Pension Savings

Paul Lassenius Kramp, Economics, Jane Lee Lohff, Market Operations and Jens Pagh Maltbæk, Statistics

INTRODUCTION AND SUMMARY

The Danish pension system may be divided into three pillars: tax-funded pensions (e.g. state retirement pension), mandatory pensions (e.g. labour-market pensions) and voluntary, savings-based pensions. The pension system has undergone changes, reflected in constant growth in savings-based pension schemes – a trend that will continue over the coming decades. Pension savings have become a key component in private sector financial balance sheets, with a major impact on the Danish capital market.

With the expansion of a savings-based system, contributions and pay-outs under savings-based pension schemes have soared. In 1984, about 4 per cent of average wages were paid into to a pension scheme. In 2010, the figure was almost 11 per cent. Payouts under savings-based pension schemes rose from approximately 15 per cent of total pension payouts in 1984 to about 35 per cent in 2010. When the pension system has fully matured, this share is estimated to be around 50 per cent.

The combination of large net contributions, accumulated returns and capital gains means that household pension wealth has doubled over the last 15 years, reaching 142 per cent of the gross domestic product, GDP, at year-end 2010. This is reflected in substantial expansion of household balance sheets, with increased assets and liabilities. Based on a stylised projection in Dream, household pension wealth is estimated to increase by a further 60 per cent of GDP over the next three decades. Viewed in isolation, this would indicate that household gross debt will increase further over the coming years, as households must be expected to include the size of their pension savings in their considerations of the rate of repayment of housing debt, etc.

The pension sector has become one of the key players in the Danish financial markets due to the massive pension wealth held by pension companies. For instance, the pension sector holds about 50 per cent of Danish government securities and more than 30 per cent of Danish mortgage debt.

The European sovereign debt crisis caused financial market anomalies, reflected in declining interest rates, greater volatility and pressure on

the financial buffers of pension companies, among other factors. This turn of events could trigger a snowball effect, with declining interest rates leading to abnormal pressure on the demand for Danish bonds, which would, in turn, exert further downward pressure on interest rates. This could have negative implications for pension savers. Therefore, parts of the regulation were adapted; for instance the discount curve was changed in late 2011.

THE DANISH PENSION SYSTEM

The Danish old-age pension system comprises three pillars: tax-funded pensions (e.g. state retirement pension), mandatory savings-based pensions (e.g. labour-market pensions) and voluntary savings-based pensions.

First pillar, tax-funded pensions

This pillar comprises e.g. state retirement pension, early retirement benefits and civil servant pensions. The common denominator of these pensions is that they are funded mainly through current tax income and supplementary early retirement contributions. In other words, since no pension wealth is involved, the size of these pensions has no direct financial market impact.

Second and third pillars, savings-based pensions

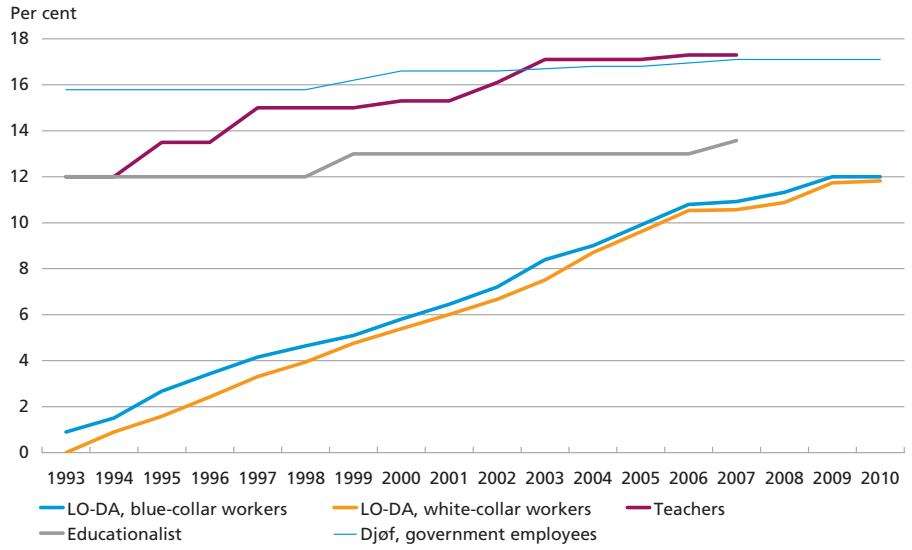
Today, most wage earners contribute to a labour-market pension, i.e. a savings-based pension. These pension schemes were introduced to various trade and professional groups at different times, but the general trend was for labour-market pensions to be introduced first to the white-collar segments, which had the widest gaps between pre-retirement income and state retirement pension benefits. In the late 1980s, labour-market pensions and the size of contributions became part of the collective agreements covered by Danish Confederation of Trade Unions (LO) and the Confederation of Danish Employers (DA), with differences from one segment to the next. The pension contributions paid were managed by the wage earners' new pension funds.

Danish politicians supported this development – e.g. because it would narrow the gap between pre-retirement income and the sum of state retirement pension and labour-market pension, thereby reducing the pressure for increased public spending in this field.

The size of contribution rates[1] for labour-market pensions is part of the collective agreements between the social partners in individual col-

[1] See the note to Chart 1 for a definition of contribution rates.

LABOUR-MARKET PENSION CONTRIBUTION RATES Chart 1



Note: Contribution rates are the rates agreed under collective agreements. In the chart, these rates are calculated using the net method, i.e. the contribution ratio is calculated as the percentage of the wage earner's pay (including tax and labour-market contributions) excluding own pension contribution.
Source: Economic Councils (2008).

lective bargaining areas. For large groups of wage earners, the contribution rate has been rising for the last almost 20 years, cf. Chart 1. If contributions are seen in relation to total payroll expenditure, the result is an aggregated contribution rate, which rose from approximately 4 per cent in 1984 to almost 11 per cent in 2010.

