Danmarks Nationalbank

Danish Government Borrowing and Debt

2010

Danish Government Borrowing and Debt 2012

The front cover shows the Opera House in Copenhagen.

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Explanation of symbols:
- - Magnitude nil
- 0 Less than one half of unit employed
- • Category not applicable
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Highlights of Government Debt Policy

The Danish market for government securities functioned well in 2012. Demand for Danish government securities was high, and yields were historically low. This reflected Denmark's AAA credit rating, high and persistent current-account surpluses and government debt of just under half the EU average. Moreover, the uncertainty in the international capital markets prompted investors to seek safe and liquid assets.

Despite considerable progress, the European government securities markets are still characterised by uncertainty. Denmark's government debt policy is therefore aimed at maintaining low sensitivity to higher interest rates and sudden changes in the financing requirement. This is achieved e.g. by:

- Issuing government securities that are attractive to a broad group of investors
- Covering most of the financing requirement by issuing bonds in the longer maturity segments
- Maintaining a substantial liquidity reserve e.g. by continuing to have a large balance on the central government's account.

BORROWING IN 2012

Low Danish government yields in 2012

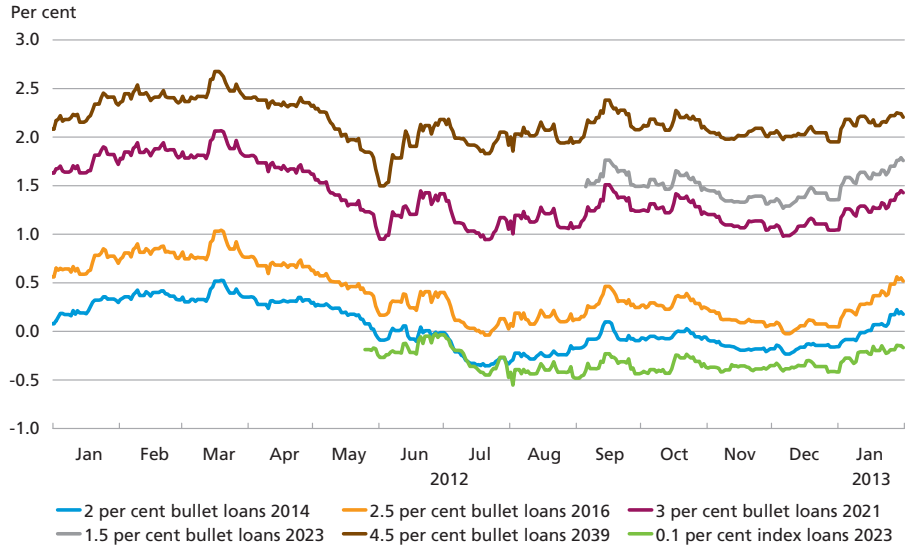
In 2012, developments in the international government debt markets were dominated by the sovereign debt crisis in parts of the euro area. The crisis-stricken countries saw rising government yields until the summer, while yields fell in countries with high credit standings, including Denmark. Yields on Danish government securities reached historically low levels and were negative in most of the 2nd half of the year for government securities with a term to maturity of up to three years, cf. Chart 1.

For most of the year, Danish government yields were lower than the corresponding German yields. This unusual situation with negative yield spreads reflects Denmark's low government debt and extraordinary demand for government securities issued by creditworthy countries outside the euro area.

Strong demand for Danish government securities

Issuance of domestic government bonds totalled kr. 102 billion in 2012 with sales in the 10- and 30-year maturity segments accounting for

YIELDS TO MATURITY OF DANISH KEY ON-THE-RUN BONDS — Chart 1

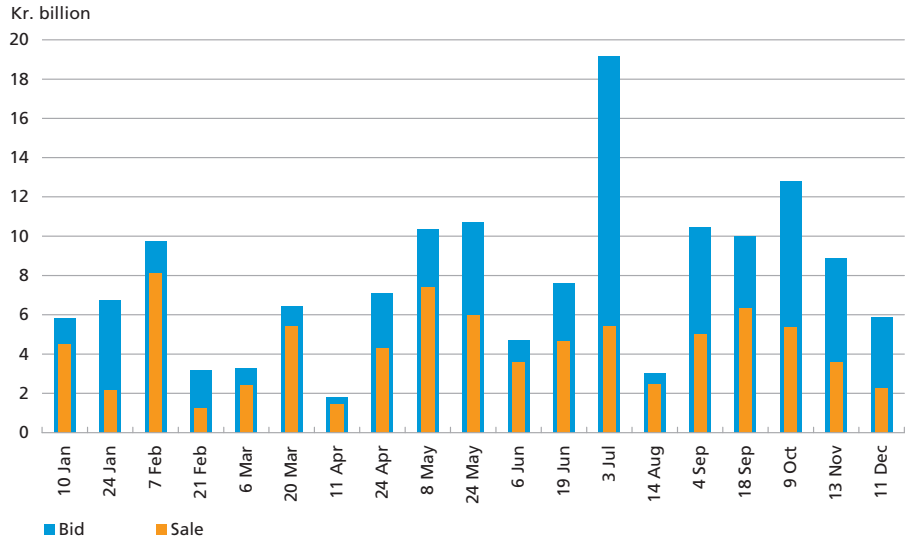


Note: For the inflation-linked bond the real yield is shown.
Source: Bloomberg.

around 80 per cent. The average maturity of the nominal bond issuance was 10.8 years, and the average yield was 1.4 per cent.

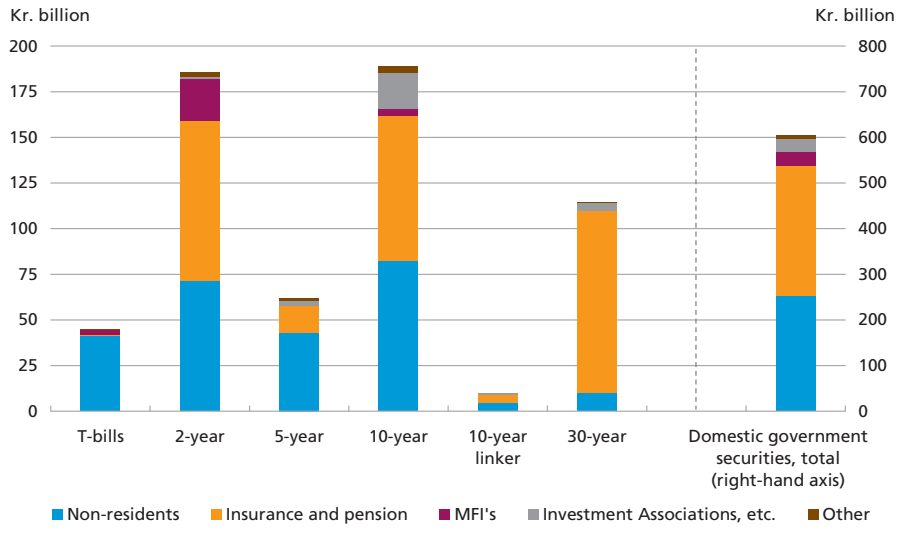
In May, the on-the-run issues were expanded with a 10-year inflation-linked bond. With the introduction of the inflation-linked bond, the central government provides for increased total potential demand for

BIDS AND SALES OF GOVERNMENT BONDS AT THE AUCTIONS IN 2012 — Chart 2



Note: Bids and sales are measured at nominal value.

OWNERSHIP SHARES OF DOMESTIC GOVERNMENT SECURITIES, END-2012 Chart 3



Note: Ownership shares are calculated on the basis of nominal stocks excluding the portfolios of the government funds. *Investment Associations, etc.* corresponds to the category *Other financial intermediaries, etc.* in the Securities Statistics. MFIs comprises primarily banks and mortgage-credit institutes.
Source: Danmarks Nationalbank, *Securities Statistics*.

Danish government bonds, which contributes to lower borrowing costs. Issuance in the inflation-linked bond totalled kr. 10 billion at market value. Since its opening, the bond has been priced close to the German 10-year inflation-linked bond.

In 2012, most of the bonds were issued via auctions. Demand was strong at the auctions, and on average, the bids totalled almost twice the volume sold, cf. Chart 2.

The outstanding volume of T-bills amounted to kr. 45 billion at end-2012, which is unchanged relative to 2011. Demand was substantial at the auctions, and for most of the year, issuance took place at negative yields.

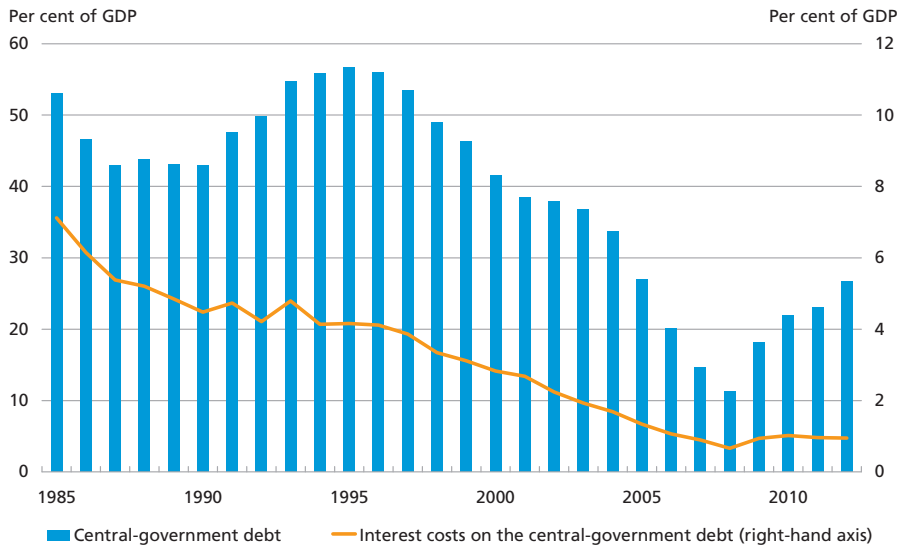
Continued strong interest from non-resident investors

Non-resident investors continued to show considerable interest in Danish government securities, increasing their holdings of domestic government securities by kr. 21 billion. At end-2012, non-resident investors held 42 per cent of the domestic government securities. The remainder was held predominantly by the Danish insurance and pension sector, cf. Chart 3.

CENTRAL-GOVERNMENT DEBT AND INTEREST COSTS IN 2012

At end-2012, the central-government debt amounted to kr. 487 billion, corresponding to kr. 87,000 per capita or 27 per cent of GDP, cf. Chart 4. This is an increase of kr. 73 billion on 2011.

CENTRAL-GOVERNMENT DEBT AND INTEREST COSTS Chart 4



Low interest costs and low interest-rate sensitivity

The interest costs on the central-government debt totalled kr. 17 billion, or 0.9 per cent of GDP, in 2012. The central government's interest costs have been maintained at a low level despite the debt increase since 2008, cf. Chart 4. The principal reason is the refinancing of existing government debt at very low interest rates.

The sensitivity of the central government's interest costs to rising interest rates is low. An increase of 100 basis points in all Danish government yields at the beginning of 2013 would result in almost unchanged interest costs on the government debt in 2013 and only a modest rise in the subsequent years, measured as a ratio of GDP.

Low debt in an international comparison

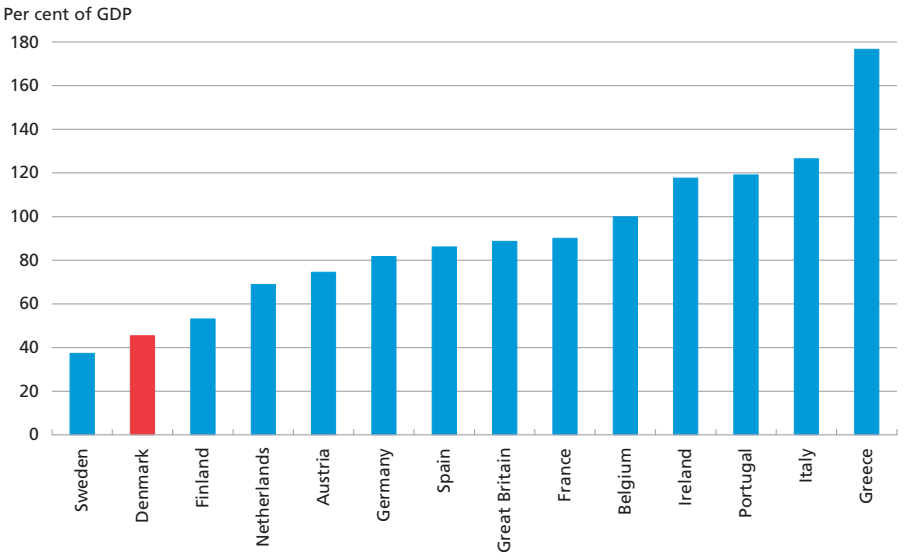
The gross general-government debt (EMU debt), comprising the debt of the central, regional and local governments as well as social security funds, is often used in international debt comparisons.

Denmark's EMU debt amounted to 45 per cent of GDP at end-2012, meaning that it is low compared with the debts of other EU member states, cf. Chart 5.

CENTRAL-GOVERNMENT BORROWING STRATEGY IN 2013

In 2013, the central government's domestic financing requirement is expected to be kr. 139 billion. The target for sales of government bonds

EMU DEBT END-2012 Chart 5



Source: *European Commission's autumn forecast*, November 2012.

in 2013 has been set at kr. 75 billion, while the target for outstanding T-bills is kr. 30 billion at end-2013. In the light of the continued large balance on the central government's account, the remaining financing requirement will be covered by drawing on the account.

The *tax reform agreement* from June 2012 will result in an one-off revenue from capital pension taxation in 2013. The size of this revenue is subject to great uncertainty. The strategy is that any additional revenue from capital pension taxation will not change the targets for sales of government bonds and T-bills. Instead, additional revenue will be used to reduce issuance in the subsequent years.

Sales primarily in longer-term bonds

Issuance in the 2-, 5-, 10- and 30-year nominal maturity segments and in the 10-year inflation-linked bond continues in 2013, cf. Table 1. In order

KEY ON-THE-RUN ISSUES, 1ST HALF OF 2013 Table 1

Maturity segment	Issuance series	Outstanding amount[1], kr. billion
Maturity < 1 year	Treasury Bills	44.9
2-year segment	2.5 per cent bullet loan 2016	21.5
5-year segment	4 per cent bullet loan 2019	87.9
10-year segment	1.5 per cent bullet loan 2023	12.6
30-year segment	4.5 per cent bullet loan 2039	114.8
10-year inflation-linked bond	0.1 per cent index loan 2023	10.2

[1] Outstanding amount as of end-2012. The outstanding amount of the inflation-linked bond is measured at indexed nominal value.

to keep the interest-rate and refinancing risks low, the strategy is to issue predominantly in the longer maturity segments, including primarily in the 10-year nominal on-the-run issue.

Foreign borrowing

The strategy for the central government's foreign borrowing in 2013 is to raise a loan of 1-2 billion euro with final exposure in euro. The loan will be issued in the 2-5-year segment and denominated in euro or dollars.

Foreign loans with a term to maturity of up to 1 year (Commercial Paper) will be issued to maintain investor interest and market access.

MARKET RISK MANAGEMENT

The continued focus on issuance in the longer maturity segments entails significantly longer duration of the government debt, also in the coming years, relative to the pre-crisis levels.

For 2013, the central government's interest-rate risk is managed within a band of 12 years ± 1 year for the average duration of the government debt, calculated on the basis of a discount rate of zero. The central government does not plan to conclude any new interest-rate swaps in 2013, since the expected savings in the medium term from reducing the duration are assessed to be low.

CREDIT RISK MANAGEMENT

The current agreements with the central government's swap counterparties entail pledging of one-way collateral for the market value of the swaps. Consequently, the counterparties pledge collateral when the market value of the swap portfolio is positive for the central government, while the government does not pledge collateral when the market value is positive for the counterparty.

In 2013, the central government will start negotiating new bilateral collateral agreements with cash as eligible collateral. The switch to two-way collateral agreements is expected to provide for more favourable terms for the central government when concluding new swaps. This reflects that two-way collateral agreements reduce the liquidity requirements of the counterparties compared with one-way collateral agreements. The negotiations with the counterparties on new bilateral collateral agreements are expected to be finalised during 2013.

CHAPTER 1

Sovereign Debt Markets in 2012

Throughout 2012, developments in the sovereign debt markets continued to be dominated by the debt crisis in parts of the euro area. At the beginning of the year, sentiment in the financial markets was positive, but it reversed due to a weak growth outlook in the euro area and the negative impact on fiscal consolidation. The renewed uncertainty was reflected in rising government yields in the crisis-stricken euro area member states towards July, while interest rates fell to historically low levels in countries with high credit ratings.

In an attempt to dampen the effect of the debt crisis and reduce the risk of the crisis spreading further, a number of stabilising measures were taken. The European Central Bank, ECB, announced the Outright Monetary Transactions programme under which the ECB may purchase short-term government securities from euro area member states in the secondary market under certain conditions. Although the announcement led to an improvement in the form of falling government yields in the crisis-stricken countries, the sovereign debt markets continued to be characterised by nervousness in the autumn.

As a result of a fiscal-policy agreement in the USA at the turn of the year 2012/13, substantial tightening of US public finances is avoided for the time being. This had a positive effect on the global capital markets and also affected the European sovereign debt markets. In January, government yields declined further in the peripheral euro area member states, while interest rates rose moderately in the core member states and in countries with high credit ratings.

SOVEREIGN DEBT CRISIS IN THE EURO AREA 1.1

In 2012, the financial markets were still affected by the sovereign debt crisis in a number of euro area member states. At the beginning of 2012, the ECB's 3-year longer-term refinancing operations, LTRO, reduced the uncertainty about the banks' funding situation and contributed to a more positive sentiment in the capital markets. But as the growth outlook worsened during the spring, the crisis flared up again, causing uncertainty as to whether the most vulnerable economies in the euro area would be able to comply with the requirements for fiscal consolidation.

This resulted in rising government yields and further pressure on public finances.

Spain and Italy in focus

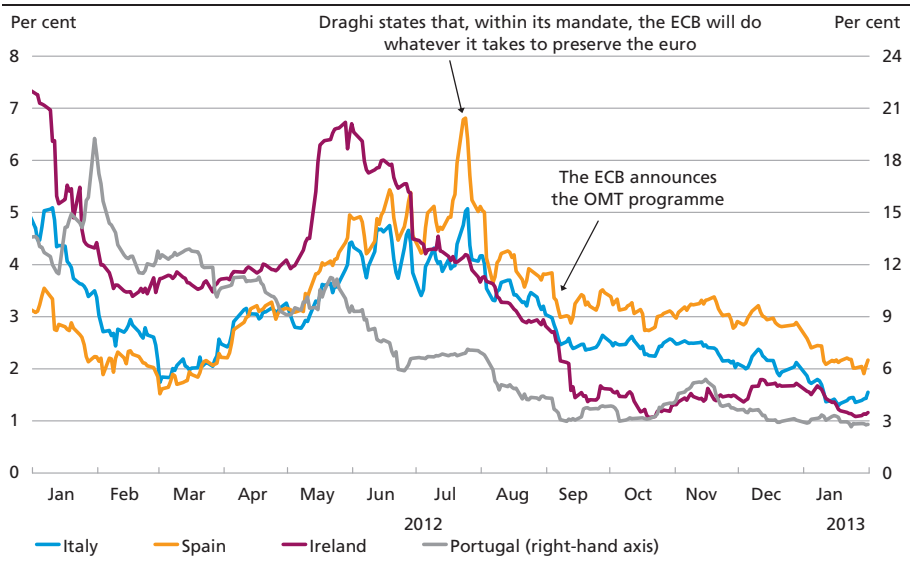
The Spanish economy weakened in the course of the spring, increasing the focus on the link between the fiscal problems and the Spanish banking sector. This was reflected in strongly widening yield spreads, cf. Chart 1.1.1. As a result of its problems, in June, Spain had to ask the other euro area member states for financial support to recapitalise its banking sector. The European Stability Mechanism, ESM, made the first payment of 40 billion euro in December 2012.

In Italy, extensive fiscal consolidation continued in 2012, substantially reducing the government deficit despite a significant drop in economic activity. However, contagion effects from Spain and Greece contributed to lower demand for Italian government securities until July, resulting in rising government yields.

Signs of market stabilisation

The turmoil in the financial markets declined when, at the end of July, the President of the ECB, Mario Draghi, stated that the ECB would do whatever it takes to preserve the euro, within its mandate. The ECB's announcement of the OMT programme in early September further dampened the nervousness, cf. Box 1.1. Although the ECB has yet to make any transactions

YIELD SPREADS TO GERMAN 2-YEAR GOVERNMENT BOND — Chart 1.1.1



Source: Nordea Analytics.

MEASURES TO STABILISE THE FINANCIAL MARKETS Box 1.1

Outright Monetary Transactions, OMT

In September, the ECB launched the Outright Monetary Transactions, OMT, programme, which entails that the ECB may purchase government securities from euro area member states in the secondary market under certain conditions. Purchases under the OMT programme are conditional upon the member state having a European Financial Stability Facility/European Stability Mechanism, EFSF/ESM, programme and that it complies with the programme conditionality. Any purchases will focus on securities in the 1-3 year maturity segments, and no upper limit has been set for programme purchases. The liquidity impact of the purchases will be fully sterilised.

European Stability Mechanism entered into force

The European Stability Mechanism, ESM, of the euro area member states entered into force on 8 October 2012 with a total lending capacity of 500 billion euro. The euro area member states also decided that it must be possible to use the ESM for direct recapitalisation of ailing banks in the euro area once a single efficient supervisory mechanism for banks has been established. In this way, recapitalisation of banks will be possible without affecting the government debt of the country in question.

Establishment of a single supervisory mechanism for banks

At the end of 2012, the Ecofin Council agreed on the framework for a single European supervisory mechanism for banks, which is planned to become effective in 2014. Comprising all credit institutions in the euro area, supervision will be undertaken by the ECB and the national supervisory authorities. It will be possible for the non-euro area member states, including Denmark, to enter into an agreement on participation in the single supervisory mechanism.

under the OMT programme, the announcement in itself boosted confidence in the sovereign debt markets, leading to falling interest rates in the crisis-stricken euro area member states, including Spain and Italy.

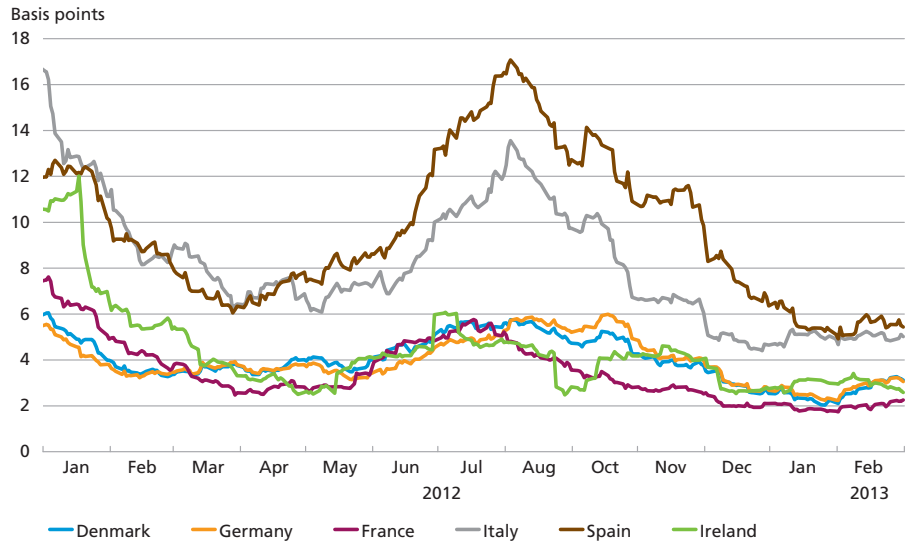
The declining uncertainty in the sovereign debt markets in the 2nd half of 2012 was also reflected in less interest-rate volatility, cf. Chart 1.1.2. Interest-rate volatility was extraordinarily high for Spanish and Italian government bonds in June and July, but declined steadily after the ECB's announcements towards the end of 2012.

DEVELOPMENTS IN MEMBER STATES WITH FINANCIAL ASSISTANCE PROGRAMMES 1.2

For some of the euro area member states with financial assistance programmes, access to the capital markets improved in 2012. This applied to Ireland in particular. Ireland has continuously complied with the requirements of the loan programme, and in 2012 the positive development enabled the country to access the capital markets again. In July 2012, an

INTEREST-RATE VOLATILITY FOR 10-YEAR GOVERNMENT YIELDS IN SELECTED EU MEMBER STATES

Chart 1.1.2



Note: 40-day moving average for the daily changes in par yields (absolute value).
Source: Bloomberg and own calculations.

auction over Irish T-bills was held for the first time since September 2010, and Ireland's bond issuance by syndication[1] in January 2013 was met with solid demand from non-resident investors.

Portugal has achieved almost all the objectives of the loan programme provided in 2011. Yields on Portuguese government bonds decreased considerably throughout 2012, and in January 2013 the Portuguese 10-year government bond fell below 6 per cent, which is the lowest level since October 2010. The improved situation is also reflected in Portugal's issuance, in January 2013, of 5-year government bonds by syndication, which was met with substantial demand from non-resident investors. This is Portugal's first issuance of government bonds since the country requested a financial assistance package.

