

Occupational Pensions, Aggregate Saving and Fiscal Sustainability in Denmark*

By

Jan V. Hansen
The Danish Insurance Association
Philip Heymans Allé 1, 2900 Hellerup
jvh@forsikringogpension.dk

Svend E. Hougaard Jensen
Department of Economics, Copenhagen Business School
Porcelaenshaven 16A, 2000 Fre deriksberg C, Denmark
shj.eco@cbs.dk

and

Peter P. Stephensen
DREAM
Amaliegade 44, 1256 København K, Denmark
psp@dreammodel.dk

Abstract: This paper studies some macroeconomic and fiscal effects following a hypothetical experiment of gradually abolishing the occupational pension system in Denmark. Specifically, we explore the sensitivity of these effects to alternative assumptions about the response of private saving to changes in mandatory saving. The paper also examines the implications for public finances of alternative schemes of taxation of pension savings. Finally, the paper studies whether the maturation of the occupational pension system would backlash on retirement behaviour through a wealth effect on the retirement decision.

Keywords: Occupational pensions, aggregate saving, fiscal sustainability, capital income taxation, retirement

DRAFT - PLEASE DO NOT QUOTE WITHOUT PERMISSION FROM THE AUTHORS

June 2015

-
- Paper prepared for PeRCent's first annual conference, "Taking the Danish Pension System to the Next Stage", held at Copenhagen Business School, June 16, 2015. Comments from Søren Bo Nielsen are gratefully acknowledged. We thank Andreas Østergaard Iversen for highly competent modelling of the experiments carried out using DREAM and Þorsteinn Sigurður Sveinsson for excellent research assistance.

1. Introduction

The task of achieving long-term fiscal sustainability is to a considerable extent complicated by the fiscal strain posed by ageing populations and uncovered expected financial liabilities associated with future public sector outlays to pensions, health care etc. Evidently, this calls for an active reform agenda, such as postponing the retirement age, restructuring the pension system to rely more heavily on (individual as well as collective) retirement savings by households, etc.

In Denmark, the pay-as-you-go public pension system has recently been revised in line with international reform trends (see, e.g., Holzmann, 2013). For example, the retirement age is now linked to changes in longevity, and nominal pension benefits are (temporarily) indexed to changes in prices rather than wages. Denmark has also developed a funded, private pension system, which is based on mandatory, occupational pension (OP) schemes covering the blue-collar segment of the labour market. These schemes were launched in 1987, as a grand agreement between social partners backed by the government (“Fælleserklæringen”), and with contributions to the schemes taking effect from 1992.¹

By growing out of negotiations between trade unions and employers’ federations, as part of the collective wage bargaining process, the Danish OP system differs from the set-up in most other countries, where OP systems typically have been introduced as part of the legislative process. This unique feature of the Danish OP design may well have enhanced its legitimacy, by improving citizens’ confidence in their pensions and by helping citizens to better understand and appreciate the necessity of saving for retirement. By having pensions and wages integrated in the same bargain, workers might find it easier to accept wage moderation. Most likely, it is a better deal to opt for larger contributions to the pension fund than increases in wages which could lead to macroeconomic instability (“job party” rather than “wage party”). Similarly, from employers’ viewpoint, an integrated bargain is likely to help securing the competitiveness of firms (Due and Madsen, 2003).

¹ This paper concentrates on the blue-collar segment as it embodies a number of unique characteristics of potential interest to other countries. White-collar workers and public employees have been covered by OP schemes since the 1950s.

The OP system has not yet reached a steady state, as total contributions are significantly higher than the benefits received by retired scheme members. The size of the accumulated OP funds currently amounts to about 140% of GDP, and is expected to increase to about 180% of GDP by year 2040. The status of being an incompletely matured funded pension system has major implications for the tax base of the personal income tax in the transition period. This is because contributions to the OP schemes are deductible in the personal income tax, whereas pension payments from the pension funds are taxable at the personal income tax rate.

More generally, in the process of saving via an OP system, taxation can appear at different stages, namely when (a) money is contributed to the fund; (b) investment income and capital gains accrue to the fund; and (c) retired scheme members receive their benefits (Whitehouse, 2005). The Danish OP system is subject to a so-called ETT regime: tax exemption (E) occurs at the time of contribution, fund income is taxable (T) and benefits are taxed when paid out (T).² This feature implies that the personal income tax base is relatively low in an economy with incompletely matured pension funds, due to high contributions to and low pension payments from the funds. However, the tax base is increasing through time as the pension funds mature, and this implies that the government possesses an implicit asset. For a given initial level of the public debt, this serves to dampen the fiscal adjustment needed to meet the projected increase in the age-burden.

The projected development of the occupational schemes will have a substantial effect on the Danish economy's ability to cope with the demographic changes. Indeed, provided the existing ETT regime remains in place, previous studies have shown that the tax revenues related to pension funds more or less match the increase in the expenditures caused by changes in the age structure (Hansen and Jensen, 2012). This clearly removes an important part of the increase in the tax burden that would otherwise have been placed on future wage earners in order to finance the deficit. Thus, although it could be argued that the introduction of funded schemes came a bit too late to fully match the increase in expenditures driven by ageing of the

² However, in 2013 a new pension scheme, so-called "age pensions", was established, which is basically a TTE scheme.

large post-war generations, the risks of generational conflicts seem smaller in Denmark than in many other countries. However, this attractive property could easily be undermined if the relevant tax revenues are front-loaded and allocated to other categories of spending so that the required revenues are not available when needed in the future.

Overall, the Danish OP schemes are thus widely regarded as highly successful: they have contributed substantially to restoring fiscal sustainability, helped averting chronic imbalances on the current account and reduced poverty among the elderly.³ Yet, the system faces a number of challenges:

First, the continued success of the model strongly depends on consistency between the public pay-as-you-go part (first pillar) of the general pension system, the OP part, and the tax and welfare system more generally. This phenomenon is closely related to what is often referred to as a problem of a poverty trap. In particular, citizens must feel certain that their (private) benefits from the occupational schemes will not be fully offset by cuts in their public pension benefits. Here the phenomenon of means-testing is critical: means-testing public pension benefits would not only allow governments to target poor pensioners but also to keep the public pension expenditures under control. However, a means-tested pension scheme may distort savings: those eligible to means-tested benefits have a lower incentive to save since the effective return on private retirement savings is reduced relative to those who are not eligible (Fehr and Uhde, 2014; Fehr, 2015). The challenge really is to (a) preserve a saving-friendly climate, (b) keep the pension expenditures under control and not least (c) keep the basic PAYG benefit sufficiently high to avoid poverty among the elderly.⁴

Second, the OP system may face a threat operating through tendencies towards a falling degree of unionization and a “zeitgeist” against collective, mandatory arrangements. Also, the existence of a poverty trap through means-testing of pension benefits may significantly reduce the incentive to save for retirement. While

³ Ministry of Economic Affairs and the Interior (2015).

⁴ In order to address this problem of a poverty trap, a Pension Commission has recently been formed (Pensionskommissionen, 2015).

this is not a threat visible in the short term, we nonetheless seek to investigate how the Danish economy would be expected to respond to the hypothetical situation where the contributions to the occupational pension system are gradually faded out. To study how such a *de facto* abolishment of the occupational pension system may affect the macroeconomic and fiscal stance of the Danish economy we use the dynamic general equilibrium model for the Danish economy, DREAM. This is a model featuring overlapping generations of households that plan their behaviour in a way consistent with rational expectations. A key aspect of this study is the extent to which saving through the occupational pension system is an imperfect substitute for private savings.

Third, the occupational pension system may also be challenged by the continued debates about rules of taxation. While several studies indicate that fiscal policy in Denmark is on a sustainable path (see, e.g., Ministry of Finance, 2014), a so-called “hammock problem” has been pointed out. This refers to the shape of the projected time path of the structural balance over next four decades or so: in the beginning, from 2015 until 2022, the structural balance is improving, and this is followed by two decades of deterioration. After 2045, public finances are improving again. Over many years, beginning in 2025, the structural deficits will breach the allowed threshold (0.5% of GDP) set by the EU’s fiscal compact and the Danish “budget law”.

A number of suggestions have been put forward to overcome the hammock problem (see, e.g. Economic Council, 2014). One possibility is to try to convince the EU that Denmark’s fiscal situation is special due to the magnitude of occupational pension funds and the associated large amounts of deferred taxes. Hence, it would make sense to allow Denmark to deviate from the general fiscal rule and be subject to a milder treatment than countries without similar volumes of implicit assets. Alternatively, it might be worth considering a conversion from the ETT to a TTE principle of taxation, as is more common in the EU. Therefore, we simulate the effects of such a tax reform, also using the DREAM model. Another possible step could be to advance the retirement reform as already agreed across a broad political spectrum. A motivation for accelerating the retirement reform is that longevity in

fact grows faster than assumed back in in 2006 when the first welfare reform was agreed.