Close to 90 per cent of the Danish population aged 16-66 contributes to the Danish Labour Market Supplementary Pension Scheme, ATP, a statutory savings-based pension scheme for wage earners and the unemployed.[1] In addition, the self-employed and others contribute to private savings-based pension schemes.

Pension savings differ from other savings in being targeted at retirement. Consequently, these savings are typically tied up[2] until retirement and they are tax-advantaged, e.g. the capital yield on pension schemes is taxed at a rate of 15.3 per cent, while the yield on free financial savings is taxed at a higher rate as capital income (between 25 and 50 per cent depending on the composition of income).[3] Moreover, contributions are fully deductible, while payouts are taxed as income.[4] If the income tax

1 Cf. ATP (2008).
2 Certain types of pension schemes may be disbursed before retirement against payment of additional tax. Early payouts are usually taxed at a rate of 60 per cent.
3 The rate of pension yield tax has temporarily been raised from 15.0 to 15.3 per cent in 2012 and 2013.
4 The tax deductibility of certain pension types, e.g. capital pensions and annuity pensions, is capped.

PENSION CONTRIBUTORS, AGE GROUP 30-55 Table 1

Number of persons/per cent of the age group	1988	1995	2005
	Number		
Labour-market pension	671,063	1,041,560	1,337,769
Private pension scheme	560,694	675,297	620,314
At least one pension scheme	1,019,283	1,320,615	1,505,239
		Per cent	
Labour-market pension	37	56	69
Private pension scheme	31	36	32
At least one pension scheme	56	71	77

Note: Civil servants are not included. Exclusive of ATP contributions. The number of persons holding a pension scheme is higher than the number contributing in any given year. The reason is that no contributions are paid e.g. during unemployment spells. Hence, the prevalence of pension schemes is higher than the table shows.
Source: Economic Councils (2008).

rate is lower at the time of payout than at the time of contribution (e.g. if you are a pensioner and do not pay the highest marginal tax rate, although you received the high tax deduction when you were in active employment), the result is a further tax advantage.[1] In contrast, private pension schemes and civil servant pensions are set off against public benefits in some instances.

The number of persons holding pension wealth has been rising for many years, but growth in this area took off in earnest in the early 1990s with the introduction of labour market pensions in the agreements covered by the Danish Confederation of Trade Unions and the Confederation of Danish Employers, cf. Table 1.

Since the millennium rollover, growth in contributions from savings-based schemes has by far outpaced growth in payouts. Contributions now account for 6-7 per cent of GDP, cf. Chart 2, primarily reflecting the widespread use of labour-market pensions.[2] During the last decade, net contributions have risen from about 1.5 per cent of GDP to around 3 per cent. The yield on these schemes (after tax) fluctuates extensively from one year to the next, at around 5 per cent of GDP. The flat trend of the yield as a percentage of GDP reflects two opposite effects: declining nominal interest rates and rising pension wealth.

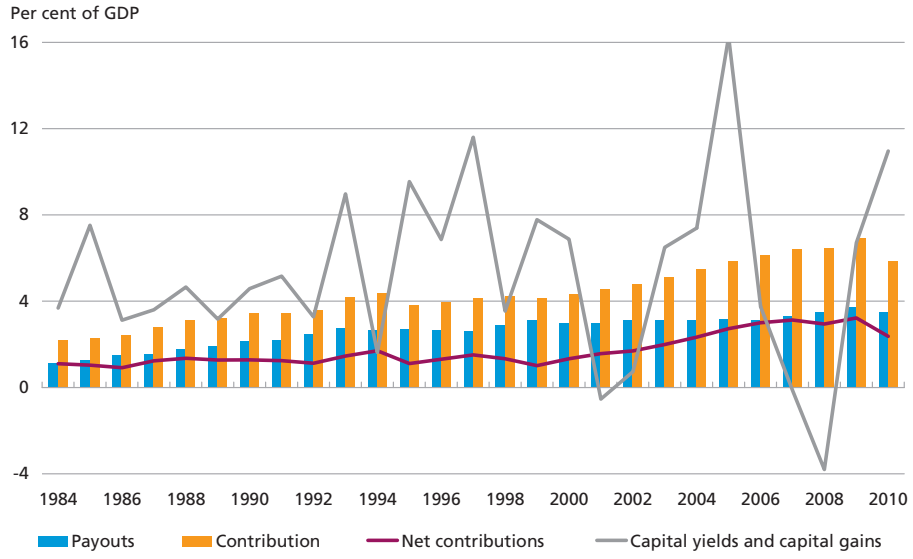
Payouts under savings-based schemes increased from about 1 per cent of GDP in 1984 to approximately 3.5 per cent in 2010. Following the strong growth, they currently account for about 35 per cent of total

[1] The incentive of tax asymmetries between contributions and payouts is uncertain, as the rate of marginal tax at the time of payout is unknown. Under the current rules, overall marginal tax at the time of payout is often quite high due to set-off of pensioner credits, etc., cf. Møller and Parum (2007).

[2] GDP growth was high in the second half of the 1990s. Accordingly, net contributions as a percentage of GDP did not increase. Therefore, the rise in net contributions from 1999 onwards seems particularly sharp.

CONTRIBUTIONS TO AND PAYOUTS FROM CONTRIBUTION-BASED SCHEMES

Chart 2



Note: Including contributions to and payouts from the SP, DSP and LD schemes. Pre-1995 data have been constructed by extending the 1995 level backwards using developments in contributions and payouts including transactions related to transfer of pension savings from one company to another. Capital yields and capital gains have been residually calculated and measure returns after tax. Figures for 2008-10 are preliminary.