Greece failed to meet the requirements of its original programme, due to a deep recession, among other factors. However, yields on Greek government bonds declined considerably when that country's second loan programme fell into place in March 2012. In December, Greece entered into a new financial agreement with the IMF, the European Commission and the ECB. This agreement gave the Greek government another two years to implement the agreed fiscal-policy adjustments and included a plan for reducing government debt to a sustainable level towards 2022.

[1] When syndication is used for issuance of government securities, investor bids are received via a group of banks (the syndicate). The final price is determined on the basis of demand.

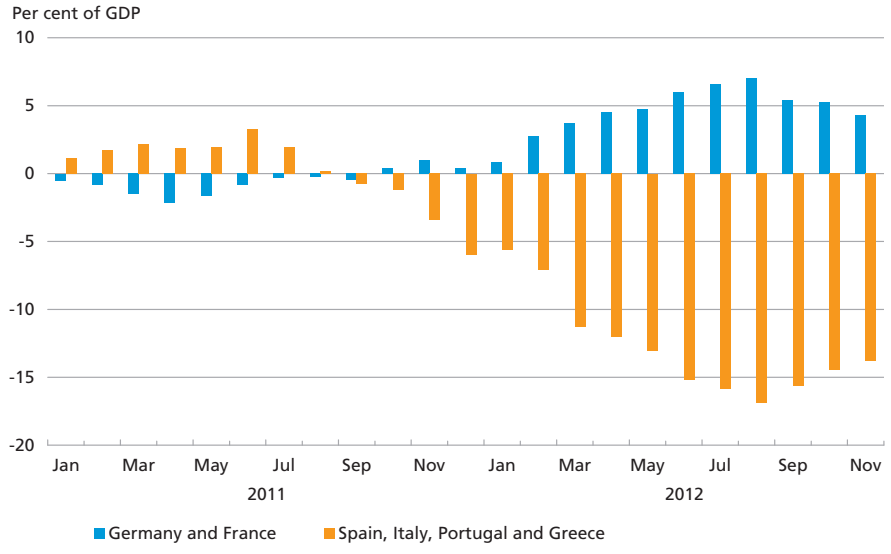
FRAGMENTATION OF EUROPEAN SOVEREIGN DEBT MARKETS 1.3

In the 1st half of 2012, continuing uncertainty as regards the debt crisis in the euro area led to increasing fragmentation of the financial markets in the EU. Foreign investors withdrew from the most vulnerable economies, especially during periods of substantial turmoil. This resulted in significant capital outflows from the peripheral euro area member states to the core member states among others in the 1st half of 2012, cf. Chart 1.3.1. The outflow of private capital from the peripheral member states was offset by the inflow of capital via their central banks in the form of withdrawals from the ECB. After the announcement of the ECB's OMT programme, there are indications that investors are returning to the peripheral member states.

Extraordinarily low interest rates in countries with high credit ratings

In 2012, growing uncertainty made investors prefer countries that are regarded as safe havens, including Denmark. As a consequence, government yields in the countries concerned dropped to extraordinarily low levels towards August, cf. Chart 1.3.2. During the autumn, interest rates in the highly rated countries remained low despite initial signs of stabilisation of the sovereign debt markets.

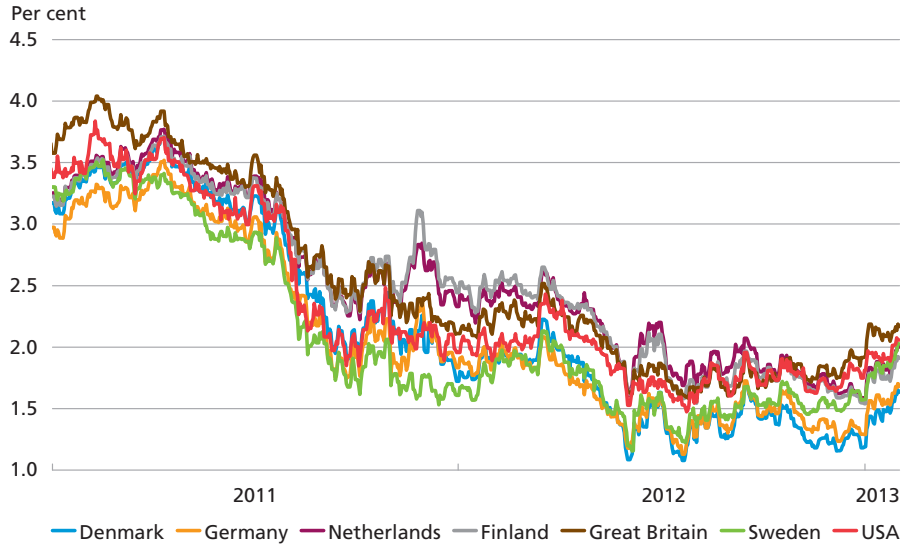
ACCUMULATED PRIVATE CAPITAL FLOWS IN SELECTED EURO AREA MEMBER STATES Chart 1.3.1



Note: The estimate of private capital flow is calculated as the sum of portfolio investment and other investment (net), excluding changes in the national central bank's Target2 balance in per cent of GDP of the previous year. Accumulated from January 2011. Latest observation: November 2012.

Source: The national central banks' balance of payments and Target2 balance statistics.

10-YEAR GOVERNMENT YIELDS IN COUNTRIES WITH HIGH CREDIT RATING Chart 1.3.2



Note: Par yields.
Source: Bloomberg.

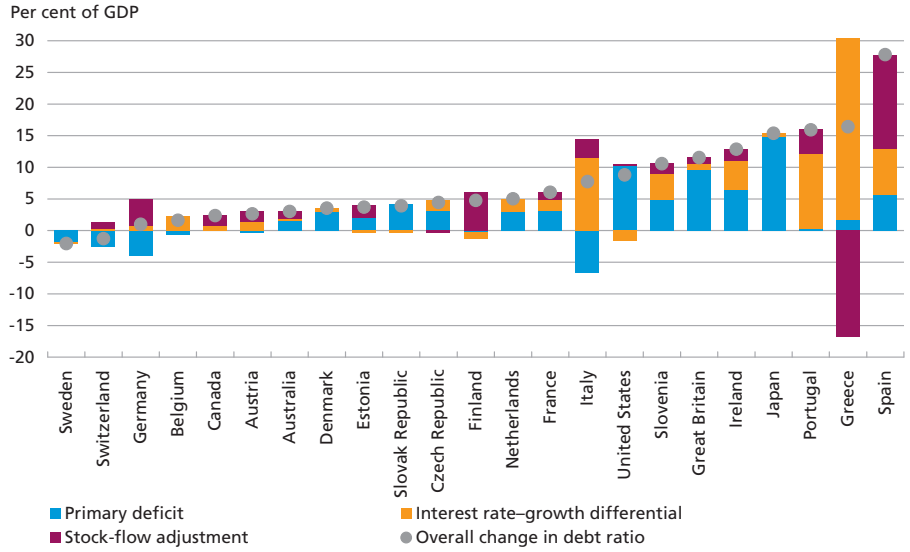
SUSTAINED INCREASE IN MOST COUNTRIES' DEBT RATIOS 1.4

Consolidation of public finances continued in most European countries in 2012. However, government deficits are still so high that government debt as a ratio of GDP continues to increase in most countries, cf. Chart 1.4.1. The slow reversal of debt ratios should also be viewed against the backdrop of the weak economic development. The relationship between real yields on government debt and economic growth has a major impact on the development in debt across countries. In countries such as Greece, Portugal and Spain, the present real yields on government debt are higher than GDP growth, which contributes to further increasing the debt ratio. This also applies to Italy, whose debt increases despite the country's primary budget surplus, i.e. its government surplus, excluding interest costs. The opposite is the case in the USA, which has a primary budget deficit, while the debt ratio is dampened by economic growth exceeding the current low level of interest rates.

Financing requirement and primary markets

In the light of the continued high financing requirements and fluctuating demand, most government debt management offices had to implement more flexible issuance policies in 2012. A number of countries shortened the period between announcing and holding auctions and increased the number of securities per auction. In addition, the crisis-

DECOMPOSITION OF CHANGES IN DEBT RATIOS FROM 2011-13 Chart 1.4.1



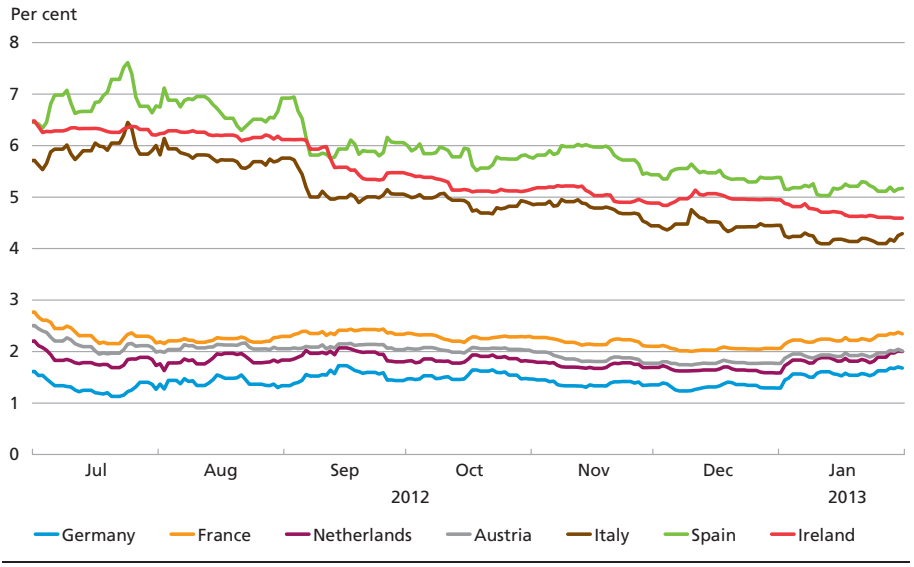
Note: The change in debt ratios is indicated as the change in gross debt relative to GDP. The primary deficit, reflecting the government budget deficit excluding interest costs, has been accumulated in 2012 and 2013.
The difference between the interest rate and GDP growth is given by: *(r-g)/(1+g)*, where *r* indicates the effective interest rate defined as the ratio of interest payments over the debt, and *g* is GDP growth in nominal terms in the period 2011-13.
Stock-flow adjustment indicates that part of the change in the debt which cannot be explained by the change in the budget deficit. This includes e.g. financial transactions, changes in the debt due to exchange-rate fluctuations and statistical discrepancy. For Greece, the -16.9 adjustment includes the write-down of government debt. For Spain, the 14.8 adjustment includes support for the financial sector.
Source: IMF Fiscal Monitor, October 2012.

stricken countries had to increase the outstanding volume in the short maturity segments due to lack of market access in the longer segments. In some countries, lower foreign demand increased the focus on domestic investors. For example, Italy began to issue bonds linked to domestic inflation as a supplement to bonds linked to inflation in the euro area.

OUTLOOK FOR 2013 1.5

At the end of 2012, the financial markets were characterised by uncertainty about the "fiscal cliff", which would entail substantial automatic tightening of US fiscal policy in 2013, unless a budget agreement was reached. It consequently helped stabilise the European sovereign debt markets when a US fiscal policy agreement was adopted at the turn of the year. In January 2013, government yields continued to fall in the peripheral euro area member states, while rising slightly in the core member states, cf. Chart 1.5.1. The USA, however, has yet to reach political agreement on public spending and raising the existing debt ceiling, which may cause renewed market nervousness in 2013. In the euro

10-YEAR GOVERNMENT YIELDS IN SELECTED EURO AREA MEMBER STATES Chart 1.5.1



Note: Par yields.
Source: Bloomberg.

area, there is still uncertainty about the development in the most distressed economies, but the risk of the debt crisis intensifying further seems to have diminished.

CHAPTER 2

Debt and Interest Costs

In 2012, the central-government debt rose by kr. 73 billion as a result of a government deficit. At end-2012, the central-government debt amounted to kr. 487 billion, corresponding to 27 per cent of GDP. Denmark's debt remains low compared with that of other EU member states.

The interest costs on the central-government debt totalled kr. 17 billion, or 0.9 per cent of GDP. In spite of an increase in the debt in recent years, interest costs on the central-government debt have remained low. This reflects, in particular, historically low interest rates on the government's issuance, entailing that existing debt is refinanced at low interest rates.

The gross general-government debt (EMU debt) declined in 2012 although public finances showed a deficit. The reason is that part of the year's financing requirement was covered by reducing the balance on the central government's account. Since the central government's account is not included in the EMU debt, a decline in the balance does not affect the EMU debt.

CENTRAL-GOVERNMENT DEBT ROSE IN 2012 2.1

The central-government debt is calculated as the nominal value of domestic and foreign debt less the balance on the central government's account at Danmarks Nationalbank and the assets of the three government funds.

In 2012, the central-government debt rose by kr. 73 billion[1] and amounted to kr. 487 billion at year-end, cf. Table 2.1.1.[2] That corresponds to 27 per cent of GDP or kr. 87,000 per capita.

In Denmark, loans to a number of government-owned companies are financed by issuance of government bonds (re-lending), cf. Chapter 7. The calculation of the central-government debt includes only government issues used to finance the loans, whereas the assets, i.e. the central government's receivables from the companies, are not deducted from the central-government debt. Furthermore, the central government's capital

[1] Except for capital gains/losses on issues and net purchases from the three government funds, the development in the central-government debt from year to year corresponds to the central government's net financing requirement, or the sum of the central government's actual receipts and disbursements. In 2012, the net financing requirement amounted to kr. 80 billion, cf. *Foreign Exchange and Liquidity and Monthly Balance Sheet*, December 2012.

[2] Central-government debt at market value was kr. 604 billion at end-2012.

CENTRAL GOVERNMENT DEBT — Table 2.1.1

Kr. billion, end of year	2010	2011	2012
Domestic debt	576.4	645.9	667.5
Foreign debt	114.7	111.8	90.0
Central-government's account	-177.3	-223.1	-162.0
Social Pension Fund	-113.5	-105.6	-92.9
Advanced Technology Foundation	-12.1	-13.4	-14.3
Fund for Better Working Environment and Labour Retention	-2.0	-1.7	-1.5
Central-government debt	386.3	413.9	486.8

Note: A positive figure indicates a liability, a negative figure indicates an asset.
Source: *Central-governments accounts 2010* and *2011*. For 2012, figures are provisional.

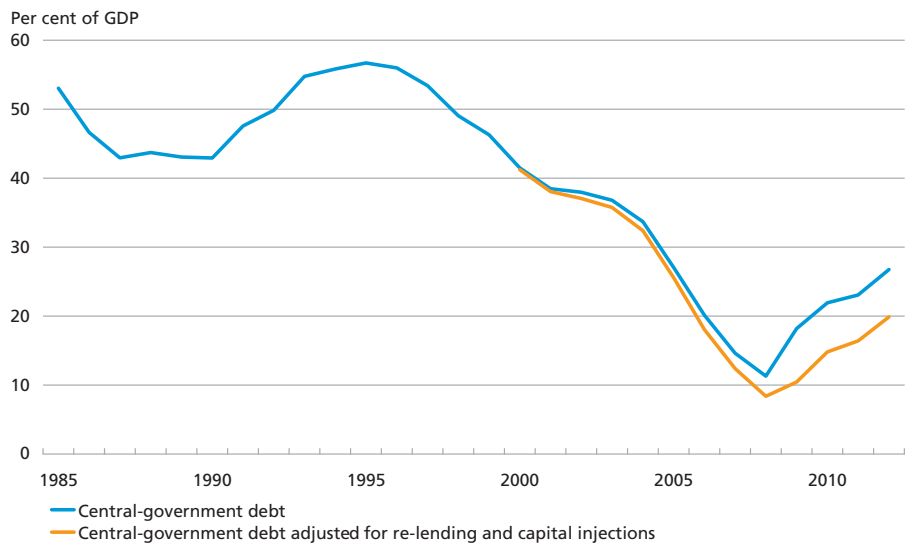
injections into banks and credit institutions in connection with Bank Rescue Package 2 are not included in the calculation of the central-government debt either. If the central-government debt is adjusted for the volume of outstanding re-lending and capital injections, the debt is reduced to 20 per cent of GDP, cf. Chart 2.1.1.

INTEREST COSTS UNCHANGED DESPITE RISING DEBT 2.2

Interest costs on the central-government debt amounted to kr. 17 billion in 2012, cf. Table 2.2.1, corresponding to 0.9 per cent of GDP, cf. Chart 2.2.1.

Interest costs have remained low in spite of the debt increase in recent years. This primarily reflects historically low interest rates on government issuance, entailing that existing debt has been refinanced at lower

CENTRAL-GOVERNMENT DEBT — Chart 2.1.1



INTEREST PAYMENTS ON THE CENTRAL-GOVERNMENT DEBT — Table 2.2.1

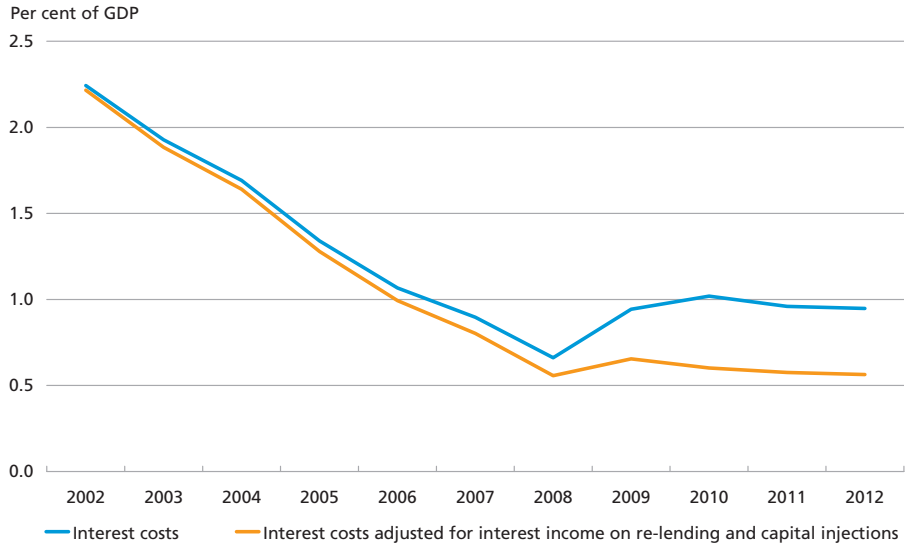
Kr. billion	2010	2011	2012
Domestic debt	21.8	23.0	21.5
Foreign debt	1.0	1.1	0.2
Central-government's account[1]	0.0	-1.8	-0.2
Social Pension Fund	-4.4	-4.5	-3.7
Advanced Technology Foundation	-0.4	-0.5	-0.5
Fund for Better Working Environment and Labour Retention	-0.1	-0.1	-0.1
Interest costs on the central-government debt	18.0	17.2	17.2

Note: A positive figure indicates interest costs; a negative figure interest income.
Source: *Central-governments accounts 2010* and *2011*. For 2012, figures are provisional.
[1] As of 11 May 2009 the interest on the account was lowered from the discount rate to the discount rate less 1 percentage point, but not less than 0 per cent. From 1 January 2011, the account accrues interest at the current-account rate.

interest rates, cf. Box 2.1. Furthermore, high net interest payments on the central government's interest-rate swaps have contributed to lower interest costs on the central-government debt, cf. Box 2.2. Interest costs as a ratio of GDP are thus lower than in 2005, when the central-government debt was at largely the same level cf. Chart 2.2.2.

The sensitivity of the central government's interest costs to rising interest rates is low. An increase of 100 basis points in all Danish government yields at the beginning of 2013 would result in almost unchanged interest costs on the government debt in 2013 and only a modest rise in the subsequent years, measured as a ratio of GDP.

INTEREST COSTS ON THE CENTRAL-GOVERNMENT DEBT — Chart 2.2.1



DECOMPOSITION OF DEVELOPMENTS IN INTEREST PAYMENTS ON THE CENTRAL-GOVERNMENT DEBT

Box 2.1

Interest payments on the central-government debt are measured by the sum of interest costs on the domestic and foreign debt less interest from the government funds' holding of bonds and interest on the balance of the central government's account:

$$\text{Interest costs}_t = \sum_i r_{i,t} B_{i,t}$$

where $r_{i,t}$ is the average interest on portfolio i in period t, and $B_{i,t}$ is the holding of portfolio i in period t. The portfolios consist of domestic debt, foreign debt and central-government assets (the government funds' holding of bonds and the central government's account). $r_{i,t}$ is calculated as the interest payment on portfolio i relative to the holding of portfolio i in period t.

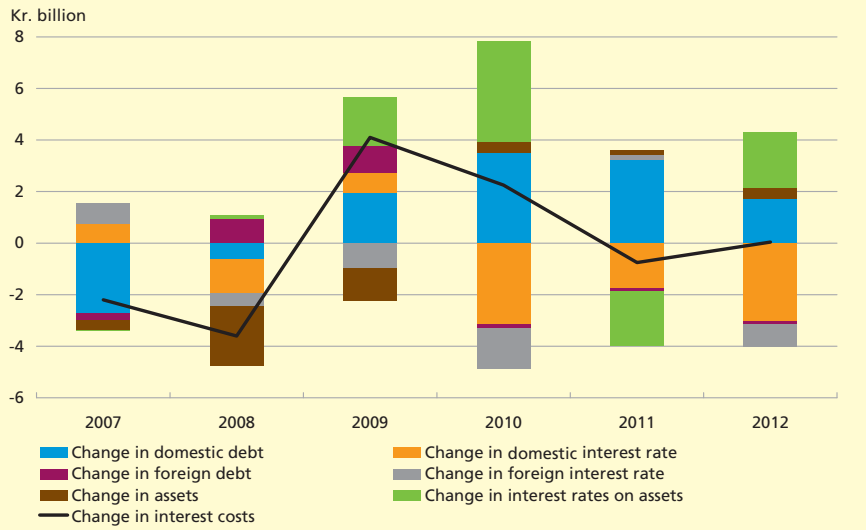
The development in total payments on the central-government debt from year to year may be decomposed into contributions from portfolio changes and contributions from changes in the average interest on the portfolios. [1]

$$\Delta\text{Interest costs}_t \approx \sum_i r_{i,t-1} \Delta B_{i,t} + \sum_i \Delta r_{i,t} B_{i,t-1}$$

Chart A illustrates how portfolio changes and changes in interest have affected developments in the central-government interest costs from year to year. Viewed in isolation, the increase in the domestic bond debt in recent years has resulted in higher costs on the domestic debt (blue bar). This effect has been offset by lower interest on the domestic and foreign debt (yellow and grey bars). Conversely, the interest income from the central government's assets has dropped as interest rates have declined (green bar).

DECOMPOSITION OF CHANGES IN INTEREST COSTS

Chart A



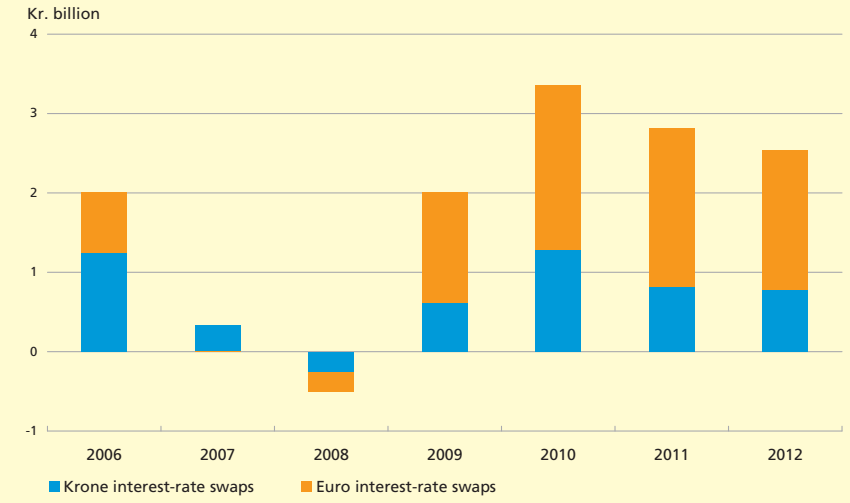
Note: A positive (negative) contribution increases (reduces) the central government's interest costs.

[1] The expression is an approximation of the change in the central government's interest costs, as the interaction term between portfolio changes and interest-rate changes, $\Delta r_{i,t} \cdot \Delta B_{i,t}$, has been omitted. On average, the correction from the interaction term for all instruments is kr. 0.4 billion during the period. To allow for the fact that the year's interest costs have not necessarily been paid from the holding at year-end, an average of this year and previous years is applied.

PAYMENTS ON THE CENTRAL GOVERNMENT'S PORTFOLIO INTEREST-RATE SWAPS Box 2.2

Payments on krone interest-rate swaps are included in interest payments on the domestic debt, while payments on euro interest-rate swaps are included in interest payments on foreign debt. The central government pays a variable interest rate and receives a fixed interest rate on interest-rate swaps.[1] Hence, the net interest income on the central government's swaps increases when interest rates decline. As a result of the fall in interest rates, interest-rate swaps have made an annual net interest income contribution of kr. 2-3 billion since 2009, cf. Chart A.

