Ageing and the Current Account

Simulations for the Netherlands

Leon Bettendorf⋆**, Thijs Knaap**⋆⋆

Research Center for Economic Policy (OCFEB), Rotterdam

January 2003

Abstract The ageing baby-boom generations in the OECD economies will have an impact on the global supply and demand of capital over the next decades. The size and direction of this impact have been the subject of much research, which we survey. We study the effects of alternative interest rate paths for the Dutch economy with the IMAGE general equilibrium model, emphasizing developments of the current account. Further simulations explore the sensitivity of the outcomes to alternative demographic projections, tax smoothing and exogenous participation increases. We find that tax smoothing is not the appropriate policy to generate a more equitable intergenerational distribution when changes in the world interest rate are taken into consideration.
Keywords: Ageing, Applied General Equilibrium, Current Account
JEL codes: J18, H63, D58

⋆ Corresponding author. Address: OCFEB (H6-20), P.O. Box 1738, NL-3000 DR Rotterdam, The Netherlands. bettendorf@ocfeb.nl. Fax: +31 10 4089173
⋆⋆ knaap@ocfeb.nl.
More about the IMAGE model can be found on its website: http://image.ocfeb.nl.
We thank L. Bovenberg, P. Broer, A. Ludwig and participants of the ENEPRI workshop on 'Ageing and international capital flows' (November 2001), the ECOMOD Brussels conference (July 2002) and the MEA workshop on 'Population aging and international capital markets' (December 2002).

OCFEB Research Memorandum 0303
OCFEB
Erasmus University Rotterdam
P.O. Box 1738
3000 DR Rotterdam
The Netherlands
Tel. (31) 10 4082430
Fax. (31) 10 4089173
Mail: info@ocfeb.nl
Web: www.ocfeb.nl

Contents

1 Introduction

The population of the OECD economies continues to age, both because of a large after-war cohort and because of a structurally lower fertility- and mortality rate. The after-war *baby boom* generation has always been influential as it forced schools to expand in the fifties and went on to flood the labor markets. Now the effects on the capital market are under discussion.

There are several reasons to suspect that the supply and demand of capital will be affected by demographics (for an introduction to this topic, see Börsch-Supan, 1996). On the supply-side, we know that an important incentive for saving is the life cycle motive: a lack of wage income in old age leads to saving, then dissaving over the lifespan. The question is how ageing will change this incentive: if it comes about through a longer lifespan, lengthening retirement, saving should go up during the active period. However, if ageing is caused by lower fertility, the fraction of the population that saves is expected to go down, depressing the overall saving rate.

On the demand side, a smaller labor force will depress the need for capital in production. However, if a large fraction of the savings of the ageing Western countries can be used to invest in emerging economies, where the ageing problem is smaller, demand may not be affected much (see Reisen 1998). Conventional economic theory suggests that the emerging markets are able to absorb Western excess capital as long as they are large enough: per-capita levels of capital in the emerging economies are low and investments should be productive. However, Turner *et al.* (1998) argue that total absorption is impossible: the OECD is too large relative to the emerging economies. On top of that, there may be impediments in the form of institutional differences and high risks.

The arguments above predict either an increase or a decrease in supply, and an uncertain decrease in demand of capital. This can cause the interest rate to move in different directions, and the net movement is not clear. For better insight, the theoretical considerations should be quantified, either by econometric estimations or by building an economic model.

The first route seems straightforward, but turns out to be harder than expected: multiple problems arise when simply trying to measure the relationship that has historically existed between interest rates and demographics. For one, Poterba (2001) finds that such an exercise produces no robust results, when applied to the United States, the United Kingdom and Canada. He concludes that the fact that an ageing population is unlike anything that has been experienced before, makes it unsuitable for statistical predictions. Eichengreen and Fifer (2002) provide a review of studies estimating the impact of demographic variables on the balance of payments. They find that changes in dependency ratios have similar effects on investment and saving, leaving the current account unchanged (*i.e.* the Feldstein-Horioka puzzle).

Another way to project the future path of interest rates and capital flows is with the use of an applied general equilibrium (or AGE) model. By their nature, such models can cope with changes not yet observed in any economy, such as an ageing population. There are some criticisms that apply, though: the model leans heavily on fully rational agents and perfect markets. Empirical support for in particular the life cycle hypothesis has historically been weak, although new research by Browning and Crossley (2001) indicates that careful measurement improves the model's performance.

In this paper, we review several exercises that have been conducted using general equilibrium models of different kinds. We look at models of a closed economy as well as world-models and their different outcomes with regard to the interest rate in section 2.

We then introduce our model of the Dutch economy, called IMAGE, in section 3. The Netherlands is a country characterized by large pension funds and substantial capital exports. The model describes a small, open economy with unhindered flows of capital and trade. The interest rate is taken as an exogenous variable. This allows us to use the interest rate scenarios of section 2 as an input into the model, so that we can study the country's responses to world interest rate movements. We look at the general characteristics of saving, investment and the current account in the base case, absent of interest rate movements in section 4. Next, we discuss the consequences of two, alternative, interest rate scenarios in section 5. A reduction of public debt before ageing takes off is usually advocated for generating a more even distribution of the ageing costs over the generations. However, we show in section 6 that this policy even increases the size of the intergenerational redistribution when the world interest rate declines due to ageing. Finally, in section 7 we study whether the effects of the different interest rate shocks are sensitive to an exogenous increase in participation rates. We end the paper with a conclusion.

2 Interest Rate Scenarios

We will use several (world-) interest rate scenarios in the IMAGE model, which takes the interest rate as given. Our base case will be a constant real world interest rate of 5% (being the average of the returns on bonds and equities). More interesting projections from AGE-models are classified into two types. The first type of studies finds temporary and permanent reductions of the interest rate. Examples of this type include the multi-country model of Aglietta *et al.* (2001) and Börsch-Supan *et al.* (2003) and the closed economy models of Chauveau and Loufir (1997) and Miles (1999)[1]. The second type of studies reports rising profiles for the interest rate, as found *e.g.* in a model of the American economy by Kotlikoff *et al.* (2001) . We discuss one representative of each type in turn.

[1] Chauveau and Loufir (1997) cover seven OECD countries, whereas Miles (1999) models the UK and Europe.

2.1 INGENUE

Aglietta *et al.* (2001) use the demographic projections of the United Nations to carve the world into six zones: three of those are ageing societies: Europe, America and Japan. The other three are emerging economies, in different demographic states: *advanced* (including China), *starting* (with parts of Latin America) and countries with a pyramid-shaped population structure (mostly in Africa).

The characteristics of these zones are used in the INGENUE model, which has overlapping generations that save and dissave according to the life cycle hypothesis. The model period is 5 years, there are no bequests and labor supply is exogenous. Pay-as-you-go (PAYG) pensions exist, and have different characteristics in the different zones. Particular attention is paid to the level of productivity in the different zones, and the speed of productivity convergence. The model is calibrated for the period 1980-2000.

