belgium 2010 (in €)

Age	GA Male	GA Female	GA representative individual	GA Female with same age profile as men
0 (newborn)	**-55.504**	**-186.029**	**-119.196**	**-90.805**
5	-4.052	-145.216	-72.811	-44.896
10	60.491	-89.753	-13.185	18.963
15	139.575	-22.927	60.571	94.691
20	213.082	44.726	129.672	163.542
25	199.767	32.008	115.404	137.523
30	134.830	-16.917	59.533	66.393
35	45.236	-82.790	-18.146	-30.867
40	-41.254	-140.264	-90.173	-120.730
45	-126.791	-201.165	-163.576	-212.031
50	-213.072	-258.193	-235.603	-304.093
55	-289.089	-297.681	-293.401	-384.436
60	-331.666	-318.749	-325.175	-428.727
65	-320.195	-308.967	-314.410	-413.547
70	-281.255	-287.191	-284.449	-365.900
75	-233.986	-254.026	-245.272	-303.898
80	-183.885	-210.642	-200.182	-235.853
85	-143.567	-171.172	-161.876	-175.433
90	-120.162	-137.586	-132.876	-131.605
95	-93.925	-98.772	-97.771	-87.448
100	-79.157	-74.560	-75.288	-57.812
105	-20.253	-33.346	-29.775	-20.253

In the appendix we break down the generational accounts into specific contributions and allowances categories to get insight into the sources of this large gender difference.[16] The results of this disaggregation confirm the above result that the gender difference is mainly driven by the age-profiles. In her entire lifetime a female newborn expects to pay 45% less social security contributions than a male newborn (€154,800 instead of €280,000). At the transfer side, the average lifetime health-care transfer is higher for women than for men. The first explanation is to be found in the age-profile of health-care (Figure 8-2). The average health-care cost is higher for women around the age of 25, which is explained by pregnancy related expenses. But once more, also higher life expectancy of women translates into more health-care costs than for men. Table 8-4 shows that, even if women face the same health-care age-profile as men, the present value of health-care benefits is still larger for women than for men.

16 Table 8-2 and Table 8-3 display the decomposition of the male and female GA's. Table 8-4 presents the disaggregation of the female GA, under the assumption of females having the same age-profile as men.

Moving down the other rows in Table 5-1, the generational account increases and becomes positive (i.e. a net tax) at the age of 6 for men and 16 for women. It reaches a maximum of € 213.082 for men and € 74.289 for women at the age of 20. From that age on, expected educational expenditures and family allowances decline and the present value of future income taxes and social security contributions dominate the future old age benefits. From the age of 20 onwards, the GA decreases as the number of years the individual is expected to work shrinks and pension benefits approach in time. The GA turns negative at the age of 35 for women and at 40 for men. The GA reaches a minimum at the age of 60. Then it starts to increase again since life expectancy declines.

5.2 Sustainability of public finances

Inspecting the generational accounts of Table 5-1 does not answer the question whether Belgian public finances are sustainable in the long run. It only shows how current policy affects currently living generations in Belgium. Of course, the negative amount for a newborn might sound an alarm, but it could be counteracted in the future by favourable demographic evolutions and/or economic growth. Therefore, in Table 5-2 we display the main sustainability indicators we have derived above, using the generational accounts of Table 5-1.

Table 5-2: Summary of the fiscal stance of Belgium

Explicit debt (billion €)	341
Implicit debt (billion €)	2.192
IPL (billion €)	2.533
IPL (% of Present value of future GDP)	**10,45**
IPL (% of current GDP)	719
GA of a representative newborn in 2010 (€)	-119.197
GA of a future representative newborn to return to sustainable finances (€)	181.014
Intergenerational gap (€)	300.211
Revenue gap (%)	20,98
Expenditure gap (%)	17,76
Sustainability gap (% GDP)	10,59

The first indicator is the intertemporal public liabilities (IPL) of equation (30). These liabilities consist of the explicit debt in 2010, plus all liabilities (or assets) incurred by net tax payments of currently living generations and the future liabilities (or assests) incurred by the net tax payments of future generations, under the crucial assumption that current and future generations face the same fiscal policy. In 2010, explicit government debt was equal to €341.1 bn, or approximately 97% of GDP. Under current policy total implicit debt converges to €2192 bn, which gives total intertemporal public liabilities of €2533 bn. Obviously, this indicator shows that public finances are not sustainable in the long run.

In the literature, these implicit liabilities are presented in two different ways. The first one, introduced by Raffelhüschen (1999) and in line with the concept of explicit debt, displays IPL against current GDP. In that case total Belgian intertemporal public liabilities are equal to 719% of current baseline GDP. Rightly so, this way of expressing the indicator is often criticized for two reasons. The first reason is the arbitrariness of the length of time period used for the flow concept when linking a stock and a flow concept.[17] Secondly, it does not take future growth prospects into account. Certainly when demographic evolutions will affect the future path of GDP it seems sensible to report the intertemporal public liabilities in terms of the present value of the sum of all future GDP's. Applied to our baseline results, we get an IPL which amounts to 10,5% of the projected GDP.

The second approach to analyse long run sustainability consists in looking at the required adjustment in net contributions of the future generations - the GA of equation (36) - to satisfy the intertemporal budget constraint. This GA can be compared to the generational account of a newborn in 2010, since the remaining lifetime for both individuals is the same. Table 5-2 shows that a future newborn would have to pay a positive amount of net taxes: €181014 to restore the intertemporal budget constraint. The intergenerational imbalance consists of the comparison of this future generational account with the one of the newborn of 2010. Given current policy and the need for sustainable public finances in the long run necessitates the future generations to pay in present value € 300210 more taxes than a current newborn. Note however, that this generational imbalance, as informative as it may be, is only a very preliminary first step in the much more comprehensive discussion about intergenerational equity. In this paper, we have not introduced any normative framework to express value judgements and trade-offs of welfare for, choices by, and resources available to subsequent generations. Therefore, any interpretation of this generational imbalance, as 'unjust' is overstretching the framework in which this result has been obtained.

Finally, instead of putting the adjustment exclusively on the future generations, one could also express the long run unsustainability by the required adjustment in either revenues or expenditures, for both the current and the future generations. Table 5-2 shows that taxes have to increase by 20,98% or government expenditures need to decrease by 17,8%. Another way to interpret this result is to look at the immediate and permanent increase in primary balance in order to return to sustainability. This indicator is frequently used in studies published by the European Commission, under the concept of S2-indicator. Our results show that to return to long term sustainability, the primary balance would have to be increased permanently with 10,5 percentage points.

As Haveman (1994) pointed out, these results are sensitive to the assumptions made regarding discount and growth rates. Therefore, Table 8-1 in the appendix presents some sensitivity analysis concerning these rates. The intertemporal public liabilities in terms of the present value of the sum al all future GDP's fluctuates between 9,59% and 11,96%, depending on the assumptions made for the discount and growth rate.

---

17 This amounts to the arbitrariness of considering 100% of GDP as an alarming level of debt. When choosing quarterly levels of GDP, the same nominal debt level is expressed as 400%, and when choosing a two-year period, the debt level will be 50%. The only value of linking a stock variable to the flow variable GDP, is that it enhances cross country and temporal comparisons with varying GDP's.

5.3 *Main determinants of the unsustainable public finances*

To investigate the main determinants of the sustainability problem we have simulated some counterfactual situations. Table 5-3 summarizes the results of four simulations.

Since, Belgian public finances have been characterized by one of the largest explicit debts in the European Union for several decades, it is often put forward that the current fiscal imbalance is due to this ‘burden of the past’. In 2010, the Belgian government indeed faced an explicit debt of 97% of GDP. The *first simulation* analyses how sustainability would be affected in the counterfactual situation where explicit debt would be absent. Table 5-3 shows that intertemporal public liabilities would decline from 719% to 622% of GDP in the baseline scenario, or the structural deficit would decline from 10,45 to 9,04% of future GDP. That means that only 13,5% of the sustainability gap can be attributed to the current debt level.

Table 5-3: Sustainability for simulated counterfactual situations

	IPL		Revenue gap (%)	Relative importance (%)
	% current GDP	% PV future GDP		
Baseline	719	10,45	20,98	100
Simulations				
No explicit debt	622	9,04	18,16	13,49
No ageing	206	2,71	5,69	74,07
No increased health-care costs	578	8,40	16,88	19,62
Employment rate age group 50-65 from 41% to 50%	638	9,27	18,22	11,29

The *second counterfactual* isolates the effect of ageing by removing the demographic change from the calculations of the GA’s. The age structure of the 2010 population is hold constant. Table 5-3 shows that the sustainability problem expressed in percentage of the present value of future GDP is now substantially reduced from 10,5% to 2,7%. It appears that future demographic evolutions influence the amount of sustainability quite severely as 74,1% of the long run imbalance can be assigned to demographic changes, i.e. 7,74 percentage points out of the total sustainability gap of 10,45%.