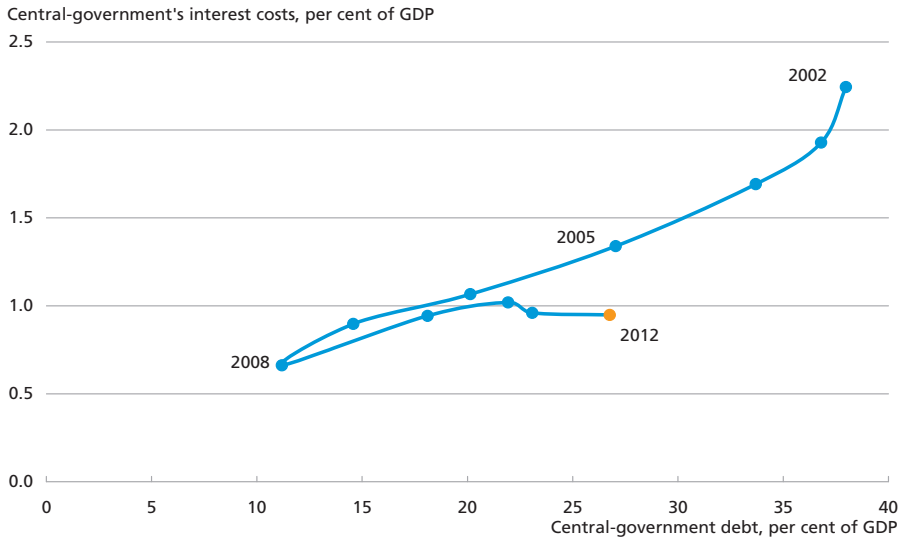
NET INTEREST INCOME ON THE CENTRAL GOVERNMENT'S PORTFOLIO SWAPS Chart A



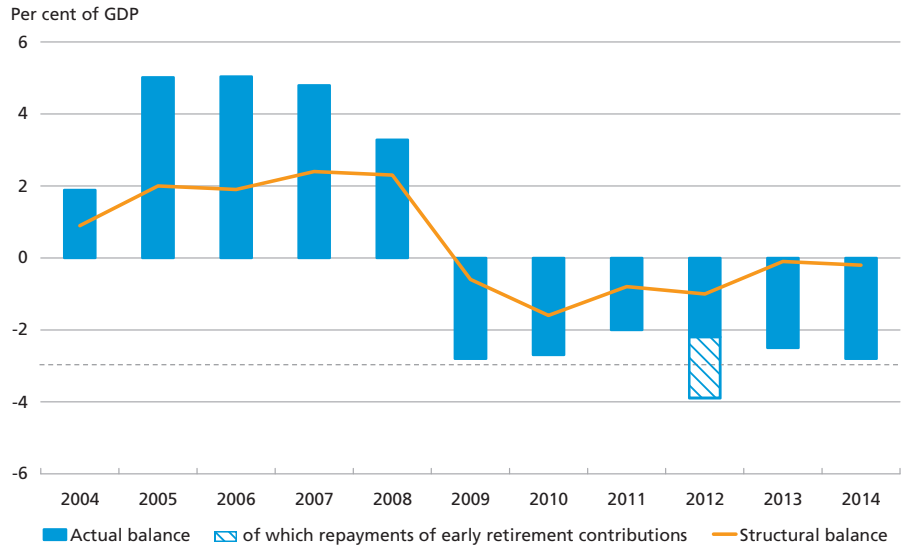
Note: Net interest income is stated on an accrued basis.

[1] 6-month Cibor is paid on the central government's krone interest-rate swaps, while 6-month Euribor is paid on the euro interest-rate swaps.

CENTRAL-GOVERNMENT DEBT AND INTEREST COSTS Chart 2.2.2



GENERAL GOVERNMENT BUDGET BALANCE AND STRUCTURAL BALANCE Chart 2.3.1



Note: For the period 2012-14 based on figures from *Economic Survey*, December 2012.
Source: Statistics Denmark and Ministry of Economic Affairs and the Interior.

THE GENERAL-GOVERNMENT BUDGET BALANCE AND DEBT 2.3

The general-government budget balance and the gross general-government debt (EMU debt), comprising the debt of the central, regional and local governments as well as social security funds, are often used in international comparisons of deficits and debt. According to the EU Stability and Growth Pact, the general-government deficit of member states must not, as a general rule, exceed 3 per cent of GDP, while the limit for the EMU debt, as a general rule, is 60 per cent of GDP.

General government budget balance

Following a number of years of government surpluses, there have been deficits since 2009, cf. Chart 2.3.1. Despite the economic slowdown as well as temporary measures to ease fiscal policy, the government deficit amounted to less than 3 per cent of GDP in 2009-11.

In December 2012, the Ministry of Economic Affairs and the Interior estimated a government deficit for 2012 of 3.9 per cent of GDP. The deficit is partly attributable to extraordinary reimbursement of early retirement contributions.[1] Adjusted for this, the government deficit is estimated to amount to 2.2 per cent of GDP, cf. Chart 2.3.1.

[1] In 2012 it was possible to leave the early retirement scheme and receive tax-free disbursement of contributions made earlier. The disbursement of early retirement contributions is offset by an improvement in public finances in the longer term when the expenditure for early retirement benefits is expected to decline.

A government deficit of 2.5 per cent of GDP is expected in 2013, which is in line with the European Commission's recommendation to reduce the actual government deficit to less than 3 per cent of GDP by 2013 at the latest.[1] With the Tax Reform of June 2012, the taxation of existing capital pensions can be moved forward to 2013. If more people than assumed choose to restructure their existing capital pension schemes, the general government budget balance will improve in 2013.

General-government structural balance

The development in the general-government budget balance is highly dependent on cyclical developments, given Denmark's strong automatic stabilisers. In addition, certain major items of public revenue are sensitive to oil-price fluctuations and movements in the financial markets. In consequence, estimates of fiscal sustainability are typically based on the general-government structural balance, which is adjusted for cyclical fluctuations and other factors of an extraordinary nature. Hence, the structural balance expresses the underlying development in public finances.

The structural balance is expected to show a deficit of 1 per cent of GDP for 2012, while close to structural equilibrium is expected for 2013, cf. Chart 2.3.1. This means that the structural balance will improve by 1.5 per cent of GDP from 2010 to 2013 in line with the EU recommendation.

In recent years, the EU member states have adopted a number of new rules intended to strengthen budgetary discipline and increase the macroeconomic surveillance of the individual member states.[2] As part of the extended fiscal policy framework, a requirement has been introduced that the individual member state's structural deficit must not, as a main rule, exceed 0.5 per cent of GDP. With the Budget Act, the Folketing (Parliament) has decided that the annual structural deficit must not, as a general rule, exceed 0.5 per cent of GDP as required by the Fiscal Compact.[3]

Gross general-government debt (EMU debt)

The gross general-government debt (EMU debt) is calculated at nominal value. The debt is calculated on a gross basis, but the public sector may consolidate the debt with claims on itself. This means that the government securities portfolios of the government funds are subtracted from

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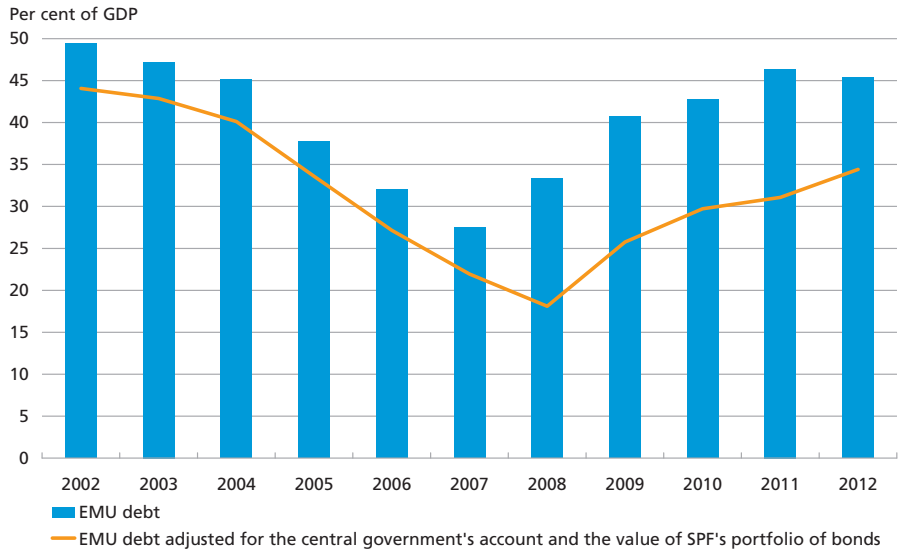
1 In July 2010, the European Commission recommended that the Danish government reduce the government deficit to less than 3 per cent of GDP by 2013 at the latest and that it consolidate its structural deficit by an average of no less than 0.5 per cent of GDP annually during the period 2011-13.

2 For a detailed discussion of the new rules, including the Fiscal Compact, see the article Fiscal Policy in the EU – What Have We Learned from the Crisis?, *Monetary Review*, 2nd Quarter 2012, Danmarks Nationalbank.

3 For a description of the Budget Act, see the article Public Expenditure Management in Denmark, *Monetary Review*, 2nd Quarter 2012, Danmarks Nationalbank.

EMU DEBT ADJUSTED FOR THE CENTRAL-GOVERNMENT'S ACCOUNT AND THE ENTIRE VALUE OF SPF's PORTFOLIO OF BONDS Chart 2.3.2



Note: 2012 based on figures from *Budget Outlook 3*, December 2012.
Source: Statistics Denmark and Ministry of Finance.

the EMU debt. On the other hand, the Social Pension Fund's portfolio of other listed bonds and the balance on the central government's account at Danmarks Nationalbank are not subtracted.

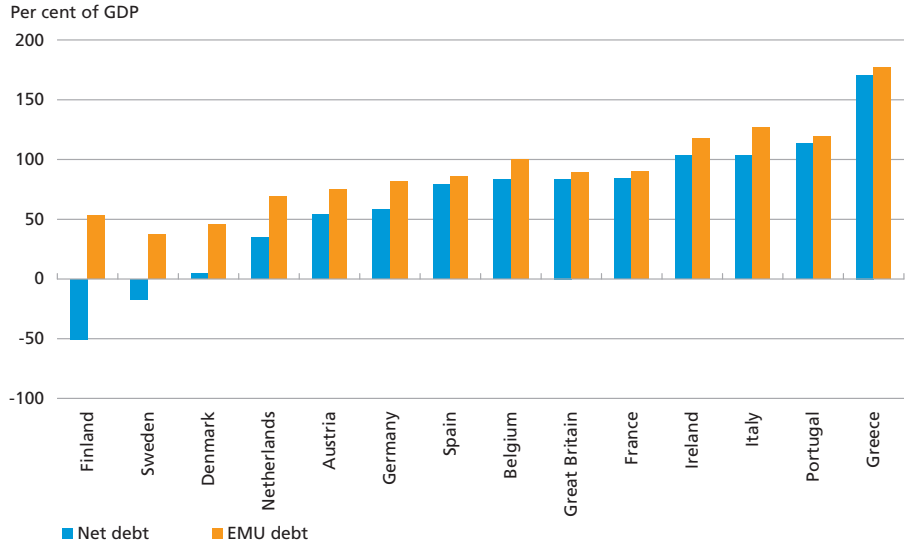
At end-2012, Denmark's EMU debt totalled 45 per cent of GDP, cf. Chart 2.3.2. Hence, the EMU debt is clearly below the limit of 60 per cent of GDP stipulated in the Stability and Growth Pact.

The EMU debt, declined marginally in 2012 despite a government deficit of 3.9 per cent of GDP. The reason is that part of the year's financing requirement was met by reducing the balance on the central government's account, cf. Chapter 3. Since the central government's account is not included in the EMU debt, a decline in the balance does not affect the EMU debt. Denmark's EMU debt is low compared with that of other EU member states, cf. Chart 2.3.3.

Net general-government debt

Assessment of the sustainability of public finances is typically based on the net general-government debt, comprising all financial assets and liabilities of the central, regional and local governments as well as social security funds. The central government's asset side includes the account at Danmarks Nationalbank, all assets in government funds, re-lending to government-owned companies and the central government's equity portfolio, e.g. shareholdings in DONG Energy, Copenhagen Airports, Post

EMU DEBT AND NET DEBT IN SELECTED EU MEMBER STATES, END-2012 Chart 2.3.3



Source: Net debt is based on *IMF World Economic Outlook*, October 2012, while EMU debt is based on *European Commission's autumn forecast*, November 2012.

Danmark (the Danish Postal Service) and Scandinavian Airlines, SAS. The net general-government debt is calculated at market value and is thus affected by value adjustments of government assets and liabilities. At end-2012, the net general-government debt amounted to 4 per cent of GDP, which is low compared to that of other EU member states, cf. Chart 2.3.3.

CHAPTER 3

Borrowing in 2012

Demand for Danish government securities was strong in 2012, reflecting the high credit standing of the Danish central government as well as uncertainty and risk aversion in the international capital markets. Towards the end of 2012, Danish government yields were lower than at the beginning of the year, and the yield spread to Germany was negative for most of the year.

Sales of domestic bonds amounted to kr. 102 billion, and issuance primarily took place in the longer maturity segments, which contributed to ensuring a low interest-rate and refinancing risk. The average maturity of the bonds issued was 10.8 years, while the average yield was 1.4 per cent. The outstanding amount of the T-bill programme was maintained at kr. 45 billion.

Non-resident investors increased their ownership share of Danish government securities to 42 per cent. The increase reflected strong interest from Asian investors as well as central banks and institutional investors, among others. These investor segments also participated largely in the government's syndicated issue of a 3-year dollar loan of 1.75 billion dollars (approximately kr. 10 billion).

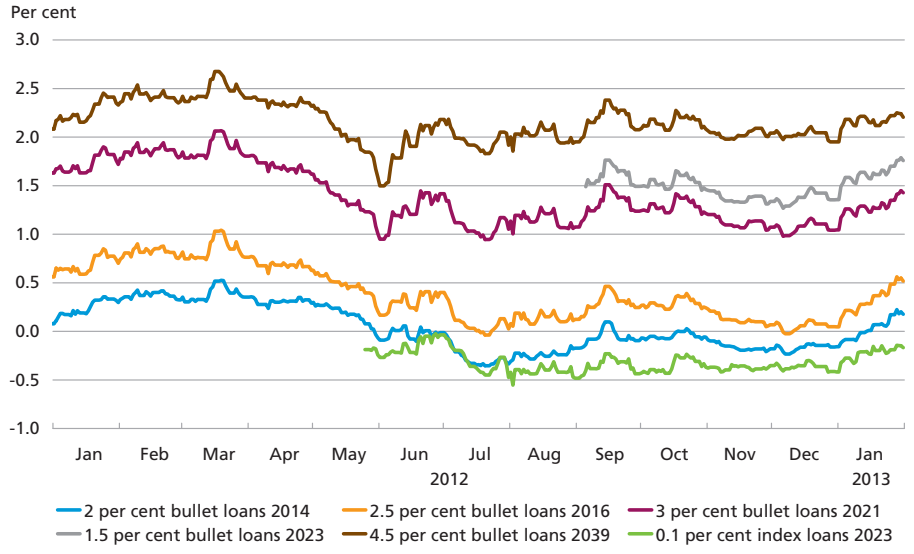
MARKET DEVELOPMENTS IN DENMARK 3.1

Danish government bond yields remained very low in 2012, cf. Chart 3.1.1. This reflects the high credit standing of the Danish central government, which is rooted in the fundamentally strong Danish economy, cf. Box 3.1.

In the beginning of 2012, yields rose slightly due to a short-lived improvement in capital market sentiment, cf. Chapter 1. The intensification of the euro area debt crisis during the spring led to higher demand for government securities issued by the countries with the highest credit ratings, such as Denmark. This prompted new yield declines until the beginning of June when yields reached a historical low.

In the 2nd half of 2012, Danish government yields were fairly stable. Yields on bonds maturing within the next few years were negative for most of the period. At the beginning of 2013, yields rose due to more positive sentiment related to the outlook for the sovereign debt crisis in

YIELDS TO MATURITY OF KEY ON-THE-RUN BONDS — Chart 3.1.1



Note: The real yield to maturity is shown for the inflation-linked bond.
Source: Bloomberg.

THE CENTRAL GOVERNMENT'S AAA RATING — Box 3.1

The central-government domestic and foreign debt has the highest rating with a stable outlook from Standard & Poor's (AAA), Moody's (Aaa) and Fitch Ratings (AAA). In 2012, DBRS rated the Danish central government's credit standing for the first time and assigned the highest rating, citing a stable outlook.

In November 2012, Standard & Poor's confirmed its AAA rating for both the domestic and foreign long-term debt, just as the A-1+ rating for the short-term debt was maintained.

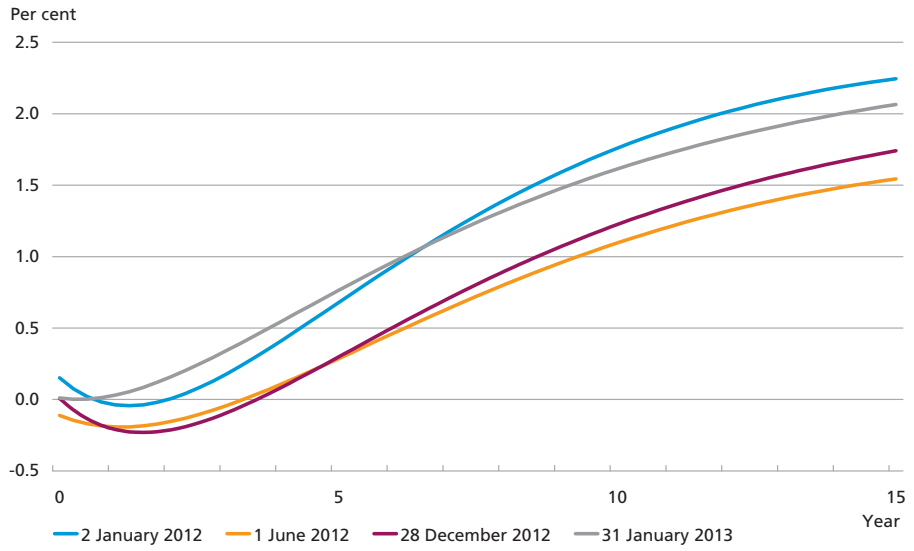
In December 2012, Moody's also confirmed its Aaa rating for the long-term debt and P-1 for the short-term debt, citing the following reason: "*The top-notch rating fundamentally reflects the strong government balance sheet but equally important is the lengthy track record of proactive structural reform, in both good times and bad.*"

In its report from April 2012, Fitch Ratings confirmed its AAA rating for the central government's long-term debt and the F1+ rating for the short-term debt. The confirmation was accompanied by the following comment: "*Denmark's high value-added economy is supported by strong institutions and a long history of solid macroeconomic and fiscal management*."

The rationale for DBRS's assignment of the highest credit rating was, inter alia: "*Denmark's fiscal position is healthy by international standards and has proven resilient throughout the 2008-2009 financial crisis thanks to a robust macroeconomic and fiscal framework, which has proven effective in ensuring stable and sustainable government finances*."

[1] Cf. Credit Analysis Denmark, December 2012, Moody's.
[2] Cf. Rating report Denmark, April 2012, Fitch Ratings.
[3] Cf. Rating report, Kingdom of Denmark, September 2012, DBRS.

ZERO-COUPON YIELD CURVES Chart 3.1.2



parts of the euro area and a changed risk perception in the international capital markets.

Due to the debt crisis, market participants were expecting an extension of the period with very low monetary-policy interest rates, and the Danish yield curve was flatter in the 2nd half of 2012 than at the beginning of the year, cf. Chart 3.1.2.

Negative yield spreads to Germany

Danish government yields were lower than the corresponding German yields throughout most of 2012, cf. Chart 3.1.3. At the beginning of 2012, when sentiment turned more positive in the financial markets, Danish yields rose more than German yields, but declined more up to the summer. In the 2nd half of 2012, Danish government yields were 10-20 basis points lower than German yields across the maturity segments.

Declining government CDS spreads

The opposite trends for the 5-year Danish CDS spread[1] and the 5-year Danish government yield seen in 2011 continued in the 1st half of 2012, cf. Chart 3.1.4. A similar pattern has been observed in several other highly rated European countries. At first glance, the high level of the 5-year CDS

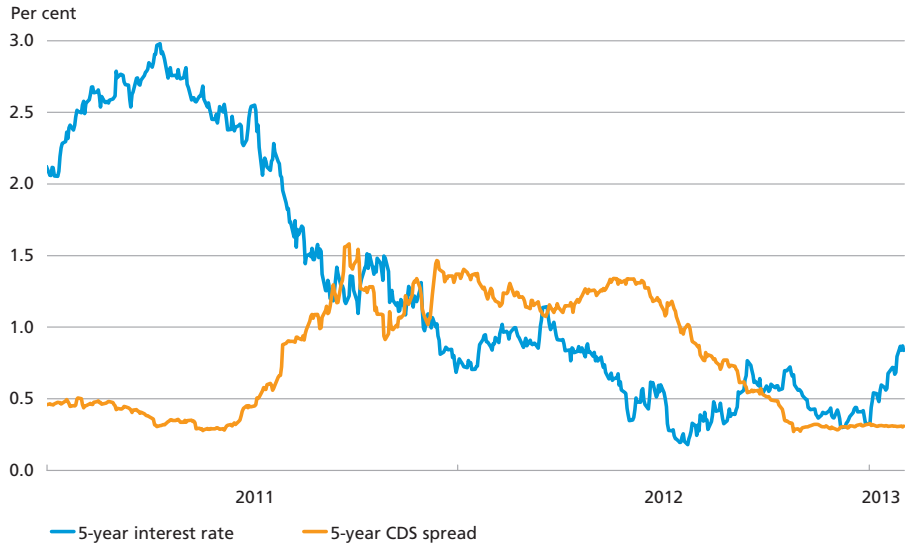
[1] A credit default swap, CDS, can be seen as an agreement between two parties to trade the credit risk on the obligations of a third party. The third party could be a government. To be protected against credit risk, the *protection buyer* pays a premium to the *protection seller* until a *credit event* occurs or the contract expires. The CDS spread is the annual premium paid by the CDS buyer over the life of the contract, expressed as a percentage of the notional value of the contract.

DANISH GOVERNMENT YIELD SPREADS TO GERMANY ACROSS MATURITY SEGMENTS — Chart 3.1.3

Note: The spreads are calculated as the yield to maturity on Danish bonds less the yield to maturity on the German bonds with a term to maturity closest to the respective Danish securities (2-year: DK: 2'2014 and DE: 3.75'2015; 5-year: DK: 2.5'2016 and DE: 3.75'2017; 10-year: DK: 3'2021 and DE: 2'2022; 30-year: DK: 4.5'2039 and DE: 4.25'2039).
Source: Bloomberg.

spread throughout most of 2012 seems incompatible with the historically low government yields. However, due to a number of factors, caution should be taken in interpreting the CDS spread as exclusively re-

5-YEAR DANISH CDS SPREAD AND 5-YEAR DANISH GOVERNMENT YIELD — Chart 3.1.4



Source: Bloomberg.

DOMESTIC ISSUANCE REQUIREMENT IN 2012 Table 3.2.1

Kr. billion	2012
Domestic net financing requirement	82
Redemption, long-term domestic debt, etc.	60
Outstanding Treasury bills, end-2011	44
Domestic financing requirement	186
Financing:	
- Issuance of domestic government bonds	102
- Outstanding Treasury bills, end-2012	45
- Drawing on the central-government account	40

Source: Ministry of Finance and own calculations.

flecting credit risk. In addition to the risk of a credit event, the CDS spread is also affected by factors such as risk premiums, restrictions on bonds in connection with contract settlement, absence of natural issuers, regulatory initiatives, CDS as proxy hedging and credit risk speculation, cf. Chapter 11. The CDS spread has narrowed markedly since the summer of 2012.

DOMESTIC BORROWING 3.2

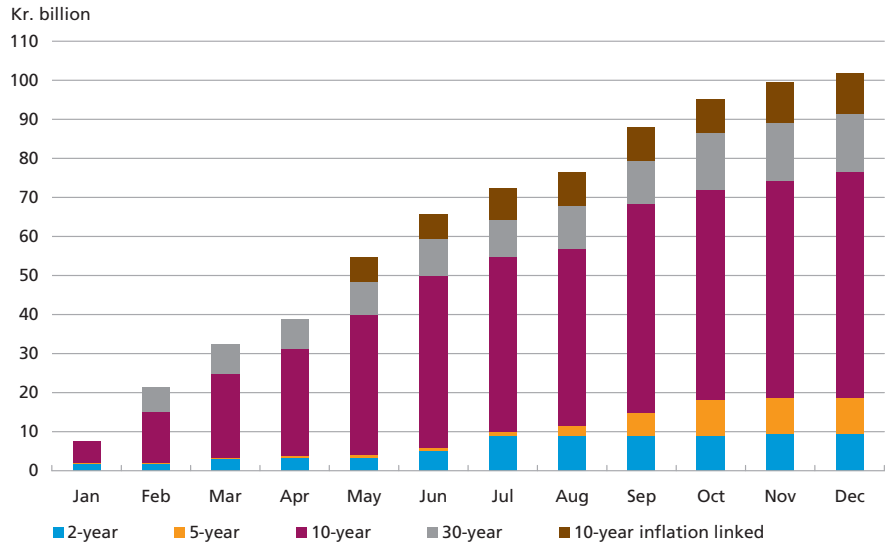
In 2012, the central government's domestic financing requirement was kr. 186 billion, cf. Table 3.2.1. The increase in the financing requirement of kr. 65 billion from 2011 reflected the repayment of early retirement contributions of almost kr. 29 billion as well as a higher government deficit as a result of weaker economic trends.