Using this model, supply and demand of capital on the world market are computed each period. A perfectly integrated world capital market is assumed. The baseline scenario quantifies the importance of the features discussed in Section 1: the supply of capital increases in 2000-2020 which drives down the rate of interest. After that, the rate rises to stabilize at a level about 50 basis points under today's level. The drop in interest is smaller than it would have been in absence of the emerging economies, but remains significant. This indicates that the emerging economies do not have the capacity to absorb the entire Western capital surplus. A graph of the interest rate path is in figure 1.[2]

2.2 Kotlikoff, Smetters and Walliser

Kotlikoff *et al.* (2001) calibrate their model to the US economy, rather than the entire world. International trade or capital flows are not present in their model. American institutions are modelled carefully, as are bequests. Incorporating the latter leads to a more realistic pattern of lifetime savings.

We need to pay special attention to the way technical progress is modelled in this paper. Rather than modifying the production function, the authors assume that the time endowment of each worker increases over time. The increase in available time can be interpreted as increased efficiency. It turns out that this assumption drives many of the results. We will make a similar assumption when we model an exogenous increase in participation rates in section 7.

In their simulations, Kotlikoff *et al.* (2001) find that the impact of ageing on the capital market results into a monotonously rising interest rate. This is, in part, due to the way that technical progress is modelled—the increasing time endowment of younger generations leads to an increasing, rather than decreasing, relative labor supply in the long run. Furthermore, the rising

[2] All figures are in appendix A which starts on page 18.

PAYG tax rate inhibits saving. These two effects lead to a falling capital-labor ratio and thus an *increasing* path of the interest rate over the next century.[3] A graph of the path is in figure 1.

We use the two scenarios discussed in this section[4] as input for our general equilibrium model of The Netherlands. The results can be used to obtain an indication of the range of possible effects.[5]

3 The IMAGE Model

The IMAGE overlapping generations AGE model is described in detail in Broer (1999). In this section, we will introduce the model without trying to be exhaustive—any mathematical detail is left out, for instance. For a complete overview of the model, we refer the reader to our website.[6]

In the IMAGE model, 560 types of households are active every period (the standard period is one year): there are 80 cohorts, and within each cohort there are 7 types of workers, differing in exogenous productivity. Each household consistently maximizes lifetime utility, using labor-leisure allocation and consumption as its instruments. Firms maximize their value, defined as the present value of the stream of dividends. Investment is subject to internal adjustment costs. From this follow the optimal labor and investment demand. The only stochastic element in the model is the risk of death, lurking every period but increasing with age; this risk is perfectly insured by an inverted-life insurance of the Yaari (1965)-type.

We discuss the institutional setting and the international flows of capital and goods in the next two subsections. The model is calibrated to 1999 data; details of the calibration are in section 3.3.

3.1 Institutions

The IMAGE model is built to replicate Dutch peculiarities of which the main issues are discussed here.

The government levies (proportional) taxes on consumption, and labor- and capital income. Capital income is taxed according to the residence principle; interest income is taxed at half of the income tax rate. Revenues are spent on government consumption, interest payments, subsidies and lump-sum transfers. Consumption is a fixed fraction of GDP; subsidies go to

[3] Another possible reason is that the starting situation does not correspond with the steady state. When the capital-labor ratio is initially too high, interest rate increases will result on the transition path.

[4] We shal refer to the shock from the INGENUE model as 'ING' in our graphs. The shock from Kotlikoff *et al.* will be denoted 'KSW'.

[5] Ageing might affect not only the average level but also the interest rate structure. Brooks (2000) argues that the risk premium will increase when the fraction of old savers, which prefer less risky assets, rises.

[6] See http://image.ocfeb.nl

public health insurance, which is reimbursed a fixed fraction of its expenditures, and to the PAYG pensions, to the extent that the premiums do not cover the costs. Age-specific transfers are tied to the gross wage rate. Civil servants and foreign transfers take up the rest. The government aims to maintain a constant debt rate and uses the income tax rate to close its budget.

There are two pension systems: a mandatory PAYG scheme, which pays out a uniform pension after age 65 that is tied to the wage rate, and a funded pension scheme that is mandatory for the higher incomes. It is a typical Dutch phenomenon that these pension funds are large: in 1999, their combined assets amounted to 1.2 times gross GDP. The benefit is based on the last-earned wage, proportional with accrued rights and indexed to the wage. The fund earns the international interest rate; discrepancies between its assets and the present value of its obligations are covered by adjusting the premium at a specified pace.[7] Contributions to the pension fund are deductible from taxable income while the benefits later in life are taxed. In the PAYG scheme the contribution rate is fixed and shortages are covered by the state.

There are two types of health insurance, for agents on either side of a statutory income. Special medical treatments are covered by a special insurance sector (AWBZ) to which both publicly and privately insured households contribute. Each scheme fixes its premium, so that its budget is balanced each year.

3.2 International Trade and Capital

The Netherlands is a small, open economy and this is reflected in the way that international trade and capital flows are modeled in IMAGE. As discussed in the introduction, the interest rate is fixed abroad and cannot be influenced by anything that happens on the local capital market. Capital imports and exports are unrestricted; all assets, including foreign assets are assumed to be perfect substitutes. This way, savers can keep their assets abroad and firms can turn to the international capital market for their finance requirements.

The same goes for international trade. We assume domestic and foreign goods are identical and that the price level is equal on either side of the border. Discrepancies between production and demand are absorbed by foreign trade without affecting the world price.

The current account is the sum of the balance of trade and the return on net foreign assets, corrected for exogenous government transfers.

[7] Complete funding of the projected obligations accumulated thus far is required by law.

3.3 Calibration

The model is calibrated to match data from the national accounts of 1999 and various other statistical resources. We employ three demographic projections, all from the CBS (Statistics Netherlands): a middle variant as well as a *grey* and *green* scenario. The extreme *grey* scenario is based on low fertility and mortality rates, whereas the *green* scenario assumes exactly the opposite. A plot of the dependency ratio (the population over 65 divided by the population aged 19-65) under the three scenarios is in figure 2. In all cases, the dependency ratio exhibits a maximum around 2040, when the baby boom generation is in retirement. It remains high afterwards due to permanent lower fertility and mortality rates. The area between the green and the grey scenario roughly corresponds to the 95% confidence interval.[8]

When the model is calibrated to the data, an attempt is made to incorporate correct expectations about the off-steady state path of endogenous variables. To that end, we fix the parameters in two rounds: first, we compute the transition path starting with a regular steady-state calibration. Then, wage and tax rates along this first transition path are used as expectations during a second, off-steady state calibration.