From here the paper proceeds as follows. Section 2 briefly outlines our analytical framework: the DREAM model. Section 3 addresses the effects of gradually abolishing the occupational pension system. In Section 4 studies the implications of replacing the ETT system with a TTE design. Section 5 examines to what extent the maturation of the occupational pension system could be expected to backlash on retirement behaviour through a wealth effect on retirement decisions. Finally, Section 6 draws out some overall conclusions and policy lessons.

2. The Analytical Framework: the DREAM Model

Since the main results of this paper are derived using the DREAM model of the Danish economy, we begin with a brief outline of that model. DREAM is a dynamic macroeconomic CGE model with overlapping generations of households. Specifically, there is a representative household for every age group (17-101 years). As an example, the 30-year-old household consists of all 30-year-old males, all 30-year-old females and their children. The representative household demands goods, services, energy and housing, and it supplies labour. Well-specified income profiles can be generated for the lifetime of each representative household. From the population projection, the number of people in each household/generation is known. We also know the number of people in the workforce and the number of people receiving income transfers.

The general wage level in the model is endogenously determined at the macro level. For each individual generation, the relative wage is determined by the individual productivity which is distributed across gender, age and origin. This productivity is calibrated in the base year using wages generated from register data and distributed across gender, age and origin. Income transfers are based on the current rules and indexed in line with the development of the general wage level. Households pay income tax according to a non-linear tax function estimated from register data. The tax function replicates the actual tax system and allows for studying changes in tax rates and brackets.

Retirement in DREAM is exogenously determined. In forecasts, a rather mechanical rule is applied: The base year information on transition from labour force participation to early retirement pay and public pensions for the age range 60-67 years is in the forecast indexed with the development of the earliest public pension age – today 65 years and gradually increasing to 72 years in 2050. Furthermore, in the forecast it is taken into account that the early retirement pay scheme is reduced from duration of 5 year to 3 years.

Given the focus of this paper, DREAM's treatment of pensions is particularly important. Pensions in DREAM are calculated in a large independent module that takes the correct actuarial regulations into account. The public pay-as-you-go system ("1st pillar") is modelled in line with current and projected future benefit rates and eligibility criteria. Households are assumed to pay an age-specific share of wages to occupational pensions ("2nd pillar") and private pensions ("3rd pillar"), respectively. Non-public pensions consist of life annuities ("livrente"), capital pension schemes ("kapitalpension") and periodic installments ("ratepension"). This ensures that the model generates a reasonable estimate of the future developments in the Danish pension system, including future tax payments from pension payments.⁵

In the DREAM model public expenditures consist of three basic components: collective public consumption, individual public consumption, and income transfers. These components are modelled separately in DREAM. First, collective public consumption is assumed to follow GDP in DREAM's base scenario. In alternative scenarios, collective public consumption is typically assumed to be given by its level in the base scenario.

Second, individual public consumption is divided into four categories, equivalent to the division in the national accounts: health care, social care, education, and leisure, culture etc. These four variables are projected in line with demographic developments. Based on register data, the cost of a person of a given gender, age and origin is calculated. For social care, education, leisure, culture etc., it is assumed that the average cost per person increases with the underlying growth rate of the

⁵ In addition to pensions, households hold savings in housing and in securities (bonds and shares). These last two types of savings are endogenously determined in the macro model.

economy, reflecting that the level of service will rise with the general increase of wealth in the economy. The projection of the costs of health care and care for the elderly is adjusted to follow the development in life expectancy. This is due to the fact that the cost of health care increases substantially in the terminal phase as most expenditures fall in the last years before death. Moreover, it is assumed that the cost of health care services and the part of social care services that is related to care for the elderly, will grow at an additional 0.3% the next 25 years. This reflects the observed additional growth of these costs since 1995. In other words, it is assumed that the historical trend in the cost of health care will continue but that the cost will be controlled in the long run.

Third, income transfers are divided into 13 sub-categories.⁶ The number of people outside the workforce receiving the different income transfers is determined by the socioeconomic projection. Within the workforce, the ratio between employed and unemployed is determined by the macro model. As previously mentioned, the socioeconomic projection incorporates the 2006 welfare reform and the 2011 “follow-up” retirement reform. This is of crucial importance to the projection of income transfers.

Finally, the DREAM simulations report an indicator of sustainability, given by the permanent improvement to the primary public budget that is necessary in order for the public sector to meet its intertemporal budget constraint. The sustainability indicator is thus a measure of the size of the changes in economic policy that are necessary in order to ensure that the public sector does not generate a deficit in the long run. It should be noted that the sustainability indicator does not specify which changes in economic policy should be made.

3. Abolishing the Occupational Pension System

To study the significance of the OP scheme, we consider a scenario where the contributions to the OP system are immediately abolished. As a starting point, Table

⁶ Unemployment benefits, student aid benefits, leave benefits, maternity benefits, sickness benefits, activation benefits, cash benefits (“kontanthjælp”), transitional benefits (“overgangsydelse”), early retirement pay (“efterløn”), early retirement pensions (“førtidspension”), public pensions, civil servants earned pensions, and introductory benefits (“introduktionsydelse”).

1 reports the order of magnitude of the accumulated pension funds in Denmark, showing the development of the size and structure of the funds over the period 1998-2013, and differentiated by the type of investor.

Table 1. Accumulated Pension Savings in Denmark, 2000-2013 (billions of DKK)

Investor	1998	2000	2005	2010	2013
1. Life insurance companies	511	650	953	1.351	1.757
2. Multi-employer pension funds	214	270	381	478	585
3. Pension funds, firms	38	43	42	51	53
4. Banks	191	215	298	405	445
5. Public pension funds	255	330	479	817	741
a. ATP	200	247	365	758	677
b. SP	6	21	51	2	0
c. LD	49	62	64	57	64
Total	1.463	1.837	2.634	3.103	3.581
Share of GDP	1,23	1,38	1,66	1,73	1,90

Source: Finanstilsynet (Danish FSA)

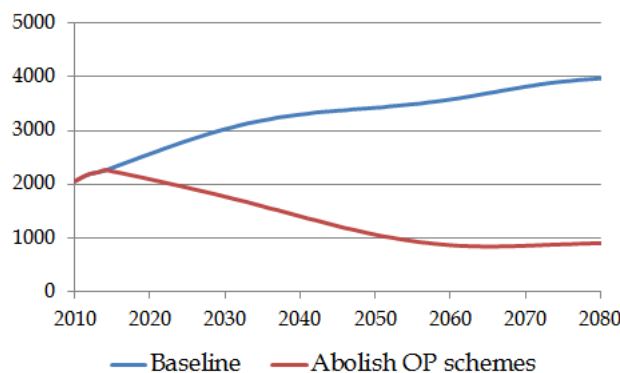
Over the period of 15 years, total assets intended for financing future funded retirement pensions have increased from constituting nearly 125% of GDP in 1998 to nearly twice the size of GDP at the present time. Of the total assets in 2013, life insurance companies and private labour market pension funds (rows 1-3 in Table 1) constitute about two thirds, banks (row 4) hold approximately an eighth part, while the remaining fifth is held with the public labour market pension funds (rows 5a-5c). The share of assets invested through banks have been almost constant over the period, while the share held by the public labour market pension funds (primarily ATP) has fallen slightly. Correspondingly, life insurance companies and private labour market pension funds have strengthened their position as investors of pension savings.

In what follows we study the effects of abolishing the contributions to a selection of the pension funds reported in Table 2. Specifically, with effect from year 2015, we consider a previously unexpected and immediately implemented “hard stop” of contributions to a certain share of the funds (as listed in rows 1-3 in Table 1) which in

a meaningful way can be thought of as OP schemes.⁷ Clearly, for schemes where contributions become zero, the funds will gradually be drained. The speed of this process depends on the real interest rate, prevailing tax rules and the time profile of the payment of benefits to members of the respective pension funds.

Figure 1 illustrates, in a stock-flow consistent manner, what happens with the funds over a period of 65 years (from 2015 up to 2080) in two alternative scenarios. First, if contributions are made according to business as usual (baseline, blue graph), the accumulation of funds continues and the stock would in year 2080 be twice as large as in 2015. Second, if the OP schemes are abolished (red graph), the funds dry out (red graph). Notice that the funds do not go down to zero, as not all of the schemes reported in rows 1-3 in Table 1 have been identified as OP schemes.

Figure 1. Projected Time Path of Private Pension Funds: Baseline vs. Abolishment of OP Schemes



Phasing out the OP system means that working-age people instead of contributing to a pension fund would have a larger disposable income available for current consumption. An important question then is how households would react: would they spend all the additional disposable income? Or would the amount be offset by a one-to-one increase in private, individual saving arrangement? The actual response would probably lie somewhere in between.