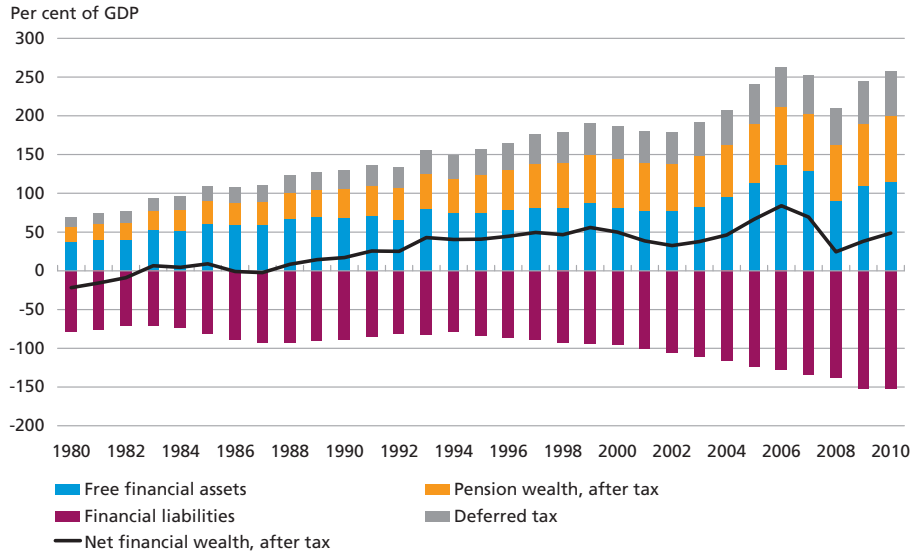
Source: Own calculations based on data from ADAM and Statistics Denmark.

pension payouts, up from approximately 15 per cent in 1984. When the pension system is fully matured, this share is expected to have increased to around 50 per cent, cf. Welfare Commission (2006). Growing payouts from pension schemes entail that coverage – i.e. the income as a pensioner relative to the income as a wage earner – has been increasing. Looking forward, coverage is expected to increase further with the maturing of the pension system. This especially applies to groups that have only recently begun to contribute to a labour-market pension scheme, e.g. wage earners covered by the agreements between the Danish Confederation of Trade Unions and the Confederation of Danish Employers, cf. the Welfare Commission (2006).

HOUSEHOLDS' AGGREGATE FINANCIAL BALANCE SHEET

Households' total net financial wealth rose until the mid-1990s, cf. Chart 3. From the late 1990s until 2010, net financial wealth accounted for a fairly constant, although varying, percentage of GDP. However, net financial wealth is greatly affected by equity prices and therefore, in the short term, is cyclically driven. From the end of 2006 until the end of 2008, equity prices plummeted, leading to sharp capital losses. Since

HOUSEHOLD FINANCIAL BALANCE SHEETS Chart 3



Note: Pension wealth is calculated after tax, i.e. less estimated future income tax on payouts. Hence, the value of pension wealth for households is comparable to that of other financial savings that are non-deductible and therefore non-taxable. Pension wealth before tax is equivalent to pension wealth after tax plus deferred tax.
Source: Danmarks Nationalbank.

then, households have increased their savings ratio, which – viewed in isolation – points towards higher net financial assets over the coming years.[1]

These developments mask significant growth in household pension wealth and free financial assets. Pulling in the opposite direction is an increase in household gross debt, reflecting substantial overall expansion of balance sheets.

During the period 1980-2010, growth in total net financial wealth after tax was driven equally by the increase in pension wealth and free financial wealth, cf. Table 2. As a result of the rise in savings, this period saw a reversal from permanent deficits to permanent surpluses on the current account. This was attributable to a number of factors, the two most important ones being the expansion of private pension savings and lower interest deductibility.

In addition to net financial wealth, households hold large real assets, including substantial housing wealth. In Denmark, housing wealth is relatively liquid because the Danish mortgage-credit system makes it easy to raise loans using home equity as collateral. Hence, considerable

[1] From end-2010 to end-2011, Danish equity prices dropped by about 15 per cent, which reduced net financial wealth, excluding pension. In early 2012, equity prices have increased to around the level seen at end-2010.

CHANGES IN HOUSEHOLD BALANCE SHEETS Table 2

Changes, percentage of GDP	Change 1980-2010
Net financial wealth, after tax	70
Financial assets, after tax	144
Of which: Pension wealth before tax	111
Deferred tax[1]	-45
Pension wealth after tax	66
Free financial assets	77
Gross debt	73

Source: Danmarks Nationalbank.
[1] Deferred tax is calculated as 40 per cent of pension wealth.

housing wealth has been a prerequisite for the ability of Danish households to increase their gross debt over the last 30 years.

The growth in household pension wealth is attributable to a combination of large net contributions (approximately 25 per cent) and accumulated returns and capital gains (approximately 75 pct.), cf. Chart 4.

Based on a stylised projection in Dream[1], household pension wealth is estimated to rise by just over 60 per cent of GDP over the next 30 years, cf. Chart 5.

It should be noted that, based on aggregated net wealth alone, it is not possible to assess household vulnerability to economic shocks, given that the distribution of wealth and debt is not known.