We describe the outcome of the model, with the interest rate fixed at 5%, in the next section. This is the so-called *base path* of the economy, absent of interest rate fluctuations. In section 5, we look at how this path changes when we take the interest rate scenarios from section 2 into account. We have discussed the closure rules of the various public institutions in section 3.1: health insurance agencies and the PAYG pension system must fix their premiums such that income equals expenditures; pension funds must adapt premiums so that in a foreseeable future, their assets match their obligations, and the central government maintains a debt target (55% of GDP), using the income tax rate as an instrument.

4 The Base Path

The base transition path of the model shows fluctuations that follow the demographic transition: the total sum of PAYG pensions and health expenditures increases and the burden on a smaller workforce becomes larger. We describe the path using graphs of key variables.

In all scenarios, total labor supply will rise for a few more years as the baby boom generation reaches their most productive years.[9] This has a dampening effect on the wage rate (corrected for technical progress of 2%), which is depicted in figure 3. After the year 2020, the wage rate rises as labor becomes scarce, peaking in 2040.

[8] See Beetsma *et al.* (2001), who also use these scenarios.

[9] This increase does not take into account participation shifts driven by social and cultural trends (see CPB 2000). These are the subject of section 7.

PAYG pensions and funded pensions are in figures 4 and 5. The payouts of these pensions rise as the number of people entitled rises, together with the wage rate. We see that the maximum is achieved around the year 2040, again, after which the path converges to the steady state equilibrium, which is persistently higher than before.

The income tax rate is used to close the government budget. As such, it reflects the easy years until 2010, when wages are relatively low, and the mounting problems that arise in the following decades. The budgetary troubles are due to the rising wage rate and the increasing costs of financing the PAYG pensions. The path under the three scenarios is in figure 6. The rising tax rate increases the cost of labor, as it depresses the workers' willingness to supply labor.

The resulting paths for investment and national savings are shown in figure 7. Investment first decreases slowly in anticipation of the shrinking labor supply. It picks up again when labor becomes less scarce around 2040. Furthermore, investment demand is stimulated by the reduction in the required rate of return, due to the rising income tax rate.

Total saving, in our model, is the aggregate of four variables. There is government saving, which is the surplus on the government budget. Pension saving is defined as the addition to the assets of the covered pension fund, which equals the sum of the premiums and interest gathered by the fund, minus paid out pensions. Personal saving is the result of private decisions to save or dissave, over and above the mandatory pension scheme, to attain a smoother consumption pattern. Finally, business saving is the result of retained profits that are used for new investments. In a formula, we write

$$\begin{aligned} CA &= TotSav - Inv \\ TotSav &= GovSav + PensSav + PersSav + BusSav \end{aligned}$$

with obvious acronyms. Since government and business saving are relatively constant in time, figure 10 plots only the two most active series, pension saving and personal saving. Personal saving falls dramatically when the baby boom generations begin dissaving. The fall is enforced by the drop in the net interest rate. The reduction in national savings also reflects the slowdown in savings by pension funds as they become more mature. Capital exports, equal to savings minus investment, are given by the surplus on the current account: an initial surplus leads to a small deficit in 2040, after which the recovering of national savings turns the current account positive again. Consumption smoothing over time is reflected in the trade balance. The accumulation of foreign assets allows the trade balance to turn into a permanent deficit in 2024. In the long run, interest earnings on foreign assets finance the small deficit.

The effects of different demographic scenarios on the current account are in figure 8. The green scenario leads to a perpetually positive current account as savings go way up; the grey outlook drives the current account down, but not dramatically so. The corresponding paths of foreign assets are in figure 9.

5 Simulation of Interest Rate Scenarios

We simulate the two interest rate scenarios of figure 1 as unexpected shocks (*i.e.* the calibration remains the same) and discuss their effects, in particular on the current account, in this section. The four components of total savings all respond to the interest rate shock, but some do so more than others. The government deficit is driven by the assumption of the constant debt rate and is therefore only affected by changes in the growth rate of GDP. Business saving is linked to new investment, which remains relatively stable.[10] Pension savings are more strongly affected, as an immediate discrepancy occurs between the obligations and the assets. This is because the present value of the obligations change as the future interest and wage paths change. In order to close this gap, premiums jump in the first period and stay permanently on a different path. The same holds for personal saving: the new interest rate path makes necessary a re-evaluation of the life plan, which causes the saving rate to jump. The results are in figures 11 and 12. All figures are based on the 'middle' demographic assumption.

We first look at the INGENUE scenario, which has a *negative* interest rate shock. On the production side, this stimulates investments which leads to a rising demand for labor and a higher wage rate. Both the lower interest rate and the higher wage rate are bad news for pension funds (see figure 11). Their future obligations are no longer covered by the current assets, and premiums must be increased in order to close the gap. We see a jump of almost four percentage points in the first year, whereafter the difference slowly decreases but forever stays above the previous path. Personal saving is down because of the anticipated decrease in interest rates and the increase in future wages.

The resulting path of the current account shows that the short-term effects of the shock are bigger than the long-term effects. In the short term, the fall in personal saving is much larger than the increase in pension saving, driving down the current account surplus. In the long run, the current account is only a few tenths of percentage points lower than it would have been without a shock. Falling interest rates make that the net-creditor cannot longer afford trade balance deficits.

We can compare these findings with those of a *positive* shock in interest rates, or the KSW scenario. Not surprisingly, the effects reverse. While investments drop, wages take a fall in the long term as production capacity decreases. Both of these are positive for pension funds, who see their obligations, tied to the wage rate, come down. Figure 12 shows on impact a percentage point drop in the pension saving rate, which stays lower than before the shock for the rest of the century. Saving picks up for the same rea-

[10] Gross investment starts as 19.1% of GDP. The ING shock causes an initial increase of 2.6 percentage points. KSW causes an initial decrease of 0.7 percentage points. In the long run, the effects are 0.9 and −1.5 percentage points, respectively. These are small effects, compared to those on pension saving, which changes by a factor of 2.

sons: the future higher interest rates and lower (efficiency-corrected) wages inspire more parsimonious living today.

The resulting current account movement is again dominated by personal saving, albeit slightly in the short term. In the longer run, we see that the fall in personal saving before 2040 has become a much more modest phenomenon. This leads to a permanent current account surplus of 2.7% of GDP and a trade balance deficit of 5.4%.

In both scenarios, we can see clearly how the small-country assumption leads to the fact that there is no countervailing force on the capital market, which works against the interest rate shock. In the latter scenario, falling investment and rising saving go hand in hand, not leading to a decrease in the interest rate. If foreign and domestic assets were less than perfect substitutes, we would expect to see a smaller effect on both saving and investment.

Compensating variations for the two scenarios are in figure 13. The compensating variation for a generation is the percentage change in (remaining) lifetime wealth that would make an agent from that generation indifferent between the base case and the scenario with an interest rate shock. Positive values indicate that the agent needs to be compensated for a loss due to the shock.