In the *third simulation* we look at the importance of the increased growth rate of health care costs. As explained above, we assumed that per capita health care costs increased with 2,2% per year, i.e. 0,7 percentage points above the productivity growth g. The simulation reveals that removing the more than proportional increase in health care expenditures only explains 19,6% of the total sustainability problem in Belgium.

Finally, we used the comparative advantage of our microsimulation tools to simulate the effect of an increase in employment on the generational accounts. In line with one of the goals of the Lisbon Strategy, we analyzed the improvement of public finances when the employment of elderly workers increases.[18] To simulate the effect on government revenues and expenditures of this increase in employment, we used the microsimulation model MEFISTO running on the micro data of the Belgian database of the European Union Statistics on Income and Living Conditions (EU-SILC).[19] MEFISTO is a tax benefit calculator which calculates for each household the net disposable income, corresponding to gross income components under given tax and benefit rules.[20]

According to the EU-SILC data, the employment rate of elderly workers (50-65 year) in 2005 is approximately 41%.[21] As is well-known, this rate is low compared to other EU-countries. For example, the employment rate of elderly in 2005 in Austria equals 44%, in France 51%, in the Netherlands 54% and in the United Kingdom 62% (see Zaida, 2007). We therefore considered it sensible to investigate the effect on sustainability of increasing the employment rate up to 50% for this age group. We randomly drew people from the labour force between 50 and 65 years old who are either inactive, unemployed or pensioned. Assuming they work full time, we calculated their gross income, and reduced their unemployment or pension payments to zero.[22] MEFISTO produces their corresponding disposable income, and hence also the taxes and social security contributions they pay. This microsimulation exercise reveals that this increase in the employment rate of elderly leads to an increase of revenues from personal income taxes of 3,03%, an increase in social security contributions of 5,30%, a decrease in pension payments of 3,39% and a decrease in unemployment benefits of 4,48%.

We then translate this increased employment rate of the age group 50-65 into the age-profiles of taxes and expenditures and recalculate the GA's and the sustainability indicators. The last row of Table 5-3 shows that the necessary adjustment in terms of GDP decreases from 10,45% to

18 The Lisbon Strategy was launched in 2000 in order to face some structural challenges in Europe like globalization, climate change and the ageing of the population. The Strategy addresses these challenges by stimulating growth and create more and better jobs. (European Commission)

19 This database which is constructed in a two-step sampling procedure and is representative for the Belgian population in private households. The data are collected in the second half of 2006 and contain information on income received in 2005. The sample consists of 5860 households or 14329 individuals. The dataset covers only private households, so all persons living in collective households and in institutions are excluded from the target population. The sample weights are household weights and are assigned to each member of the household to make the dataset representative for the Belgian population in 2006.

20 MEFISTO is the expanded version of the Belgian module of EUROMOD, as developed in the SBO-project "FLEMOSI: A tool for ex ante evaluation of socio-economic policies in Flanders", funded by IWT Flanders. For more information on the original EUROMOD-model, see Sutherland (2001)

21 In 2005, the official employment rate of elderly workers was 44.7% (ADSEI). This figure differs only marginally from the employment rate that is obtained from the micro data. Note that the employment rate of elderly workers in Belgium in 2010 was equal to 50.2%.

22 In order to assign these people gross wages, an hourly gross wage is essential. However, the EU-SILC data do not report an hourly wage for people who are not working at the time of the survey. We therefore estimated and imputed an hourly wage by means of a Heckman selection model (see Vanleenhove 2011).

9,27%, a rather disappointing result. The generational imbalance does shrink of course, and the necessary increase in taxes is reduced to 18,22% instead of 20,98%. But the preliminary conclusion of this simulation is that more will be needed to restore the unsustainability of Belgian public finances. We hope to shed some light on this with more elaborate simulations in the near future.

5.4 Returning to sustainability: different generational effects by different instruments

As discussed above, to return to sustainable fiscal policies in the long run, two possible tracks are available. The revenue gap indicates that total taxes have to increase immediately and permanently with 20,98 %. The expenditure gap shows that lowering expenditures by 17,76%, could reach the same result. Both approaches lead to the same final result, but evidently, the choice of track – or a mixture of both - will affect different age cohorts (or other subgroupings, such as gender) differently.

Table 5-4 displays the effect on the generational accounts for each gender-specific age cohort by using different tax or expenditure instruments to restore fiscal sustainability in the long run. Each row represents the total increase in remaining lifetime net taxes for each age cohort, for the different instruments that are modified. Concerning tax changes, we investigate the differential effects of increasing personal income taxation, indirect taxation and social security contributions. For the expenditure side, we analyse the effects of lowering health-care expenses and pension benefits.[23] We repeat the warning that the resulting change in generational accounts cannot be compared across different age cohorts, as the remaining lifetime is different. The purpose of Table 5-4 is twofold. First, analysing for each age group separately what instrument leads to the lowest increase in generational account and secondly, to compare the differences between men and women in absolute terms.

Looking at the tax instruments, several conclusions can be made. First, the total *change* in generational account for male newborns is the highest when the government decides to use social security contributions. Their remaining lifetime net taxes change on average by € 185170, compared to € 127129 and € 138188 if respectively the personal income tax system and indirect taxes are used. For a female newborn, on the contrary, the highest increase in their generational account is observed when the indirect tax instrument is used. This difference between both genders is not surprising when looking at the composition of the generational accounts, as displayed in Table 8-2 and Table 8-3 in the appendix and to the age profile of social security contributions. Due to the higher male income on average, using the social security contributions puts the adjustment burden disproportionately on men since in the male GA their social security contributions are more important compared to the female's one. Second, for both genders, the adjustment in remaining lifetime net contributions increases for older age cohorts as they approach a period with higher contributions and lower allowances. The importance of social security contributions for men becomes even more prominent, which again reflects the work related contributions. Third, from the age of 50 onwards, the increase in generational account for both genders due to increases in social

[23] It should be noticed that we analyse here only one instrument at a time, for the sake of simplicity. In reality, it would seem more appropriate that policymakers opt for a combination of several instruments

security contributions or personal income taxes decreases in size as they approach the retirement age. Consequently, an increase in indirect taxes is now more harmful for both genders. Concluding, looking to the tax instruments, it is obvious that, in absolute terms, men face higher net contribution increases than women if the government were to use work related contributions to restore fiscal sustainability.

Looking at the expenditure side, similar gender differences can be observed. The total increase in generational account for a female newborn is much higher when the health-care system rather than the pension system is used as the adjustment channel. However, for a male newborn, the opposite is observed. The reason can be found in the age profiles of both expenditure categories and the composition of the accounts, that are displayed in Table 8-2 and

Table 8-3 in the appendix. For newborn women, pension benefits are on average lower than for men and health-care benefits are higher. These lower pension benefits are also further away into the future, i.e. more discounted, than the increased health-care costs due to pregnancy related expenses. For both genders, the importance of a pension reform increases for older age cohorts as the period of retirement approaches. The absolute difference in the increase of generational accounts for men when looking at health-care and pension reforms even increases. For women, however, the difference decreases, especially after the age of 30 where the pregnancy related expenses vanish. Eventually, from the age of 50 onwards, the increase in remaining lifetime net taxes for women due to a pension reform is larger than for a health-care reform.

As displayed in Table 5-4, the choice of track by which the government chooses to get back to fiscal sustainability does not only influence the age cohorts in a substantially different way, but also affects both genders differently. This also illustrates that our framework is void as far as the discussion of intergenerational justice is concerned. The choice of one specific route to restore fiscal sustainability will determine the relative weights put on younger or older generations. This should be done within an as explicit as possible elucidated normative framework of intergenerational justice. Generational accounting does not provide this framework, but only produces the necessary positive inputs to feed this inevitably normative policy choice.