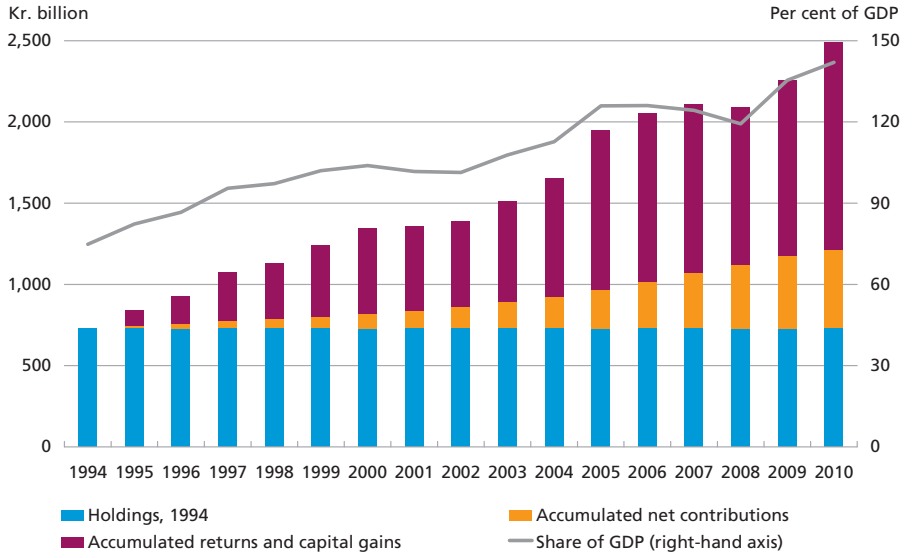
Given the extensive and partly opposite changes in pension savings, free financial assets and gross debt, it is not possible to conclude to what extent the development in overall financial savings is attributable to changes in the structure of the pension system and lower interest deductibility, etc.

It is to be expected that households have included and will continue to include knowledge about the size of their pension savings in the management of their overall savings, including investment in free assets, repayments on housing loans and raising of new loans. For instance, mandatory pension contributions could prompt households to repay housing loans more slowly and high pension wealth reduces the need to be debt-free at retirement.

An analysis based on trends in debt and wealth ratios across a number of countries concludes that when pension wealth increases by kr. 100, debt rises by kr. 30-40, cf. Isaksen et al. (2011). Hence rising pension wealth may have been a major factor behind the increase in the gross debt of Danish households. Viewed in isolation, increasing pension wealth therefore points to further growth in household debt over the coming years. Other studies show a smaller crowding-out effect, cf. Box 1.

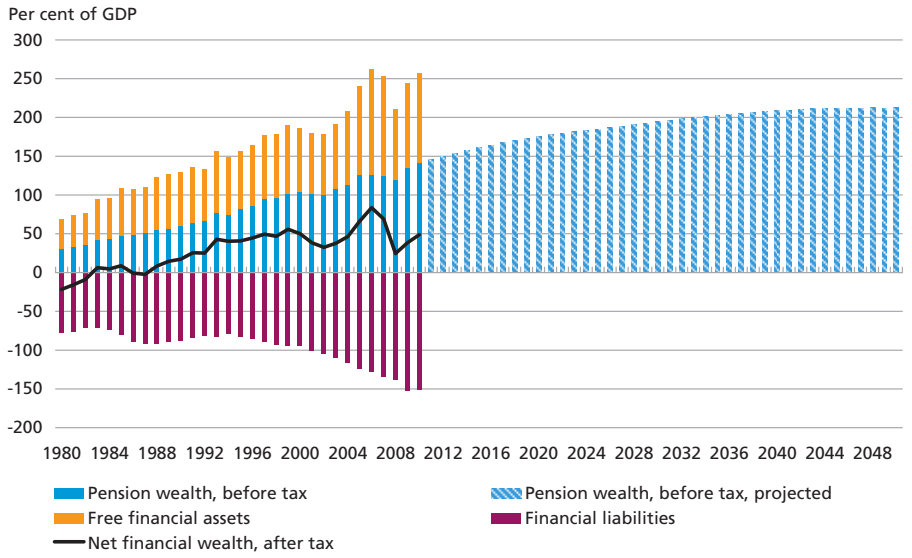
[1] Danish Rational Economic Agents Model. See http://www.dreammodel.dk/

HOUSEHOLD WEALTH INVESTED IN PENSION COMPANIES — Chart 4



Note: Pension wealth has been calculated before tax. Net contributions are based on data from ADAM.
Source: Statistics Denmark and own calculations.

HOUSEHOLD NET FINANCIAL WEALTH AND PROJECTION OF PENSION WEALTH — Chart 5



Note: Pension wealth before tax. The projection is based on Dream, with levels adjusted to historical data. This means that pension wealth is increased by approximately 7 per cent of GDP throughout the period.
Source: Statistics Denmark, Danmarks Nationalbank and Dream.

BEHAVIOURAL IMPLICATIONS OF LABOUR-MARKET PENSION SCHEMES Box 1

Labour-market pension schemes entail that a large percentage of wage earners must contribute part of their wages to pension schemes. It is uncertain how and to what extent the introduction of mandatory pension schemes and the use of voluntary schemes have affected overall household savings and balance sheets. Household behaviour in terms of pension savings hinges on a number of factors, including set-off of public benefits and liquidity restraints. At the same time, the period from the late 1980s was characterised by changes in other circumstances impacting the propensity to save, especially lower tax deductibility of interest expenses and a number of years of low inflation.

An empirical analysis of data at individual level during the period 1998-2004 demonstrates a relatively small crowding-out effect. The analysis concludes that total savings rise by about kr. 0.70-0.80 with each krone contributed through a mandatory pension scheme, cf. Economic Councils (2008). According to the analysis, this implies that one additional krone contributed to a labour-market scheme will reduce other savings by about kr. 0.20-0.30 (e.g. by the household increasing its borrowing by 0.20-0.30), i.e. the crowding-out effect of other savings is relatively modest.[1]

A positive savings effect of this magnitude does not comply with the aggregated figures in the national accounts according to which the household savings ratio has not shown an increase over the last 40-odd years. This should be seen against the backdrop that, during the same period, households have reaped significant capital gains, which, viewed in isolation, points towards a lower savings ratio. Hence it is possible that the savings ratio would have fallen, had it not been mandatory for households to save through labour-market pensions.