We see that the negative ING shock immediately hurts the existing generations. Older generations lose capital income because of the lower interest rate. Since gross wages go up, generations that are already retired gain from higher (indexed) pensions. There is a clear difference between those that are already retired and those that are working (seen as a jump in figure 13) that results from the feature that pensioners do not have to pay higher pension premiums. The biggest loss is borne by the generations that are in mid-career when the shock occurs: they lose capital income and have to pay the highest pension premium. For future generations, the effects work the other way: lower interest rates lead to a higher steady state capital stock, which boosts overall production. This means that future generations benefit from efficiency gains.

The pattern is reversed for the positive KSW shock: current generations gain while future generations are worse off when interest rates go up. Comparing the two curves in figure 13 is hazardous because the two shocks are not scaled. However, even if the interest rate shocks would have been scaled to be of the same magnitude, we would not have expected their effects to be symmetrical. A change in interest rates causes changes in tax- and contribution rates (this mechanism will be further discussed below). Because welfare losses vary quadratic with the size of the rates, we expect an asymmetric response to shocks.

6 Tax Smoothing

The sharp rise of the income tax rate in figure 6 demonstrates that, under a status-quo policy (with constant interest rates), the costs of ageing will be distributed unevenly over the generations. One way to achieve a more equal distribution is to implement tax smoothing. Under this policy, the income tax rate is constant and its value follows from the intertemporal budget constraint of the government: present value of revenues should be equal to present value of expenditures. Since tax smoothing results in an immediate increase in the tax rate, the public debt can be paid off and part of the burden of ageing is shifted from future to current generations. This policy is in line with the advice of *e.g.* CPB (2000) to "[reduce] public debt to a level close to zero at the time when ageing reaches its maximum in 2040" (p. 128). Since distortions are known to increase with the level of the tax rate, exercises with tax smoothing also indicate the size of potential efficiency gains.

At first, we leave interest shocks out of the model and concentrate on the constant interest case. The constant tax rate is 18.7% in this case (see figure 14). Relative to the base case, the tax rate is higher until 2029. Resulting surpluses allow a quick reduction of the public debt in figure 15. The debt ratio becomes negative (for the first time) in 2026 and stabilises at −9% in the long run. The compensating variations in figure 16 are as expected: current generations (born before 1981) lose in utility terms, future generations gain.

So far, we have ignored the effects that ageing, by itself, may have on interest rates. The effects of tax smoothing *combined* with the interest rate scenarios of section 2 are given in the figures 14–16 (*i.e.* calibration and the base case are the same over the three scenarios). Under the ING scenario, where interest rates drop, smoothing requires a higher tax rate (21.9%) relative to the base case in every year. Lower interest rates will eventually lead to higher capital-labor ratios and hence higher wages. Government expenditures that are linked to the wage rate (e.g. public pensions) are driven by this increase. A second effect is due to the adverse consequences that lower interest rates have on the pension funds. Their lower earnings have to be compensated for by higher contributions. Since these contributions can be deducted from taxable income, the tax base shrinks. These two effects on net expenditures outweigh savings on interest payments, explaining the increase in the tax rate. A smaller reduction of the public debt is now sustainable, so that the debt ratio converges to 3%. Not the whole debt is paid off, because obviously, when the interest rate is low, keeping some of the debt around is less expensive.

Remember from figure 13 that current generations suffer considerably from lower interest rates, while future generations gain. By strongly increasing the tax rate during the first decades, tax smoothing imposes an extra burden on those current generations, while future generations benefit from the elimination of the intertemporal distortions (see figure 16). Reducing public debt is unattractive when ageing is believed to depress interest rates since this policy leads to a less equitable intergenerational distribution.

The rising interest rate under the KSW scenario has favorable effects on the government account. The effects of lower wage and contribution rates dominate the rise in the interest burden in this case. Government expenditures move more in accordance with the tax revenues, resulting in a rather stable evolution of the tax rate, even without smoothing. With smoothing the tax rate is higher than the base case only until 2013, and a high debt ratio is feasible in the long run. The favorable development of the primary surplus gives the government the means to pay the (increased) interest charges. Comparison of the compensating variations in figures 13 and 16 shows that tax smoothing hardly generates any welfare effects. Tax smoothing is not the appropriate policy to achieve a more equitable intergenerational distribution in this case.

7 An Increase in Participation

Increasing participation rates is another strategy that is proposed to alleviate the budgetary consequences of ageing (see e.g. European Commission 2002). The Lisbon European Council aimed at an increase of the average employment rate from the current 61% to 70% by 2010. The Stockholm European Council specified the target for the older age-group (55-64) at 50% by 2010. Even without new policy initiatives, the participation rates, in particular of women, are expected to increase due to ongoing social and cultural trends (see CPB 2000).

In this section we simulate the usual interest rate shocks in a scenario which incorporates a rising, exogenous trend in participation rates. Our projection of the macro-participation rate is brought in line with those in CPB (2000) by modifying, in each period, the amount of time available for all cohorts working in that period. An increase in available time can be interpreted as a special type of labor-augmenting technological progress (see Kotlikoff *et al.* 2001). The increase in the time endowments is treated as an unexpected shock, concurrent with each interest scenario. The resulting macro-participation rate is shown in figure 17. Note that in the base path, participation is expected to drop. After the shock on available time, initial participation is lower than in the base case as the rise in human wealth leads to increasing demand for leisure. Thereafter, the positive shock in available time prevents the drop in the participation rates found in the base path. Without accomodating policies, the participation increase is limited to 3%-points in the long run. After the initial adjustment, the tax base expands and a slightly lower income tax rate becomes sustainable, compared to cases without the participation shock (see figure 18). Due to the positive wealth effect on consumption, personal savings and the current account worsen in the first decade. Thereafter, the current account evolves very similar to earlier simulations (compare figure 19 with figures 11 and 12).

8 Conclusion

The future developments of supply and demand on the capital market, and their effects on the Dutch current account, are highly uncertain. In this paper, we have shown that there is considerable uncertainty in demographic scenarios, as well as disagreement on the effect of ageing populations on world capital markets. The question is, how this uncertainty reflects on our expectations about the Dutch current account.

We have used the IMAGE model to simulate the state of the Dutch current account under unchanged policy and interest rates, and its sensitivity for different demographic scenarios, as well as different interest rate developments. To that extent, we have used the CBS's *green* and *grey* demographic scenarios and used interest rate scenarios from the INGENUE model (Aglietta *et al.* 2001) and from Kotlikoff *et al.* (2001). We use these interest rate scenarios from other models, because the IMAGE model, describing a small, open economy, takes the world interest rate as given.

We find that the Dutch current account is quite sensitive to these different assumptions, but asymmetrically so. The baseline scenario has the current account positive and increasing until 2020, then dipping into negativity around 2040 and recovering ten years later. A similar path is followed for the grey demographic scenario, but under the green scenario the current account is always positive, and foreign assets soar.