The target for issuance of domestic government bonds in 2012 was fixed at the beginning of the year at kr. 75 billion with a large share of issuance in the longer maturity segments. The strategy for T-bills was to maintain an outstanding volume of approximately kr. 44 billion. In view of the strong demand for Danish government bonds, the very low Danish government yields and the uncertainty over the international economic situation, it was decided in June to raise the target for issuance of domestic government bonds to kr. 100 billion.

Issuance of domestic government bonds

Issuance of domestic government bonds totalled kr. 102 billion in 2012 with issuance in the 10- and 30-year maturity segments accounting for over 80 per cent, cf. Chart 3.2.1. The average maturity of the nominal bonds issued was 10.8 years, while the average yield was 1.4 per cent, cf. Table 3.2.2.

ACCUMULATED ISSUANCE OF GOVERNMENT BONDS IN 2012 Chart 3.2.1



Note: Accumulated issuance across maturity segments at market value.

Government bond auctions

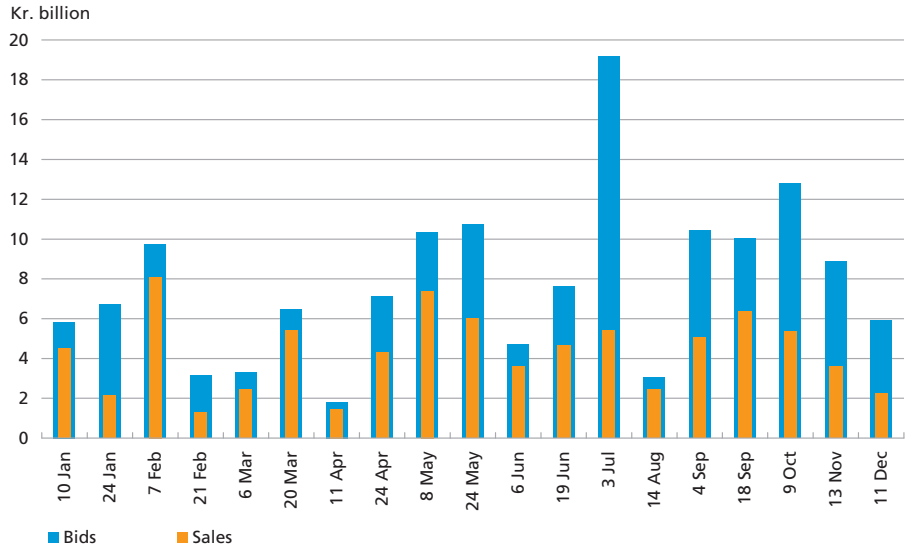
A total of 19 government bond auctions were held in 2012. Except for the opening auctions of the 10-year inflation-linked bond and the current 10-year nominal bond, two securities were offered at each auction. Overall, demand was high at the auctions (average bid-to-cover ratio of 1.8), cf. Chart 3.2.2. This was particularly true for the 10-year series, while demand for other maturity segments varied more during the year. The 2-year bond (2 per cent bullet loans 2014) has not been offered at auctions since July due to the short time to maturity.

ISSUANCE OF DOMESTIC GOVERNMENT BONDS IN 2012 Table 3.2.2

	Issuance, kr. million, market value	Average effective interest-rate, per cent	Average maturity, years
2 per cent bullet loans 2014	9,479	0.06	2.5
2.5 per cent bullet loans 2016	9,133	0.33	4.2
3 per cent bullet loans 2021	45,223	1.63	9.6
1.5 per cent bullet loans 2023	12,639	1.49	11.1
4.5 per cent bullet loans 2039	14,972	2.24	27.5
Nominal bonds, total	91,447	1.42	10.8
0.1 per cent inflation-linked bond ...	10,493	-0.17[1]	11.3
Total	101,940		

Note: Effective interest rates are weighted by market value. Maturities are weighted by nominal value.
[1] Effective real yield.

BIDS AND SALES OF GOVERNMENT BONDS AT THE AUCTIONS IN 2012 Chart 3.2.2



Note: Bids and sales are measured at nominal value.

Opening of 10-year inflation-linked bond

In May, the key on-the-run issues were supplemented by a 10-year inflation-linked bond maturing in 2023. Following the introduction, the central government issues instruments within several asset classes and, hence, increases the aggregate potential demand for Danish government securities.

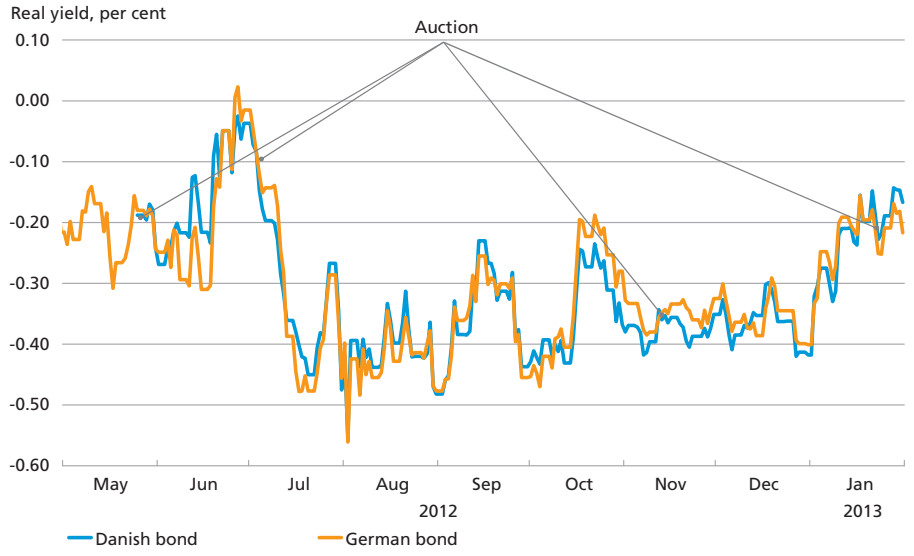
The inflation-linked bond was offered at three auctions in 2012, and the issuance totalled kr. 10 billion at market value. Since the opening, the bond has been priced close to the German 10-year inflation-linked bond, cf. Chart 3.2.3.

The current real-yield level for the inflation-linked bond indicates a break-even inflation rate of 1.8 per cent p.a. Break-even inflation expresses the rate of inflation at which a nominal bond will yield the same return as an inflation-linked bond. Due to inflation risk premiums, relative liquidity spreads and seasonal effects, the break-even inflation does not exclusively reflect inflation expectations, cf. Chapter 10. Similarly, these factors have a bearing on the assessment of the relative pricing between inflation-linked bonds and nominal bonds.

Strong demand for T-bills

At the end of 2012, the total outstanding volume of T-bills was kr. 44.9 billion. Monthly auctions were held over the three open T-bills, and demand was solid throughout the year, cf. Chart 3.2.4.

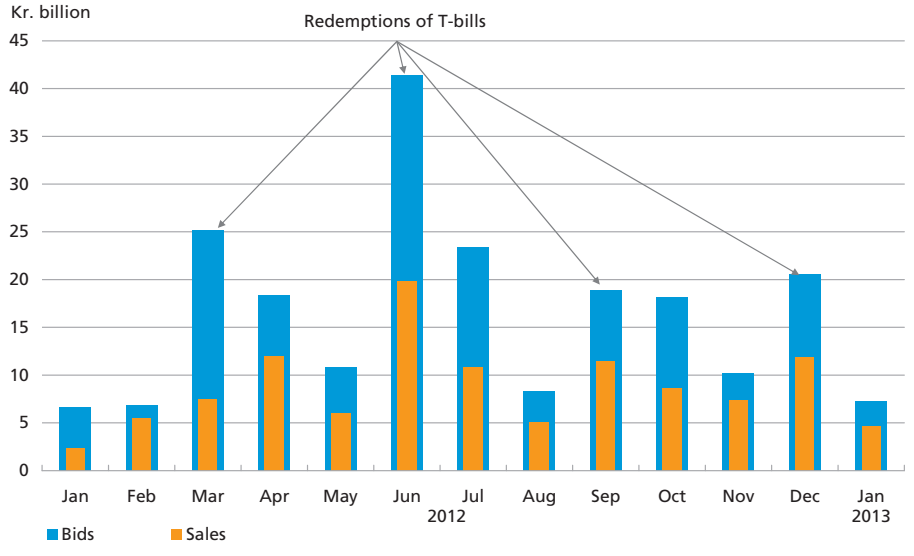
YIELD TO MATURITY ON 10-YEAR INFLATION-LINKED GOVERNMENT BONDS Chart 3.2.3



Source: Bloomberg.

In recent years, notably non-resident investors and the Danish financial sector (MFI sector) have held T-bills. In 2011-12, non-resident investors were the main buyers of T-bills. This should be viewed against the background of prices in the currency swap market (kroner/dollars) making it advantageous for dollar investors to combine currency swaps with short-

BIDS AND SALES OF T-BILLS AT THE AUCTIONS IN 2012 AND JANUARY 2013 Chart 3.2.4



Note: The auctions are indicated at value date.

BUY-BACKS BY THE CENTRAL GOVERNMENT AND NET BUY-BACKS BY THE GOVERNMENT FUNDS

Table 3.2.3

Kr. million, nominal value	Central government	The Social Pension Fund	The Fund for Better Working Environment and Labour Retention	The Advanced Technology Foundation	Total buy-backs from the market
4 per cent bullet loans 2012	21,480	-1,425	-	-	20,055
5 per cent bullet loans 2013	8,662	-8,141	-229	-292	-
4 per cent bullet loans 2017	-	1,100	-	200	1,300
4 per cent bullet loans 2019	-	8,415	-	550	8,965
7 per cent bullet loans 2024	-	1,945	-	460	2,405
Bonds maturing after 2012	8,662	3,319	-229	918	12,670
Buy-backs at market value, total ..	31,236	4,316	-245	1,297	36,604

Note: Negative figures indicate net sales.

term placements in kroner, including Danish T-bills.[1] The strong demand from non-resident investors has contributed to T-bills being issued at negative interest rates at the auctions since May.

Well-functioning auctions despite negative interest rates

The negative interest rates on T-bills and the shortest on-the-run bonds throughout most of 2012 did not cause system-related problems. The auction systems had been adjusted in advance and demand was strong for all securities, including securities with negative interest rates.

Buy-backs

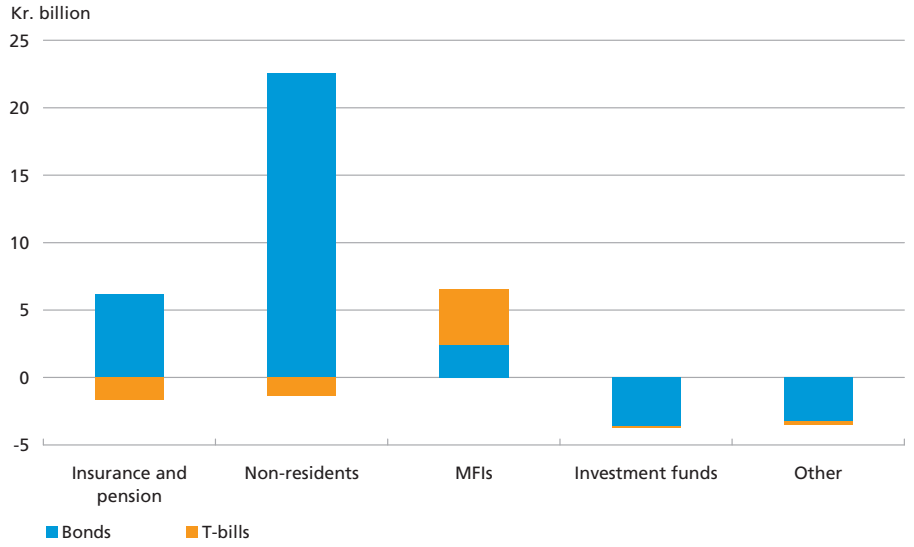
The buy-back strategy was focused on buying back bonds maturing in the next few years. The buy-backs have reduced the financing requirement in 2013 by kr. 9 billion, cf. Table 3.2.3. The placement needs of the government funds were primarily met by buying back securities with longer maturities. In total, bonds maturing after 2012 worth kr. 13 billion (nominal value) were bought back.

INVESTORS IN DOMESTIC GOVERNMENT SECURITIES 3.3

The central government is aiming to reach a wide range of domestic and non-resident investors. The key on-the-run government securities in various segments, including the inflation-linked bond, all contribute to this. Demand from non-resident investors remained high in 2012, resulting in an increase in their holdings of domestic government securities of approximately kr. 21 billion, cf. Chart 3.3.1.

[1] Cf. Palle Bach Mindested, Martin Wagner Toftdahl and Lars Risbjerg, The Danish Money Market at Low Interest Rates, Danmarks Nationalbank, *Monetary Review*, 4th Quarter 2012 (Part 1).

CHANGE IN HOLDINGS OF DOMESTIC GOVERNMENT SECURITIES IN 2012 Chart 3.3.1

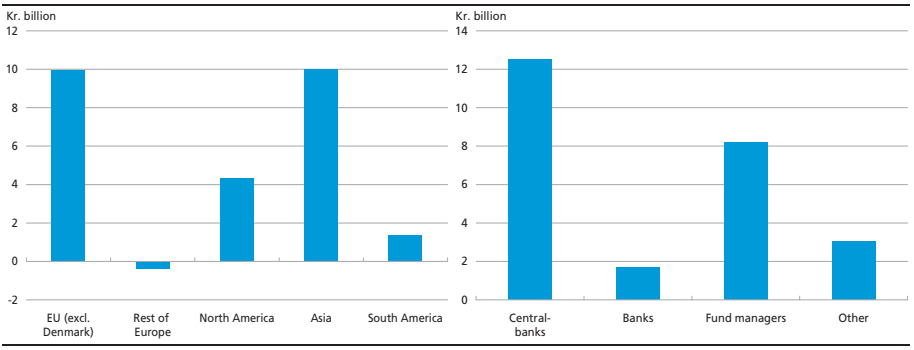


Note: Changes are calculated on the basis of nominal holdings. The holdings of the government funds are not included. *Investment funds etc.* corresponds to the category *Other financial intermediaries etc.* in the Securities Statistics. The MFI sector comprises mainly banks and mortgage banks.
Source: Danmarks Nationalbank, *Securities Statistics.*

Non-residents' net purchases of Danish government securities are geographically spread across the world, with Asian investors showing particularly strong interest, cf. Chart 3.3.2 (left). Central banks are the main net buyers of Danish government bonds, cf. Chart 3.3.2 (right).

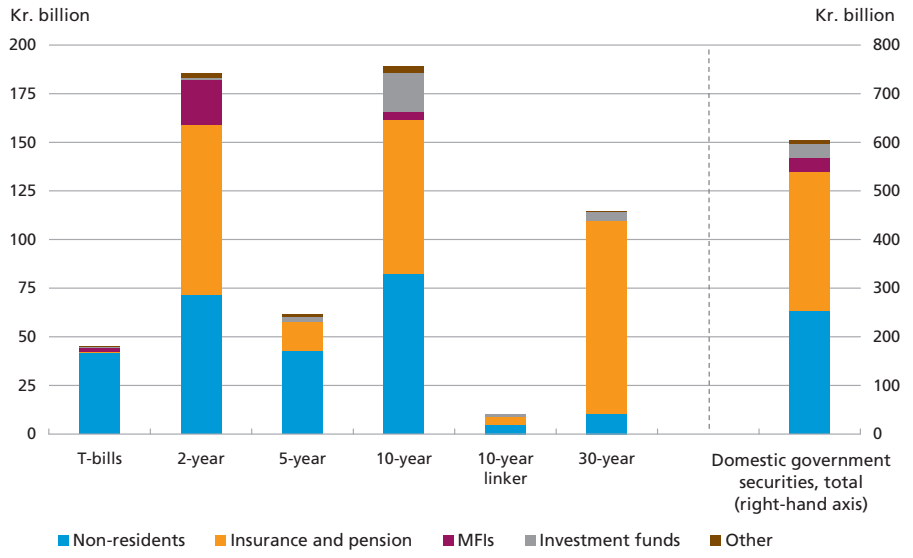
At end-2012, non-resident investors held 42 per cent of the domestic government securities, which is slightly less than the ownership share of the domestic insurance and pension sector, cf. Chart 3.3.3. Non-resident investors hold significant ownership shares of all government securities

NON-RESIDENT INVESTORS' NET PURCHASES OF DANISH GOVERNMENT BONDS Chart 3.3.2



Note: The net purchases are based on reports on purchases and sales of Danish government bonds from 8 of the 12 primary dealers.
Source: Reporting from primary dealers.

OWNERSHIP SHARES OF DOMESTIC GOVERNMENT SECURITIES, END-2012 Chart 3.3.3

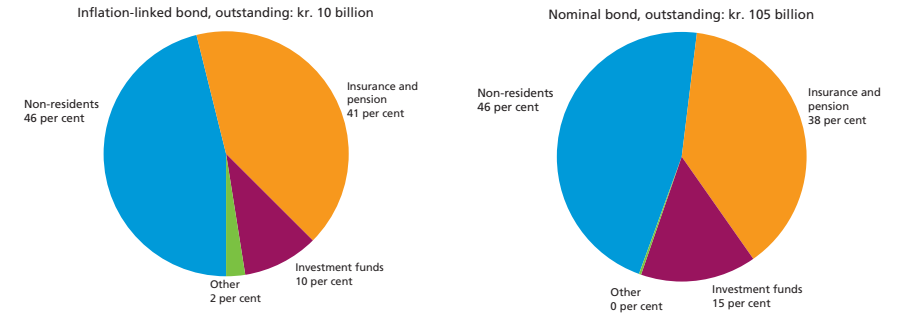


Note: Ownership shares are calculated on the basis of nominal holdings excluding the holdings of the government funds. *Investment funds etc.* corresponds to the category *Other financial intermediaries etc.* in the Securities Statistics. The MFI sector comprises mainly banks and mortgage banks.
Source: Danmarks Nationalbank, *Securities Statistics.*

up to and including the 10-year segment. The domestic insurance and pension sector has a natural interest in long-term krone-denominated bonds for the hedging of their long-term commitments in kroner, and the sector holds the majority of the outstanding volume of 30-year government bonds.

Based on sectors, the ownership distribution of the inflation-linked bond does not differ markedly from the ownership distribution of nominal bonds with a similar maturity, cf. Chart 3.3.4.

OWNERSHIP SHARES IN THE 10-YEAR MATURITY SEGMENT Chart 3.3.4



Note: The 10-year nominal segment includes 3 per cent bullet loans 2021 and 1.5 per cent bullet loans 2023. *Investment funds etc.* corresponds to the category *Other financial intermediaries etc.* in the Securities Statistics. The MFI sector comprises mainly banks and mortgage banks.
Source: Danmarks Nationalbank, *Securities Statistics.*

CENTRAL GOVERNMENT'S RAISING OF 3-YEAR DOLLAR LOAN, MAY 2012 Box 3.2

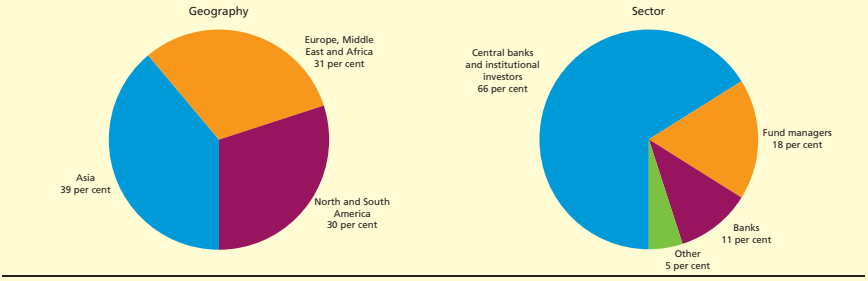
Generally, the central government's foreign loans are syndicated. Investor bids are received via a group of banks (the syndicate) undertaking the "book-building". The final price is determined on the basis of demand. Syndication ensures increased awareness of the issuance as the syndicate markets the issuance to a group of investors with a wide distribution on geography and sectors. In order to reach the broadest possible investor group, efforts are made to compose a syndicate of a group of banks complementing each other's investor relations.

The foreign borrowing strategy for 2012 was to raise foreign loans of 1-1.5 billion euro. The European sovereign debt crisis made the timing of the issuance particularly important. Market developments were monitored closely during the spring, and on 15 May 2012 the government raised a syndicated dollar loan maturing on 22 May 2015.

The loan was issued as a bullet loan with a coupon of 0.625 per cent and a yield to maturity of 0.65 per cent, corresponding to 29 basis points over the 3-year US Treasury rate. Bids totalled close to 3 billion dollars and the issuance amounted to 1.75 billion dollars. The proceeds were subsequently swapped into 1.4 billon euro at a fixed rate of 0.21 per cent, which was cheaper than raising a 3-year loan directly in euro. This reflects a basis swap spread that was favourable for the government.

The concentration of central banks and institutional investors participating in the issuance was high, cf. the Chart. There was a wide geographical distribution of investors – e.g. a large share of Asian investors.

INVESTOR DISTRIBUTION AT THE SYNDICATION Chart A



FOREIGN BORROWING 3.4

In 2012, the central government raised a 3-year dollar loan of 1.75 billion dollars, corresponding to approximately kr. 10 billion, cf. Box 3.2, while redemptions on foreign loans totalled 4.2 billion euro, corresponding to approximately kr. 32 billion. This reduced the government's foreign debt and the contribution to the foreign-exchange reserve.

Regular issuance in the central government's CP programme

Short-term foreign loans are raised via the central government's Commercial Paper programmes (ECP and USCP programmes). CPs were issued regularly in 2012 to maintain investor interest and facilitate market access. At year-end the total outstanding volume of the two CP programmes was just under kr. 3 billion.

CHAPTER 4

Issuance Strategy 2013

In 2013, the central government's domestic financing requirement is expected to be kr. 139 billion. The financing requirement will be met via sales of government bonds and Treasury bills and by drawing on the central government's account at Danmarks Nationalbank. The reduction of the balance on the central government's account should be viewed in the light of prefunding in the preceding years. The target for sales of government bonds in 2013 has been set at kr. 75 billion, while the target for outstanding T-bills is kr. 30 billion at end-2013.

The tax reform agreement from June 2012 will result in an one-off revenue from capital pension taxation in 2013. The size of this revenue is subject to great uncertainty. The strategy is that additional revenue from capital pension taxes will not affect the targets for sales of government bonds and T-bills in 2013, but will be used to reduce the issuance volume in the subsequent years.

Issuance in the 2-, 5-, 10- and 30-year nominal maturity segments and in the 10-year inflation-linked bond continues in 2013. Most of the issuance will take place in the longer maturity segments, primarily in the 10-year nominal on-the-run issue.

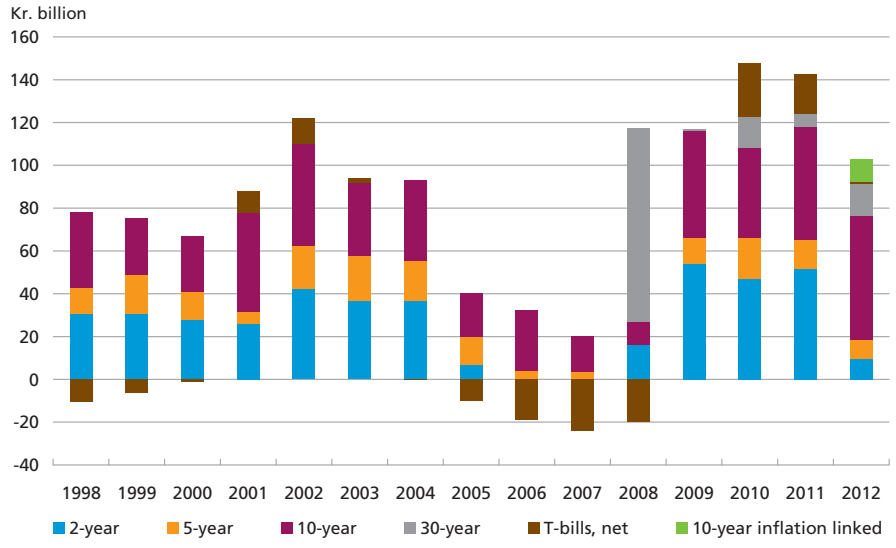
The strategy for the central government's foreign borrowing is to raise a loan of 1-2 billion euro with final exposure in euro. This loan will be issued in the 2-5-year segment and denominated in euro or dollars.

MEDIUM-TERM STRATEGY FOR DOMESTIC ISSUANCE 4.1

The central government's medium-term strategy is based on a trade-off between costs and risk, cf. Chapter 8. Moreover, the strategy is designed to support a liquid domestic market for government securities, which will be built up to a considerable outstanding volume. Issuance takes place in segments that are attractive to a broad group of domestic and foreign investors, which contributes to reducing the central government's borrowing costs.