[1] Cf. Economic Councils (2008) and Arnberg and Barslund (2012).

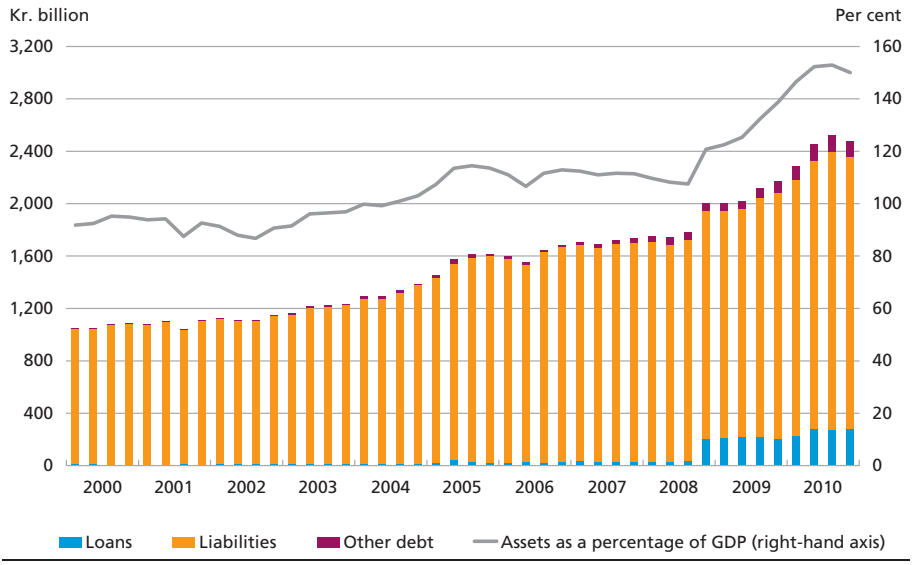
THE PENSION SECTOR IS A MAJOR PLAYER IN THE FINANCIAL MARKETS

Over the last decade, the pension sector's total assets have risen from around 90 per cent of GDP in 2000 to approximately 150 per cent of GDP in 2010, cf. Chart 6.[1] This is reflected in an increasing investment need for the sector. With the growth in pension schemes, pension companies play an increasing role in the capital and foreign-exchange markets.

Moreover, some companies choose to leverage themselves by borrowing additional funds against the company's assets as collateral, enabling them to invest larger amounts. This also entails that some companies have an ongoing need to borrow funds in the market. Use of financial derivatives may also indicate leveraging. The typical aim of leveraging is, on the one hand, to achieve a higher expected return, and, on the other, to increase the likelihood that the companies will be able to meet their payment obligations.

[1] Household pension savings invested in pension companies account for about 80 per cent of the pension sector's total assets, equivalent to approximately 120 per cent of GDP. Household pension savings at banks (accounting for roughly 20 per cent of GDP) are not included.

PENSION SECTOR LIABILITIES Chart 6



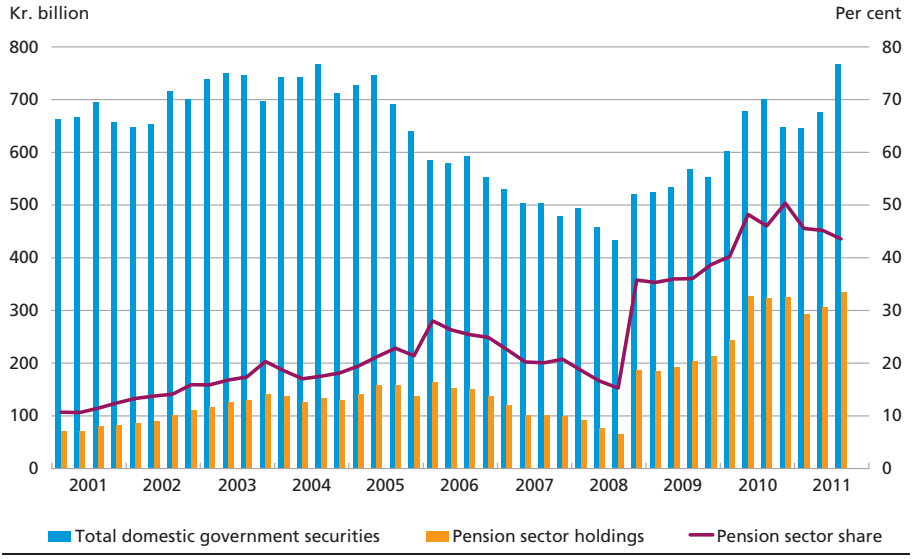
Note: Assets as a percentage of GDP are the moving average of four quarters. Figures are exclusive of pension funds in the LD and SP schemes and in banks.
Source: Danmarks Nationalbank.

In 2001, the pension sector's holdings of *domestic government securities*, i.e. Danish government bonds and T-bills, amounted to just over kr. 100 billion, equivalent to an 11-per-cent ownership interest in the central government's total domestic issuance, cf. Chart 7. At the end of the 3rd quarter of 2011, the sector's holdings of domestic government securities totalled just under kr. 350 billion and the ownership interest had increased to 45 per cent.

The sharp increase in the 4th quarter of 2008 was attributable to the central government's issuance of a 30-year government bond, the vast majority of which was acquired by the pension sector. To some extent, the companies sold euro securities to purchase Danish government bonds. This helped to underpin the exchange rate of the krone during a period of pressure following the collapse of Lehman Brothers.