We find that the effects of interest rate shocks on the current account can be mainly traced back to their effect on personal and pension saving. The (negative) interest rate scenario from the INGENUE model leads to an immediate drop in the current account, but the net effect is close to zero after 2030. The (positive) KSW scenario lifts the current account over the entire period and prevents it from ever becoming negative. The exisiting generations suffer in utility terms from the ING shock, but gain under the KSW scenario. The reverse holds for future generations.

Policies aimed at debt reduction are advocated for generating a more even distribution of ageing costs over the generations. We simulate a tax smoothing policy to explore this issue. We find that tax smoothing possibly is not the appropriate policy to achieve a more equitable intergenerational distribution when changes in the world interest rate are taken into consideration.

Finally, we study the sensitivity of the outcomes with respect to a rising trend in participation rates, as projected by CPB (2000). Since the exogenous increase in labor participation remains limited, the current account is only affected in the short run.

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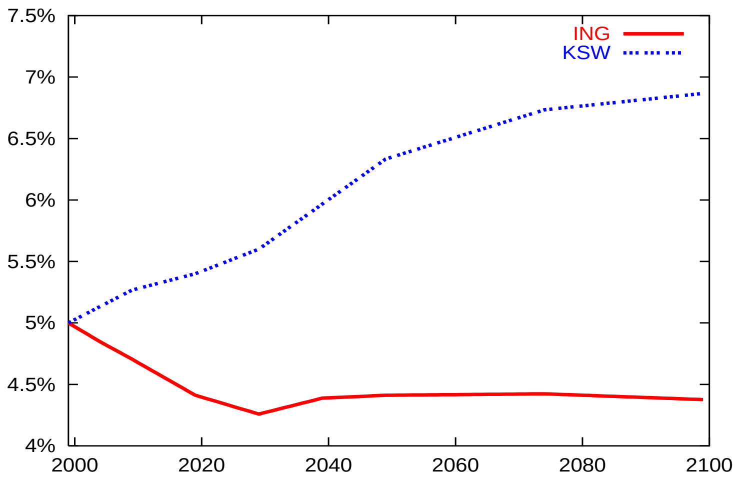
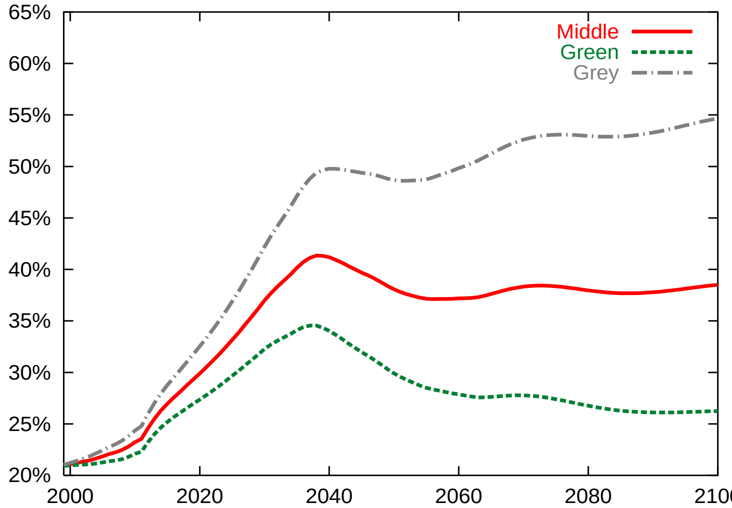
A Figures

Fig. 1 Interest rate scenarios



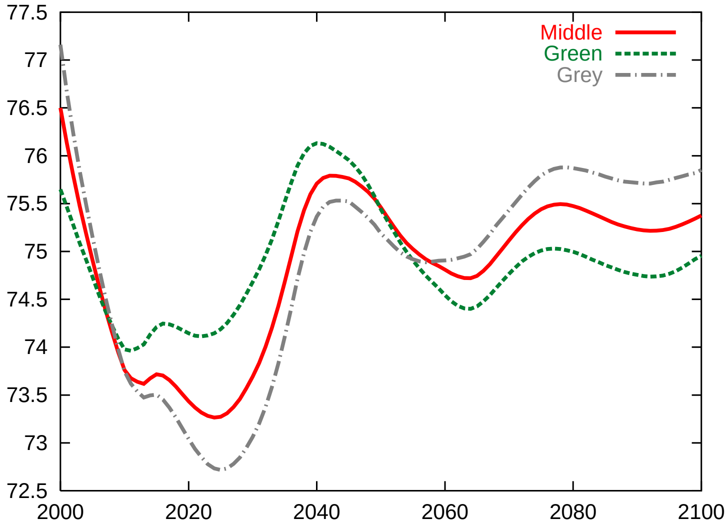
Note: The rates are multiplicatively scaled to begin at 5%.

Fig. 2 The old age dependency ratio



Note: the number of persons aged over 65 divided by the number of working-age persons, aged 19-65. Source: Statistics Netherlands.

Fig. 3 The wage rate in three demographic scenarios



Note: corrected for technological growth of 2%.

Fig. 4 Pay-as-you-go pensions under three demographic scenarios (%GDP)

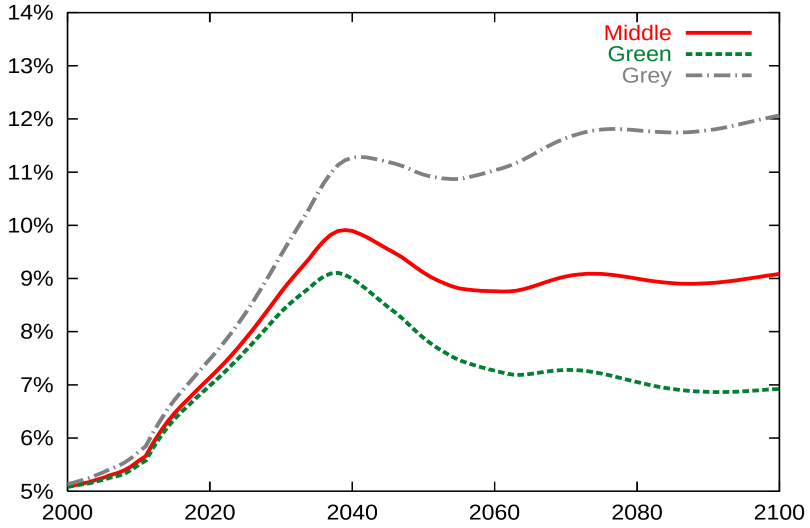


Fig. 5 Funded pensions under three demographic scenarios (%GDP)