Evidently, in a scenario with a private saving offset of 100%, i.e. where households respond by saving all the unleashed OP savings through fully private arrangements,

⁷ A more detailed treatment of pension contributions can be found in Appendix 1.

the total private saving profile (voluntary plus mandatory) will coincide with that of the baseline and correspond to a “zero shock”.

The empirical literature has not been able to bring out a clear message on how private savings respond to changes in mandatory savings. A number of studies have been conducted using US data. For example, Feldstein (1974) found that an additional dollar of social security would offset 30-50 cents of private savings. Later, Gale (1998) found offset effects of about 80%, and Attanasio and Rohwedder (2003) report offset effects somewhere in between the results found by Feldstein and Gale. Turning to estimates of the offset effect on other private savings from IRAs and 401(k)s, they range from little or no offset (Poterba, Venti and Wise, 1995, 1996) to close to full offset (Engen, Gale and Scholz, 1996; Attanasio and DeLeire, 2002). Again, there are findings in between such as Hubbard and Skinner (1996) and Benjamin (2003).

The question as to whether mandatory pension savings crowd out private savings has also been investigated using Danish data. In a study by Arnbjerg og Barslund (2012) it is found that contributions to mandatory OP schemes result in a reduction in private voluntary savings of 0-30%, depending on age. This clearly indicates little substitutability between current mandatory labour market pension savings and private voluntary savings. Similarly, in a major study by Chetty et al. (2014) it is found that only 15% of Danes respond actively to retirement savings policies.

Thus, there is strong evidence to believe that mandatory labour market pension schemes are effective at raising aggregate saving. Or, put differently, by giving up contributions to the OP system, this empirical evidence suggests that net saving would fall substantially. In what follows, we assume that private saving increases by approximately 50% of the fall in mandatory saving. This assumption has been used in the calibration of the DREAM model in the baseline scenario.⁸

⁸ In fact, DREAM is a model where household behaviour is governed by intertemporal optimization and rational expectations. Within such a setting it is hard to believe that households should not revise their voluntary saving plans following (major) changes to their mandatory saving. In future work we plan to investigate how the calibration of household behaviour in dynamic general equilibrium models (such as DREAM) can be better reconciled with recent empirical evidence.

Table 2 summarizes the macroeconomic effects over a period of 50 years following a gradual abolishment of the OP schemes. An index for each variable is reported where the outcome in the base year (2009) has been normalized at 100. Apparently, the experiment only leads to minor effects on the level of output and employment. However, the composition of aggregate demand changes significantly. Indeed, private consumption and investment demand increase, and net exports fall. This occurs because a large share of the increase in private consumption takes the form of imported goods and exports fall considerably as international competitiveness weakens.

Table 2. Macroeconomic Effects of Abolishing Occupational Pensions

	2009	2015	2020	2025	2030	2040	2050	2060
	Index, baseline=100							
GDP	100,0	100,4	100,3	100,4	100,4	100,4	100,2	100,1
Private consumption	100,0	103,1	103,7	104,0	104,2	104,1	103,2	102,6
Investment	100,0	103,5	102,1	101,2	100,8	100,3	100,2	100,1
Public spending	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
Export	100,0	97,0	96,2	96,4	96,3	96,4	97,1	97,7
Import	100,0	101,2	101,1	101,2	101,3	101,2	100,9	100,6
	Index, baseline=100							
Employment	100,0	100,1	99,8	99,8	99,8	99,8	99,8	99,8
Private	100,0	100,0	99,6	99,6	99,6	99,6	99,6	99,6
Public	100,0	100,1	100,1	100,1	100,1	100,1	100,1	100,1

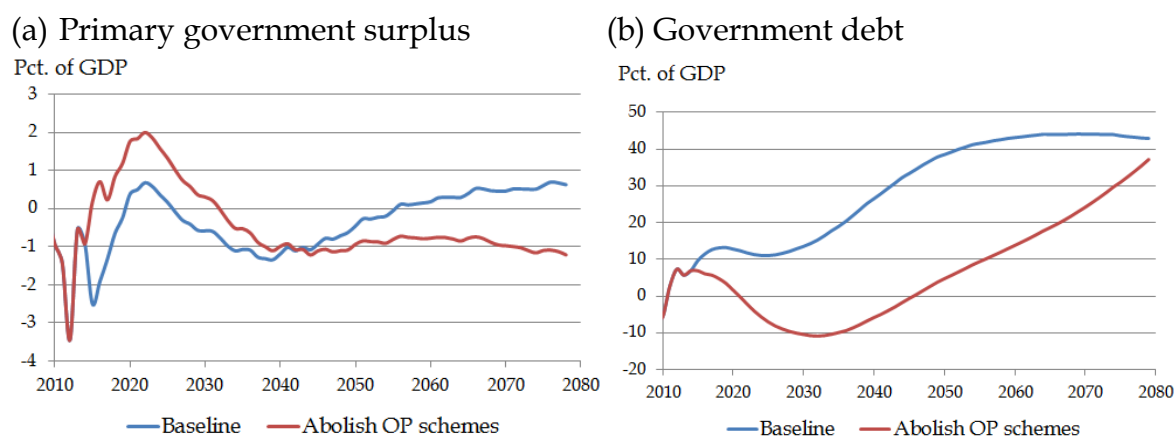
Source: DREAM, own calculations

While the general macroeconomic effects are modest, the fiscal effects are considerable. Figure 2 summarizes the effects on the primary government budget (left panel) and government debt (right panel). In order to understand the fiscal effects, it is crucial to understand the model of taxation of the funded pension system in Denmark. As stated above, tax exemption (E) occurs at the time of contribution, while fund income and benefits are taxable (T, T), hence referred to as an ETT regime of taxation.

The existing ETT regime is the reason why public finances will improve in the short-to-medium term where households do not exempt as many contributions from taxation as in the baseline scenario. The strengthening of public finances shows up as (a) an increase in the primary surplus and (b) a fall in government debt. Over time,

however, tax revenues will fall, simply because the tax base of the OP schemes is fading out. In the baseline there will be a long period characterized by deficits on the primary balance, a trajectory largely determined by the demographic dependency ratio. As Figure 2 shows, abolishing the OP schemes would lead to stronger public finances compared to the baseline scenario for quite a long period, up to the end of the 2030s. In the long term, however, public finances will be stronger with the OP system (and the ETT regime) in place.

Figure 2. Effects on Public Finances: Baseline vs. Abolishment of OP Schemes



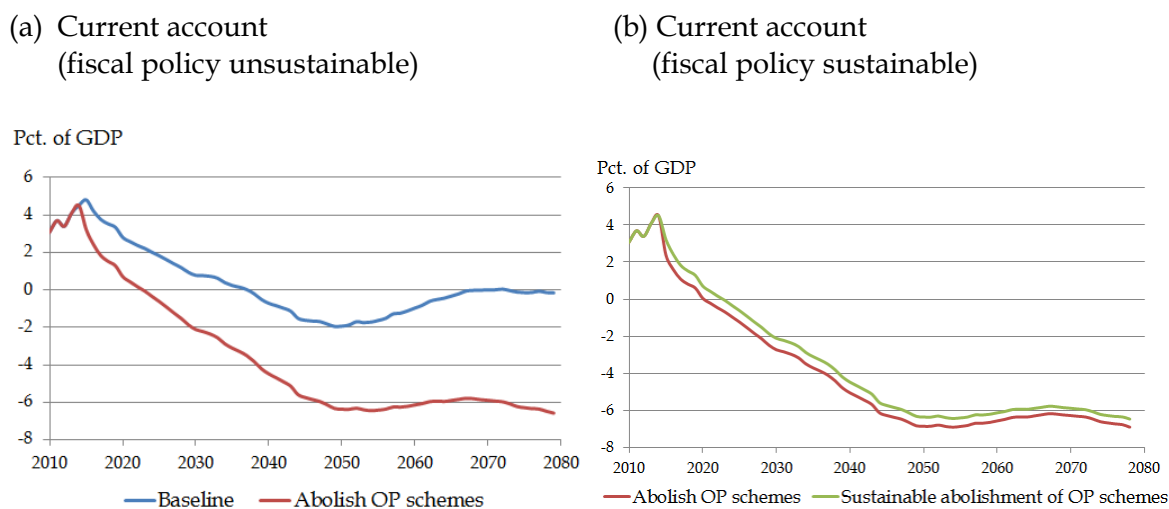
Overall, it is evident that the OP schemes play a major role for the behaviour of public finances in Denmark. It is also clear that a major trade-off is involved: by sacrificing the OP schemes, improvements to public finances can be made in the short term, but only at the expense of weaker public finances in the longer term. This clearly raises the question as to how abolishing the OP scheme would affect the long-term stance of fiscal policy.