During the period 2001-10, the pension sector's holdings of *Danish mortgage bonds* increased by kr. 380 billion, cf. Chart 8 (left-hand side). Despite strong growth in the Danish mortgage market, pension companies maintained an ownership interest of one third. On the other hand, there was a notable shift in the portfolio composition, with short-term mortgage bonds (remaining term to maturity up to and including five years) with and without amortisation accounting for an ever increasing proportion of total mortgage-credit holdings. The reason is that households have extensively financed home purchases via adjust-

PENSION SECTOR HOLDINGS OF DOMESTIC GOVERNMENT SECURITIES — Chart 7

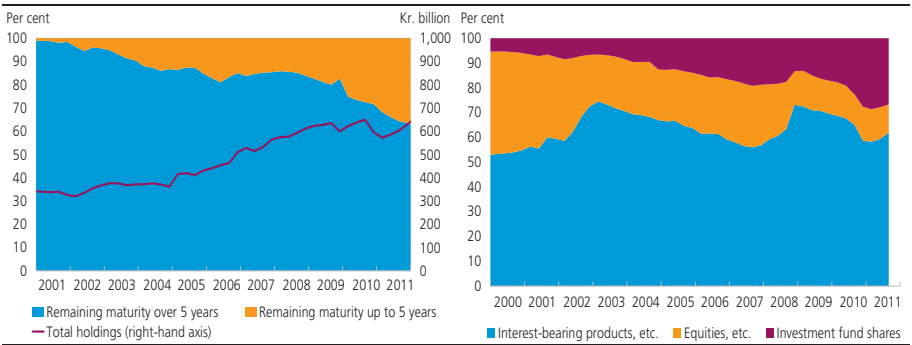


Note: Domestic government securities are government bonds and T-bills in Danish kroner. Figures include investment associations in which the pension sector has an ownership interest of at least 95 per cent, but exclude pension funds in the LD and SP schemes and in banks.
Source: Danmarks Nationalbank.

able-rate loans. As a result, the supply of short-term mortgage bonds increased sharply.

During recent years, a growing proportion of the pension sector's assets have been converted from direct to indirect ownership through *investment fund shares*, cf. Chart 8 (right-hand side). This is attributable *inter alia* to the increasing popularity of products where the customers bear a higher proportion of the investment risk and have greater influ-

PENSION SECTOR HOLDINGS AF DANISH MORTGAGE BONDS (LEFT-HAND SIDE) AND ASSET ALLOCATION (RIGHT-HAND SIDE) — Chart 8



Note: Figures for the left-hand chart include investment associations in which the pension sector holds an ownership interest of at least 95 per cent, but exclude pension funds in the LD and SP schemes and in banks.
Source: Danmarks Nationalbank.

ence on the investment composition. Many pension companies offer their customers to mix their own pension portfolio, either in full or in part, based on selected units.[1] With these products, the customers bear much of the investment risk, as there is no guaranteed return. This also means that pension companies have less incentive to purchase long-term, fixed-rate bonds or other products that ensure a minimum return, cf. below.

Investment decisions and pension guarantees

Pension sector payouts are in the distant future relative to customers' contributions. Obviously, the pension companies' commitments in terms of payouts play a key role in their investment policies.

Pension schemes have typically been based on a guaranteed rate of interest, indicating a nominal minimum yield on pension savings. The Danish Financial Supervisory Authority has established a maximum guaranteed rate of interest as the upper limit on the yield pension companies are allowed to guarantee to customers. Hence each company has to decide for itself whether it is appropriate to offer the maximum rate of interest.

At end-2010, pension sector provisions for guaranteed benefits totalled kr. 1,260 billion, corresponding to 63 per cent of total assets.[2] Provisions for contracts with guarantees in excess of 4 per cent still account for a significant percentage of total provisions, approximately one third, but this percentage has been declining during recent years.

As the return on investment may be lower than the guaranteed rate of interest, pension companies offering high guaranteed rates of interest are faced with a number of challenges. Chart 9 (left-hand side) shows that the fall in the market rate since 1984 has narrowed the margin between the safe market return after tax and maximum guarantees.

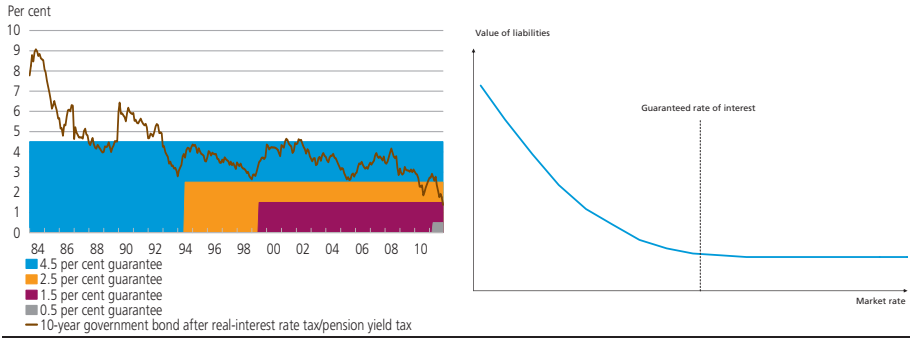
A pension guarantee means that the pension companies must, as a minimum, pay the guaranteed rate of interest on the customers' savings over a very long period of time. When the market rate is close to or lower than the guaranteed rate of interest, the value of the company's liabilities increases as the market rate declines, cf. Chart 9 (right-hand side). In other words, the *interest-rate sensitivity* of liabilities is high.

When interest rates are low, pension companies therefore need to hold bonds – or other instruments – that appreciate in value when interest rates decline. Examples could be long-term, fixed-rate bonds or vari-

[1] Overall, there are two types of market-rate products. With unit-linked products, the customer composes his own portfolio, mostly on the basis of a selection of units. With lifecycle products, the customer may opt to have some influence on the investment composition, e.g. based on the risk profiles high, medium or low.

[2] The figure includes bonus potential and excludes provisions for unit-linked contracts.