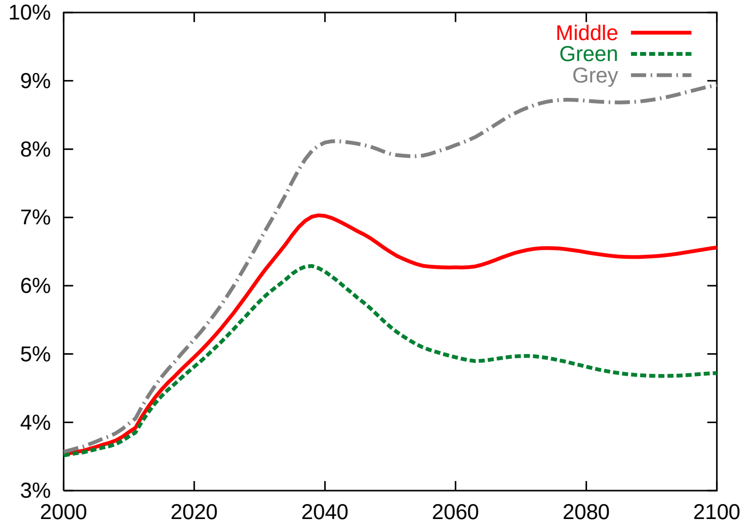


Fig. 6 The income tax rate under three demographic scenarios

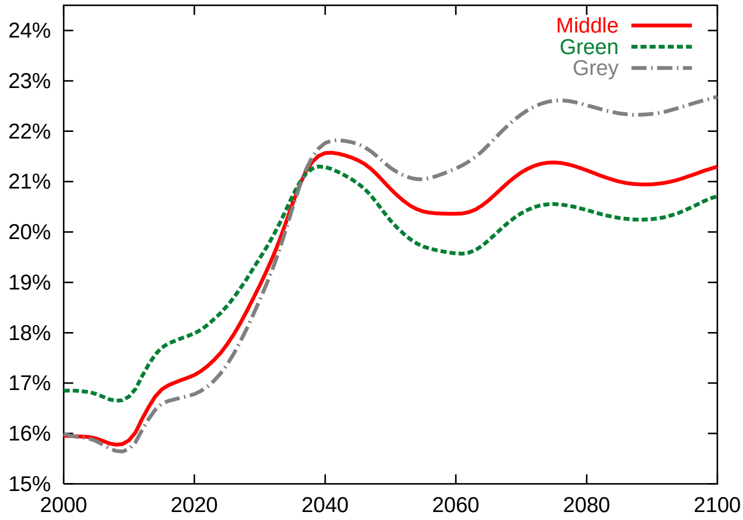


Fig. 7 Investment and national saving under the demographic *middle* scenario (%GDP)

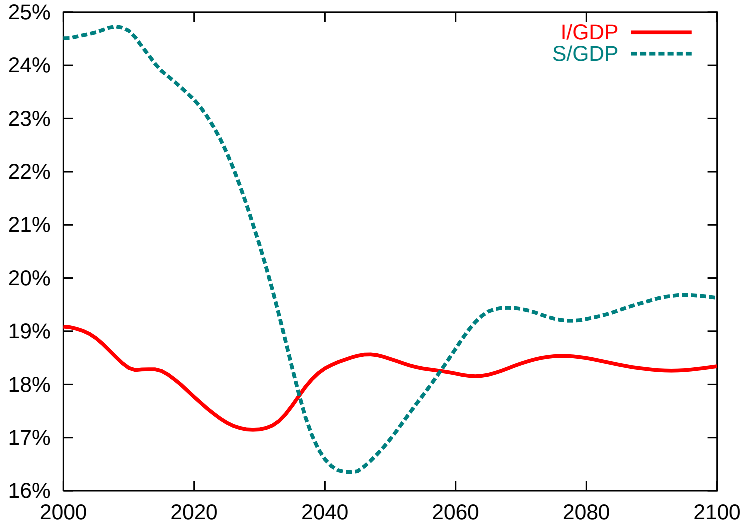


Fig. 8 The current account under three demographic scenarios (%GDP)

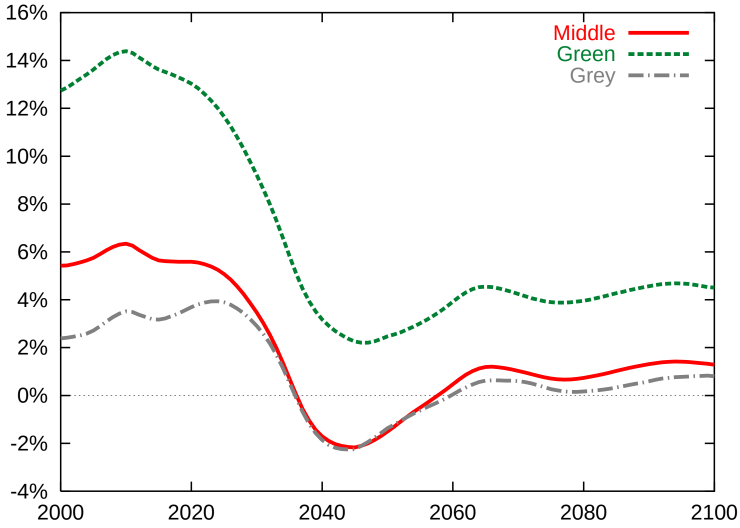


Fig. 9 Foreign assets under three demographic scenarios (%GDP)

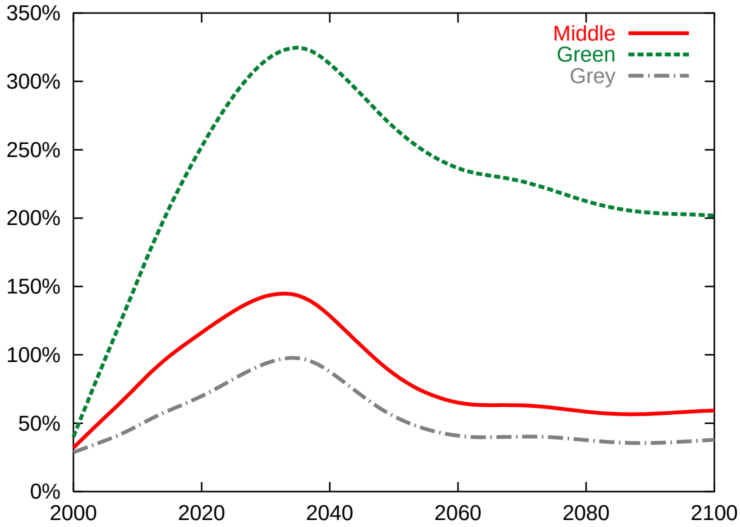


Fig. 10 Pension saving, personal saving and the current account with a constant interest rate (%GDP)