Table 5-4 Absolute change in generational account induced by different instruments to return to sustainable finances (thousands euro)

	Generational account Baseline		Instrument: SSC		Instrument: PIT		Instrument: Indirect tax		Instrument: Health care		Instrument: Pensions	
Age	*Male*	*female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
0	-55,50	-186,03	185,17	116,16	127,13	158,27	138,19	169,85	93,02	152,49	101,87	97,09
5	-4,05	-145,22	193,97	123,06	132,46	169,21	137,65	174,95	90,41	158,78	109,88	106,69
10	60,49	-89,75	201,90	126,42	135,93	176,18	133,88	174,56	86,74	160,51	113,59	108,97
15	139,58	-22,93	208,63	127,61	138,18	180,84	126,00	168,91	80,10	157,52	111,69	107,27
20	213,08	44,73	251,26	166,11	178,78	220,17	154,34	196,51	112,13	187,91	147,85	143,05
25	199,77	32,01	269,68	170,18	204,84	228,98	172,61	198,58	143,20	203,40	185,97	164,23
30	134,83	-16,92	251,77	153,24	200,31	217,23	167,25	186,11	152,46	203,28	200,76	172,32
35	45,24	-82,79	216,15	121,58	179,19	187,31	146,19	156,40	150,32	190,97	206,07	168,21
40	-41,25	-140,26	180,83	102,17	157,92	165,94	128,53	138,73	147,53	185,93	212,30	172,49
45	-126,79	-201,17	145,07	76,24	133,72	136,60	112,67	117,97	143,54	176,42	219,62	172,30
50	-213,07	-258,19	108,25	49,18	107,49	102,65	98,95	96,88	138,51	163,64	229,07	169,94
55	-289,09	-297,68	63,88	26,86	73,74	68,88	80,77	78,96	124,06	148,45	228,32	164,36
60	-331,67	-318,75	15,32	4,22	31,47	35,66	48,00	55,30	93,76	126,81	204,44	149,12
65	-320,20	-308,97	4,92	4,84	9,69	18,92	26,57	38,62	74,34	111,91	174,24	130,10
70	-281,26	-287,19	12,98	9,91	1,76	8,17	8,74	21,02	59,18	96,74	133,87	107,49
75	-233,99	-254,03	17,73	15,59	9,14	1,88	4,07	5,16	46,21	79,59	96,57	83,49
80	-183,89	-210,64	15,58	16,86	9,33	7,17	4,55	0,76	39,63	66,15	70,41	62,73
85	-143,57	-171,17	11,99	16,02	7,88	10,02	3,51	4,51	36,78	55,65	48,97	44,30
90	-120,16	-137,59	10,80	17,41	7,49	13,41	2,60	8,07	34,49	43,29	37,88	30,14
95	-93,93	-98,77	7,45	8,28	5,54	6,51	2,95	4,13	31,42	34,86	22,45	22,16
100	-79,16	-74,56	16,37	10,87	15,63	10,45	12,84	8,37	20,25	20,01	2,17	12,63
105	-20,25	-33,35	20,25	33,35	20,25	33,35	19,59	32,69	9,68	20,54	17,72	22,38

6. Regional generational accounts

In this section we derive the gender specific generational accounts for the three Belgian regions, i.e. Flanders, Wallonia and Brussels. Figure 4-1 showed a clearly different demographic projection for the three different regions. With generational accounting we can investigate the budgetary impact of this region specific demographic evolution. Note that this does not amount to a prediction of regional revenues and expenditures. For that we would have to model regional taxation, regional revenues as obtained through the Special Finance Act which determines grants to regions and communities, and regional expenditures, such as education. This exercise is beyond the scope of this paper.

Analogous to the calculations for Belgium in the previous section, we assume an annual growth rate of productivity of 1,5% for all accounts, except for health-care allowances which grow annually by 2,2% for the first 40 years, and a discount rate of 3%.

6.1 Methodology and data requirements

Although the generational accounts methodology remains unchanged, we had to insert some additional assumptions to be able to calculate regionalized generational accounts. First, to allocate the Belgian aggregate expenditures and receipts from Table 4-1 over the three regions, we mainly used the microsimulation model MIMOSIS, which contains micro-data which can be identified by region. It is also the only source of differentiation between genders for the regions. The revenues or expenditures for which no regionalized information is available, were distributed proportionately by regional population size.[24] The results of this distribution are in Table 8-5, Table 8-6 and Table 8-7 in the appendix.

Second, if available from micro data, we calculated regionalized gender specific age profiles for each revenue and expenditure component. If not, we use the gender specific age profiles from the Belgium case.

Third, we use the region specific population projection of the Federal Planning Bureau and the National Institute of Statistics from 2007 to 2060. The projection by gender in each region is derived from the projection by gender of in the total Belgian population since there is no projection at the regional level.

6.2 Comparison of generational accounts

Given the regional aggregate accounts of Table 8-5, Table 8-6 and Table 8-7 and the age-specific contribution and expenditure profiles (see Figure 8-1 up to Figure 8-15 in the appendix), we are able to derive the region specific generational account, in a similar way as we computed the accounts for Belgium. Figure 6-1 shows the generational accounts for Flanders, Wallonia and Brussels graphically and Table 6-1 gives an overview of these accounts for some age cohorts. The last two columns display the generational accounts of Wallonia and Brussels under the

24 It concerns birth and other allowances, capital, corporate and indirect taxation and “other contributions”.

assumption that they face the same age-profile as Flanders. The gender specific generational accounts are included in the appendix in Table 8-8.

Figure 6-1: Generational accounts by region

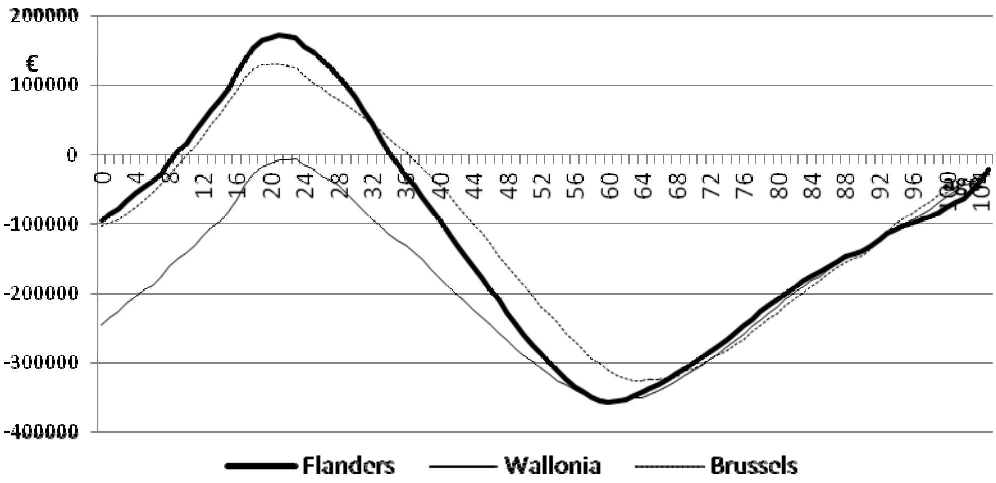


Table 6-1: Generational accounts by region (euro)

Age	Flanders	Wallonia	Brussels	Wallonia *	Brussels *
0	-94.256	-245.220	-102.751	-89.034	-8.793
15	96.089	-81.870	76.310	99.103	290.412
30	82.557	-67.473	63.445	82.743	156.193
45	-177.297	-234.152	-112.861	-173.233	-111.760
60	-355.945	-354.126	-312.049	-341.150	-326.359
75	-257.070	-268.192	-273.463	-252.084	-259.913
90	-139.240	-140.018	-145.597	-133.840	-135.553
105	-20.352	-19.089	-27.151	-20.352	-20.352

* Assuming the same age-profiles of taxes and expenditures as in Flanders.

Table 6-1 reveals how different the generational accounts are for the regions. Under current policy, and – more importantly – given the current age profiles, which reflect the current socio-economic situation in the regions, a representative newborn in Wallonia is expected to receive on average almost €151.000 more benefits than a Flemish newborn over their remaining lifetime. The difference between Flanders and Brussels at the level of the newborns is much smaller. The pattern over the different ages is similar for all regions and comparable to what we found in the Belgian generational accounts.[25] Table 8-9 in the appendix shows the disaggregation of the regional generational accounts of

25 Also the gender pattern is similar as what we obtained in section 3, see Table 8-8 in the appendix.

Table 6-1. Not unexpectedly, when projecting the current situation into the future, an average Walloon newborn will pay a lower amount of social security contributions and personal income taxes than his Flemish counterpart.

Since the regional differences in GA's can be explained by both differences in age profiles and different demographic evolutions, we have, in line with the discussion at the Belgian level in Table 5-1, simulated the GA of Wallonia and Brussels under the assumption of a similar age profile as in Flanders. The result is in the two rightmost columns of Table 6-1. Removing differences in age profiles and only keeping differences in demographic projections leads to very different GA's. This counterfactual GA for a representative Walloon individual is now slightly less negative than the one for Flanders. The difference between both accounts reduces from € 150.964 in the baseline to a mere € 5.222 in the other direction. This clearly shows how the large difference in the baseline between the GA for Flanders and Wallonia is entirely due to the age-profiles in Wallonia. Also the GA for Brussels improves substantially when we use the Flanders age profile for taxes and benefits.

6.3 Ageing and regionalized generational accounts

Table 5-3 showed that ageing is the main determinant of the unsustainable Belgian public finances. However, Figure 4-1 showed that the demographic change is different in the three regions. Flanders faces a more severe ageing problem than Wallonia and Brussels. This section analyses, by using simulations, how ageing affects the regionalized generational accounts. We therefore remove the change in the demographics from the calculation of the GA's. The results are in the second row of Table 6-2.