MAXIMUM GUARANTEED RATES OF INTEREST AND YIELD TO MATURITY ON GOVERNMENT BONDS (LEFT-HAND SIDE) AND RELATION BETWEEN THE VALUE OF PENSION COMPANY LIABILITIES AND THE MARKET RATE (RIGHT-HAND SIDE) Chart 9



Note: The yield to maturity on government bonds is calculated using a 10-year Danish government bond after real-interest rate tax and after pension yield tax after the year 2000. The maximum guaranteed rates of interest are shown after deduction of an expense premium and loading for risk, typically at 0.5 percentage points.
Source: Danish Ministry of Taxation and Danmarks Nationalbank.

ous financial derivatives with high interest-rate sensitivity, for instance interest-rate swaps on which the company receives a fixed rate of interest for a long period of time, while paying a variable rate of interest. Other examples could be products on which the company receives a variable rate of interest, which cannot fall below a specified floor.

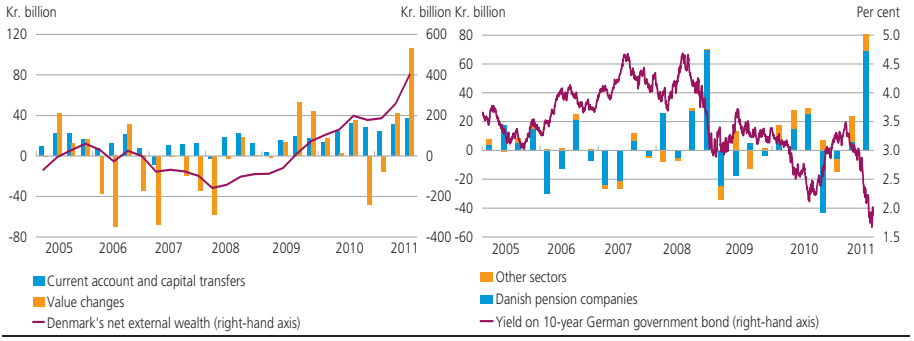
The pension sector has purchased substantial amounts of derivatives to achieve higher interest-rate sensitivity. Some of these derivatives are based on euro interest rates – the reasons being that, on account of the fixed-exchange-rate policy, the euro interest rate is very closely correlated with the interest rate in Danish kroner and that the market for derivatives in euro is much larger than the market for derivatives in Danish kroner.

When derivatives are traded with non-resident counterparties, large fluctuations in value may impact Denmark's external net wealth. Chart 10 (left-hand side) shows that the external net wealth increased quite strongly in the 3rd quarter of 2011. A very substantial percentage of the increase is attributable to the Danish pension sector's capital gains on foreign derivatives, cf. Chart 10 (right-hand side). Chart 10 also shows that the value of the pension sector's derivatives is highly dependent on interest rates in Germany. Falls in German interest rates are reflected in large gains on the sector's financial contracts.

Discount curve and market impact

Pension companies are responsible for having sufficient assets to meet their liabilities. The Danish Financial Supervisory Authority regularly assesses whether they fulfil this requirement. The regulation in this field is

DENMARK'S NET EXTERNAL WEALTH (LEFT-HAND SIDE) AND CAPITAL GAINS/LOSSES ON DANISH SECTORS' DERIVATIVES TRADED WITH NON-RESIDENTS (RIGHT-HAND SIDE) Chart 10



Source: Danmarks Nationalbank.

important when it comes to the investment behaviour of the companies – and thus to the foreign-exchange and capital markets.

Since 2003, Danish pension companies have determined the value of their liabilities based on the Danish Financial Supervisory Authority's discount curve, which is published daily. The discount curve is a yield curve[1], used to discount pension company liabilities. In 2003, the curve was fixed based on the euro swap rate, adjusted for the 10-year Danish-German yield spread.

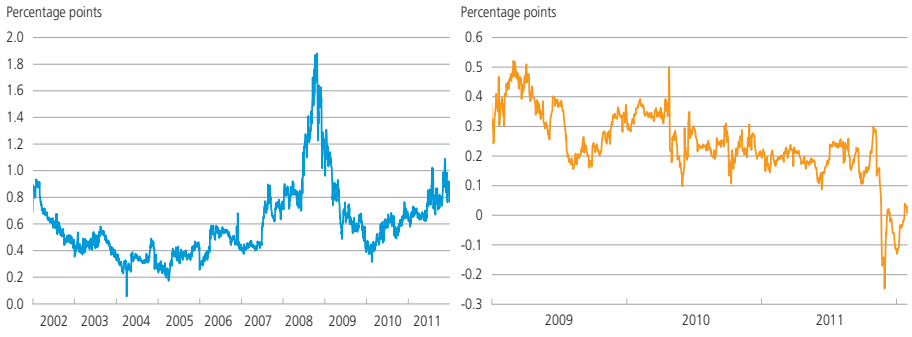
If a company has investments that reflect the discount curve, its solvency ratio will not be affected by changes in interest rates. It may, however, be inexpedient to invest in a manner corresponding to the discount curve. Hence, it will be difficult to obtain a higher return if the market return increases and it may be difficult to acquire sufficient volumes of instruments in the markets.

If pension companies do not have considerable excess capital, lack of hedging may trigger strong market dynamics, for example if the discount curve falls, while the interest rates of the assets actually owned by the pension companies remain unchanged. In that case, the value of the pension companies' liabilities will increase, while the asset value remains unchanged. This will reduce the companies' excess capital. To protect themselves against further downward pressure on their excess capital, the companies may wish quickly to reallocate their portfolio to better align it with the discount curve. Given the size of the pension sector, this could have a massive impact on the market.

During the 2008 financial crisis, the credit spread between mortgage bonds and government bonds widened significantly, cf. Chart 11 (left-

[1] Some pension schemes may use simpler methods.