Before 2006 and since 2009, the central government's target for the medium-term issuance strategy has been a 40-20-40 distribution on the 2-, 5- and 10-year segments, cf. Chart 4.1.1. In addition, issuance has taken place in a 30-year bond since 2008. In accordance with the strategy, most

ISSUANCE OF DOMESTIC GOVERNMENT SECURITIES Chart 4.1.1



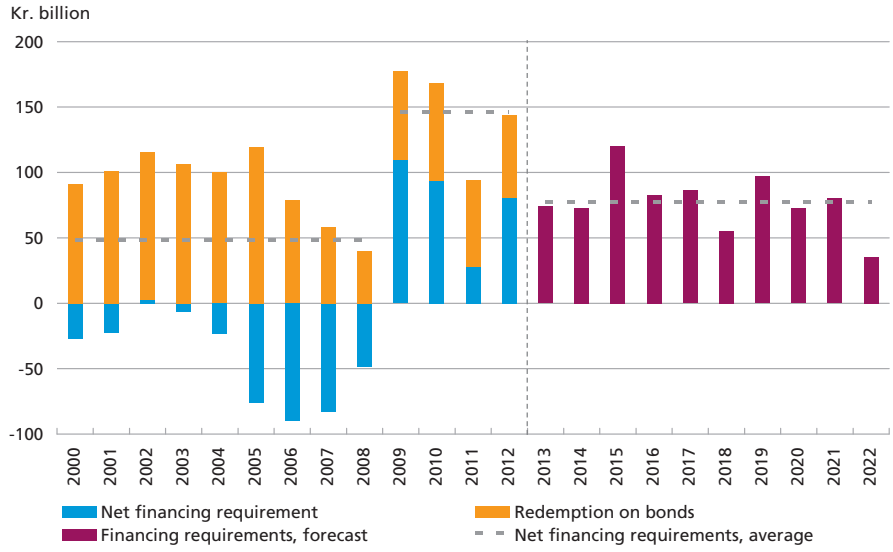
issuance in 2012 took place in the longer maturity segments, cf. Chapter 3.

In the coming years, most of the domestic financing requirement in bonds is met through sales in the longer maturity segments. The main focus will still be on issuance in the nominal 10-year segment, which is regarded as the most important segment internationally. The focus on issuance in the longer maturity segments should be viewed in the light of the following considerations:

- The central government's average annual refinancing volume is reduced by issuing a larger share in the longer maturity segments. The sovereign debt crisis in parts of Europe has entailed stronger focus on sovereign issuers' refinancing volumes.
- Issuance in both a 10-year inflation-linked bond and a 10-year nominal bond entails a need to issue a larger share in the 10-year segment in order to ensure sufficient liquidity in both series.
- The demand for the 30-year bond reflects substantial interest in a long-term Danish government security. Therefore, the intention is to continue to issue in series with maturities of more than 10 years.

On the basis of a medium-term projection of the central-government finances and an issuance strategy dominated by issuance in the longer maturity segments, the average annual domestic financing requirement in bonds is estimated to be approximately kr. 80 billion, cf. Chart 4.1.2.

DOMESTIC FINANCING REQUIREMENT IN BONDS Chart 4.1.2



Note: The projection of the financing requirement is based on *Budget Outlook 3*, December 2012, for 2013 and internal projections for the period 2014-22. The financing requirement for 2000-12 is the sum of the net financing requirement and redemptions on bonds.
Source: Ministry of Finance and own calculations.

In the event of a considerable short-term improvement in central-government finances, e.g. due to substantial one-off revenue in 2013 from the restructuring of capital pension taxation, there may be a need for consolidation of the issues in fewer segments in order to maintain the liquidity of on-the-run issues. Should the central-government finances deteriorate relative to expectations, the issuance strategy may be adapted by opening new issues more frequently and/or by increasing the outstanding volume in the existing issues.

STRATEGY FOR DOMESTIC ISSUANCE IN 2013 4.2

The central government's domestic financing requirement in 2013 is kr. 139 billion, cf. Table 4.2.1. This is a marked decrease on 2012, which can be attributed to a lower government budget deficit.

Targets for sales of bonds and Treasury bills

The financing requirement is met by sales of government bonds and T-bills. As a result of the central government's prefunding in the preceding years, a part of the 2013 financing requirement will be met by drawing on the central government's account at Danmarks Nationalbank.

The target for sales of domestic bonds in 2013 has been set at kr. 75 billion, which is assessed to be sufficient to ensure the liquidity of the

DOMESTIC FINANCING REQUIREMENT IN 2013 Table 4.2.1

Kr. billion	2013
Domestic net financing requirement	37
Redemption, domestic long-term debt, etc.	57
Outstanding T-bills, beginning of year	45
Domestic financing requirement	139
Targets for financing :	
- Issuance of domestic bonds	75
- Expected outstanding T-bills, year-end	30
- Drawing on the central government's account	34

Source: *Budget Outlook 3*, December 2012, and *Danish Government Debt Management Strategy in 2013*, December 2012.

on-the-run issues. The target for outstanding T-bills is kr. 30 billion at end-2013.

The *tax reform agreement* from June 2012 will result in an one-off revenue from capital pension taxation in 2013. The size of the revenue are subject to great uncertainty.

In order to retain investor interest in Danish government securities and ensure the continuity of the government debt policy, it is desirable that sales of bonds and T-bills are relatively stable year-on-year. Consequently, the strategy is to maintain the targets for sales of government securities, even if the revenue from the capital pension taxation turns out to be extraordinary large. Additional revenue will be used to reduce issuance in the subsequent years. This ensures that the one-off revenue is used to reduce the government debt in accordance with the tax agreement.

On-the-run issues

Issuance in the 2-, 5-, 10- and 30-year nominal maturity segments and in the 10-year inflation-linked bond continues in 2013, cf. Table 4.2.2.

In accordance with the medium-term issuance strategy, most of the issuance will take place in the longer maturity segments. The main focus will be on continued build-up of the 10-year nominal on-the-run issue, which had reached an outstanding volume of almost kr. 13 billion at end-2012, cf. Chart 4.2.1.

The 2- and 5-year on-the-run issues were replaced at the beginning of 2013. The previous 2-year on-the-run issue, 2 per cent bullet loan 2014, had reached an outstanding volume of just under kr. 60 billion and a term to maturity of less than two years. Against this background, the previous 5-year on-the-run issue, 2.5 per cent bullet loan 2016, becomes the new 2-year on-the-run issue, enabling further build-up in the series.

KEY ON-THE-RUN ISSUES, 1ST HALF OF 2013 Table 4.2.2

Maturity segment	Issuance series	Outstanding[1], Kr. billion
Maturity < 1 year	Treasury bills	44.9
2-year nominal	2.5 per cent bullet loan 2016	21.5
5-year nominal	4 per cent bullet loan 2019	87.9
10-year nominal	1.5 per cent bullet loan 2023	12.6
30-year nominal	4.5 per cent bullet loan 2039	114.8
10-year index-linked ..	0.1 per cent inflation-linked bond 2023	10.2

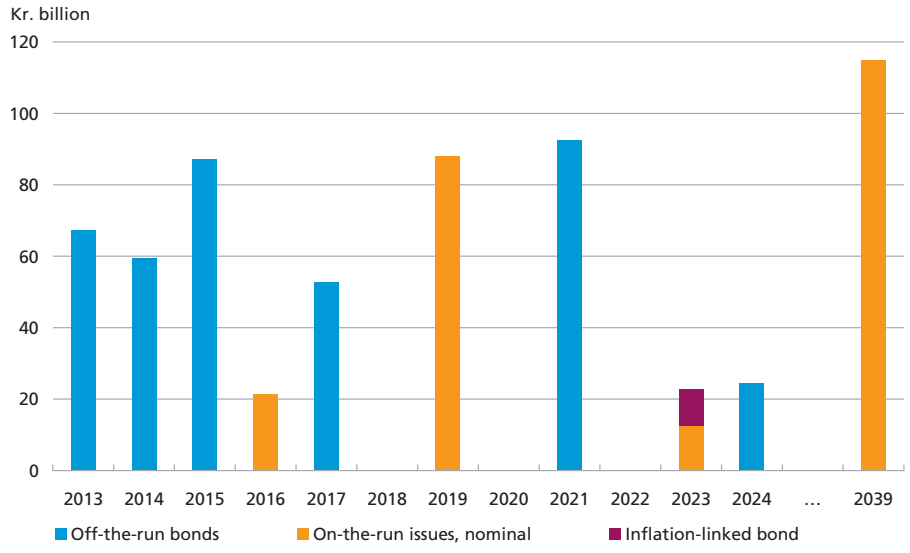
[1] Outstanding volume as of end-2012. The outstanding volume of the inflation-linked bond has been calculated at indexed nominal value.

In view of the continued focus on issuance in the longer maturity segments and the target for sales of bonds of kr. 75 billion, it is assessed that it will not be possible to build up a new 5-year on-the-run issue maturing in 2018 to a sufficient outstanding volume. Instead, the 4 per cent bullet loan 2019 becomes the new 5-year on-the-run issue. The strategy is only to issue a limited amount in the 5-year on-the-run issue in 2013.

Issuance in the inflation-linked bond

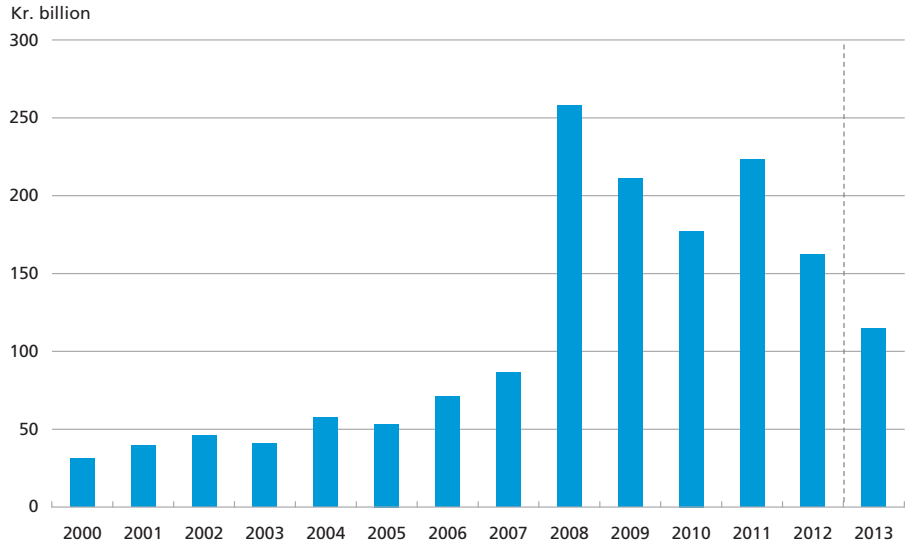
In May 2012, the central government opened an inflation-linked bond maturing in 2023. This enables investors to invest in an asset with a return that mirrors Danish consumer prices, which contributes to attracting a broader group of investors. At end-2012, the outstanding volume was kr. 10 billion at indexed nominal value.

THE CENTRAL GOVERNMENT'S DOMESTIC REDEMPTION PROFILE IN BONDS Chart 4.2.1



Note: The redemption profile at end-2012 excluding T-bills, currency swaps and Fisheries Bank bonds.

CENTRAL-GOVERNMENT ACCOUNT AT YEAR-END Chart 4.3.1



Note: The central government's contribution to the foreign-exchange reserve will be reduced in 2013, meaning that a part of the expected decline in the balance on the central government's account in 2013 can be attributed to financing of foreign redemptions.

The build-up of the 10-year inflation-linked bond will continue in 2013. The principal focus is still on ensuring liquid nominal on-the-run issues, and the inflation-linked bond should be viewed as a supplement to the nominal on-the-run issues. The strategy is to build up the bond to at least kr. 20 billion.

THE CENTRAL GOVERNMENT'S ACCOUNT AS A LIQUIDITY BUFFER 4.3

The balance on the central government's account increased significantly in 2008 in connection with issuance of the 30-year bond, cf. Chart 4.3.1. Since then, the balance has been kept at a high level, totalling kr. 162 billion at end-2012, corresponding to 9 per cent of GDP.

Against the background of the expected central-government financing requirement and the strategy for domestic and foreign borrowing, the balance on the central government's account is expected to be kr. 115 billion at end-2013, cf. Chart 4.3.1. Additional revenue from capital pension taxation will increase the balance on the central government's account.

The central government's high liquidity reserves contribute to reducing the financing risk and the central government's vulnerability to short-term changes in the financing requirement.[1] The balance on the central govern-

[1] For example, revenue from oil and gas activities in the North Sea and the revenue from pension-yield taxes are difficult to project, as these factors are highly sensitive to oil-price fluctuations and fluctuations in the financial markets, cf. *Economic Survey*, December 2012, pp. 175-177 (only in Danish).

ment's account at end-2012 is more than sufficient to meet the domestic financing requirement in 2013 of kr. 139 billion. The revenue from domestic issuance of government securities in 2013 will thus, in practice, contribute to meeting the domestic financing requirement in 2014 (prefunding).

The sovereign debt crisis and the increasing market focus on financing risk have emphasised the advantages of large liquidity reserves. A large balance on the central government's account is therefore still assessed to be expedient.

BUY-BACK OF DOMESTIC GOVERNMENT BONDS 4.4

All government securities can be bought back. On-the-run issues are, as a general rule, excepted.

Buy-backs of bonds maturing in the current year allow investors to distribute the central government's redemption payments across the year. Buying back bonds maturing in the following years in the market brings forward the coming years' redemption payments to the current year. This reduces the central government's refinancing risk and smooths out the redemption profile. Moreover, the three government funds cover their placement needs via buy-backs in the market.

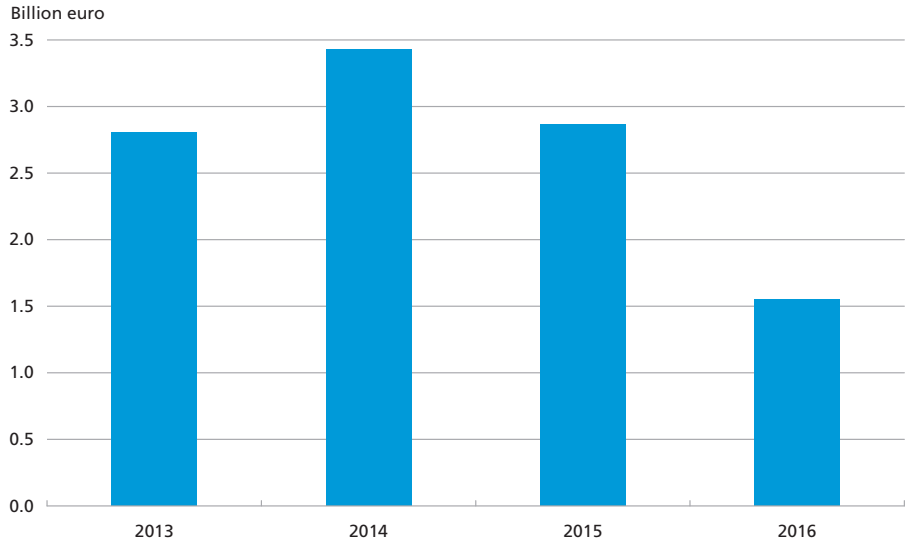
Regular buy-back auctions are held for 5 per cent bullet loans 2013 and 2 per cent bullet loans 2014. Buy-backs are published on a daily basis on www.governmentdebt.dk.

FOREIGN BORROWING STRATEGY IN 2013 4.5

In 2013, the central government's redemptions on long-term foreign debt total 2.8 billion euro, cf. Chart 4.5.1. In principle, the central government issues debt denominated in foreign currency equivalent to the redemptions on the foreign debt. This principle can be deviated from if Danmarks Nationalbank wishes to increase or reduce the foreign-exchange reserve.

Against the background of the considerable expansion of the foreign-exchange reserve in recent years, cf. Chart 4.5.2, the central government's contributions to the foreign-exchange reserve can be reduced in 2013. However, the experience from the financial crisis is that regular central-government presence in the international capital markets is important. This contributes to ensuring the central government's access to loans in foreign currency in the longer term. Consequently, the strategy is to raise a foreign loan of 1-2 billion euro with final exposure in euro. The loan will be issued in the 2-5-year segment and denominated in euro or dollars.

THE CENTRAL GOVERNMENT'S FOREIGN REDEMPTION PROFILE Chart 4.5.1

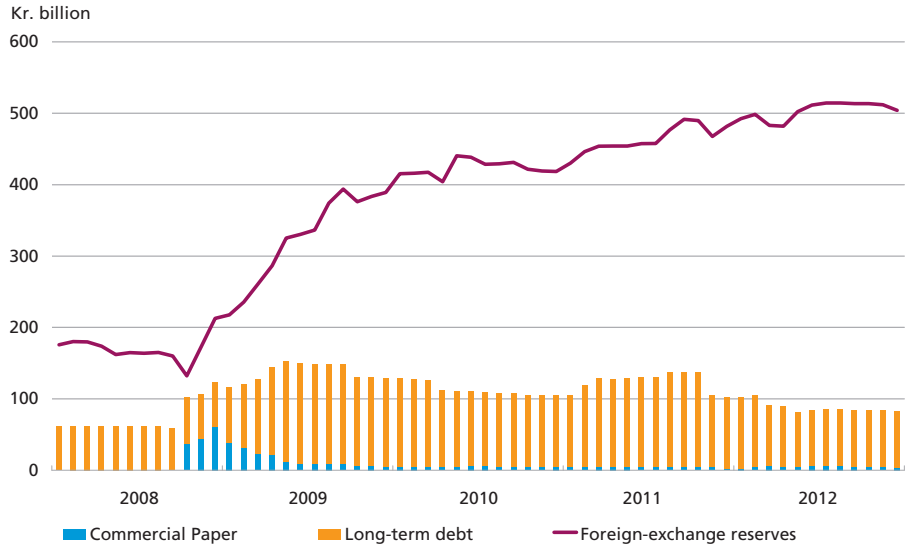


Note: Redemption at end-2012 excluding Commercial Paper and currency swaps concerning re-lending to Danish Ship Finance.

Issuance of Commercial Paper

Foreign loans with maturities of up to one year are raised via the central government's two Commercial Paper, CP, programmes. The ECP programme aims at the European market, while the USCP programme aims at the US market. Under the USCP programme, all issuance is in dollars,

FOREIGN DEBT AND FOREIGN-EXCHANGE RESERVE Chart 4.5.2



while it is possible to issue in a number of currencies, including dollars and euro, under the ECP programme. The objective of the programmes is to ensure a liquidity reserve for rapid adjustment of the foreign-exchange reserve or the central government's account.

Issuance in Commercial Paper in 2013 continues on a limited scale in order to maintain the liquidity of the programmes.

CHAPTER 5

Issuance of and Trading in Danish Government Securities

Danish government securities are issued to a group of primary dealers. The key obligations of the primary dealers is to act as counterparties at the auctions of government securities and to quote prices in the secondary market. In 2012, the group of primary dealers comprised 12 banks for government bonds and 5 banks for T-bills.

Danish government securities are primarily sold via regular auctions. Investors can buy on-the-run issues at the auctions by submitting bids via a primary dealer.

A priority in government debt policy is to build up liquid government bond series, enabling the central government to cover its financing requirement at lower yields. The liquidity in the Danish government bond market is estimated to be sufficient for investors to trade relatively large amounts without significantly affecting the market.

PRIMARY DEALERS IN DANISH GOVERNMENT SECURITIES 5.1

Danish government bonds are issued to a broad group of investors via banks that have concluded primary dealer agreements with the central government. The group of primary dealers in Danish government bonds comprises 12 banks, 6 of which are international banks, cf. Box 5.1, while 5 banks are primary dealers in T-bills. The key obligations of the primary dealers is to act as counterparties in connection with the government's issuance and to act as price quoters in the secondary market.

The broad distribution channel contributes to enhancing interest in Danish government securities and supports competition in connection with issuance and buy-backs by the central government. This contributes to lower financing costs for the central government.

ISSUANCE OF DANISH GOVERNMENT SECURITIES 5.2

The central government issues government securities via regular auctions supplemented with electronic tap sales via the trading platform MTS Denmark. At auctions, investors can buy large amounts of government securities by submitting bids via a primary dealer.

PRIMARY DEALER CONTRACTS — Box 5.1

Government Debt Management has concluded primary dealer contracts for government bonds and T-bills, respectively. The rights and obligations of primary dealers are determined in consultation with the group of primary dealers and are specified in the contracts, which can be found at www.government debt.dk.

PRIMARY DEALERS, BEGINNING OF 2013

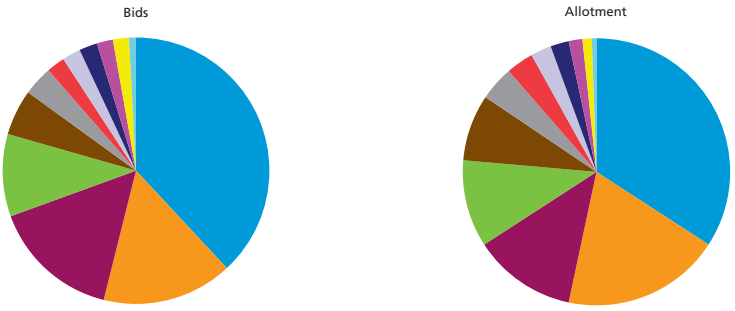
Primary dealers in government bonds	Primary dealers in T-bills
Barclays Bank	Danske Bank
BNP Paribas	Nordea
Danske Bank	Nykredit Bank
Deutsche Bank	SEB
HSBC	Sydbank
J.P. Morgan	
Morgan Stanley	
Nordea	
Nykredit Bank	
SEB	
Spar Nord Bank	
Sydbank	

Issuance of government securities mainly takes place via auctions

In 2012, around 90 per cent of domestic bonds were issued at auctions. All the central government's primary dealers participated in the auctions, with 5 primary dealers accounting for more than 80 per cent of the bids and allotments, cf. Chart 5.2.1.

Government Debt Management at Danmarks Nationalbank regularly announces preliminary auction dates for domestic government bonds for the next three months, cf. Box 5.2. As a general rule, two different series are offered at each auction, because investor demand may change quickly across maturity segments.

BIDS AND ALLOTMENT AT AUCTIONS IN 2012 BY PRIMARY DEALERS — Chart 5.2.1



Note: Bids and allotment at bond auctions in 2012. The primary dealers have been anonymised. The colours of the two charts are not necessarily consistent.

AUCTION METHOD FOR DANISH GOVERNMENT BONDS Box 5.2

The central government's auctions take place via MTS Denmark's auction system with the primary dealers as counterparties. Investors can submit bids for the auctions via the primary dealers.

Auction procedures are as follows:

Announcement of auction calendar

- An auction calendar is published regularly with preliminary auction dates for the next three months. The government bond(s) to be auctioned will be announced no later than three trading days prior to each auction. Auctions and auction results are announced via DN News[1] and published at www.governmentdebt.dk. The auctions depend on stable market conditions.

Bids and allotment

- The auction principle is uniform pricing, i.e. bids at the cut-off price or above are met at the cut-off price. Securities can be allotted pro rata to bids at the cut-off price. An auction can be completed without allotment.
- Each primary dealer may submit a broad range of bids. The deadline for submitting bids on the auction day is typically 10:15 a.m. A cut-off price is then fixed and announced within 10 minutes. On average, the cut-off price was announced after 3 minutes in 2012.

[1] Danmarks Nationalbank's system for dispersing information to connected news agencies.

At the auctions, the cut-off price is determined on the basis of financing requirement, demand, yield spread to other countries and prices in the secondary market. In addition, monthly T-bill auctions are also held, usually on the second last banking day of the month.

PRICE QUOTATION FOR AND TRADING IN DANISH GOVERNMENT SECURITIES 5.3

Danish government securities are traded via a number of trading platforms, cf. Box 5.3. Only dealers can trade in the interdealer market. On

TRADING PLATFORMS FOR DANISH GOVERNMENT SECURITIES Box 5.3

Danish government securities are traded on several electronic trading platforms, some of which are targeted at trading between dealers and others at trading between dealers and investors. In addition, a large share of turnover takes place in the over-the-counter market.

Danish government securities are primarily traded on the following trading platforms:

- **Interdealer trading platforms:**
  MTS Denmark, ICAP/BrokerTec and Nasdaq OMX
- **Electronic trading platforms targeted at investors:**
  Bloomberg, Bondvision and Tradeweb

the trading platforms targeted at investors, investors can buy and sell government securities directly at the dealers.

Price quotation by primary dealers

One of the main tasks of the primary dealers is to quote prices on an ongoing basis (market making) in government bonds, enabling market participants to monitor price developments and trade at known prices.

As specified in the primary dealer agreements, a dealer must quote prices for five hours a day within a bid-ask spread, depending on the average bid-ask spread for all primary dealers, cf. *Danish Government Borrowing and Debt 2009,* Chapter 12. Since market making obligations are defined relative to the prices quoted by the other primary dealers, requirements are adjusted to market conditions on a continuous basis. In 2012, all primary dealers complied with the obligations.

As from 1 January 2013, the 0.1 per cent inflation-linked bond 2023 is included in the assessment of the primary dealers in line with other benchmark bonds.

Every year, the primary dealers evaluate the infrastructure of the Danish market for government securities, including the platforms chosen for market making. In the report[1] from end-2012, the primary dealers recommended that the current structure of market making obligations be maintained on one platform in the interdealer market. In consequence, the primary dealers have decided that in 2013 market making must continue to take place on MTS Denmark.

Price-quoting system aimed at the retail market

The central government has a price-quoting system on Nasdaq OMX aimed at the retail market, and four banks have committed to quote current bid-ask prices. Through the price-quoting system, investors have ongoing access to pre-trade information about Danish government securities. Members of the bond sub-segment on Nasdaq OMX can trade directly with the price quoters. Investors have access to submitting orders in the trading system via their banks.

LIQUIDITY OF DANISH GOVERNMENT BONDS 5.4

Typically, investors are willing to pay a premium for liquid securities. Thus, the central government has an interest in supporting liquidity in the Danish government securities market.

[1] The main elements and conclusions are outlined in *Infrastructure in the Danish government securities market in 2013*, www.governmentdebt.dk.