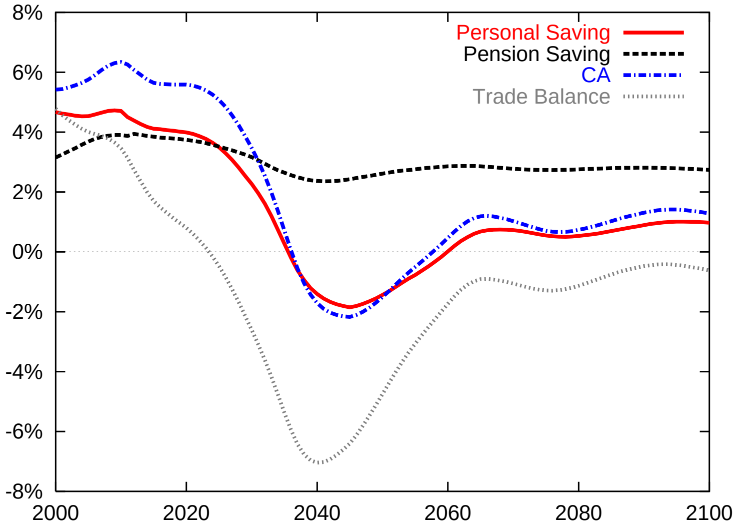


Fig. 11 Pension saving, personal saving and the current account under the INGENUE interest rate scenario (%GDP)

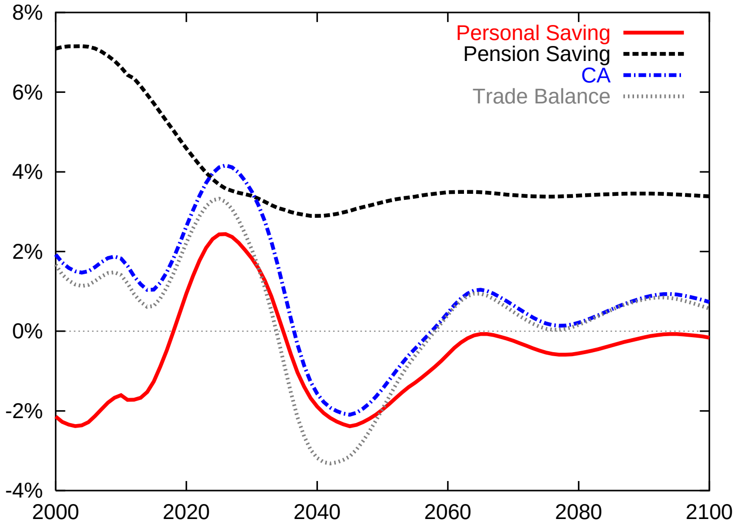


Fig. 12 Pension saving, personal saving and the current account under the KSW interest rate scenario (%GDP)

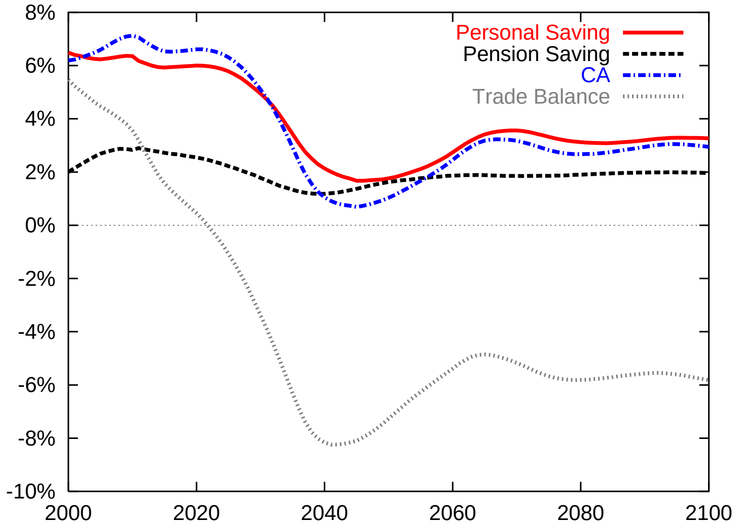
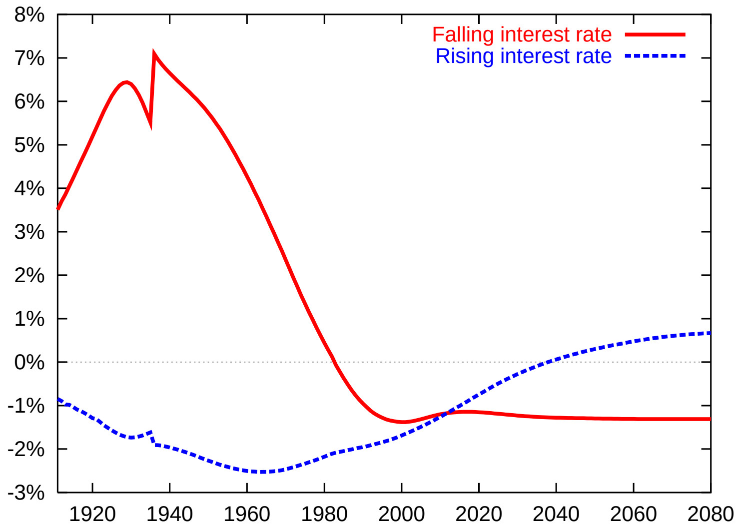


Fig. 13 Compensating Variations for the two interest rate shocks



Note: year of birth is on the horizontal axis. CV is expressed as percentage of remaining lifetime wealth on the vertical axis. CV is corrected for technological progress.

Fig. 14 Income tax rates in the base case and with tax smoothing

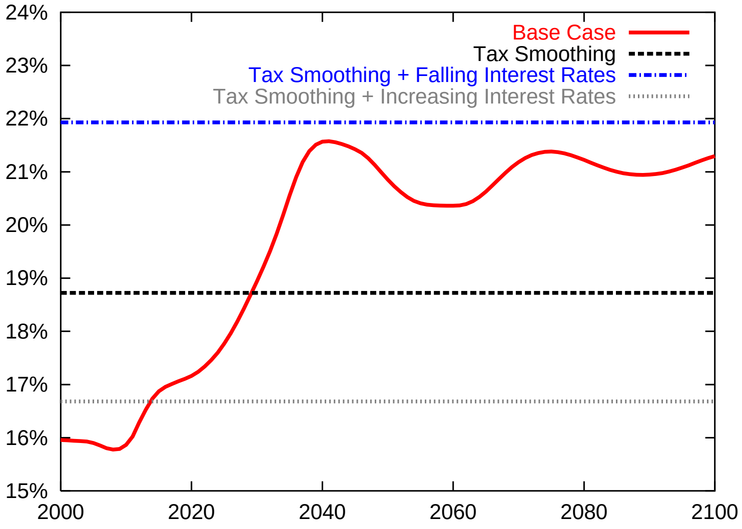


Fig. 15 Government debt with tax smoothing (%GDP)