30-YEAR CREDIT SPREAD (LEFT-HAND SIDE) AND 10-YEAR YIELD SPREAD TO GERMANY (RIGHT-HAND SIDE) Chart 11



Note: The 10-year yield spread shows the same pattern, but the effect is more pronounced in the 30-year spread. Yield spreads to Germany are based on 10-year zero-coupon yields.
Source: Bloomberg and Nordea Analytics.

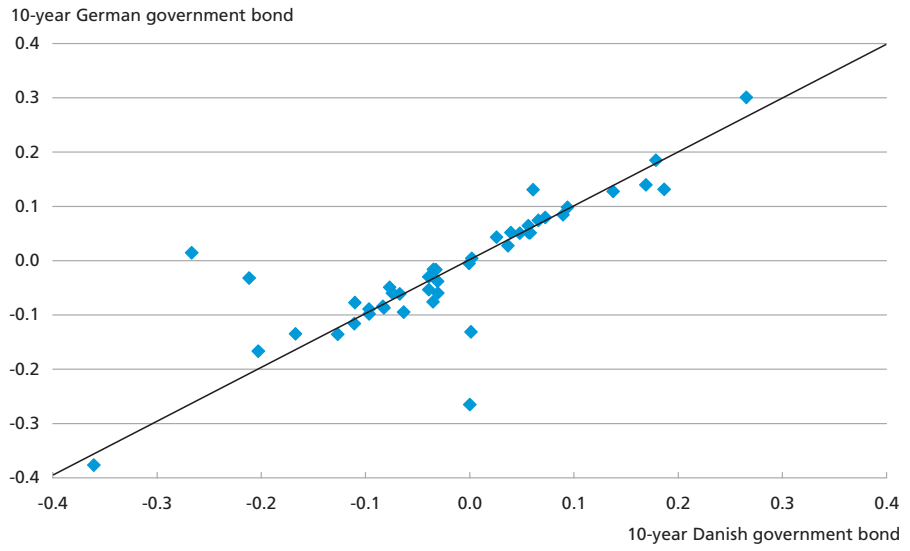
hand side). Since mortgage yields were not part of the discount curve, the widening entailed that the decline in the market value of the mortgage holdings was not matched by an equivalent fall in the value of liabilities. This gave the pension companies an incentive to sell mortgage bonds. To dissuade the companies from divesting mortgage bonds unnecessarily, the discount curve was changed to include mortgage bond yields. Hence, the pension companies no longer had an incentive to sell mortgage bonds, and the spread between mortgage bonds and government bonds fell back, cf. Chart 11.

2011 saw another adjustment of the discount curve. The European sovereign debt crisis caused a gradual narrowing of the Danish-German yield spread, cf. Chart 11 (right-hand side). On account of the substantial weight of Danish interest rates in the discount curve, the value of pension company liabilities increased more than the value of their assets. This reduced the companies' excess capital adequacy and gave them the incentive to sell German government bonds and buy Danish ones. This applied further downward pressure on Danish government bond yields, and the krone strengthened. This could have started a process of self-reinforcing dynamics, with adverse impacts on the companies' excess capital adequacy – and on pension savers. Against this backdrop, the discount curve was adjusted. Due to the size of the sector, potential reallocations in response to the negative yield spread could also impact the bond and foreign-exchange markets. One of the results of the latest adjustment of the discount curve is that the spread between the Danish and German government bond yields is now part of a 12-month moving average with a zero lower bound.[1]

[1] See www.finanstilsynet.dk

RELATION BETWEEN QUARTERLY YIELDS ON GERMAN AND DANISH GOVERNMENT BONDS

Chart 12



Source: Bloomberg and own calculations.

The structure of the discount curve is to reflect overall developments in market rates. Most pension company liabilities are in Danish kroner. Hence, it is natural for Danish interest rates to have a relative high weighting in the discount curve. On the other hand, the domestic financial markets are not large enough to absorb the sector's requirement for long maturities. Consequently, the euro swap rate and the German government bond yield are also included.

Danish and German government bond yields typically show the same pattern, cf. Chart 12, albeit without a clear one-to-one relation. The zero lower bound is to prevent a scenario under which a narrowing in the Danish-German yield spread leads to an abnormal pressure on the demand for Danish bonds. The moving average is intended to smooth the impact of daily fluctuations in the country spread, as these are difficult to hedge.

LITERATURE

Arnberg, Søren and Mikkel Barslund (2012), The crowding-out effect of mandatory labour market pension schemes on private savings: Evidence from renters in Denmark, *Danish Economic Councils Working papers,* No. 1, January.

ATP (2008), Mere end hver tredje erhvervsaktiv under 40 år har pensionshuller (More than one in three people of working age below 40 have pension-savings gaps – in Danish only), *faktum*, No. 56, May.

Danish Economic Councils (2008), *The Danish Economy*, Spring, Chapter 2.

European Commission (2009), Pension schemes and pension projections in the EU-27 member states – 2008-2060, *Occasional Papers*, No. 56, October.

Isaksen, Jacob, Paul Kramp, Louise Sørensen and Søren Sørensen (2011), Household balance sheets and debt – an international country study, Danmarks Nationalbank, *Monetary Review*, 4th Quarter, Part 2, pp 39-81.

Møller, Michael and Claus Parum (2006), Beskatning af pension (Pension taxation – in Danish only), Nordic Tax Research Council, *Dansk Økonomisk Nationalrapport*.

Mogensen, Louise (2002), Market dynamics at low interest rates, Danmarks Nationalbank, *Monetary Review*, 1st Quarter, pp 69-75.

Danish Ministry of Taxation (2012), Pensionsindskud 1998-2010 (Pension contributions 1998-2010 – in Danish only), http://www.skm.dk/tal_statistik/skatter_og_afgifter/668.html

Welfare Commission (2006), De fremtidige pensionsindkomster (Future pension income – in Danish only), *Fremtidens velfærd – vores valg*, Chapter 5.