DIMENSIONS OF MARKET LIQUIDITY — Box 5.4

Market liquidity is frequently analysed by means of the following three dimensions:[1]

- Tightness indicates the costs of selling a bond immediately after purchase. Tightness is reflected in the bid-ask spread.
- Depth indicates the amounts that can be traded without affecting the price.
- Resiliency indicates how fast market prices recover after a transaction that does not provide new information to the market.

A liquid market is characterised by tightness, large depth and high resiliency. Occasionally, the term immediacy is used to reflect how fast a market participant can execute a trading decision, i.e. find a counterparty. This dimension is less relevant in markets with continuously quoted tradable prices (like on MTS Denmark).

[1] Cf. e.g. A. Kyle, Continuous Auctions and Insider Trading, Econometrica, Vol. 53, No. 6 (1985), pp. 1315-1336.

The central government supports liquidity in several ways. Firstly, the agreements on the primary dealers' price quotation ensure a continuous market for Danish government securities, which provides tightness and depth. This also ensures that investors have continuous access to information about market prices.[1]

Secondly, the central government's issuance strategy focuses on the build-up of liquid benchmark series in certain maturity segments, which concentrates the trading and, as a result, increases the depth of the market.

Thirdly, the government's securities lending facility and the very strong correlation with liquid German government securities and Bund futures make it easy and cheap to hedge positions in Danish government securities.

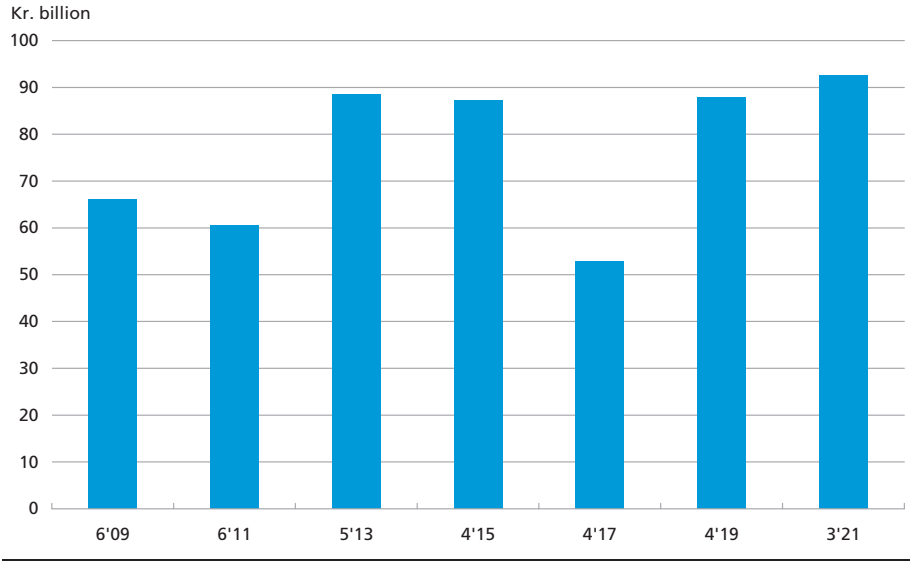
Liquidity is often analysed on the basis of the tightness, depth and resiliency of the market, cf. Box 5.4. In the following, these dimensions of the liquidity in the Danish government securities market are illustrated by volume of series, turnover and average bid-ask spreads.

Volumes of bond series

Large bond series typically have greater market depth. Danish government bond series are built up to a size that is considered to be liquid in an international context. For 10-year benchmark securities, this corresponds to a volume of approximately 10 billion euro (approximately kr. 75 billion), and the 10-year Danish on-the-run issues have typically been built up to approximately this level, cf. Chart 5.4.1.

[1] Current bid-ask prices for Danish government securities on MTS Denmark are publicly available on MTS's website (http://www.mtsdata.com/content/data/public/dkk/best/).

MAXIMUM SIZE OF 10-YEAR ON-THE-RUN ISSUES Chart 5.4.1



Note: The chart shows the maximum volume to which the 10-year on-the-run issues are built up over their lifetime.

Turnover in Danish government bonds

Turnover, or trading in a given bond in a given period, provides an indication of the market depth. During the financial crisis in 2008 and 2009, turnover in Danish government bonds declined but in the subsequent years has largely recovered to the pre-crisis level, cf. Chart 5.4.2.

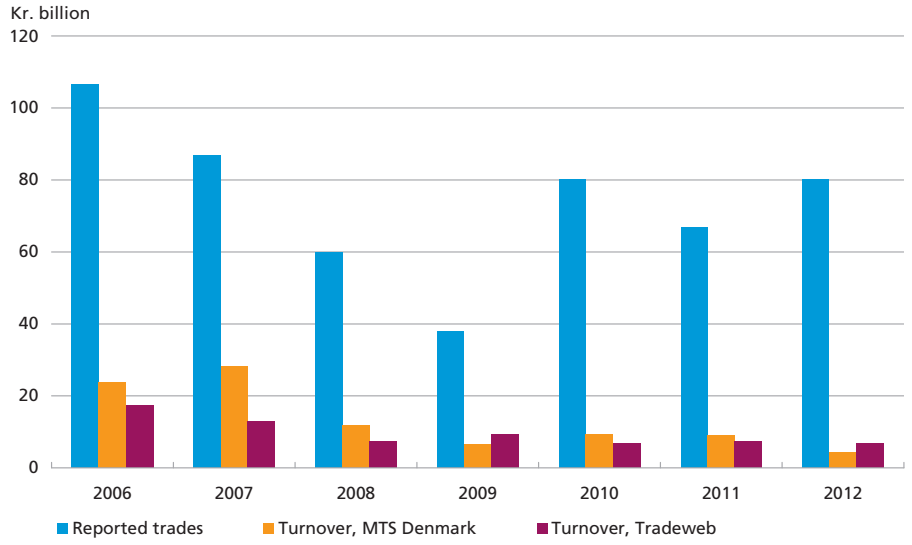
Trading on the electronic trading platforms, MTS Denmark and Tradeweb, is still significantly lower than in the pre-crisis years, reflecting that, after the financial crisis, part of the trading has moved from electronic platforms to the over-the-counter market, OTC market.

In 2012, trading in Danish government bonds was concentrated in the shorter maturity segments and key on-the-run issues, cf. Chart 5.4.3. Turnover frequency varies for the series but is highest for the key on-the-run issues. The high turnover in key on-the-run issues reflects, inter alia, that after the issuance the primary dealers typically resell allotted bonds to investors.

Bid-ask spreads in the interdealer market

Bid-ask spreads indicate market tightness. When spreads are narrow, it is cheaper to buy and sell a given position. In 2012, the spread between bid-ask prices in the interdealer market, MTS Denmark, has been wider than in previous years. The spread has been extraordinarily wide in some periods, cf. Chart 5.4.4, reflecting, inter alia, the volatility of the European government securities markets.

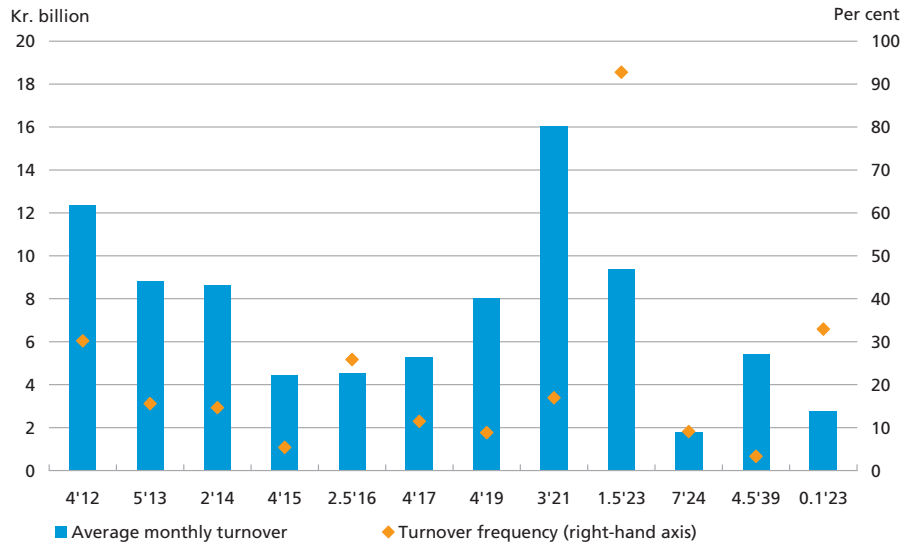
AVERAGE MONTHLY TURNOVER IN DANISH GOVERNMENT BONDS — Chart 5.4.2



Note: Average monthly turnover. Reported transactions cover transactions reported to Nasdaq OMX and indicate total turnover in Danish government bonds.
Source: Nasdaq OMX, MTS Denmark and Tradeweb.

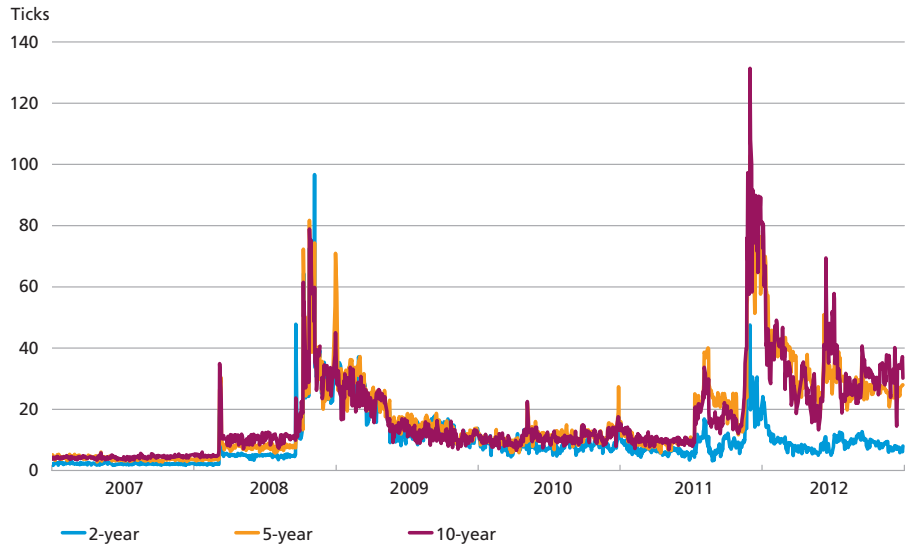
In this context, allowance should be made for the fact that a large share of trading in Danish government securities takes place in the OTC market. Bid-ask spreads in the OTC market are non-observable, but accord-

LEVEL AND FREQUENCY OF TURNOVER, 2012 — Chart 5.4.3



Note: Turnover frequency is calculated as the percentage share of average monthly turnover of the total outstanding volume in the series excluding the holdings of the government funds.
Source: Nasdaq OMX and own calculations.

BID-ASK SPREADS FOR BENCHMARK SECURITIES Chart 5.4.4



Note: Average of the day's bid-ask spreads based on best bid and ask prices. 1 tick corresponds to 0.01 price quotation points.
Source: MTS Denmark.

ing to market participants, investors can trade at narrower bid-ask spreads than the spreads observed on MTS Denmark. A possible explanation for the wider spreads on MTS Denmark is that dealers may have a greater incentive to offer liquidity to their customers than to competing dealers on MTS Denmark.

Liquidity and new regulations

In response to the financial crisis, several new international regulatory measures have been taken to strengthen the financial system. However, some of the measures may contribute to limiting the liquidity in the European government securities markets, including the Danish market.

The measures include the European Commission's proposal to revise the Markets in Financial Instruments Directive, MiFID, which was put forward in the autumn of 2011 and is still being negotiated in the EU. The proposed revision of the MiFID entails requirements for the publication of pre- and post-trade information on bond trading with a view to enhancing the transparency of the market. However, the requirements may result in primary dealers becoming more reluctant to trade in government bonds.

Primary dealers make liquidity available to other market participants and, hence, their exposure may change quickly. When dealers have bought or sold large quantities of government securities, they typically seek to settle these positions soon afterwards. If primary dealers must

publish details of their deals shortly after they have been concluded, there is a risk that other market participants react to this information so that prices move against the primary dealers before they have settled their positions (winner's curse).

To compensate for the increased risk, the dealers are likely to quote lower bid prices and higher ask prices. This will harm market liquidity and eventually increase the central government's borrowing costs. Therefore, it is essential that the new regulation takes the effects on liquidity into account.

CHAPTER 6

Assets in the Government Funds

Government Debt Management at Danmarks Nationalbank manages the assets of the Social Pension Fund, SPF, the Advanced Technology Foundation and the Fund for Better Working Environment and Labour Retention. The assets of the government funds are included in the total central-government debt and are managed on a consolidated basis with other financial assets and liabilities of the central government in the area of government debt.

At the end of 2012, the assets of SPF amounted to kr. 94 billion nominally. In 2012, SPF invested its funds from redemptions and drawn bonds solely in Danish government bonds. Compared with 2011, this has increased the share of government bonds in the portfolio from 51 to 58 per cent.

The assets of the Advanced Technology Foundation and the Fund for Better Working Environment and Labour Retention were kr. 14 billion and kr. 1.5 billion, respectively, at end-2012. In 2012, the Advanced Technology Foundation reached its intended size, and no further capital injections from the government are planned.

THE SOCIAL PENSION FUND 6.1

The Social Pension Fund, SPF, was established in 1970 by the Social Pension Fund Act, whereby a special pension contribution was introduced. The proceeds were allocated to SPF and invested in bonds. The pension contribution – and hence payments into SPF – ceased in 1982. Since then, SPF's portfolio of assets and the interest received, less pension-yield tax, have been used to fund pension improvement measures.

SPF and its assets are managed by a committee comprising representatives of the Ministry of Finance, the Ministry of Social Affairs and Integration and Danmarks Nationalbank. Day-to-day management of the assets is undertaken by Government Debt Management at Danmarks Nationalbank.

The principles for asset management are laid down in *Regulations governing the management of the Social Pension Fund*.[1] Under the regulations, the assets shall be invested in Danish listed bonds. The placement of the

[1] The regulations may be downloaded from the Government Debt Management website, www.governmentdebt.dk.

THE GOVERNMENT FUNDS' REVENUES AND EXPENDITURES IN 2012 Table 6.1.1

Kr. million	Social Pension Fund	Advanced Technology Foundation	Fund for Better Working Environment and Labour Retention
Revenue:			
Interest etc.[1]	3,741	453	67
Injection of capital	-	1,000	-
Expenditure:			
Transfer to relevant ministry	11,980	640	350
Pension-yield tax	1,303	•	•
Net revenue	-9,542	813	-283

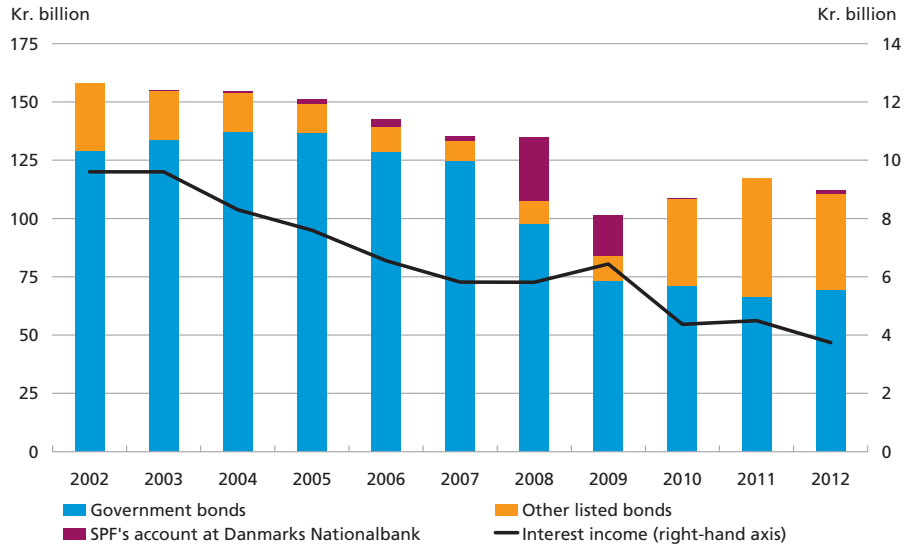
[1] Net statement of interest received, interest receivable, and distributed capital losses on buy-backs.

funds of the Social Pension Fund is managed on a consolidated basis with other central-government financial assets and liabilities under the government debt area, including, in particular, the domestic government debt.

Transfer of funds and SPF's interest income

The Finance Act stipulates the amount to be transferred annually from SPF to the Ministry of Social Affairs and Integration. In 2012, kr. 12 billion was transferred from SPF to the Ministry of Social Affairs and Integration, cf. Table 6.1.1, and SPF paid pension-yield tax for 2011 corresponding to kr. 1.3 billion. SPF had interest income of kr. 3.7 billion.

ASSET PORTFOLIO AT MARKET VALUE AND INTEREST INCOME, END-YEAR Chart 6.1.1



Note: Other listed bonds include mortgage bonds and inflation-linked bonds. The latter are stated at indexed value.

THE GOVERNMENT FUNDS' ASSETS, END-2012 Table 6.1.2

Kr. billion, nominal value	Social Pension Fund	Advanced Technology Foundation	Fund for Better Working Environment and Labour Retention	Share of outstanding, per cent.[1]
5 per cent bullet loan 2013	10.1	3.4	0.6	21
4 per cent bullet loan 2015	9.5	3.9	0.9	16
4 per cent bullet loan 2017	10.7	3.0		26
4 per cent bullet loan 2019	12.3	3.1		18
7 per cent bullet loan 2024	12.4	0.9		54
Government bonds, total	55.0	14.3	1.5	
Mortgage bonds etc.[2]	32.6	•	•	
Index-linked bonds[3]	5.3	•	•	
Balance of account	1.5	0.1	0.0	
Total	94.4	14.4	1.5	

[1] States the Fund's share of outstanding volume in each issue.
[2] Mortgage bonds, municipal, Ship Finance and Fisheries Bank bonds other than index-linked bonds.
[3] Indexed value.

SPF's assets

At end-2012, the assets of SPF totalled kr. 94 billion nominally, cf. Table 6.1.2. In 2012, surplus liquidity was invested in government bonds, thus the share of government bonds in the portfolio rose from 51 to 58 per cent at nominal value.

Since 1996, the asset portfolio of SPF stated at nominal value has gradually declined as a result of yearly transfers exceeding interest income on SPF's portfolio. Stated at market value, the asset portfolio's decline has been partially offset by capital gains. The market value of SPF's portfolio has declined by 30 per cent since 2002, cf. Chart 6.1.1.

Market risk is managed via a band for the average Macaulay duration. The risk on SPF's assets is assessed separately, but is included in the consolidated risk management of the total government debt. In 2012, the duration band was increased from 4 years to 4.5 years +/- 0.5 year. The average duration of SPF's portfolio was 4.6 years at end-2012. By comparison, the average duration was 4.1 years at end-2011. The duration band for SPF will be kept unchanged in 2013.

THE ADVANCED TECHNOLOGY FOUNDATION 6.2

The Advanced Technology Foundation was established by Act of Parliament in 2004 to strengthen growth and employment by supporting Denmark's further development as an advanced technological society. The

Foundation supports strategic initiatives within research and innovation with special focus on small and medium-sized enterprises.

In January 2012, the Foundation received kr. 1 billion from the central government, thereby reaching its intended size. At end-2012, the assets of the Advanced Technology Foundation amounted to kr. 14.4 billion nominally, cf. Table 6.1.2.

In 2012, the interest income of the Advanced Technology Foundation was kr. 453 million, while kr. 640 million was transferred to the Ministry of Science, Innovation and Higher Education, cf. Table 6.1.1.

It is a statutory provision that the assets of the Foundation may be invested in Danish government bonds only. The investment strategy for the Advanced Technology Foundation is to seek to achieve an equal distribution on short-, medium- and long-term Danish government bonds.

THE FUND FOR BETTER WORKING ENVIRONMENT AND LABOUR RETENTION[1] 6.3

The Fund for Better Working Environment and Labour Retention was established in 2007. Its assets are used for preventive measures, retention and inclusion in the labour market. As such, the Fund provides support for measures to prevent physical and mental impairment, work-related accidents and occupational diseases. A total of kr. 3 billion was transferred to the Fund when it was established. No further capital injections from the government are planned.

In 2012, kr. 350 million was paid by the Fund to the Ministry of Employment. The Fund had interest income of kr. 67 million. At end-2012, the assets of the Fund totalled kr. 1.5 billion, cf. Table 6.1.2.

It is a statutory provision that the assets of the Fund for Better Working Environment and Labour Retention may be invested in Danish government bonds only. The investment strategy is aimed at achieving revenue from interest and redemptions to match future transfers to the Ministry of Employment.

[1] On 1 January 2013, the Fund's name was changed from the Prevention Fund to the Fund for Better Working Environment and Labour Retention.

CHAPTER 7

Government Re-lending and Loan Guarantees

Government Debt Management at Danmarks Nationalbank is responsible for re-lending and loan guarantees to a number of government-owned companies. Government re-lending and guarantees enable the companies to achieve attractive borrowing terms since they can benefit from the central government's high credit rating. At end-2012, relending totalled kr. 90 billion whereas loan guarantees totalled kr. 41 billion.

PURPOSE AND FRAMEWORK FOR RE-LENDING AND GUARANTEES 7.1

A number of government-owned companies may raise loans directly from the central government (re-lending) or raise government-guaranteed loans, cf. Table 7.1.1. Re-lending and government loan guarantees derive from the political intention to support certain projects. The majority of the loans are issued to government-owned companies involved in large infrastructure projects. Purposes and frameworks for the companies' borrowing are laid down by law.

GOVERNMENT-OWNED COMPANIES WITH ACCESS TO RE-LENDING OR LOAN GUARANTEES Table 7.1.1

	Re-lending	Government-guaranteed loans
The Danish Broadcasting Corporation	x	-
The Danish State Railways	-	x
Eksport Kredit Fonden	x	-
Energinet.dk	x	-
Femern Belt	x	x
Femern Landworks	x	x
The Financial Stability Company	x	-
The Metro Company	x	-
The Danish North Sea Fund	x	-
Statens Serum Institut	x	-
The Great Belt Bridge	x	x
Sund & Bælt Holding	x	x
CPH City & Port Development	x	-
Øresund Landworks	x	x
Øresundbro Konsortiet	-	x

Note: (X) indicates that the company has access, while (-) indicates that the company does not have access. The table includes public companies whose loan guarantee is administered by Government Debt Management in Danmarks Nationalbank.

Re-lending means that loans are raised directly from the central government. By issuing a loan guarantee, the central government guarantees that the loans raised by the company in the private market will be serviced on time. Due to the central government's high credit rating, re-lending and government-guaranteed loans give the companies access to cheaper funding than loans without guarantees. As a main rule, the companies that may raise government-guaranteed loans or have access to re-lending pay an annual commission of 0.15 per cent of the loan value to the government.

Guidelines for borrowing by the companies

The Boards of Directors and Executive Boards of the government-owned companies are responsible for the companies' funding, including borrowing and management of market risk, etc. Government Debt Management at Danmarks Nationalbank formulates general guidelines for borrowing by the companies that have access to loan guarantees or re-

GUIDELINES FOR BORROWING AND RISK MANAGEMENT — Box 7.1

The list of eligible loan types sets out the general guidelines for borrowing by the companies that have access to re-lending or government-guaranteed loans.

The guidelines are based on the companies managing the risk on their assets and liabilities on a consolidated basis. It is the responsibility of the companies to lay down a financing strategy that contains rules for all financial transactions in relation to borrowing and risk-taking by the company.

The list of acceptable loan types is based on the following criteria:

Government loan guarantees

- Loan types must be customary, i.e. known and used in the market by reputed borrowers.
- Loans must be built up from simple elements that make them transparent.

Re-lending operations

- Companies have access to re-lending on the basis of the re-lending list. As a starting point, the re-lending list comprises all fixed-rate government bonds denominated in Danish kroner in the maturity segments between two and ten years.[1]

Risk-management requirements

- The swap counterparties are subject to minimum rating requirements.
- Swaps are only transacted with counterparties who have concluded collateral agreements, CSA.
- The currency exposure of the loan portfolio should, as a general rule, be limited to euro (or Swedish kronor in the case of Øresundsbro Konsortiet).

[1] The Financial Stability Company has access to re-lending in bullet loans with maturities ranging from one month to ten years. Eksport Kredit Fonden has access not only to the re-lending list, but also to re-lending with a serial redemption profile of up to 18 years. Energinet.dk, Femern Belt, the Metro Company and Øresund Landworks also have access to obtain re-lending in the 30-year issue, 4.5 per cent 2039.

lending. The aim is to ensure that the companies do not assume financial risks that the central government itself would not assume.

The guidelines for borrowing by the companies are stated in a set of agreements comprising two main elements[1]:

- An agreement between the ministry in question, the Ministry of Finance, Government Debt Management at Danmarks Nationalbank and the individual company.
- A list of eligible loan types, which is specified and updated by Government Debt Management, cf. Box 7.1.

Once a year, the companies' auditors inform the management whether the procedures established in relation to the loan portfolio are adequate in terms of controls. The auditors must provide Government Debt Management with confirmation of this.

RE-LENDING 7.2

Re-lending means that loans are raised directly from the central government. The terms and conditions for most of the central government's re-lending mirror loans in existing government bonds, so that coupon rates, interest-payment dates and redemption dates correspond to the characteristics of existing government bonds.