To answer this we compute the sustainability index, i.e., the permanent improvement of the primary budget (measured as a share of GDP) that is needed to guarantee that the government's intertemporal budget constraint is satisfied. In fact, while the sustainability index in the baseline amounts to -0.07, indicating that fiscal policy is almost sustainable (a minor tightening of 0.07% of GDP is required), we find that the sustainability index equals -0.93 in the alternative scenario of phasing out the OP schemes. This implies a need for a fiscal tightening to keep public finances on a sustainable path at the magnitude of 14,8 billions of DKK (2013 level).

The bottom line is that an abolishment of the OP scheme is associated with a substantial worsening of public finances.⁹

More generally, the macroeconomic trajectory reported in Table 1 is associated with an unsustainable path of fiscal policy. Furthermore, as Figure 3a shows, the projected development following an abolishment of the OP schemes leads to a marked deterioration of the current account. By dismantling the OP schemes, private consumption increases considerably, part of which is fulfilled by imports. Also, the induced wage pressure leads to a deterioration of international competitiveness. With effect from about year 2020, the current account turns into deficit. So, not only does public debt become unsustainable, the experiment also leads to a dramatic fall in aggregate saving and, correspondingly, to a large increase in national indebtedness.

Figure 3. Effects on the Current Account: Abolishment of OP Schemes

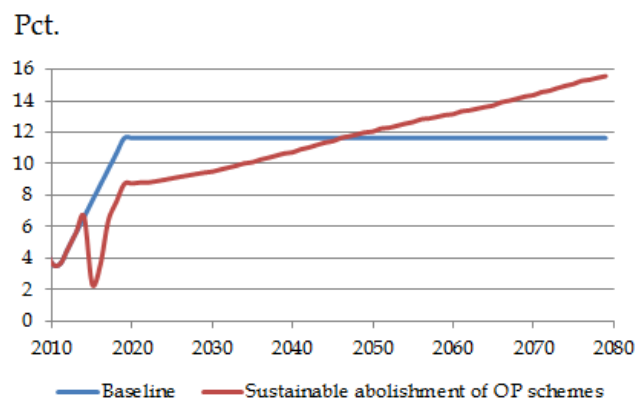


From a policy perspective our findings suggest that implementing a funded pension system in line with the Danish OP scheme would be a recommendable way of overcoming the problem of twin deficits. Our analysis thus leads to an important policy implication for countries struggling with both fiscal deficits and deficits on the current account. This is indeed a situation relevant to several members of the euro area in Southern Europe.

⁹ See Andersen, Jensen and Pedersen (2008) for an earlier study of the importance of the OP schemes for sustainability of fiscal policy in Denmark.

In order to shed further light on the sustainability issue, we conduct an alternative experiment of abolishing the OP schemes. Specifically, by adjusting the first-tier (basic, or lowest) tax rate, it is guaranteed that the sustainability of fiscal policy in the baseline scenario is carried over to the abolishment scenario. Figure 4 shows the time profile of the basic tax rate in the baseline and the “sustainable abolishment” case, respectively.

Figure 4. Projected Time Path of the Basic Tax Rate: Baseline vs. Sustainable Abolishment of OP Schemes



Evidently, due to the significant improvement of the primary budget in the first decades following the abolishment of the OP schemes, there is room for cutting the basic tax rate. Indeed, this is the case in three decades, until year 2045, and then the basic tax rate has to increase (and keep increasing) above the rate in the baseline scenario. By 2080, for example, the basic tax rate in the sustainable OP scenario exceeds the basic tax rate in the baseline scenario by nearly five percentage points.

Clearly, changing the basic tax rate by such magnitudes would have macroeconomic effects, as reported in Table 3. In particular, in the short term there is an upsurge in private consumption, reflecting not only that the OP schemes are abolished but also that the basic tax rate falls. Both shocks serve to increase disposable income and therefore boost private consumption.

Table 3. Macroeconomic Effects of Abolishing Pensions and Adjusting the Basic tax Rate to Ensure Sustainability of Fiscal Policy

	2009	2015	2020	2025	2030	2040	2050	2060
	Index, baseline=100							
GDP	100,0	101,1	100,9	100,9	100,9	100,6	100,2	99,8
Private consumption	100,0	104,9	105,5	105,6	105,6	104,8	103,1	101,9
Investments	100,0	107,4	103,2	101,6	100,9	100,0	99,7	99,5
Public consumption	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
Exports	100,0	96,1	95,6	96,1	96,1	96,4	97,2	97,8
Imports	100,0	102,5	101,9	101,9	101,9	101,5	100,8	100,3
	Index, baseline=100							
Employment	100	100,1	99,8	99,8	99,8	99,8	99,8	99,8
Private	100	100,2	99,7	99,7	99,7	99,6	99,6	99,5
Public	100	99,8	99,8	99,9	99,9	100,1	100,2	100,3

Source: DREAM, own calculations

Notice also the major increase in private investment. Over time, as the basic tax rate starts rising, consumption and investment both fall back, and the external imbalance is gradually diminished. The effect on the current account of keeping fiscal policy on a sustainable path has also been shown with the aid of Figure 3b. While the effects are not large, they are non-negligible. In some sense, this is indicative of the existence of Ricardian Equivalence (or close to it) in this model.

4. *Converting from an ETT to a TTE Regime of Taxation*

This section seeks to further illuminate the fiscal dimension of the OP schemes, by considering the effects of changing the tax treatment of pension savings. As already pointed out, Denmark operates an ETT regime, and from here we study in further detail the effects of shifting, fully or partly, to a TTE regime. The motivation for front-loading the taxation of pension savings could be a wish, or requirement, to satisfy (a) the fiscal compact in the euro area, (b) the Danish budget law, (c) any other fiscal rule calling for short-to-medium term improvements of public finances, or (d) to simply treat pension savings like other forms of savings in the Danish tax system.

As a starting point, we illustrate the fiscal implications of maintaining the ETT system, see Table 4. Two years, 2015 and 2050, respectively, have been picked out for special attention.

Table 4. Old-Age Expenditures and Taxation of Pension Savings (DKK, billion)

	2015	2050	Difference
(a) Changes in age-related expenditures			
Old-age pension expenditures	102,1	107,8	
Old-age service provision	81,9	129,4	
Total	184,0	237,2	53,2
(b) Revenues from taxation of pension savings			
OP schemes: Pension benefits	63,9	134,7	
Income tax revenue of pension benefits	25,5	53,9	
Effect on VAT and other indirect taxes	9,4	19,8	
Phasing-out of pension supplement	2,9	6,1	
Total	37,8	79,8	42,0

Source: DREAM and own calculations

Evidently, outlays to public pensions, health care etc. will increase as a result of ageing of the population. In fact, the number of elderly is forecast to increase by about 80.000 persons from 2015 to 2050, corresponding to an increase of about 10%.¹⁰ (Statistics Denmark, 2015). As shown in Table 4 (top panel), this demographic change leads to an increase in public expenditures by DKK 53 billion. It is noteworthy that while the projected increase in outlays to public pensions is fairly moderate, about 5%, the projected increase in service production amounts to nearly 60%.

An important question is how, and to what extent, the funded pension system could contribute to cover the financing of this major shift in public expenditures. The bottom panel of Table 4 shows this. First, it is worth noting that if the OP schemes are maintained, the total benefits would increase from DKK 64 billion to DKK 135 billion. Under an ETT regime of taxation, and with existing tax rates in place, this would generate an increase in the income tax revenue of the pension benefits from

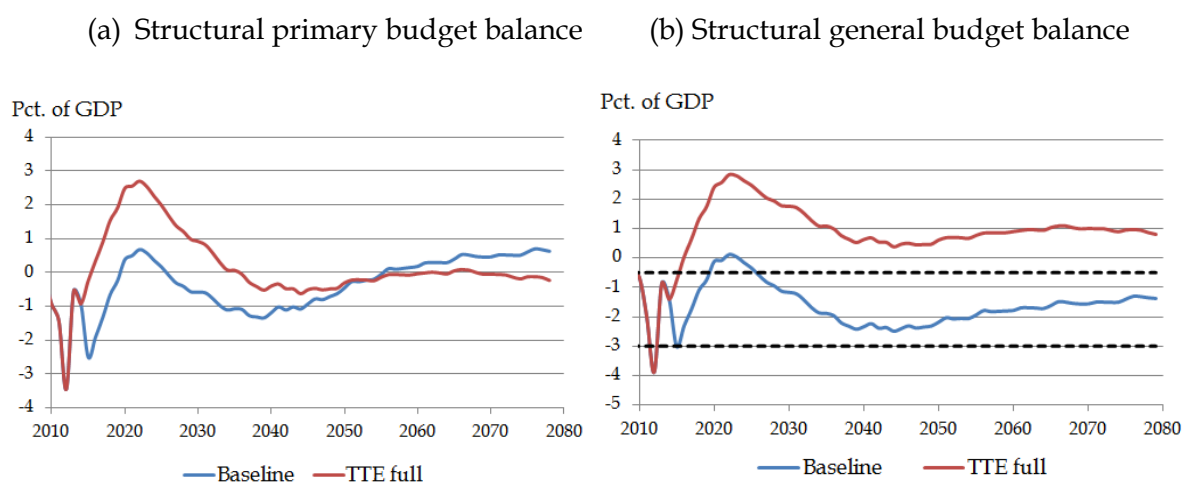
¹⁰ By international comparison, this may be a modest increase in the number of pensioners. This reflects the effects of the Danish welfare reform of 2006 which stipulates an indexation of the retirement age in line with changes in longevity. As a result, the earliest public pension age is projected to increase from 65 in 2015 to 72 years in 2050.