Table 6-2: Simulations – results for the regional generational accounts

	Flanders	Wallonia	Brussels
Baseline 2010	-94.256	-245.220	-102.751
No ageing	19.211	-139.167	-45.163
No ageing, Flanders age profiles for all regions	19.211	3.524	44.048

The generational account of a newborn in 2010 increases significantly in each of the three regions. In Flanders, neutralizing the effect of ageing even turns the generational account of a newborn positive from €- 94.256 to € 19.211.

Finally, we also simulate the regional GA in the case of "no ageing", where we endow Wallonia and Brussels with the same age profiles of Flanders. The results are on the third row. Compared to the difference in the generational account of a newborn in

Table 6-1, i.e. € -5.222 between Flanders and Wallonia, the difference between the two after the "non-ageing" simulation becomes larger again (€ 15.687). If demographic evolution would have the same effect on both regions, we would expect to see approximately the same difference after the "no ageing" simulation. However, the generational account of a newborn in Flanders is affected in a more significant way than the one of a Walloon newborn. This means that demographic evolution, and more specifically the ageing of the population, has higher effects in Flanders.

7. CONCLUSION

Since the financial crisis turned into the sovereign debt crisis, fiscal imbalances are in the centre of the public debate. Belgium is not an exception to this general picture. The current fiscal deficit and debt level forecasts for 2011 are respectively -3,5% and 96,1%. There is no doubt that these figures deserve attention. But an exclusive and frenetic focus on these cyclical and short term problems threatens to conceal the long term picture of structural and long term fiscal imbalances. It is well known that the current deficit and explicit debt ratio only measure annual flows of expenditures and receipts. They ignore all future liabilities such as future pension entitlements and health care costs which, due to an ageing population, are going to increase substantially in the near future. As an alternative or complementary way of looking at the fiscal stance of countries, Auerbach, Gokhale and Kotlikoff (1991) therefore introduced the method of generational accounting.

This paper derived the generational accounts for Belgium using data of 2010, and can be read as an update for Belgium of the earlier work of Dellis and Lüth (1999) and Stijns (1999). Additional to that, this paper introduced some new elements and improvements. First, and most important is the use of microdata and microsimulation models to derive gender specific age profiles of the most important taxes and benefits. Secondly, the generational accounts for Belgium are disentangled into regional accounts for Flanders, Wallonia and Brussels. A third contribution of our paper is the investigation of several counterfactual situations such as the removal of initial debt, ageing or increased employment rates.

In line with other studies which investigate the long run sustainability of Belgian public finances (e.g. Saintrain 2010), we conclude that current fiscal policy, when confronted with the demographic change ahead, violates the intertemporal government budget constraint. According to our calculations Belgium faces a structural deficit of 10.45% of future GDP. Contrary to what is often put forward in public debates, the current level of explicit debt plays only a minor role in explaining this sustainability problem. The ageing of the population and the related increase in age related expenditures are the main drivers of the long run fiscal imbalance and the high implicit debt. Only 13% of the total sustainability gap can be attributed to explicit debt, whereas 75% of the challenge is due to ageing. Looking in detail to the regionalized generational accounts, the current economic situation with lower participation rates and higher unemployment in Wallonia translates into an average Walloon newborn to receive almost three times as much from the government than an average newborn in Flanders. However, notwithstanding, this bigger fiscal imbalance in Wallonia, demographic changes and ageing will have more challenging budgetary repercussions in Flanders. Brussels has the most favourable demographic outlook.

As pointed out by Haveman (1994), the method of generational accounting has some major drawbacks. The derivation of the results is purely arithmetic in a sense that, unlike macro models we do not take any economic interactions into account. The methodology is only used to summarize the combination of current budgetary and social policy with future demographic evolution. Therefore, the results presented in this study should not be read as a ‘prediction’. We know that current policy and the economic environment will change in the next years, let alone decades. We are even more firm in our warning not to interpret these results as pointing towards intergenerational injustice. For that purpose one needs an elaborated normative framework to trade-off welfare between different generations. Economic growth, further increases in longevity and uncertainty are but some elements which make this framework far from obvious and certainly beyond the scope of this paper. However, these caveats do not make these calculations of generational accounts less valuable. They can serve as the indispensable input to these other models, and as positive input for an informed normative debate. Moreover, we hope they can help to advocate a shift of the attention of policymakers from the current deficit to the real long term structural challenges.

8. APPENDIX

AGE PROFILES FOR BELGIUM: Average benefit, tax or contribution in € per year by age group