When a company requests re-lending, Government Debt Management sets the price of the loan on the basis of the current market conditions. The proceeds of the loan are paid from the central government's account. The resulting financing requirement is met via current issuance in the government's key on-the-run issues. Re-lending is included in the consolidated management of the market risk on central-government debt.

Re-lending in 2012

Re-lending by the central government in 2012 amounted to approximately kr. 25 billion, cf. Table 7.2.1. The outstanding volume of re-lending increased by kr. 13 billion in 2012, to kr. 90 billion. The increase was mainly attributable to new re-lending to Energinet.dk and Eksport Kredit Fonden, EKF. Re-lending was evenly distributed on maturity segments and over the year, cf. Chart 7.2.1.

The average maturity of new re-lending in 2012 was approximately 12 years, which more or less corresponds to the average maturity of the central government's domestic issues.

[1] As far as Øresundsbro Konsortiet is concerned, a tripartite agreement has also been concluded between Øresundsbro Konsortiet, Riksgälden (the Swedish National Debt Office) and Government Debt Management at Danmarks Nationalbank.

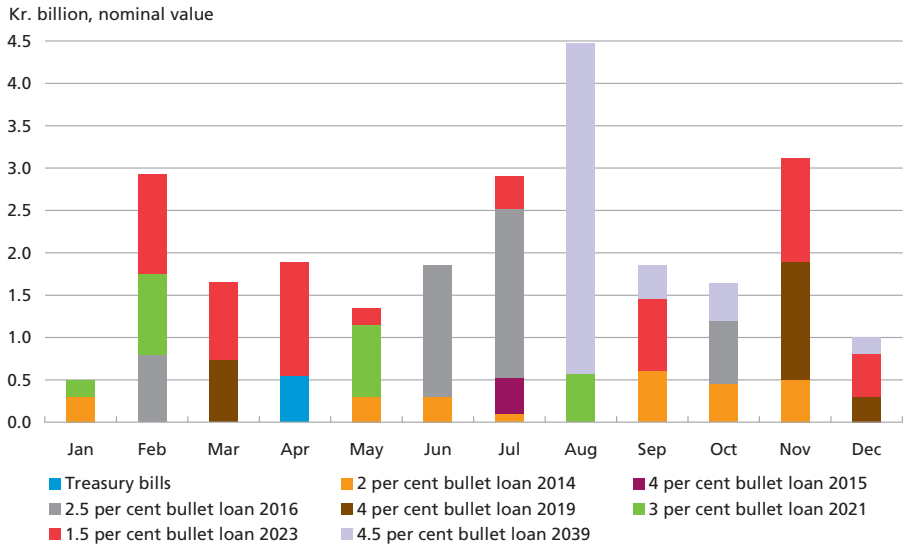
RE-LENDING IN 2012 Table 7.2.1

Kr. billion, nominal value	Portfolio end-2011	Borrowing in 2012	Redemptions in 2012	Portfolio end-2012
The Danish Broadcasting Corporation ..	3.6	0.0	0.1	3.5
Danish Ship Finance	9.6	0.7	1.4	8.9
Eksport Kredit Fonden	5.3	5.7	0.6	10.5
Energinet.dk	6.5	5.9	0.5	11.9
Femern Belt	0.5	0.8	0.5	0.8
Femern Landworks	0.1	0.1	0.0	0.2
The Financial Stability Company	13.9	2.5	2.9	13.5
Loan to Ireland	1.8	1.8	0.6	2.9
Loan to Iceland	0.3	0.1	0.4	0.0
The Metro Company	0.4	0.0	0.0	0.4
The Danish North Sea Fund	13.1	1.5	1.2	13.4
Statens Serum Institut	0.4	0.4	0.4	0.4
The Great Belt Bridge	10.1	2.9	1.4	11.6
Sund & Bælt Holding	7.4	1.4	0.0	8.8
CPH City & Port Development	0.0	1.5	0.0	1.5
Øresund Landworks	3.6	0.0	2.1	1.5
Total	76.4	25.2	12.0	89.6

Note: Redemptions include premature redemptions.

Energinet.dk, the Metro Company, Øresund Landworks and Femern Landworks may apply for re-lending in the 30-year on-the-run issue, 4.5 per cent 2039, and in 2012 the first three of these companies did so. These companies are characterised by being involved in projects with a long-term investment horizon, and via re-lending in long-term government

MONTHLY DISTRIBUTION OF RE-LENDING IN 2012 Chart 7.2.1



Note: EKF has access to re-lending expiring in years when no government bonds mature. In the chart, these loans have been included in the nearest years in which government bonds available for re-lending mature.

securities they can better align the duration of the debt portfolio with the duration of the fixed assets. In August, Energinet.dk raised a significant re-lending volume in the 30-year on-the-run issue, immediately after an auction had been held for this series. Energinet.dk used the loan to fund the acquisition of regional electricity transmission networks.

In 2012, the export loan scheme, which is administered by EKF, was extended until end-2015, and EKF's re-lending limit was increased from kr. 20 billion to kr. 35 billion.

Discontinuation of re-lending to Danish Ship Finance

At the end of 2012, access to re-lending for Danish Ship Finance, DSF, expired. At end-2012, DSF had re-lending in dollars totalling just under kr. 8 billion, while re-lending in kroner totalled around kr. 1 billion. In connection with the re-lending in dollars, the central government has concluded a kroner-to-dollars swap, whereby it avoids the net foreign-exchange exposure. DSF has the option of redeeming its re-lending prematurely at market value.

Bilateral loans to Iceland and Ireland

To support the Icelandic stabilisation programme, Denmark, jointly with the other Nordic countries and the IMF, has committed itself to bilateral loans. Iceland has received 480 million euro from Denmark, corresponding to the limit of the loan facility. The loan has been granted at a flexible rate of interest which is equal to the 3-month Euribor +275 basis points. In 2012, Iceland redeemed 281 million euro prematurely, thereby reducing the outstanding debt to 199 million euro. Originally, Iceland was to have redeemed the loan in quarterly instalments from December 2014 to 2021, but the premature redemptions mean that the first instalment is not due until December 2018.

In 2010, the EU member states and the IMF granted Ireland an 85 billion euro loan facility. Together with Sweden and the UK, Denmark has committed itself to a bilateral loan facility, amounting to 400 million euro in Denmark's case. The rate of interest on the loan has been fixed at the 3-month Euribor +100 basis points. The first disbursement of 100 million euro was made in the spring of 2012, and in the autumn a further 100 million euro was disbursed. It is expected that another 200 million euro will be disbursed in 2013. The loan facility expires at the end of the year.

GOVERNMENT LOAN GUARANTEES 7.3

In 2012, the outstanding government-guaranteed loans of government-owned companies whose loan guarantees are managed by Government

LOAN GUARANTEES ADMINISTERED BY GOVERNMENT DEBT MANAGEMENT Tabel 7.3.1

Kr. billion	Portfolio end-2011	Portfolio end-2012
The Danish Broadcasting Corporation	0.9	0.9
The Danish State Railways	7.1	5.9
Femern Belt	0.0	0.0
Femern Landworks	0.0	0.0
The Great Belt Bridge	14.4	13.0
Sund & Bælt Holding	0.0	0.0
Øresund Landworks	3.6	2.6
Øresundsbro Konsortiet[1]	17.8	18.2
Total	43.8	40.5

Note: The numbers are inclusive of guaranteed swaps.
[1] Loans issued by Øresundsbro Konsortiet are guaranteed by the Danish and Swedish government with joint and several liability.

Debt Management at Danmarks Nationalbank were reduced by kr. 3 billion to kr. 41 billion, cf. Table 7.3.1.

In late 2012, the Danish State Railways' loan facility was expanded to include not only projects, but also operations.

Not all government guarantees are administered by Government Debt Management. An aggregate list of government guarantees can be found in the Government Accounts.[1]

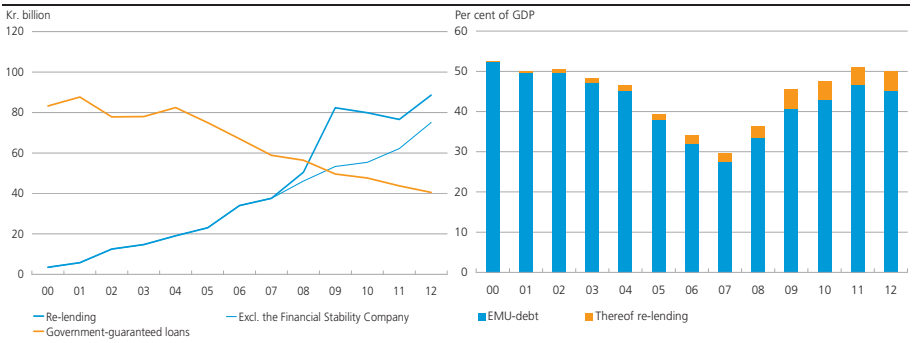
COMPARISON OF GOVERNMENT RE-LENDING AND LOAN GUARANTEES 7.4

Loan guarantees and re-lending are equivalent with regard to purpose and risk for the central government. However, their respective impacts on the central government's financing requirement and debt diverge. Re-lending is financed via increased issuance of government securities, leading to higher government and EMU debt, while the asset, i.e. re-lending, is not offset in the statement of government and EMU debt. Government-guaranteed loans to companies in the private market do not affect government and EMU debt.

In recent years, the government-owned companies have tended to fund their debt via re-lending rather than government-guaranteed borrowing, cf. Chart 7.4.1 (left). By opting for re-lending rather than government-guaranteed loans the companies have reduced their funding costs, as investors have been willing to pay a premium for the higher liquidity in government bonds. Moreover, re-lending is the only option available to a number of new government-owned companies.

[1] Cf. http://www.oes-cs.dk/bevillingslove/ (in Danish only)

RE-LENDING, GOVERNMENT LOAN GUARANTEES AND EMU-DEBT, 2000-12 Chart 7.4.1



The increased volume of re-lending has contributed to the increase in EMU debt seen in recent years cf. Chart 7.4.1 (right). In 2012, EMU debt was 45 per cent of GDP, of which re-lending accounted for just under 5 per cent of GDP.

CHAPTER 8

Market Risk

The duration of the government debt portfolio has been long since 2008, reflecting a number of strategic choices, such as a high balance on the central government's account financed by sales of long-term bonds in particular. These decisions have contributed to ensuring low interest-rate and refinancing risk.

The issuance strategy for 2013 aims at a high share of long-term issuance in order to maintain a low refinancing volume. Long-term fixed-rate issuance also helps to keep the interest-rate risk on the government debt low.

For 2013, the central government's interest-rate risk is managed within a band of 12 years ± 1 year for the average duration of the government debt, calculated on the basis of a discount rate of zero. The central government does not plan to conclude any new interest-rate swaps in 2013, since the expected medium-term savings from reducing the duration are expected to be low.

To facilitate access to updated information on the debt structure, a number of monthly indicators of refinancing risk, based on the current portfolio, will be published at www.governmentdebt.dk in future.

FOCUS OF MARKET RISK MANAGEMENT 8.1

The overall objective of government debt policy is to achieve low long-term borrowing costs, while taking the degree of risk into account. Market risk management focuses on the consolidated interest-rate and refinancing risk on the assets and liabilities in the government debt portfolio. The portfolio comprises domestic and foreign debt, swaps, the assets of the government funds, re-lending and the central government's account at Danmarks Nationalbank, cf. Table 8.1.1. Market risk is managed on the basis of a target band for the duration of the total portfolio.

A central focus area in market risk management is the risk of higher interest costs. For a given portfolio structure, interest costs may rise due to an increase in the general level of interest rates (interest-rate risk) and/or isolated increases in the Danish spread to a relevant risk-free interest rate (refinancing risk). These risks are analysed using indicators of interest-rate and refinancing risk on the current debt portfolio, and by

DURATION OF GOVERNMENT-DEBT SUB-PORTFOLIOS, END-2012 Table 8.1.1

	Macaulay duration, years	Market value, kr. billion
Liabilities:		
Domestic debt	7.5	807.9
Foreign debt	-1.1	87.1
Assets:		
The funds' portfolios of government bonds:		
The Social Pension Fund	4.6	110.4
The Fund for Better Working Environment and Labour Retention	2.0	1.7
The Advanced Technology Foundation	4.0	16.8
Re-lending	5.3	103.6
Balance on central government's account	0.0	161.9
Total central-government debt adjusted for re-lending	9.7	500.5

Note: Foreign debt includes portfolio interest-rate swaps in euro. Hence, the duration can be negative. For a fixed-rate bond, the Macaulay duration is the weighted average maturity of the cash flows. The weights are given by the present value of each cash flow divided by the market value.
Source: Own calculations.

performing medium-term projections of the debt structure and interest costs, based on a number of technical assumptions.[1]

MARKET RISK MANAGEMENT IN 2012 8.2

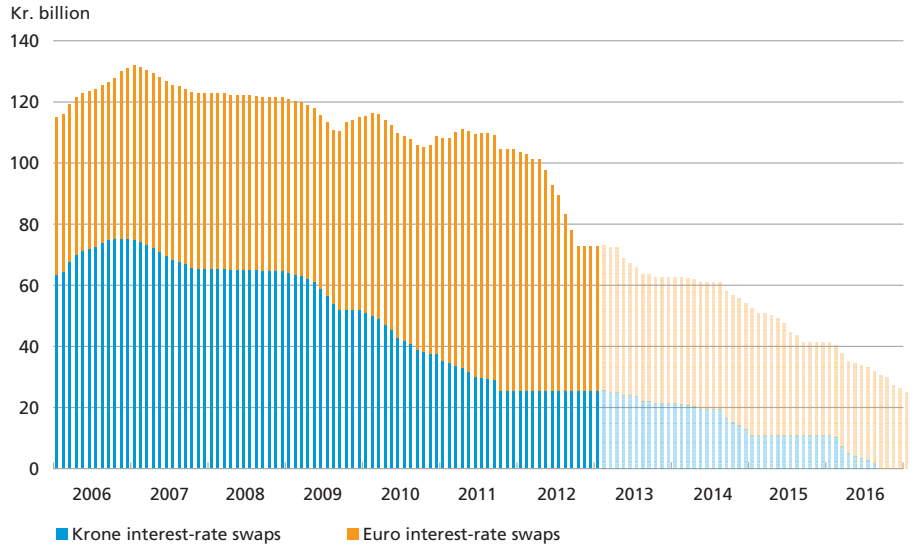
Long duration and average term to maturity

The duration of the central-government debt portfolio remains long due to recent years' large share of long-term issuance and the sizeable liquidity reserves maintained in the form of the balance on the central government's account at Danmarks Nationalbank. As a result of these strategic choices, the central government has been able to keep its exposure to rising interest rates at a low level despite growing debt.

At the beginning of 2012, the target for interest-rate risk management was an average duration of 9 years ± 1 year. In the 1st quarter, higher-than-expected revenue from the taxation of pension yields contributed to an increase in the balance on the central government's account and hence the duration. Given the historically low long-term interest rates, it was decided not to counter this increase in duration. Consequently, the target for the average duration was adjusted upwards to 10 years ± 1 year. The average duration of the government debt was

[1] The projection in the Cost-at-Risk (CaR) model focuses on the size of interest costs. In principle, the correlation between the central government's interest costs and other budget items could also be included. For example, increased interest costs are less of a problem for the government if they go hand in hand with improved public finances. In practice, this correlation is difficult to model as it requires a simultaneous model for the yield curve, the macroeconomy and government finances.

CENTRAL-GOVERNMENT INTEREST-RATE SWAP PORTFOLIO, NOTIONALLY Chart 8.2.1



Note: The chart shows the development, assuming that no new interest-rate swaps are concluded.

10.0 years in 2012, calculated using a fixed discounting factor of 2.5 per cent.[1] As a target, the duration calculated with a fixed discount rate has the advantage over e.g. the Macaulay duration that the indicator is not affected by interest-rate fluctuations during the year.[2]

The large share of long-term issuance in 2012 meant that the average term to maturity for the central government's domestic liabilities was maintained at around 9 years in 2012, cf. Box 8.1.

The central government's swap portfolio is decreasing

In accordance with its strategy, the central government did not conclude any new portfolio interest-rate swaps in 2012. The strategy reflected the assessment that, given the low level of interest rates, no medium-term costs savings could be expected from doing so. The expiry of existing interest-rate swaps in euro in 2012 reduced the notional portfolio of interest-rate swaps from kr. 105 billion to kr. 73 billion, cf. Chart 8.2.1.

1 The fixed discounting factor was determined at the beginning of 2012, so that the duration calculated using the fixed discount rate corresponded to the Macaulay duration at end-2011. The average Macaulay duration rose from 9.6 years in 2011 to 10.0 years in 2012.

2 The Macaulay duration of the government debt portfolio is calculated as a weighted average of the Macaulay durations of the portfolio's sub-elements. Interest-rate fluctuations affect the market value of the individual portfolio elements and thereby also the overall Macaulay duration.

PUBLICATION OF INDICATORS OF REFINANCING RISK Box 8.1

In future, indicators of the refinancing risk on domestic liabilities will be published on a monthly basis. Publication of these indicators and the methodology applied enhances transparency in relation to the debt structure and facilitates access to updated information. For the sake of clarity and international comparability, the indicators focus on domestic debt only.[1]

The data published relate to the liability side and shows three dimensions of refinancing risk: maturity profile, short-term refinancing volume and average term to maturity. The individual indicators should not be viewed in isolation. For example, a portfolio comprising equal volumes of T-bills and newly issued 30-year bonds will have a relatively high average term to maturity, but potentially also an unacceptably high short-term refinancing volume. Similarly, a low short-term refinancing volume does not reveal what is to come in the following years. The combination of the average term to maturity and the short-term refinancing volumes gives a better indication of the refinancing risk on the portfolio.

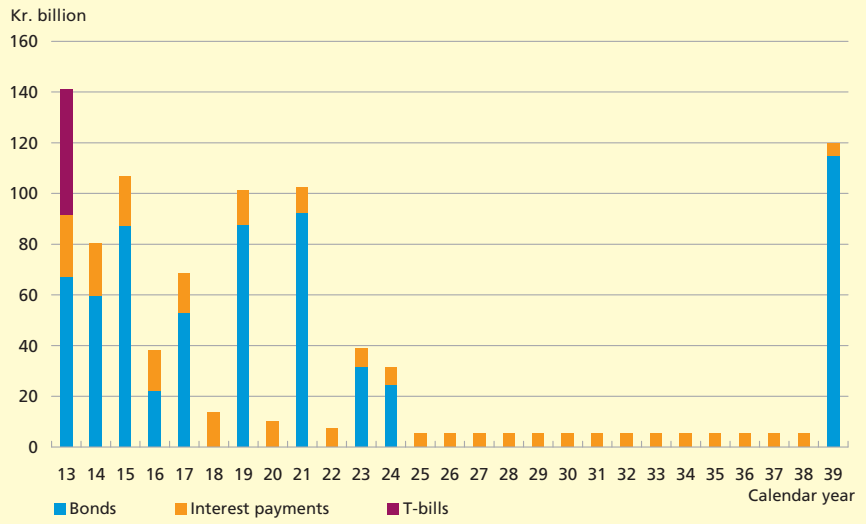
Indicators are calculated on the basis of the portfolio's current structure and are hence not based on assumptions regarding issuance strategy, future financing requirements, etc.

The indicators are published at www.governmentdebt.dk under Risk Management. Here, users can find descriptions of the indicators and the precise methodology on which they are based. Time series are available back to 2002.

Maturity profile

The maturity profile provides an overview of the volume of payment obligations (maturing principal and coupon payments) facing the central government in the coming years, cf. the Chart A.

MATURITY PROFILE Chart A



Note: Maturity profile as of 31 January 2013.

PUBLICATION OF INDICATORS OF REFINANCING RISK Box 8.1

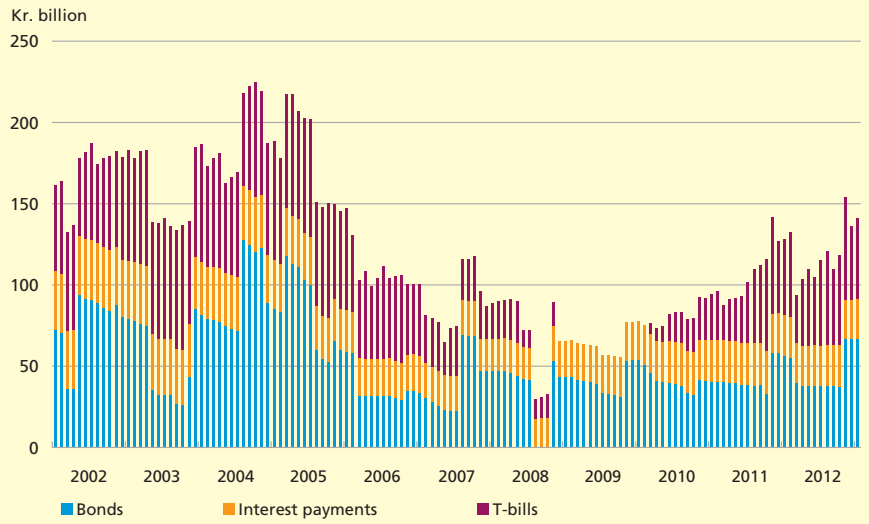
Methodology

- The indicator focuses on the calendar year.
- The amounts include both maturing T-bills and bonds (i.e. repayment of principal) and coupon payments on bonds. In principle, coupon payments are payment obligations in line with repayment of the principal and should be seen together.
- Interest payments are stated as actual interest payments on a non-accrual basis.
- Future payments on the inflation-linked bond are uncertain due to the indexation. It is assumed that the index coefficient increases by 2 per cent a year, calculated from the latest known value for 15 November.

Short-term domestic refinancing volume

The short-term domestic refinancing volume is stated as the sum of maturing existing government securities (bonds and T-bills) and interest payments on existing bonds over the coming 12 months, cf. Chart B. The indicator expresses the size of the payments on the domestic debt to be made by the central government in the short term.

SHORT-TERM REFINANCING VOLUME Chart B



Methodology

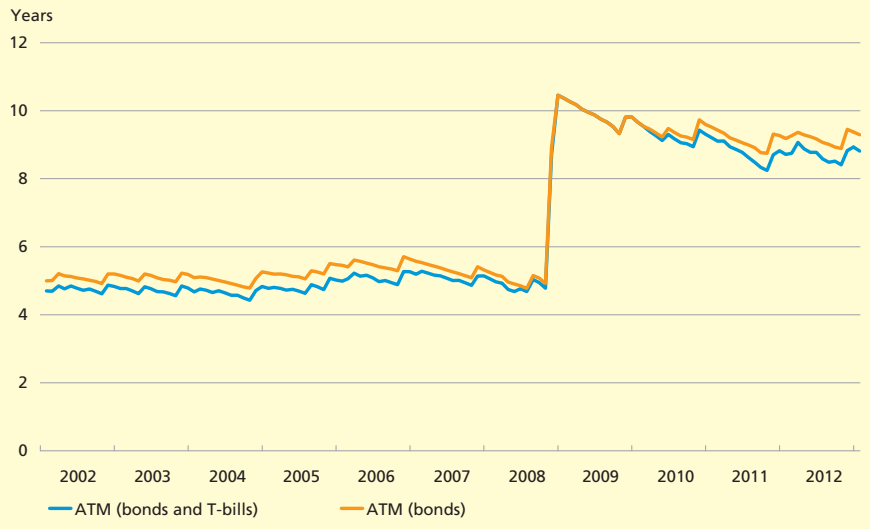
- The indicator is based on a 12-month rolling window.
- The amounts include all domestic bullet loans and T-bills. Interest payments are included and shown separately.
- Interest payments are stated as actual interest payments on a non-accrual basis.
- Future payments on the inflation-linked bond are uncertain due to the indexation. It is assumed that the index coefficient increases by 2 per cent a year, calculated from the latest known value for 15 November.

PUBLICATION OF INDICATORS OF REFINANCING RISK Box 8.1

Average term to maturity, ATM

The average term to maturity, ATM, summarises the entire maturity profile of the domestic liabilities in one figure, cf. Chart C. This indicator is published both with and without T-bills.

AVERAGE TERM TO MATURITY FOR DOMESTIC LIABILITIES Chart C



Methodology

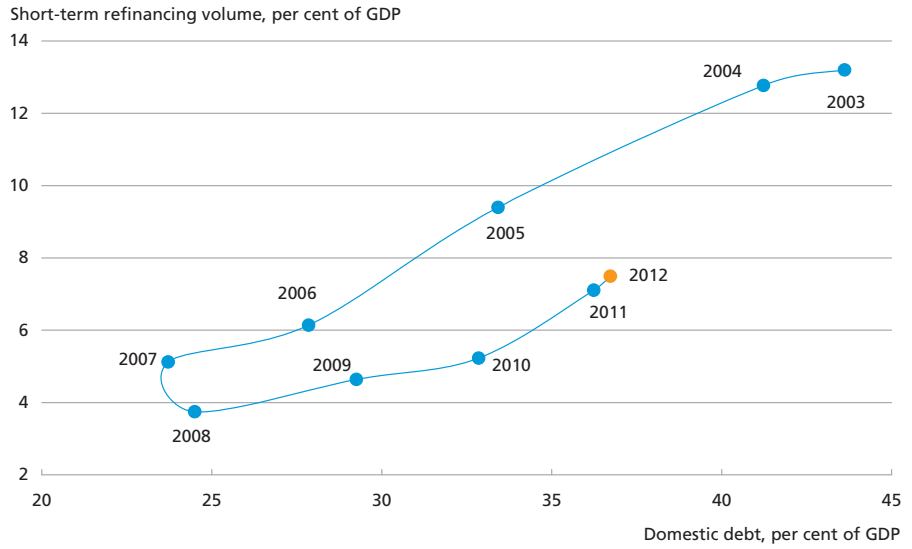
- The indicator includes all maturing domestic bullet loans, including T-bills, and coupon payments on bonds.
- The average term to maturity is calculated as a weighted average of the time until maturity and coupon payments, the weights being the payments' shares of the total nominal payments.
- Future payments on the inflation-linked bond are uncertain due to the indexation. It is assumed that the index coefficient increases by 2 per cent a year, calculated from the latest known value for 15 November.