DKK 26 billion to DKK 54 billion. Together with other indirect effects on the revenue side, including larger VAT revenues, there would be an increase in tax revenues amounting to approximately DKK 42 billion.

Despite a large increase in the tax revenue from funded pension benefits, there still is a considerable gap (of more than DKK 10 billion) to be filled.¹¹ Obviously, if the ETT system is replaced by a TTE system, filling this gap becomes even harder. Admittedly, if the government saves the revenues collected from front-loading the taxation of the funded OP schemes, the problem does not (necessarily) arise. One could, however, have serious doubts as to whether policy-makers would display such a high degree of fiscal discipline and forward-looking behaviour.

To gain further insight into the effects of switching from ETT to TTE, we consider an experiment where contributions to OP schemes are taxed when they are paid in, with effect from 2015, and exempted from taxation when paid put. The implied budgetary effects are shown in Figure 5.

Figure 5. From ETT to TTE Taxation: Effects on Public Finances



The figure shows the structural primary budget balance (left panel) and the structural general budget balance (right panel). The dotted lines have been included to indicate the medium-term objective (MTO), as defined in the Stability and Growth

¹¹ In a previous study (Hansen and Jensen, 2012), a more balanced relation between expenditures and revenues was found, indicating that an ETT regime would provide almost simultaneity of (increases in) age-related expenditures allocated to the elderly and tax revenues from the funded pension system.

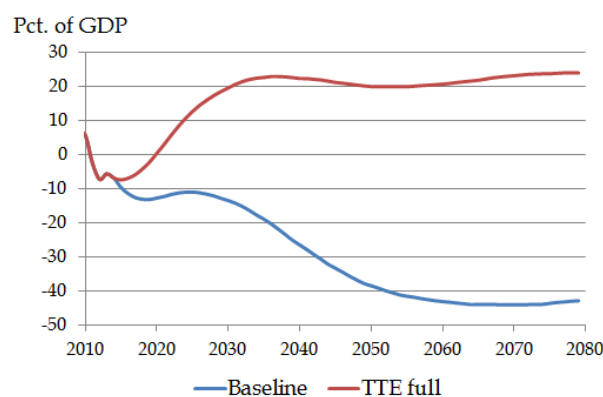
Pact (SGP), with a lower limit of a structural deficit (cyclical effects and one-off measures are not taken into account) of 0.5% of GDP. This limit also equals the deficit limit contained in the Danish so-called “budget law”, as enacted in 2012 (Ministry of Finance, 2012). Moreover, following the Maastricht Treaty and the SGP, the general government deficit must not exceed 3% of GDP, so that limit has been indicated as well.¹²

The baseline scenario shows clear evidence of the so-called “hammock” problem: after a period with relatively strong public finances, this is with effect from app. Year 2025 followed by decades with structural budget deficits in violation of the fiscal compact and the domestic budget law. This has attracted a lot of attention in the Danish policy debate, and concerns have been voiced as to how to address this challenge. Hardly surprising, front-loading the taxation of pension savings has been put forward as one possible way of overcoming the “hammock” problem.

Evidently, front-loading the taxation of pension savings has strong effects on both the primary and general structural budget. Measured as a ratio to GDP, both government budgets are improved by 2.25 percentage points already in 2015 and, in effect, turn positive the same year.

The significant improvements of public finances are also reflected in a fast settlement of public net debt, see Figure 6.

Figure 6. From ETT to TTE Taxation: Effects on Public Net Wealth



¹² The fiscal criteria used in relation to the fiscal compact as well as the Danish budget law are deficits and debt that are conventionally measured and reported. However, a comprehensive balance sheet and permanent income accounting framework for the public sector would allow for implicit assets (and liabilities), such as the present value of deferred taxes (see, e.g., Buiters, 1983).

In fact, by 2020 the government net debt has been completely phased out, and around 2030 the government has a net wealth at the order of 20% of GDP. In effect, interest payments accrue which explains the difference between the general and primary balance shown in Figure 5.

Importantly, the sustainability index is identical in the baseline and the TTE scenarios. This property is clearly sensitive to the rate at which the contributions are taxed. When the rate is set to 44%, the sustainability index equals -0.07 in both scenarios, thus indicating that fiscal policy is not quite but almost sustainable in the long term. A lower taxation of pension contributions clearly gives a lower sustainability index of front-loading.

It should be stressed that the above experiment of front-loading the taxation of pension savings involves *all* funded arrangements.¹³ This across-the-board (OP and individual schemes) implementation explains the massive improvement of the government budget that is immediately obtained as well as the implied fast debt reduction and subsequent accumulation of government net wealth.

As already alluded to, it is a critical assumption that the government saves the additional tax revenues in preparation of meeting otherwise uncovered liabilities associated with providing for the elderly. In reality, however, these revenues might be converted into additional spending programmes in which case the long-term stance of fiscal policy would be weaker than reported above. As Table 4 clearly suggests, the revenues from taxation of pension funds are strongly needed to match the additional expenditures to the elderly (pensions, health care, service etc.), as caused by changing demographics.

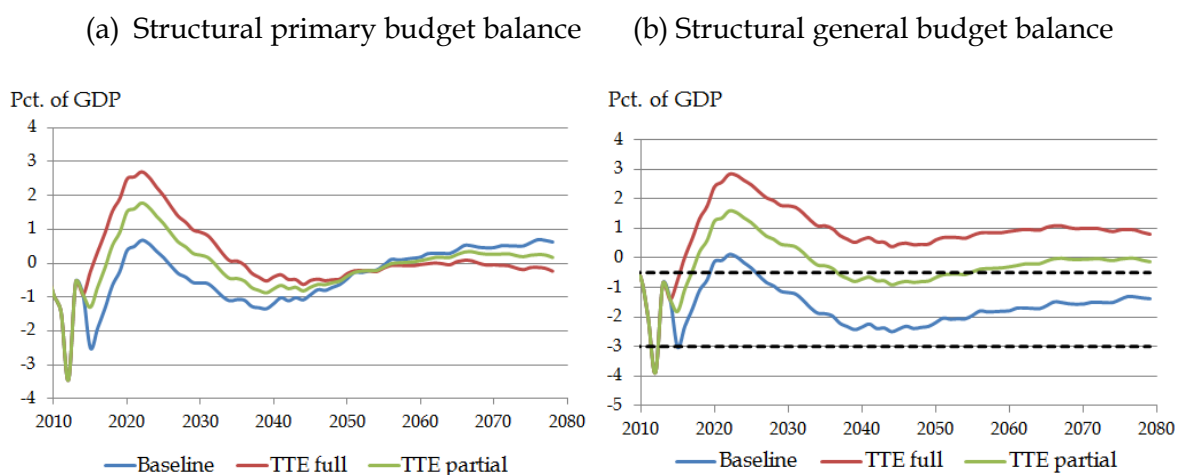
Against that, we continue the analysis with a less far-reaching experiment, characterised by only a partial conversion to the TTE scheme. Specifically, compared to the across-the-board implementation in the previous experiment, front-loading of taxation is here confined to periodic installments. The tax rate is kept at 44%. What insights can be obtained from such a partial and targeted conversion from ETT to TTE?

¹³ Appendix 1 contains a detailed listing of different contribution rates.

First, the long-term stance of fiscal policy is slightly stronger compared to the baseline and full conversion alternatives, as indicated by a sustainable index of -0.06 (% of GDP) – compared to -0.07 (% of GDP) in the baseline.

Second, the budgetary effects of the experiments can be seen in figure 7, again reporting both the structural primary budget balance (left) and the structural general budget balance (right).