Figure 8-1 Family allowances

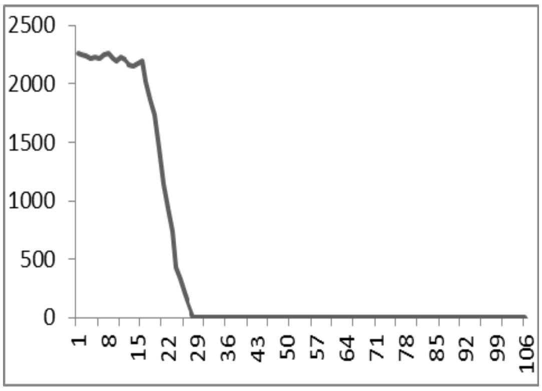


Figure 8-2: Health-care benefits

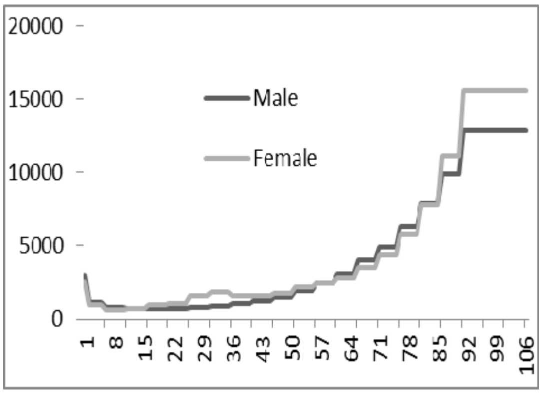


Figure 8-3: Sickness-disability benefits

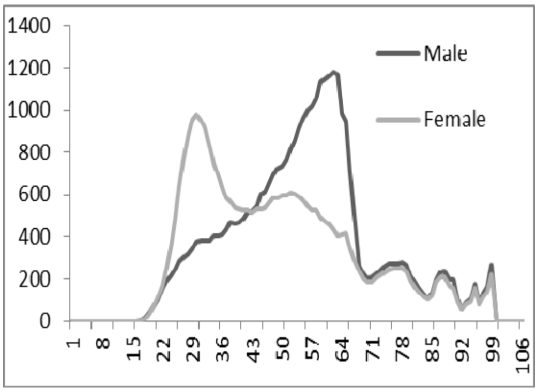


Figure 8-4: Unemployment benefits

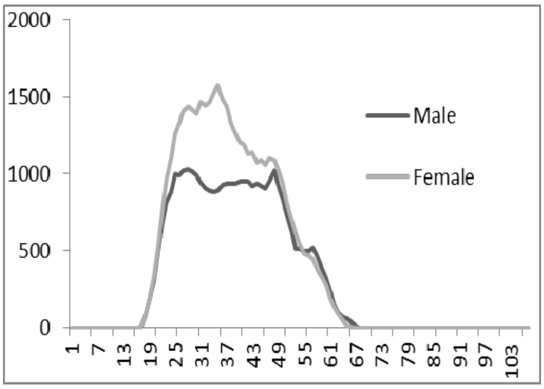


Figure 8-5: Pensions

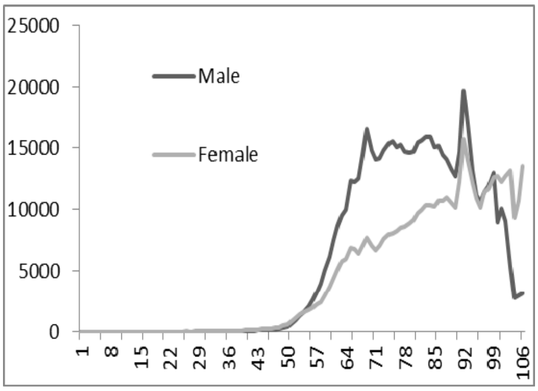


Figure 8-6: Capital taxation

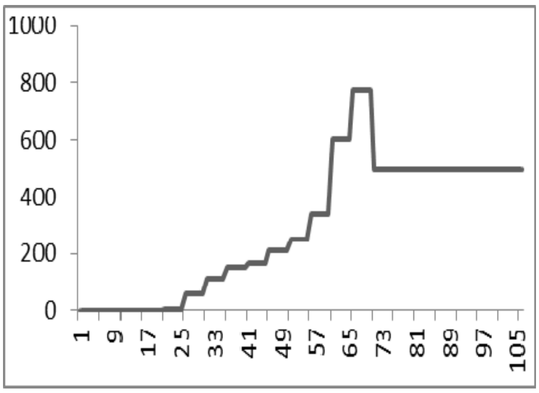


Figure 8-7: Personal income taxation

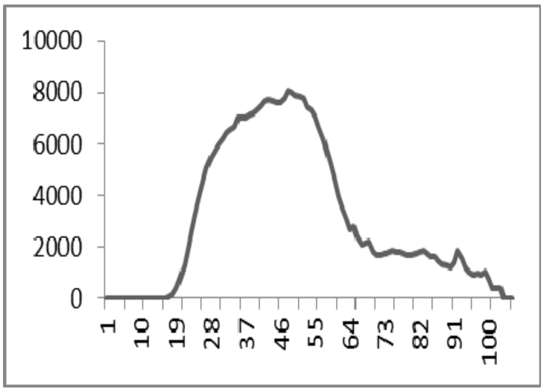


Figure 8-8: Indirect taxation

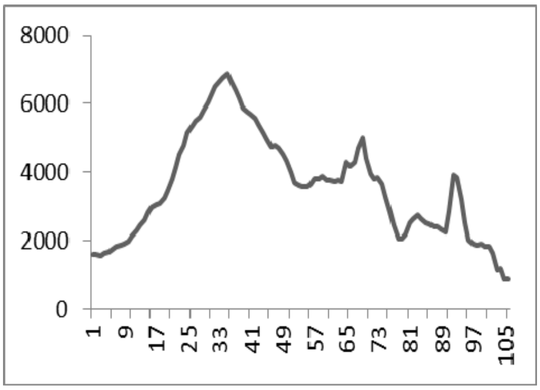


Figure 8-9: Social security contributions

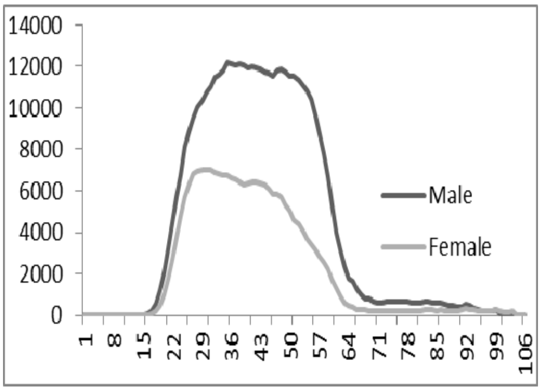
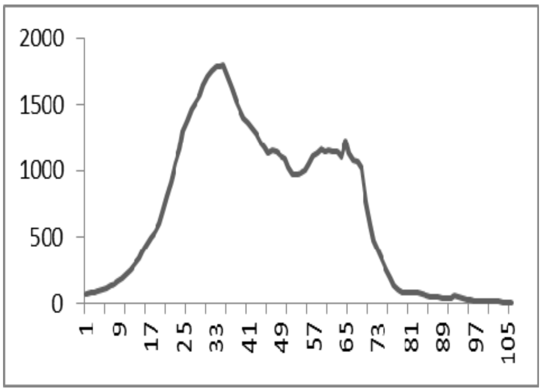


Figure 8-10: Corporate taxation



REGIONAL AGE PROFILES: Average benefit, tax or contribution in € per year by age group

Figure 8-11: Personal income taxation

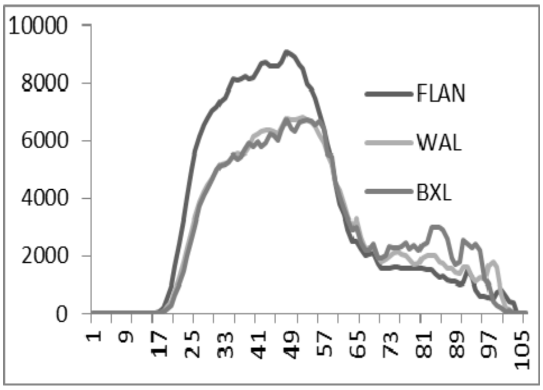


Figure 8-12: Social security contribution

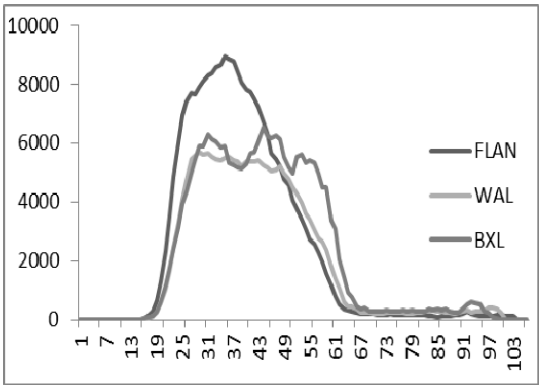


Figure 8-13: Sickness-disability benefits

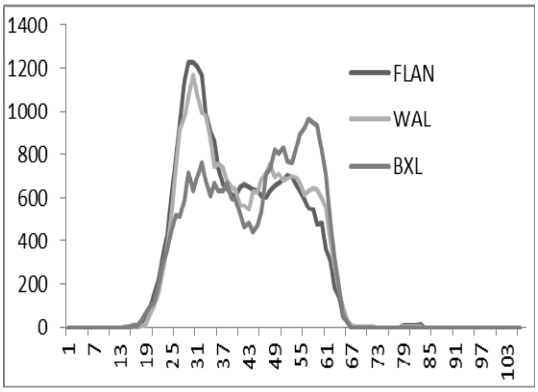


Figure 8-14: Unemployment benefits

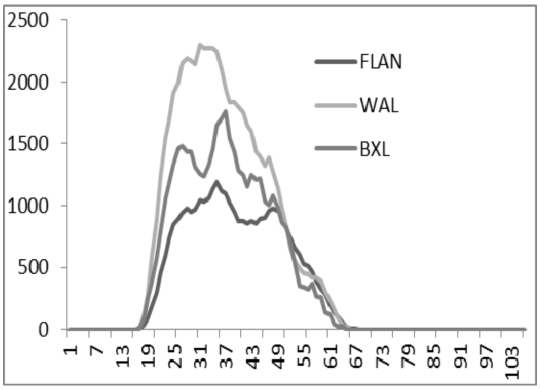


Figure 8-15: Pension benefits

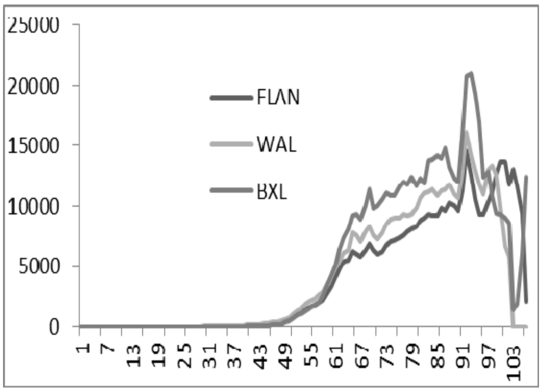


Table 8-1 Sensitivity results for the Belgian Generational Accounts in Baseline of 2010

Growth rate	Discount factor	Male GA	Female GA	IPL as % of Present value of future GDP	Revenue gap (%)	Transfer gap (%)
1,25	2	-103.045,36	-290.592,54	11,72	0,23	0,19
	3	-53.671,85	-171.848,05	10,66	0,21	0,18
	4	-51.197,82	-129.818,74	10,30	0,21	0,18
	5	-62.379,11	-116.611,54	10,22	0,20	0,18
1,50	2	-123.316,18	-333.858,07	11,78	0,22	0,18
	3	**-55.504,55**	**-186.029,64**	**10,45**	**0,21**	**0,18**
	4	-47.262,05	-133.124,42	10,02	0,20	0,17
	5	-57.521,42	-116.316,90	9,90	0,20	0,18
1,75	2	-150.766,75	-388.423,12	11,96	0,22	0,18
	3	-59.733,73	-204.530,97	10,27	0,21	0,17
	4	-43.847,35	-137.926,45	9,76	0,20	0,17
	5	-52.515,14	-116.413,03	9,59	0,19	0,17

Table 8-2: Composition generational accounts male (thousands of euro)