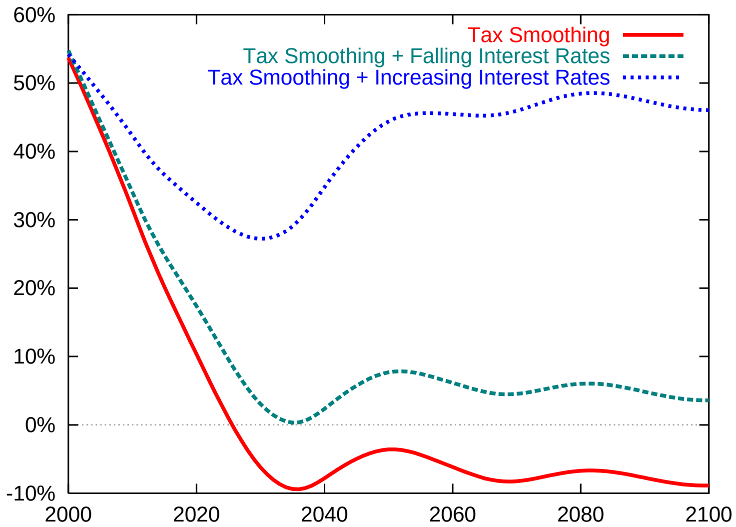
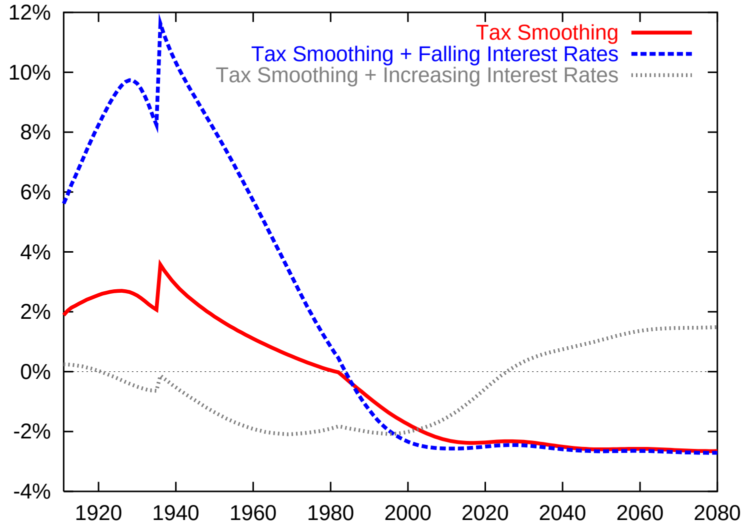


Fig. 16 Compensating Variations for both tax smoothing and tax smoothing combined with an interest rate shock



Note: year of birth is on the horizontal axis. CV is expressed as percentage of remaining lifetime wealth on the vertical axis. CV is corrected for technological progress.

Fig. 17 Participation rate in the base path and after a participation shock

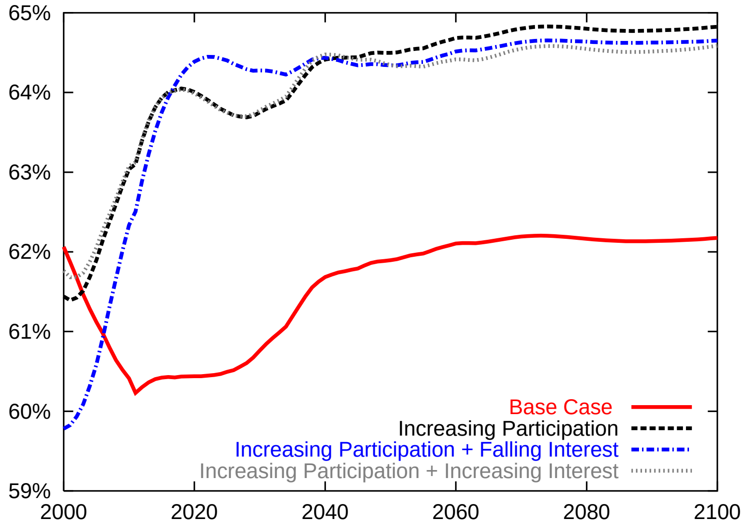


Fig. 18 The income tax rate in the base path and after a participation shock

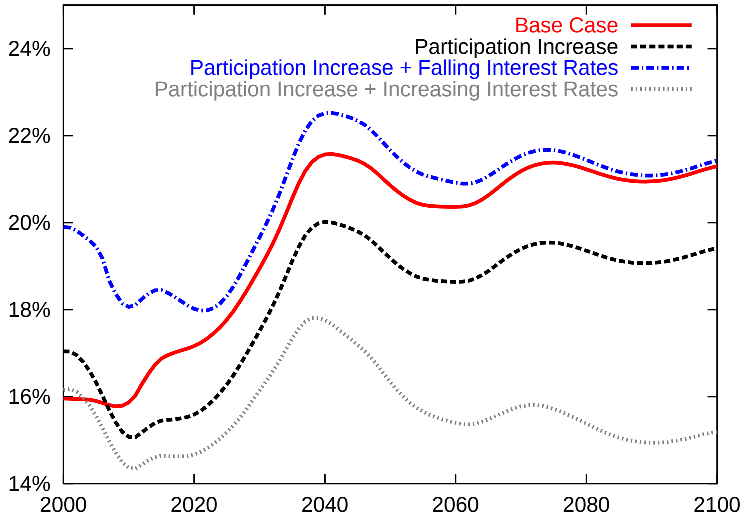
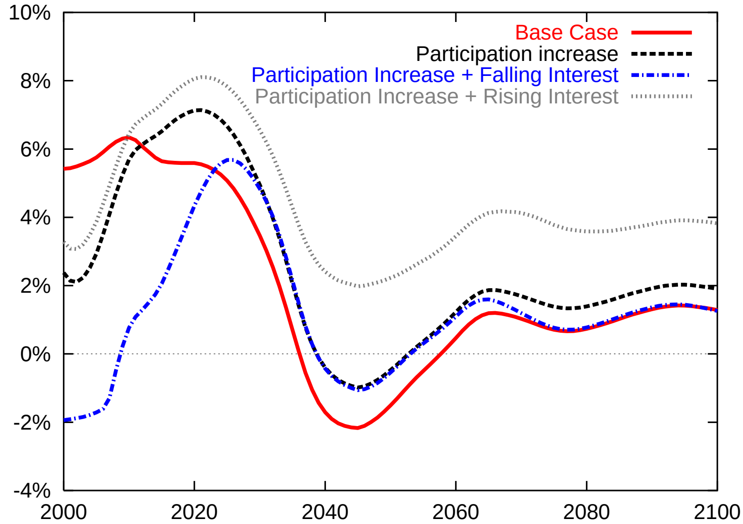


Fig. 19 The current account in the base path and after a participation shock (%GDP)



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