Figure 7. Partial Conversion from ETT to TTE Taxation: Effects on Public Finances

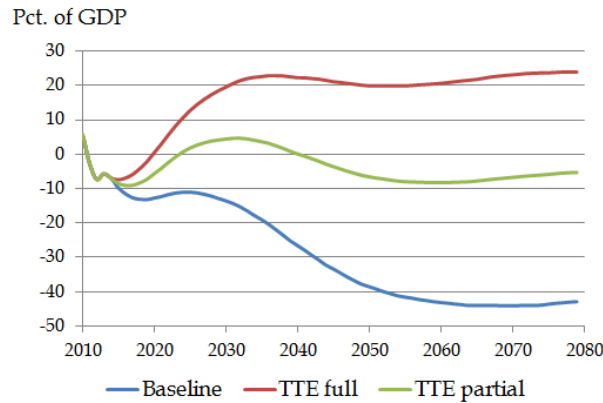


With a partial conversion the budgetary effects become more moderate than in the full conversion case. While a full conversion improves the structural budget by 2.25 percentage points in the first year (2015), the improvement associated with the more targeted experiment amounts to only 1.20 percentage points. With effect from year 2016 both full and partial conversion lead to surpluses on the structural balance. However, it is notable that partial conversion is not enough to guarantee fulfillment of the deficit limit of the fiscal compact and the budget law. Yet, this may not be a serious problem for Denmark, as Member States with a debt ratio significantly below 60% of GDP have been granted a less binding limit of 1.0% of GDP. Specifically, Denmark has been offered a limit of its structural deficit of 0.75% of GDP.

In terms of impact on the public (net) wealth, a partial conversion offers a smoother trajectory compared to the baseline and the full conversion case, see Figure 8. Effectively, the net debt position is close to zero on average, thus indicating that the government does not accumulate wealth available for funding the significantly

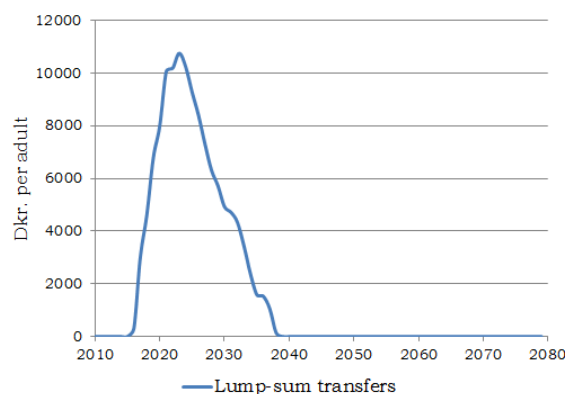
higher expenditures in the future due to population ageing. In fact, in 2050 government net wealth constitutes about 6.5% of GDP, which is still significantly higher than in the baseline scenario.

Figure 8. A Partial Shift from ETT to TTE Taxation: Effects on Public Net Wealth



So far, we have seen that by front-loading the taxation of funded pension schemes, fully or partly, provides a lot of scope for fiscal relaxation in the short-to-medium term. There is a room for manoeuvre, and rather than saving the surplus, thereby preparing for the future pressure on public finances, a short-sighted government might decide to implement a tax relief. In what follows we consider such a scenario, which is designed in the form of a lump-sum transfer from the government to households, see Figure 9.¹⁴

Figure 9. Change in Lump-sum Transfer to Households



¹⁴ A more likely scenario would be a cut in income taxes, or in VAT. This is a more complicated experiment, involving possible responses in labour supply as well as concerns about variability in tax rates (Barro, 1979). In future work we will address such extensions more directly.

This lump-sum transfer has been calculated such that each adult each receives a transfer in the amount of the government budget surplus divided by the number of adults. In carrying out this tax policy, the government must follow a fiscal rule satisfying the constraint that the structural deficit does not exceed 0.5% of GDP.

As shown by Figure 9, this tax and transfer scheme can be maintained in the years between 2015 and 2037. After 2037, there is no longer scope for making such lump-sum transfers, and the transfer is set equal to zero. The budgetary effects of this scenario have been illustrated with the aid of Figures 10 and 11.

Figure 10. Conversion from ETT to TTE Taxation Combined with Tax Relief: Effects on Public Finances

(a) Structural primary budget balance (b) Structural general budget balance

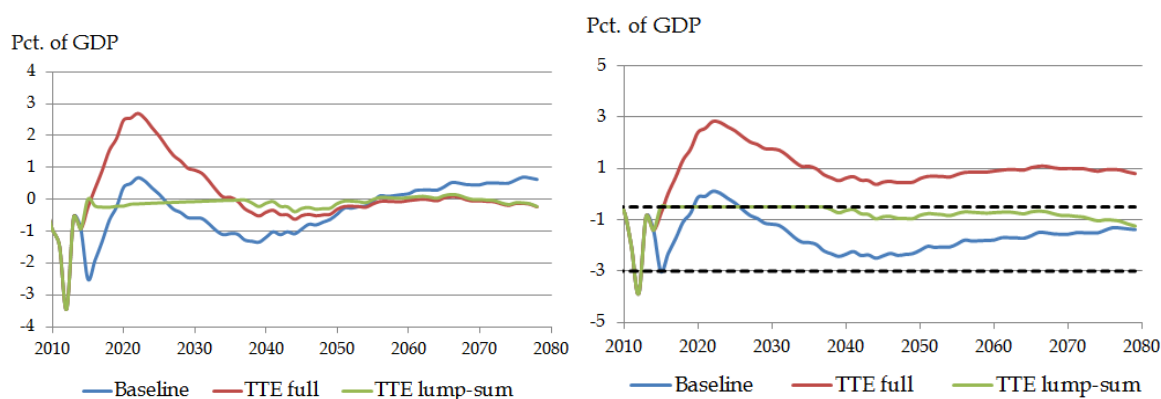
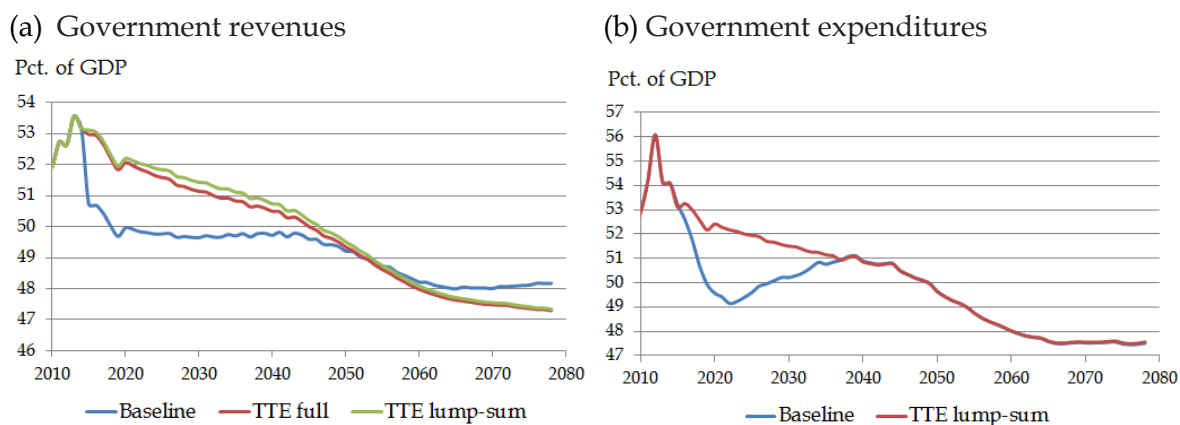


Figure 10 shows (in the right panel) that the path of the general deficit just obeys the fiscal policy rule stipulated by the fiscal compact (or the Danish budget law) until year 2037. After that year, a worsening of the fiscal balance occurs.

In Figure 11, the general budget balance is decomposed into public revenues and expenditures. As shown by Figure 11 (a), it is remarkable that the scenario with lump sum transfers is associated with more revenues compared to full TTE scenario without transfers. This is so because the *de facto* tax relief stimulates more spending by households which, in turn, generates more VAT and other indirect tax revenues. Similarly, Figure 11 (b) shows that government expenditures are considerably higher compared to the other two scenarios over the period when the lump-sum transfer is

paid to households. Before and after the period 2015-2037 period, the expenditures are approximately the same.

**Figure 11: Conversion from ETT to TTE Taxation Combined with Tax Relief:
Effects on Public Finances**



Finally, it should be stressed that despite the compliance with the budget law and the fiscal compact, a policy involving tax reliefs in the amount considered here gives rise to a sustainable index equal to -0.33 – and hence is not sustainable in the long run.