Age	GA	Capital taxation	Income taxation	Indirect taxation	SSC	Non fiscal taxation	Corporate taxation	Birth allowance	Child allowance	Schooling	Health Care	Public wages	Sickness - disability	Unem-ployment	Pensions	Other
0	-55,5	9,4	182,9	209,5	280,0	92,8	44,9	1,0	42,3	113,9	133,2	164,3	17,9	20,8	145,5	236,1
5	-4,1	10,3	196,5	216,0	299,6	90,3	47,7	0,0	32,7	101,9	136,5	160,0	19,5	22,2	161,9	229,9
10	60,5	11,2	211,9	222,6	322,6	88,1	50,6	0,0	22,9	78,8	142,5	156,0	21,0	23,9	177,1	224,2
15	139,6	11,8	225,2	223,0	343,3	84,2	52,2	0,0	12,9	46,9	144,4	149,1	22,3	25,4	184,8	214,3
20	213,1	12,2	235,0	216,8	356,9	79,0	51,8	0,0	3,7	12,1	143,3	139,9	23,2	26,4	188,8	201,1
25	199,8	12,8	232,5	203,6	343,5	74,1	48,6	0,0	0,0	0,0	147,0	131,2	23,4	23,9	201,2	188,5
30	134,8	12,8	210,2	178,8	300,7	66,8	41,9	0,0	0,0	0,0	142,5	118,3	22,3	19,7	203,5	170,0
35	45,2	12,7	184,7	151,8	252,7	60,6	34,5	0,0	0,0	0,0	141,3	107,4	21,2	16,2	211,4	154,3
40	-41,3	12,4	156,4	126,5	202,3	54,3	28,1	0,0	0,0	0,0	136,7	96,2	19,8	12,5	217,9	138,2
45	-126,8	12,2	126,8	106,3	154,0	48,6	23,3	0,0	0,0	0,0	133,0	86,1	18,3	8,8	228,1	123,7
50	-213,1	12,1	95,9	90,4	105,6	43,3	19,4	0,0	0,0	0,0	129,3	76,7	16,3	5,0	242,1	110,3
55	-289,1	11,7	64,8	78,5	57,0	37,8	15,9	0,0	0,0	0,0	123,1	66,9	13,2	2,6	252,7	96,2
60	-331,7	11,0	40,9	66,0	22,2	32,2	11,7	0,0	0,0	0,0	114,9	57,0	8,9	0,6	252,3	81,9
65	-320,2	9,1	28,6	53,3	10,9	26,8	7,0	0,0	0,0	0,0	106,0	47,5	4,1	0,1	230,0	68,2
70	-281,3	6,2	21,3	36,9	7,6	21,5	2,6	0,0	0,0	0,0	94,5	38,1	2,7	0,0	187,4	54,7
75	-234,0	4,8	16,2	24,1	5,7	16,6	0,8	0,0	0,0	0,0	82,8	29,4	2,0	0,0	145,6	42,3
80	-183,9	3,6	11,6	18,8	4,0	12,4	0,4	0,0	0,0	0,0	70,7	22,0	1,2	0,0	109,3	31,7
85	-143,6	2,7	7,5	13,9	2,5	9,3	0,2	0,0	0,0	0,0	61,5	16,4	1,0	0,0	77,2	23,6
90	-120,2	2,1	5,6	12,6	1,5	7,3	0,2	0,0	0,0	0,0	56,4	12,9	0,4	0,0	61,2	18,5
95	-93,9	1,8	2,9	6,6	0,6	6,2	0,1	0,0	0,0	0,0	47,8	11,0	0,4	0,0	37,3	15,7
100	-79,2	1,7	0,9	4,8	0,0	5,8	0,0	0,0	0,0	0,0	44,6	10,3	0,0	0,0	22,8	14,8
105	-20,3	0,5	0,0	0,9	0,0	1,7	0,0	0,0	0,0	0,0	12,9	3,0	0,0	0,0	3,1	4,3

Table 8-3: Composition generational account female (thousands of euro)

Age	GA	Capital taxation	Income taxation	Indirect taxation	SSC	Non fiscal taxation	Corporate taxation	Birth allowance	Child allowance	Schooling	Health Care	Public wages	Sickness-disability	Unem-ployment	Pensions	Other
0	-186,0	10,9	195,7	223,8	154,8	99,4	47,4	1,0	42,5	114,6	179,8	176,0	19,4	18,0	113,7	252,9
5	-145,2	12,0	211,0	232,2	165,9	97,8	50,5	0,0	32,9	102,5	188,8	173,1	20,9	20,8	126,8	248,8
10	-89,8	12,9	227,5	239,8	178,9	95,9	53,6	0,0	23,1	79,4	198,2	169,9	22,6	24,2	137,0	244,1
15	-22,9	13,8	244,1	243,5	192,2	93,4	55,9	0,0	13,1	47,6	204,7	165,3	24,2	27,9	145,2	237,6
20	44,7	13,8	246,6	230,3	193,8	85,5	53,9	0,0	3,7	12,3	196,3	151,5	24,4	30,1	143,3	217,7
25	32,0	14,1	236,9	210,8	176,6	78,5	49,1	0,0	0,0	0,0	195,1	138,9	23,3	27,9	149,1	199,6
30	-16,9	14,2	215,3	186,9	145,9	71,6	42,6	0,0	0,0	0,0	188,7	126,9	19,6	23,3	152,7	182,3
35	-82,8	14,3	190,7	160,9	116,6	66,1	35,2	0,0	0,0	0,0	186,5	117,0	16,2	18,1	160,6	168,1
40	-140,3	14,1	162,6	136,1	88,7	60,0	28,9	0,0	0,0	0,0	179,6	106,2	14,0	13,2	165,1	152,6
45	-201,2	14,0	133,3	116,6	61,5	54,6	24,2	0,0	0,0	0,0	175,7	96,8	12,1	9,1	172,6	139,1
50	-258,2	13,9	102,2	100,9	37,2	49,6	20,2	0,0	0,0	0,0	171,8	87,8	10,0	4,9	181,5	126,2
55	-297,7	13,6	71,0	89,2	19,0	44,2	16,7	0,0	0,0	0,0	164,6	78,3	7,7	2,2	186,0	112,6
60	-318,7	12,9	46,9	76,5	7,5	38,7	12,3	0,0	0,0	0,0	155,7	68,5	5,6	0,5	184,9	98,4
65	-309,0	10,9	34,2	63,0	4,3	33,0	7,4	0,0	0,0	0,0	145,8	58,4	3,9	0,0	169,7	83,9
70	-287,2	7,8	26,2	45,3	3,4	27,0	2,8	0,0	0,0	0,0	132,7	47,8	3,0	0,0	147,4	68,7
75	-254,0	6,1	20,0	30,8	2,8	21,1	1,0	0,0	0,0	0,0	118,2	37,4	2,2	0,0	124,3	53,7
80	-210,6	4,5	14,3	23,9	2,1	15,7	0,5	0,0	0,0	0,0	102,9	27,8	1,3	0,0	99,8	40,0
85	-171,2	3,2	9,0	17,0	1,5	11,2	0,3	0,0	0,0	0,0	88,5	19,9	1,0	0,0	75,5	28,6
90	-137,6	2,3	6,2	13,8	1,2	8,0	0,2	0,0	0,0	0,0	74,9	14,1	0,4	0,0	59,5	20,2
95	-98,8	1,6	2,9	6,3	0,7	5,7	0,1	0,0	0,0	0,0	53,1	10,1	0,3	0,0	38,1	14,5
100	-74,6	1,2	0,8	3,7	0,3	4,1	0,0	0,0	0,0	0,0	37,8	7,3	0,0	0,0	29,2	10,4
105	-33,3	0,5	0,0	0,9	0,0	1,7	0,0	0,0	0,0	0,0	15,6	3,0	0,0	0,0	13,5	4,3

Table 8-4: Composition generational account female, assuming the same age-profile of men (thousands of euro)