5. Robustness Analysis

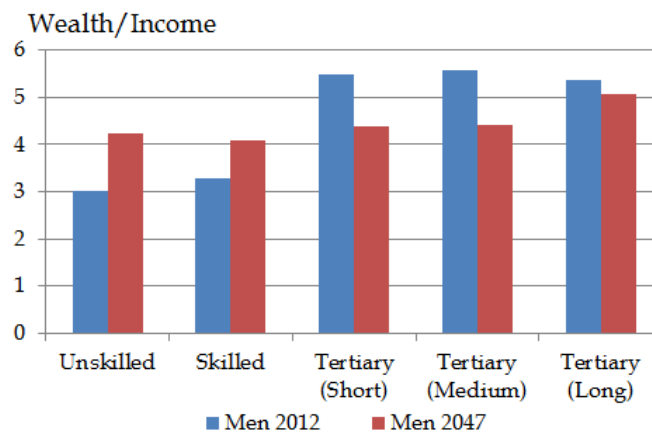
As mentioned in section 2, retirement behaviour in the DREAM model is exogenous based on mechanical extrapolation of historical age related transitions from labour force participation to early retirement pay and public pension. The assumption of exogeneity ignores the impact of increased pension wealth related to maturation of the OP schemes. This effect on household wealth might counteract the increase in the official retirement age and the tightening of the early retirement schemes that have been implemented in recent years in Denmark.

To explore this issue we use a retirement model based on optimizing behaviour developed by Arnberg and Stephensen (2015) following the tradition of Stock and Wise (1990). Ideally, this option value model should be incorporated in the DREAM model, thus replacing the mechanical projection. However, due to technical limitations we rely on simulated differences in aggregate retirement age in the

Arnberg and Stephensen (2015) model as a crude indicator of the importance of maturation of the pension system.

Figure 12 provides an indication of maturation of the pension system illustrated by the pension wealth-income ratio for men with different educational attainment 5 years before the earliest public pension retirement age. Comparing figures for 2012 and 2047, where the cohort born in 1981 has saved with the present contribution rates throughout their working age, clearly shows the maturation of the pension system for skilled and unskilled groups.

Figure 12. Pension Wealth-Income Ratio Today and in the Mature Pension System - Men 5 years Before Earliest Public Pension Retirement Age

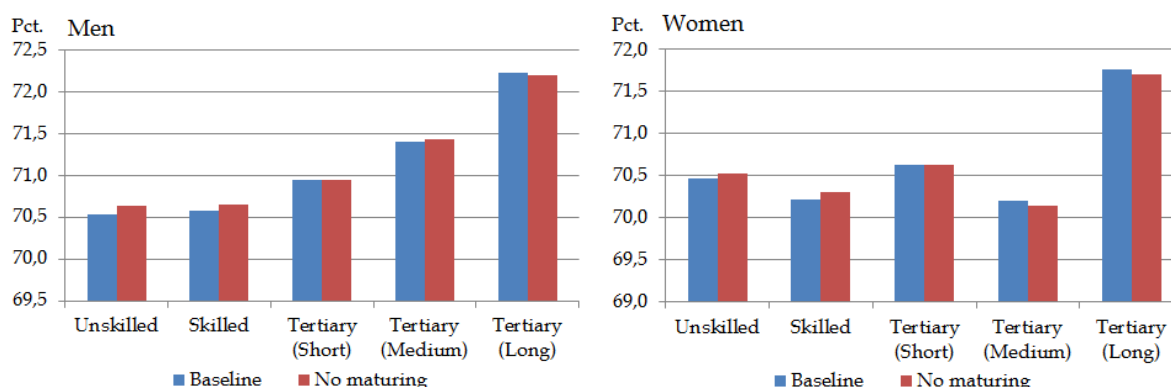


However, for groups with tertiary education, for whom the pension system is already mature today, the pension wealth-income ratio will *decrease* in the future.

The explanation for this surprising development is founded in the difference between historical and expected future returns on savings. Future returns are expected to be significantly lower than historical returns. Furthermore, a presently large group of civil servants with generous DB pensions (“tjenestemænd”) is significantly contributing to the pension wealth-income ratio in 2012. This group will gradually disappear in the future which partly explains the reduction in the ratio.

The impact of maturation is simulated by simply keeping the 2012 pension wealth-income ratio constant throughout 2047, and comparing retirement behaviour in this counter-factual scenario with the forecasted ratio in 2047, cf. Figure 13.

Figure 13. Retirement Age for Cohort Born 1981 with Different Educational Attainment and Gender in a Scenario with and without Maturation of OP schemes



As expected, unskilled and skilled groups are retiring slightly later due to maturation. This is almost totally offset by groups with tertiary education retiring earlier due to maturation. In total, average retirement age – aggregated over educational attainment and gender – is almost unchanged due to maturation defined in this way.

6. Final remarks

According to the *Melbourne Mercer Global Pension Index*, the Danish pension system is “world-class” and has for three consecutive years been ranked number one in the world. The primary reasons for this top spot is “Denmark’s well-funded pension system with its good coverage, high level of assets and contributions, the provision of adequate benefits and a private pension system with developed regulations”.

The occupational pension (OP) schemes constitute a pillar of the general Danish pension system. These schemes have a long tradition in Denmark and the latest addition, covering the blue-collar segment of the labour market, was introduced in 1987 as part of the collective wage negotiations between trade unions and employers’ federations.

In this paper we have argued that the Danish OP design, which differs from designs in other countries where OP schemes typically have been introduced as part of the legislative process, has contributed significantly to restoring fiscal sustainability. Moreover, they have helped to avert chronic imbalances on the current account and to reduce poverty among the elderly.

Another, often neglected, virtue of the Danish OP system relates to the implied voting structure. In a society where existing replacement rates are strongly defended, conservatism as to the existing indexation scheme is a most likely outcome. This illustrates an important trade-off in the design of pension policy: A policy reform which would shift some of the financial burden associated with population ageing away from the working-age people, and thereby presumably be good to the overall economy, would be hard to achieve.

The inherent protection of the elderly is in line with another finding in the literature, namely that the interests of the elderly tend to be structurally over-represented in the political process.¹⁵ This "overrepresentation" in the voting process is moderated in Denmark through an important mechanism: voting rights in unions negotiating on pensions are restricted to current workers. Therefore, the structural overrepresentation of the elderly in unions is much smaller than in general voting. In this respect the Danish system is uniquely well positioned to cope with the pressures that population ageing exerts on political sustainability.

Despite this prominent status, at least by international comparison, the Danish pension system faces a number of challenges. According to the *Melbourne Mercer Global Pension Index*, the overall index value for the Danish system could be increased by (a) raising the level of household saving; (b) introducing arrangements to protect the interests of both parties in a divorce; (c) increasing the labour force participation rate amongst older workers; (d) providing greater protection of members' accrued benefits in the case of fraud, mismanagement or provider insolvency.

In this paper we have emphasized the threat that contributions to the OP may fall considerably. Why? One reason is the presence of a poverty trap, driven by means-testing and with the effect that a substantial part of the benefits from the OP schemes are offset by cuts in public pension benefits and other welfare provisions. This may seriously undermine the incentive to save through the OP schemes. Therefore, it is

¹⁵ An implication hereof could be that political decision-making may result in a pay-as-you-go system even when all generations, once the system is established, would have been better off without a pay-as-you-go system.

crucial to guarantee that a means-tested pension scheme does not distort pension savings too much. Moreover, the OP schemes are challenged by tendencies towards a falling degree of unionization and possibly by a “zeitgeist” against mandatory, collective arrangements. This may also reduce the volume of contributions to the OP schemes.

Against that, in this paper we have taken these concerns to the extreme by considering a worst-case scenario where contributions to the schemes are abolished. It is hard to predict how, and to what extent, private individual saving would react to an abolishment of the OP schemes. In fact, the findings in the literature on this important issue point in different directions. Yet, recent evidence based on Danish data seems to suggest that a complete abolishment of the OP schemes would lead to a dramatic fall in aggregate saving.

Since contributions to the OP schemes are deductible in the personal income tax, whereas pension payments from the pension funds are taxable at the personal income tax rate, improvements to public finances can be made in the short term by sacrificing the OP schemes. However, these gains would accrue at the expense of weaker public finances in the longer term. Based on simulations using the DREAM model we find that abolishing the OP schemes would *all else equal* put fiscal policy on an unsustainable path. More generally, abolishing the OP schemes in Denmark would in all likelihood weaken the macroeconomic and fiscal stance of the Danish economy.

Much of the Danish debate on fiscal policy relates to a so-called “hammock” problem. This refers to the prospect that after a period with improving public finances over the next decade, after 2025 there will be several decades where structural budget deficits exceed the limits set by the EU fiscal compact and the Danish budget law. Since the OP system is currently subject to a tax regime, where tax exemption occurs at the time when contributions are made and benefits are taxed when paid out, the tax revenues are effectively back-loaded. However, shifting to a new tax regime characterised by front-loading, the taxation of pension savings, could be envisaged as one possible way of overcoming the “hammock” problem.

The results reported in this paper show that such a front-loading is certainly a possibility, even without sacrificing the key property of current fiscal policy being sustainable.

However, doubts could be raised as to whether policy-makers can resist the temptation to spend the additional revenues, rather than saving the funds for the future when they are needed to cover extra outlays caused by changing demographics. Can such a high degree of fiscal discipline and forward-looking behaviour be expected? And would the accumulated savings currently administered by private pension funds be taken care of with a similar proficiency and efficiency if handed over to the public sector?

Another possibility, also examined in the paper, would be to pay out the additional revenues from taxation of funded pensions in the form of tax reliefs to households. Here the concern is whether the increase in disposable income to a sufficient extent would be saved, thereby preparing for future needs. Based on existing empirical evidence, indicating that only 15% of Danes respond actively to retirement savings policies, one could have serious doubts.

References

- Attanasio, O.P. and S. Rohwedder. (2003), "Pension Wealth and Household Saving: Evidence from Pension Reforms in the United Kingdom", *American Economic Review* 93: 1499-1521
- Alho, J., S. H. Jensen and J. Lassila (2008), *Uncertain Demographics and Fiscal Sustainability*, Cambridge University Press, Cambridge
- Andersen, T. M., S. H. Jensen and L. H. Pedersen (2008), "The Welfare State and Strategies toward Fiscal Sustainability in Denmark", in: R. Neck and J. Sturm (eds.), *Sustainability of Public Debt*, MIT Press
- Arnberg, S. and M. Barslund (2012), "The Crowding-Out Effect of Mandatory Labour Market Pension Schemes on Private Savings: Evidence from Renters in Denmark", DØRS Working Paper 2012:1
- Arnberg, S. and P. Stephensen (2015), "Økonomiske incitament, nedslidning og tilbagetrækning – Semi-parametrisk estimation af heterogenitet", Working Paper, DREAM
- Barro, R. (1979), "On the Determination of the Public Debt", *Journal of Political Economy* 87: 940-971
- Benjamin, D.J. (2003), "Does 401(k) Eligibility Increase Saving? Evidence from Propensity Score Subclassification", *Journal of Public Economics* 87: 1259-1290

- Bergman, U. M, M. M. Hutchison, and S. Hougaard Jensen (2013), "Shaping the Fiscal Policy Framework: Lessons from Fiscal Consolidations in Denmark and Sweden", in: T. M. Andersen, U.M. Bergman and S. H. Jensen (eds.), *Reform Capacity and Macroeconomic Performance in the Nordic Countries*, Oxford University Press
- Buiter, W. H. (1983), "Measurement of the Public Sector Deficit and Its Implications for Policy Evaluation and Design," *IMF Staff Papers* 30: 306-349
- Börsch-Supan, A. (2004), "Mind the Gap: The Effectiveness of Incentives to Boost Retirement Savings in Europe", *OECD Economic Studies* 39: 112-141
- Chetty, R., Friedman, J., Leth-Petersen, S., Nielsen, T. and Olsen, T. (2014), "Active vs. Passive Decisions and Crowd-out in Retirement Savings Accounts: Evidence from Denmark", *Quarterly Journal of Economics* 129: 1141-1219
- Davig, T., E. Leeper and T. Walker (2010), "Unfunded Liabilities and Uncertain Fiscal Financing", *Journal of Monetary Economics* 57: 600-619
- Due, J. and J.S. Madsen (2003), "Fra magtkamp til konsensus: Arbejdsmarkedspensionerne og den danske model", DJØF-Forlaget
- Dullien, S. (2012), "Reinventing Europe: Explaining the Fiscal Compact", The European Council on Foreign Relations (ECFR), Comment
- Economic Council (2014). *Dansk Økonomi*, May
- Fehr, H. (2015), "Optimal Pension Design with Means-tested Benefits", presentation at conference organized by the Danish Pension Commission, Copenhagen, January 29, 2015
- Fehr, H. and J. Uhde (2014), "Means-Testing Retirement Benefits in the UK: Is it Efficient?", Netspar Discussion Paper No. 02/2014-006. Available at SSRN: <http://ssrn.com/abstract=2414480> or <http://dx.doi.org/10.2139/ssrn.2414480>
- Feldstein, M. (1974). "Social Security and Private Saving: Reply", *Journal of Political Economy* 82: 905-926
- Forsikring & Pension (2012), *Danskernes pension: Design i verdensklasse*. Copenhagen
- Gale, W. (1998), "The Effects of Pensions on Household Wealth: a Reevaluation of Theory and Evidence", *Journal of Political Economy* 106: 706-723
- Hansen, J.V. and S. H. Jensen (2013), "Arbejdsmarkedspensionerne efter 25 år: En succes med udfordringer", *Nationaløkonomisk Tidsskrift*, 150: 201-217
- Holzmann, R. (2013), "Global Pension Systems and Their Reform: Worldwide Drivers, Trends and Challenges", *International Social Security Review* 66: 1-29
- Hubbard, R.G. and J. S. Skinner (1996), "Assessing the Effectiveness of Saving Incentives", *Journal of Economic Perspectives* 10: 73-90
- Kangas, O., Lundberg, U. and Ploug, N. (2010), "Three Routes to Pension Reform: Politics and Institutions in Reforming Pensions in Denmark, Finland and Sweden", *Social Policy & Administration* 44: 265-284
- Linaa, J. G., L. H. Pedersen og P. B. Sørensen (2010), "Den effektive beskatning af opsparingsafkast i Danmark", DØRS Working Paper 2010:5

Ministry of Finance (2012). Budgetlov. Copenhagen

Ministry of Finance (2014). Finansredegørelse 2014. Copenhagen

Munnell, A. (1976), "Private pensions and Savings: New evidence", *Journal of Political Economy* 84: 1013-1032

OECD (2013), "Recent Pension Reforms and Their Distributional Impact", in: Pensions at a Glance 2013: OECD and G20 Indicators, OECD Publishing. http://dx.doi.org/10.1787/pension_glance-2013-4-en

Palme, J. (2005), "Features of the Swedish Pension Reform," *The Japanese Journal of Social Security Policy* 4:42-53.

Palmer, E. (2002), "Swedish Pension Reform: How Did It Evolve, and What Does It Mean for the Future?" in: Feldstein, M. and H. Siebert (eds.), *Social Security Pension Reform in Europe*, University of Chicago Press

Pension Commission (2015), "Det danske pensionssystem - internationalt anerkendt, men ikke problemfrit". Copenhagen

Stock, J.H. and Wise, D.A. (1990), "Pensions, the Option Value of Work and Retirement", *Econometrica* 58: 1151-1180

Sunden, A. (2006), "The Swedish Experience with Pension Reform", *Oxford Review of Economic Policy* 22:133-148

Venti, S., and D. Wise (1990), "Have IRAs increased US saving?", *Quarterly Journal of Economics* 105: 661-698.

Whitehouse, E. (2005), "Taxation: The Tax Treatment of Funded Pensions", World Bank, Washington, DC.

Appendix

Table A1: Contributions to Pension Schemes, millions of DKK

Personal pensions schemes	2000	2005	2010	2013	2014*
Annuities	2.458	3.288	2.051	2.341	2.512
Periodic installments	2.217	3.524	2.350	2.763	2.811
Capital Pension Schemes	7.662	7.492	6.061	44	25
Indexed Schemes	329	217	103	49	35
Periodic installments within banks	3.543	8.998	7.425	7.428	7.066
Expiring annuities	-	-	90	58	42
Age savings	-	-	-	1.555	2.921
<i>Total personal schemes</i>	16.209	23.519	18.080	14.237	15.412
- Of which banks	9.046	14.704	12.285	7.483	7.099
- Of which insurance companies	7.163	8.815	5.794	5.199	5.392
- Of which unclassifiable	-	-	-	1.555	2.921
Occupational pension schemes					
Annuities	23.748	32.741	42.695	52.253	53.753
Periodic installments	6.823	19.229	30.662	33.136	34.590
Periodic installments within banks	2.762	7.916	4.337	2.636	2.518
Indexed Schemes	13	7	2	0	0
Capital Pension Schemes	7.593	8.770	8.879	33	7
Expiring annuities	-	-	217	2.767	2.829
Age Savings	-	-	-	145	159
<i>Total occupational schemes</i>	40.939	68.663	85.754	90.970	93.856
- Of which banks	4.326	9.099	5.427	2.647	2.518
- Of which insurance companies	36.613	59.564	81.365	88.178	91.179
- Of which unclassifiable	-	-	-	145	159
Total pension schemes					
Annuities	25.625	35.239	43.707	54.593	56.265
Periodic installments	15.345	39.667	45.082	48.788	49.856
Indexed	342	224	105	49	35
Capital or supplementary lump-sums	15.836	17.052	15.978	78	32
Age savings	-	-	-	1.699	3.080
<i>Total pension schemes</i>	57.148	92.182	104.872	105.208	109.269
- Of which banks	13.372	23.803	17.713	10.130	9.618
- Of which insurance companies	43.776	68.379	87.159	93.378	96.570
- Of which unclassifiable	-	-	-	1.699	3.080

Source: The Danish Tax and Customs Administration, SKAT

*Data for 2014 is preliminary