Age	GA	Capital taxation	Income taxation	Indirect taxation	SSC	Non fiscal taxation	Corporate taxation	Birth allowance	Child allowance	Schooling	Health Care	Public wages	Sickness-disability	Unem-ployment	Pensions	Other
0	-90,8	10,9	195,7	223,8	295,8	99,4	47,4	1,0	42,5	114,6	162,8	176,0	19,4	13,9	180,6	252,9
5	-44,9	12,0	211,0	232,2	317,5	97,8	50,5	0,0	32,9	102,5	169,8	173,1	21,1	16,0	201,7	248,8
10	19,0	12,9	227,5	239,8	342,3	95,9	53,6	0,0	23,1	79,4	177,4	169,9	22,7	18,5	218,0	244,1
15	94,7	13,8	244,1	243,5	367,7	93,4	55,9	0,0	13,1	47,6	183,2	165,3	24,3	21,4	231,0	237,6
20	163,5	13,8	246,6	230,3	370,3	85,5	53,9	0,0	3,7	12,3	176,5	151,5	24,5	23,0	227,7	217,7
25	137,5	14,1	236,9	210,8	345,7	78,5	49,1	0,0	0,0	0,0	177,6	138,9	24,0	20,9	236,5	199,6
30	66,4	14,2	215,3	186,9	303,4	71,6	42,6	0,0	0,0	0,0	175,6	126,9	23,0	17,7	242,2	182,3
35	-30,9	14,3	190,7	160,9	256,2	66,1	35,2	0,0	0,0	0,0	177,7	117,0	22,0	15,0	254,4	168,1
40	-120,7	14,1	162,6	136,1	205,9	60,0	28,9	0,0	0,0	0,0	173,9	106,2	20,7	11,9	263,0	152,6
45	-212,0	14,0	133,3	116,6	157,6	54,6	24,2	0,0	0,0	0,0	172,0	96,8	19,3	8,7	276,5	139,1
50	-304,1	13,9	102,2	100,9	108,5	49,6	20,2	0,0	0,0	0,0	169,7	87,8	17,2	5,0	293,5	126,2
55	-384,4	13,6	71,0	89,2	59,4	44,2	16,7	0,0	0,0	0,0	164,2	78,3	14,1	2,6	306,7	112,6
60	-428,7	12,9	46,9	76,5	24,3	38,7	12,3	0,0	0,0	0,0	155,7	68,5	9,7	0,6	307,5	98,4
65	-413,5	10,9	34,2	63,0	12,8	33,0	7,4	0,0	0,0	0,0	144,8	58,4	4,8	0,1	282,8	83,9
70	-365,9	7,8	26,2	45,3	9,3	27,0	2,8	0,0	0,0	0,0	129,8	47,8	3,3	0,0	234,6	68,7
75	-303,9	6,1	20,0	30,8	7,0	21,1	1,0	0,0	0,0	0,0	112,6	37,4	2,4	0,0	183,8	53,7
80	-235,9	4,5	14,3	23,9	4,8	15,7	0,5	0,0	0,0	0,0	93,6	27,8	1,4	0,0	136,8	40,0
85	-175,4	3,2	9,0	17,0	2,9	11,2	0,3	0,0	0,0	0,0	76,2	19,9	1,1	0,0	93,3	28,6
90	-131,6	2,3	6,2	13,8	1,7	8,0	0,2	0,0	0,0	0,0	61,8	14,1	0,5	0,0	67,1	20,2
95	-87,4	1,6	2,9	6,3	0,6	5,7	0,1	0,0	0,0	0,0	43,8	10,1	0,4	0,0	35,8	14,5
100	-57,8	1,2	0,8	3,7	0,0	4,1	0,0	0,0	0,0	0,0	31,2	7,3	0,0	0,0	18,7	10,4
105	-20,3	0,5	0,0	0,9	0,0	1,7	0,0	0,0	0,0	0,0	12,9	3,0	0,0	0,0	3,1	4,3

Table 8-5 Revenues and expenditures Flanders, 2010

Revenues	Amount (billion euro)	Expenditures	Amount (billion euro)
Capital taxation	1,38	Birth allowances	0,07
Income taxation	27,41	Family allowances	3,14
Corporate taxation	5,59	Education benefits	9,34
Indirect taxation	25,14	Health-care benefits	14,24
Social security contributions	31,12	Public wages	18,91
Other revenues	10,64	Sickness and disability benefits	2,41
		Unemployment benefits	2,87
		Pension benefits	16,73
		Other expenditures	27,09
Total:	101,28		94,81
GRP in 2010	191,4		

Table 8-6 Revenues and expenditures Wallonia, 2010

Revenues	Amount (billion euro)	Expenditures	Amount (billion euro)
Capital taxation	0,77	Birth allowances	0,04
Income taxation	11,89	Family allowances	2,04
Corporate taxation	3,15	Education benefits	4,96
Indirect taxation	14,14	Health-care benefits	8,04
Social security contributions	12,90	Public wages	11,31
Other revenues	5,99	Sickness and disability benefits	1,51
		Unemployment benefits	2,16
		Pension benefits	9,81
		Other expenditures	15,23
Total:	48,84		55,11
GRP in 2010	78,85		

Table 8-7 Revenues and expenditures Brussels, 2010

Revenues	Amount (billion euro)	Expenditures	Amount (billion euro)
Capital taxation	0,24	Birth allowances	0,01
Income taxation	3,62	Family allowances	0,59
Corporate taxation	0,96	Education benefits	1,50
Indirect taxation	4,32	Health-care benefits	2,24
Social security contributions	3,90	Public wages	2,47
Other revenues	1,83	Sickness and disability benefits	0,38
		Unemployment benefits	0,55
		Pension benefits	2,68
		Other expenditures	4,66
Total:	14,87		15,09
GRP in 2010	64,93		

Table 8-8 Regional generational accounts - By gender (euro)

	Flanders			Wallonia			Brussels		
Age	Representative individual	Men	Women	Representative individual	Men	Women	Representative individual	Men	Women
0	-94.255	-13.780	-178.699	-245.220	-180.619	-313.006	-102.750	-72.224	-134.781
5	-45.994	38.379	-134.841	-195.834	-130.350	-264.789	-65.483	-24.726	-108.400
10	16.204	104.202	-75.244	-141.631	-74.022	-211.892	-2.437	47.818	-54.665
15	96.089	188.003	-1.053	-81.869	-9.683	-158.163	76.309	133.836	15.510
20	169.407	267.917	69.082	-12.200	60.192	-85.926	130.191	185.315	74.052
25	147.973	247.596	49.493	-20.862	54.890	-95.747	104.549	148.733	60.871
30	82.556	170.841	-7.080	-67.472	993	-136.988	63.444	100.421	25.901
35	-12.655	61.384	-88.168	-122.615	-68.825	-177.474	13.181	47.713	-22.036
40	-94.976	-39.713	-151.563	-176.887	-135.875	-218.881	-43.725	-14.235	-73.922
45	-177.296	-137.576	-217.886	-234.151	-204.053	-264.908	-112.861	-83.998	-142.355
50	-259.372	-238.087	-280.712	-289.246	-270.583	-307.956	-188.431	-162.445	-214.485
55	-323.952	-325.801	-322.116	-332.688	-327.766	-337.574	-257.296	-238.471	-275.982
60	-355.944	-370.781	-341.256	-354.126	-358.332	-349.961	-312.049	-295.702	-328.232
65	-337.115	-349.294	-325.659	-344.554	-349.114	-340.264	-324.297	-307.963	-339.662
70	-301.057	-301.365	-300.792	-311.6055	-307.296	-315.305	-309.136	-289.106	-326.335
75	-257.070	-247.125	-264.782	-268.191	-255.291	-278.197	-273.463	-252.052	-290.069
85	-168.897	-149.456	-178.767	-174.492	-156.164	-183.798	-181.198	-158.673	-192.634
90	-139.240	-126.412	-143.991	-140.184	-125.882	-145.4817	-145.597	-128.313	-151.998
100	-76.528	-70.787	-77.609	-61.239	-65.671	-60.404	-54.772	-50.386	-55.598
105	-20.352	-16.828	-21.673	-19.088	-17.328	-19.749	-27.151	-16.542	-31.129

Table 8-9 Decomposition of the regional generational accounts (present value - thousands euros)

	Flanders				Wallonia				Brussels			
Age	SSC	PIT	Unemployment benefits	Health-care benefits	SSC	PIT	Unemployment benefits	Health-care benefits	SSC	PIT	Unemployment benefits	Health-care benefits
0	254,5	215,5	18,7	168,4	190,9	170,3	37,0	174,0	136,3	122,7	23,5	106,6
5	268,2	228,2	19,6	173,5	193,5	173,5	37,4	171,1	180,4	162,9	30,9	131,6
10	283,9	242,4	20,9	179,9	203,1	182,7	39,4	175,0	226,8	201,9	38,9	158,1
15	299,6	254,9	22,0	180,2	217,1	195,2	41,9	171,1	264,7	238,6	45,4	174,9
20	312,3	267,3	23,0	180,3	220,8	198,5	42,5	173,8	249,7	225,9	42,5	157,2
25	293,3	260,4	21,2	183,0	226,3	210,9	40,3	190,5	187,5	174,8	30,2	121,6
30	252,3	234,9	17,9	176,2	202,0	198,7	33,1	190,0	150,7	148,1	22,4	109,3
35	207,5	205,3	14,5	175,8	164,5	173,0	24,6	179,3	133,5	140,3	18,9	116,9
40	160,5	170,4	11,2	166,6	130,6	149,2	17,2	171,3	115,5	129,3	14,1	122,6
45	116,7	135,7	8,3	161,1	98,0	124,3	10,8	165,3	93,4	114,6	9,4	129,0
50	74,9	99,753	5,1	157,1	66,6	98,4	5,1	159,1	67,4	95,8	4,6	133,2
55	38,1	65,5	2,5	150,5	37,3	70,6	2,3	150,3	38,9	71,8	2,4	131,9
60	13,8	40,6	0,5	141,5	16,1	47,7	0,6	140,1	16,9	50,6	0,6	129,4
65	6,9	28,3	0,0	130,7	8,1	34,2	0,0	131,8	8,6	39,9	0,0	125,2
70	4,8	20,7	0,0	118,4	5,9	26,1	0,0	119,5	6,5	34,1	0,0	117,9
75	3,6	15,6	0,0	103,3	4,5	19,8	0,0	106,7	5,1	28,1	0,0	106,0
80	2,4	10,8	0,0	92,3	3,3	14,4	0,0	93,4	3,9	22,2	0,0	93,7
85	1,5	6,7	0,0	81,1	2,1	9,1	0,0	81,7	2,7	15,1	0,0	80,7
90	1,0	4,6	0,0	71,5	1,4	6,1	0,0	71,2	2,1	11,9	0,0	68,7
95	0,6	2,1	0,0	53,2	1,0	4,1	0,0	53,7	0,5	2,4	0,0	47,8
100	0,3	1,0	0,0	39,3	0	0,3	0,0	41,7	0,0	0,0	0,0	33,2
105	0	0	0,0	14,7	0	0	0,0	15,2	0,0	0,0	0,0	14,5

Table 8-10: Decomposition of generational accounts by region (Present value - thousand euros) assuming the Flanders age profile for each of the three regions

	Flanders				Wallonia				Brussels			
Age	SSC	PIT	Unemployment benefits	Health-care benefits	SSC	PIT	Unemployment benefits	Health-care benefits	SSC	PIT	Unemployment benefits	Health-care benefits
0	254,5	215,5	18,7	168,5	260,2	220,4	19,1	167,8	203,8	165,1	15,1	107,1
5	268,2	228,2	19,6	173,5	263,5	224,0	19,3	165,1	269,5	218,7	19,9	132,2
10	283,9	242,4	20,9	179,9	276,5	235,7	20,3	168,8	338,3	275,1	25,1	158,9
15	299,5	254,9	22,0	180,2	295,4	251,7	21,7	174,7	394,7	320,5	29,2	175,8
20	312,3	267,3	23,0	180,3	299,2	255,9	22,0	167,6	369,8	302,4	27,4	157,0
25	293,3	260,4	21,2	183,0	298,9	265,9	21,6	183,8	269,1	227,8	19,6	122,2
30	252,3	234,9	17,9	176,3	261,5	244,1	18,5	183,2	208,7	186,3	17,9	109,8
35	207,5	205,3	14,5	175,8	208,9	206,7	14,6	172,9	178,8	170,5	12,6	116,6
40	160,5	170,4	11,2	166,6	161,5	171,5	11,3	165,3	145,7	150,0	10,3	123,2
45	116,6	135,7	8,3	161,1	117,2	136,2	8,4	159,5	109,5	123,9	7,9	129,6
50	74,9	99,7	5,1	157,1	74,9	99,5	5,1	153,5	71,6	92,8	4,9	133,8
55	38,1	65,6	2,5	150,5	37,9	64,7	2,5	145,0	36,5	60,9	2,5	132,6
60	13,8	40,6	0,5	141,5	13,5	39,6	0,3	135,1	13,1	38,0	0,5	130,0
65	6,9	28,3	0,0	130,7	6,8	27,9	0,0	127,1	6,7	27,4	0,0	125,9
70	4,8	20,7	0,0	118,4	4,8	20,4	0,0	115,3	4,8	20,7	0,0	118,6
75	3,6	15,6	0,0	105,3	3,5	15,4	0,0	102,9	3,6	15,7	0,0	106,9
80	2,4	10,8	0,0	92,3	2,4	10,7	0,0	90,1	2,4	11,0	0,0	94,6
85	1,5	6,7	0,0	81,1	1,4	6,6	0,0	78,8	1,5	6,8	0,0	81,7
90	1,0	4,6	0,0	71,5	0,9	4,4	0,0	68,7	1,0	4,5	0,0	69,5
95	0,6	2,7	0,0	53,2	0,5	2,0	0,0	51,8	0,5	1,9	0,0	48,4
100	0,4	1,0	0,0	39,3	0,3	1,0	0,0	40,2	0,3	0,9	0,0	33,7
105	0	0	0,0	14,7	0	0	0,0	14,7	0	0	0,0	14,7

9. References

Auerbach, J., Gokhale J., Kotlikoff, L. (1991), Generational accounting: a meaningful alternative to deficit accounting, *Tax Policy and the Economy*, Vol. 5.

Auerbach, J., Gokhale J., Kotlikoff, L.(1992), Generational accounting: a new approach to understanding the effects of fiscal policy on saving, *Scand. J. of Economics* , Vol. 94 (2), pp303-318

Auerbach, J., Gokhale J., Kotlikoff, L.(1994), Generational accounting: a meaningful way to evaluate Fiscal Policy, *Journal of Economic Perspectives*, Vol. 8, No 1, pp 73-94

Auerbach, J., Kotlikoff, L., Leibfritz, W.(1999), Generational accounting around the world, *National Bureau of Economic Research*, pp 31-41,pp 73-101 and pp 161-176

Auerbach, A. (2011), Long-term fiscal sustainability in major economies, *BIS Working papers* No 361

Benz, U., Fetzer, S. (2006), Indicators for measuring fiscal sustainability: a comparison of the OECD method and generational accounting, *FinanzArchiv* 62:129-125

Blanchard,O.(1990), Suggestions for a new set of fiscal indicators, *OECD Economics Department Working papers* No. 79

Bonin, H., Patxot, C.(2004), Generational accounting as a tool to assess Fiscal Sustainability: an overview of the Methodology, *IZA DP* No. 990

Bonin, H., (2001), Generational Accounting: Theory and Application, Springer, Heidelberg

Bovenberg, A., Rele ter, H. (2000), Generational accounts for the Netherlands: An Update, *International Tax and Public Finance*, Volume7, number 4-5, pp411-430

Cattoir, P., Docquier, F. (2004), Debt sharing and Secession: A generational Accounting Approach, *Regional Studies*, Volume 38, Issue3, pp293-303

Conseil Supérieur des Finances (2010), Comité d'Etude sur le Vieillissement – *Rapport annuel*, pp3-12

Decoster, A., De Swerdt, K., Maréchal, C., Orsini, K., Perelman, S., Rombaut, K., Van Camp G. and G. Verbist (2007), MIMOSIS: A Belgian Microsimulation Model for Social Security and Personal Income Taxes.

Decoster, A., De Swerdt, K., Loughrey, J., O'Donoghue, C., and Verwerft, D. (2009), Comparative analysis of the distributional impact of combined changes in direct and indirect taxes and benefits for five European countries, Workpackage 3.6 of Accurate Income Measurement for the Assessment of Public Policies (AIM-AP,EU-Contract no 028412), Leuven.

Decoster, A., Loughrey, J., O'Donoghue, C., Verwerft, D. (2010), How regressive are indirect taxes? A microsimulation analysis for five European countries, *Journal of Policy Analysis and Management* 29(2), pp. 326-350.

Enseignement.be (2010), Les indicateurs de l'enseignement. French community of Belgium, pp14-17

Delli, A., Lüt, E.(1999), Belgium: can fiscal policy cope with debt and ageing?, *European Economy, European Commission*, pp 29-40

Drèze, J. (1993), Regions or Europe: a feasible status, to be discussed, *Econ. Policy* 17, pp 266-307

European Commission (2010), Public Finances in EMU-2010, *European Economy*, Volume 4,

Federal Planning Bureau (2008), Bevolkingsvooruitzichten 2007-2060, pp110-123

FOD Sociale Zekerheid (2011), Vademecum van de financiële en statistische gegevens over de sociale bescherming in België, *FOD Sociale Zekerheid*

Hagist, C., Klusen, N., Plate, A., Raffelhüschen, B.(2005), Social Health Insurance- The major driver of unsustainable fiscal policy? *Forschungs Zentrum Generationen Verträge*, discussion paper no.1

Haveman, R. (1994), Should Generational Accounts Replace Public Budgets and Deficits?, *Journal of Economic Perspectives*, 8(1), pp 95-111

Hoge Raad van Financiën, Afdeling Financieringsbehoeften van de Overheid. (2011), Evaluatie 2010 en Begrotingstrajecten voor het Stabiliteitsprogramma 2011-2015.

Jägers,T., Raffelhüschen, B.(1999), Generational accounting in Europe: an overview, *European Economy, European Commission*, pp 1-15

Kotlikoff, J.(1999), An international comparison of generational accounts, *Generational accounting around the world*, University of Chicago Press, pp 73-102

Newhouse, J.P. (1992), Medical Care Costs: How Much Welfare Loss?, *Journal of Economic Perspectives*, 6 (3):3-21

Onderwijs.Vlaanderen.be (2009), Statistisch jaarboek van het Vlaams onderwijs 2008-2009, *Onderwijsstatistieken Vlaanderen*, pp 9-10

Raffelhüschen, B.(1999), Generational accounting: method, data and limitations, *European Economy, Europese Commissie*, pp 17-28

Saintrain,M. (2010), Herziening van het Belgisch budgettair federalisme: vragen omtrent de budgettaire houdbaarheid en omtrent budgettair beleid en economische cyclus, *Federaal Planbureau, Working Paper* 23.-10

Sutherland, H. (2001), EUROMOD: An integrated European Benefit-Tax model, *Euromod Working Paper* No. EM9/01

Stijns, JP.(1999), Generational accounts for Belgium, *Generational Accounting around the World*, University of Chicago Press, pp 161-176