[1] At end-2012, foreign liabilities accounted for just under 12 per cent of total liabilities.

Moderate refinancing requirement despite rising debt

At the end of 2012, the central government's short-term refinancing volume was at the same moderate level as at the end of 2011, cf. Chart 8.2.2. Despite a higher level of debt, the refinancing volume is currently lower than in e.g. 2005. This reflects recent years' attempts to limit the refinancing risk despite rising debt, including by issuing little in the short-term maturity segments and maintaining a relatively low outstanding volume of T-bills.

DOMESTIC DEBT AND REFINANCING VOLUME Chart 8.2.2



Note: The refinancing volume is the sum of the next 12 months' redemptions and interest payments, including swaps, calculated at year-end. Year-end figures for each year. Estimated GDP for 2012.

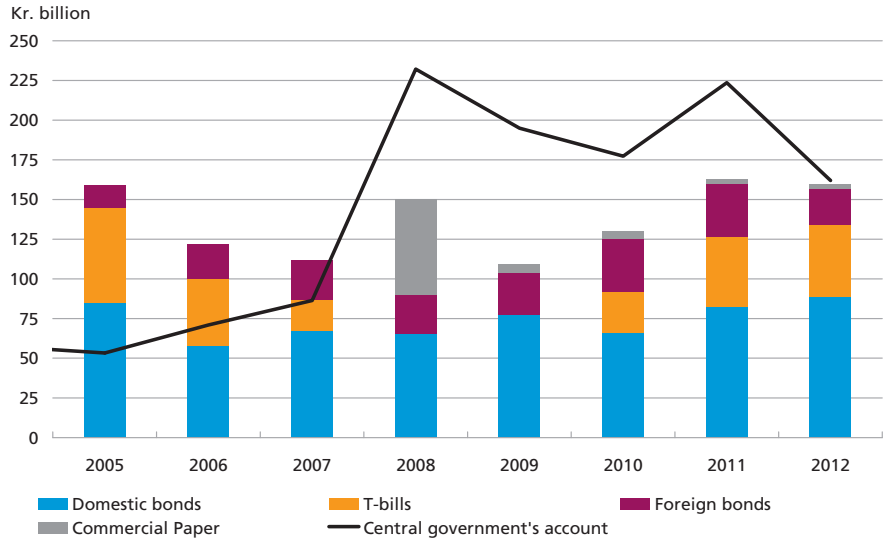
A significant element in the assessment of the central government's overall refinancing risk is its portfolio of short-term assets. At end-2012, the balance on the central government's account was sufficient to service all domestic and foreign debt one year ahead, cf. Chart 8.2.3.

The central government's short-term refinancing requirement, stated as a percentage of GDP, is low compared with those of other EU member states, cf. Chart 8.2.4. Due to increased focus on refinancing risk, also internationally, indicators of the refinancing risk on the government debt will be published on a monthly basis in future, cf. Box 8.1.

STRATEGY FOR MARKET RISK MANAGEMENT IN 2013 8.3

The average duration of the debt portfolio can be adjusted via the central government's issuance, buy-back and swap strategies. The issuance strategy for 2013 aims at a continued large share of long-term issuance in order to keep the refinancing risk at a low level. All other things being equal, a large share of long-term issuance means that the duration of the government debt will remain considerably above the pre-crisis level in the coming years. This section describes why the duration should remain long in 2013. It is also shown that in the current situation interest-rate swaps cannot be expected to reduce the variation in the central government's interest costs in the medium term. The reason is that the central government's portfolio of short-term liabilities is expected to

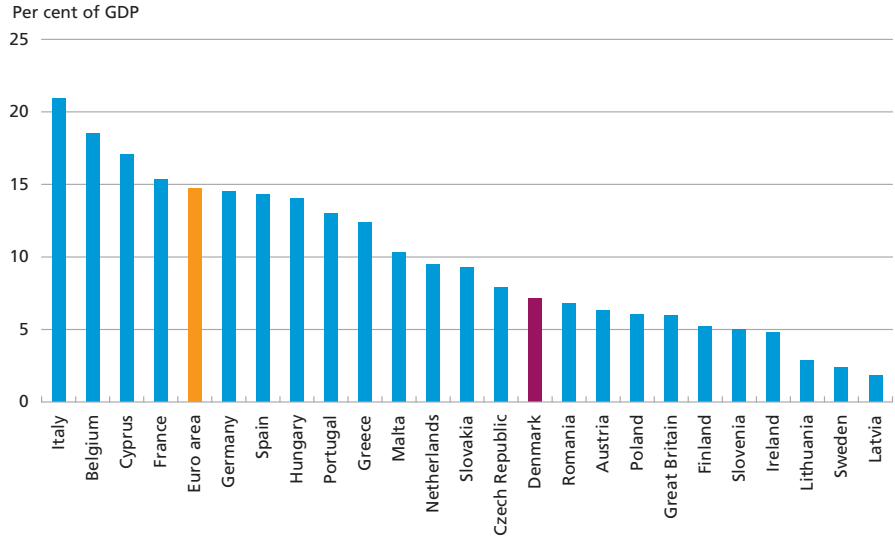
SHORT-TERM REFINANCING VOLUME AND THE CENTRAL GOVERNMENT'S ACCOUNT — Chart 8.2.3



Note: The central government's account at end-2008 and end-2009 has been adjusted by kr. 26 billion and kr. 16 billion, respectively, since most of the mortgage bonds purchased by the Social Pension Fund in December were not settled until early January.

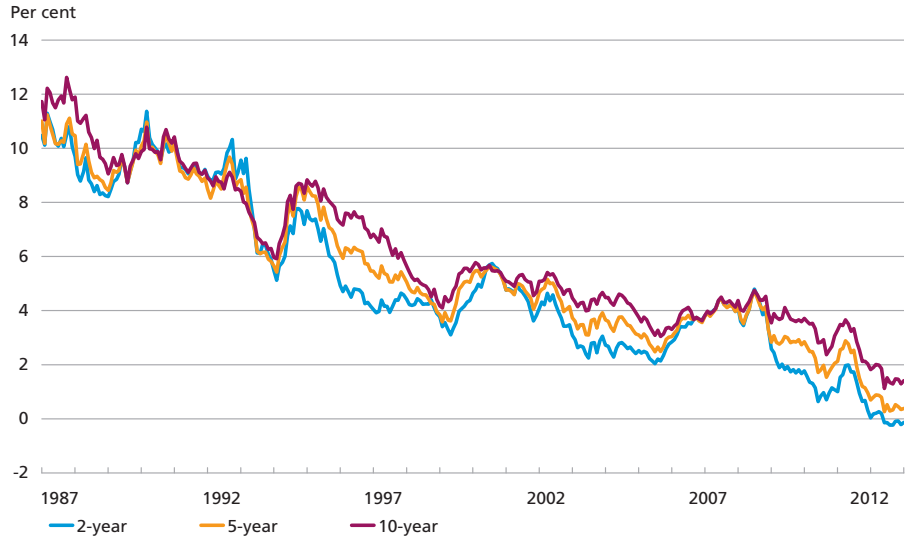
exceed the portfolio of short-term assets in the coming years. But this may change if the one-off revenue from the restructuring of capital pensions is extraordinarily high, cf Chapter 4.

SHORT-TERM REFINANCING REQUIREMENTS OF EU MEMBER STATES — Chart 8.2.4



Note: Repayments on marketable domestic and foreign debt instruments in the period December 2012 – November 2013.
Source: ESRB Risk Dashboard, Issue 2, European Systemic Risk Board.

DANISH GOVERNMENT BOND YIELDS 1987-2012 Chart 8.3.1



Note: Monthly observations.
Source: Bloomberg and Nordea Analytics.

Can savings currently be expected from reducing the duration?

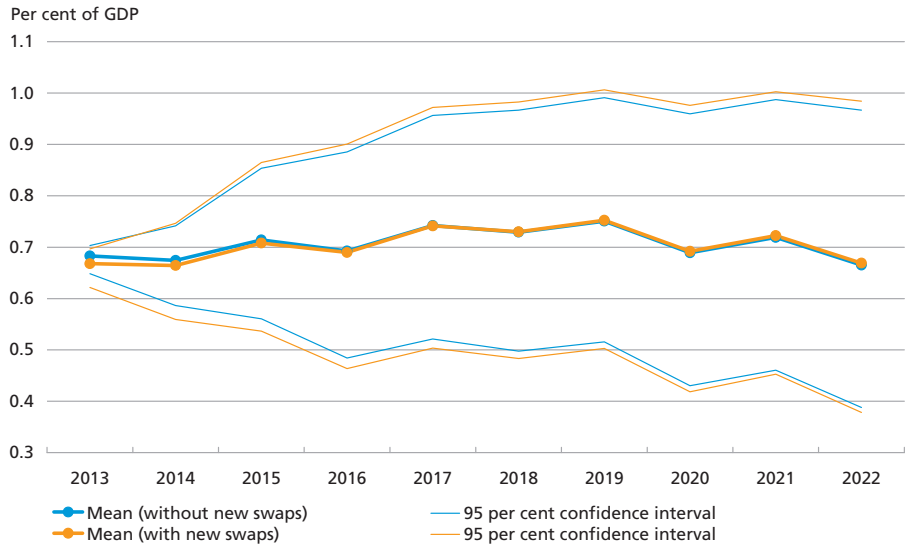
Historically, investors in interest-rate markets have achieved an excess return by investing in bonds with longer duration (term premium). Likewise, long duration of government debt has been associated with higher expected interest costs. If the term premium is assessed still to be considerable, it might be desirable to reduce the duration and thereby the expected interest costs.

However, the current unusually low level of long-term interest rates gives rise to doubts about the presence of a significant term premium. Firstly, the Danish 10-year yield was around 1.3 per cent at end-2012, cf. Chart 8.3.1. A positive term premium at this level of interest rates requires that the short-term yield in the coming 10 years is expected to average less than 1.3 per cent. Given the ECB's medium-term definition of price stability (annual inflation below, but close to 2 per cent p.a.), such levels for the short-term yield would correspond to a long period of negative short-term real interest rates. Secondly, model estimates, cf. the Cost-at-Risk analysis below, indicate that the term premium is currently substantially lower than previously. Some analyses even point to the possibility of a negative term premium in the bond market in recent years.[1]

[1] If the return on bonds issued by creditworthy sovereigns tends to be relatively high, while the return on other important asset classes (such as equities) is low, risk-averse investors may (based on CAPM logic) be willing to pay a premium for such bonds. A recent analysis based on US data does in fact find that the correlation between the return on US government bonds and a number of other asset classes has declined considerably since the mid-1990s. Viewed in isolation, this would point to a lower risk premium, cf. e.g. J. Campbell, A. Sunderam and L. Viceira (2012), "Inflation Bets or Deflation Hedges? The Changing Risks of Nominal Bonds", Harvard University.

DISTRIBUTION OF EXPECTED INTEREST COSTS WITH AND WITHOUT CONCLUSION OF NEW INTEREST-RATE SWAPS

Chart 8.3.2



Note: Distribution of net accrued interest costs for 5,000 interest-rate scenarios. The distribution depicted with yellow lines shows an example, where the government concludes 10-year Eonia for kr. 20 billion notionally. The projected budget figures are based on *Budget Outlook 3*, December 2012, for 2013 and internal projections for the years 2014-22

Source: Ministry of Finance and own calculations.

All else equal, the low term premium indicates that the central government should not reduce the duration in 2013 by e.g. concluding interest-rate swaps in which a fixed rate of interest is received and a variable rate paid.

Analyses in the Cost-at-Risk model

The above argumentation indicates that reducing the duration by concluding new interest-rate swaps will not lower the expected interest costs. This section demonstrates that the Cost-at-Risk analysis gives a similar result.

The distribution of the central government's future interest costs is analysed by simulating 5,000 scenarios for the Danish government yield curve towards 2022 based on assumptions of the central government's primary deficit, issuance strategy, etc. The point of departure is a stochastic term structure model, cf. Box 8.2. The model is estimated on historical Danish government yields, and the parameter estimates for the model entail a tendency for yields to increase in the coming years.

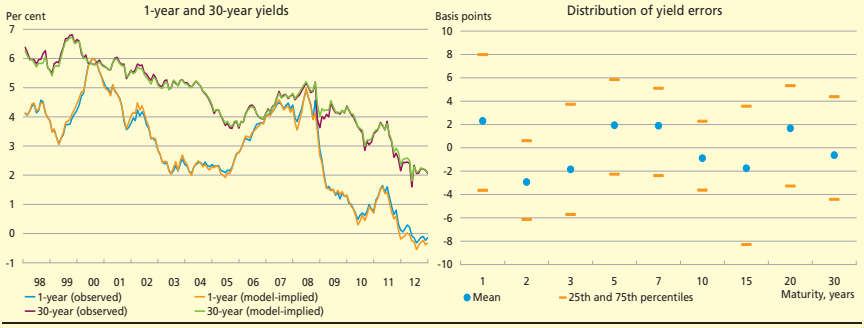
In the baseline scenario, the central government's interest costs are projected at just under 0.7 per cent of GDP in 2022, which is virtually unchanged compared with 2013, cf. Chart 8.3.2.[1] This reflects that interest

[1] Here, the interest costs (net) are calculated inclusive the interest income from the re-lending portfolio.

NEW INTEREST-RATE MODEL FOR THE COST-AT-RISK MODEL — Box 8.2

Since 2005, simulations of future interest-rate scenarios for the government debt portfolio have been based on a 2-factor Cox-Ingersoll-Ross, CIR, model. This model type, which excludes negative interest rates by construction, is not suitable for modelling the current Danish government yield curve. Consequently, a new stochastic term structure model, belonging to the Arbitrage-Free Nelson-Siegel, AFNS, class, has been implemented.[1] The AFNS class is described in the special-topic chapter "Interest-Rate Models for Cost-at-Risk Analysis" in *Danish Government Borrowing and Debt*, 2010. In the new model, the factors are normally distributed stochastic processes, which means that the model – unlike the CIR model – can generate scenarios with negative interest rates.

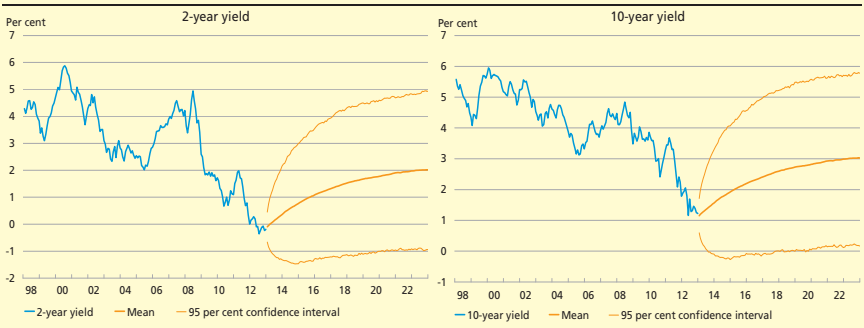
OBSERVED AND MODEL-BASED INTEREST RATES — Chart A



Note: The left-hand Chart shows the levels of observed and model-based interest rates. The right-hand Chart shows the average spread between observed and model-based interest rates for all maturities used to estimate the model. Based on 180 monthly observations for the period 1998-2012.
Source: Own calculations.

In the new model, the development in the yield curve is determined by three independent factors, representing the level, slope and curvature, respectively, of the yield curve. The model is able to precisely reproduce the Danish government yield curve at both the short and long ends, cf. Chart A (left), and in general there are only small spreads between the observed and model-based interest rates, cf. Chart A (right).

PROJECTION OF 2- AND 10-YEAR DANISH GOVERNMENT YIELDS — Chart B



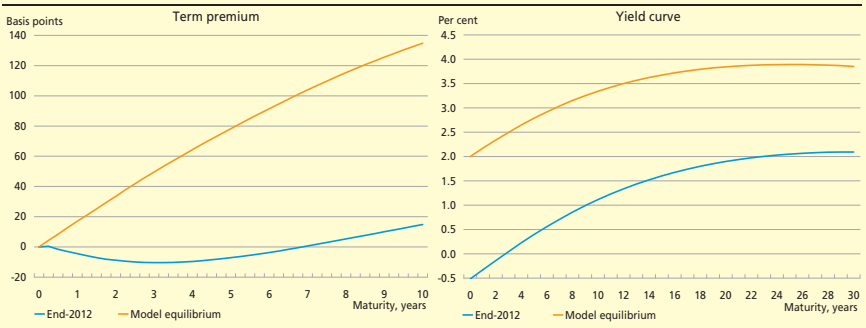
Note: The model has been estimated on the basis of monthly data from the period 1998-2012 (n = 180). The confidence bands have been calculated on the basis of 5,000 interest-rate scenarios.
Source: Own calculations.

NEW INTEREST-RATE MODEL FOR THE COST-AT-RISK MODEL Boks 8.2

The model is used to simulate a large number of scenarios for the development in the Danish government yield curve. In the mean scenario, 2-year zero-coupon yields rise from -0.2 per cent at end-2012 to 2.0 per cent at end-2022, cf. Chart B (left). The model attributes a low, but not insignificant probability to scenarios in which the 2-year yield is negative for many years. This is seen in that the confidence interval for the 2-year yield in 2022 (95-per-cent level) ranges from -0.9 per cent to 4.9 per cent. In the mean scenario, the 10-year yield, cf. Chart B (right), is projected to rise from 1.2 per cent at end-2012 to 3.0 per cent at end-2022. The confidence intervals are more or less as wide as for the 2-year yield.

The model's 10-year term premium – calculated as the 10-year yield at end-2012 less the average of 5,000 simulated scenarios for short-term yields over the next 10 years – is approximately 15 basis points. The model-based term premia are shown in Chart C (left). The very low term premia reflect that the model is currently so far from its equilibrium, cf. Chart C (right), that in the first few years interest-rate increases are projected to be stronger than what the forward rates indicate.[2] In the model's equilibrium, the 10-year term premium is approximately 130 basis points, which is more or less in line with historical estimates of the expected excess return from holding 10-year bonds. It should be emphasised that there is considerable uncertainty linked to all estimates of term premia; for example, the choice of estimation period may affect the results. However, the overall picture – that the term premium is currently significantly lower than previously – is assessed to be robust across model types and estimation periods.

TERM PREMIUM (LEFT) AND YIELD CURVE (RIGHT) NOW AND IN EQUILIBRIUM Chart C



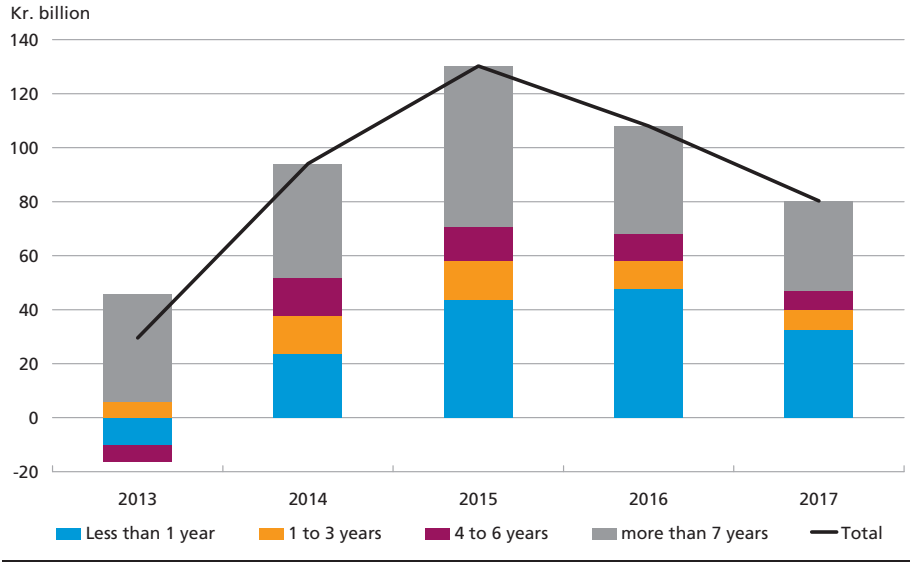
Note: The model has been estimated on the basis of monthly data from the period 1998-2012 (N = 180).
Source: Own calculations.

[1] See J. Christensen, F. Diebold and G. Rudebusch, The Affine Arbitrage-Free Class of Nelson-Siegel Term Structure Models, *Journal of Econometrics*, 164, September 2011, 4-20.

[2] In the estimation of the model, the restriction has been imposed that the long-term mean level of the very short-term yield is at least 2 per cent. At the current level of interest rates, this restriction entails a tendency for interest rates to rise in the model.

rates are generally expected to rise, while the debt as a ratio of GDP is expected to fall in the second half of the projection period. The risk on interest costs is very low in the first few years. The uncertainty increases up to 2022, but interest costs remain modest in all the years, even in scenarios with considerable interest-rate increases. In just 2.5 per cent of

CENTRAL GOVERNMENT'S INTEREST-RATE FIXING ON MATURITY SEGMENTS Chart 8.3.3



Note: Interest-rate fixing is the amount in kroner on which a new, unknown rate of interest is to be fixed. Interest-rate fixing is calculated as interest-rate fixing for liabilities less interest-rate fixing for assets. Based on same assumptions as chart 8.3.2.

the scenarios, interest costs exceed 1.0 per cent of GDP towards 2022. The distribution purely reflects uncertainty about interest rates, not about budget developments.

Distribution of interest costs with conclusion of new swaps

Chart 8.3.2 shows – as an example – the effect on the distribution of interest costs of reducing the duration by concluding 10-year interest-rate swaps for kr. 20 billion notionally in 2013. In the first years, the conclusion of interest-rate swaps will yield small savings. This is because short-term interest rates are projected to be below the current long-term rates for some time. But later on the savings are expected to be offset by higher short-term interest rates.

The conclusion of interest-rate swaps increases the simulated variance in net interest costs towards 2022. The reason is that the central government's portfolio of short-term liabilities is expected to exceed the portfolio of short-term assets in the coming years, even without the conclusion of new interest-rate swaps, cf. Chart 8.3.3. When this is the case, further exposure to short-term interest rates via new interest-rate swaps is likely to increase rather than reduce the variation in interest costs.

INTEREST-RATE FIXING Boks 8.3

Interest-rate fixing is the amount in kroner on which a new, unknown rate of interest is to be fixed. For a pure fixed-rate bond portfolio, the interest-rate fixing corresponds to the expected volume of new issuance in the respective maturity segments. Interest-rate fixing is calculated as interest-rate fixing for liabilities less interest-rate fixing for assets.

- Interest-rate fixing for liabilities comprises the year's issuance of government securities, conclusion of new interest-rate swaps and holdings of interest-rate swaps at the beginning of the year
- Interest-rate fixing for assets comprises the year's buy-backs from the market, relending, conclusion of new interest-rate swaps and the average balance of the central government's account at Danmarks Nationalbank.

Interest-rate fixing is broken down into different maturity segments. The short-term interest-rate fixing applies to maturities of less than one year. It primarily includes the balance of the central government's account, issuance of T-bills and the notional principal of the total portfolio of interest-rate swaps. In addition, interest-rate fixing is divided into the maturity segments 1-3 years, 4-6 years and more than 7 years. This breakdown thus corresponds to the distribution of the central government's key on-the-run issues.

Modest negative short-term interest-rate fixing in 2013

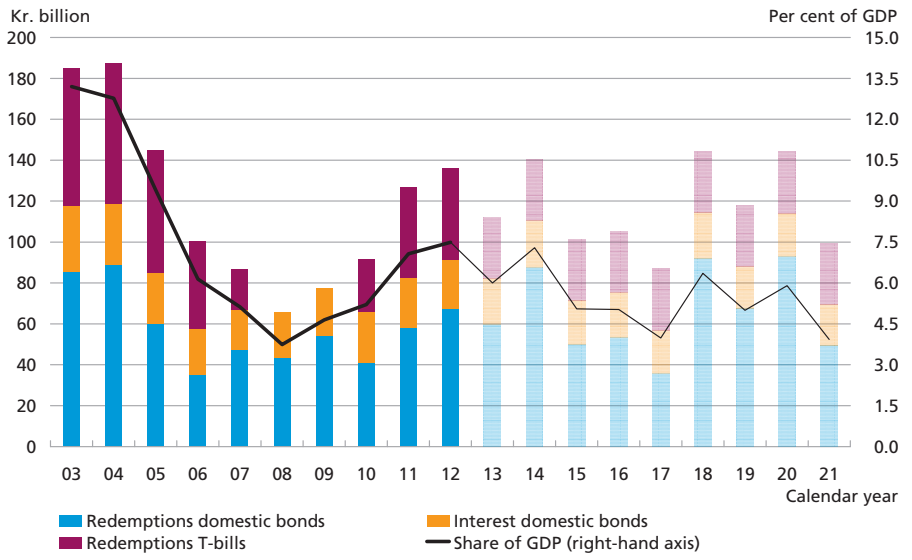
The central government's short-term interest-rate fixing (less than 1 year, cf. Box 8.3) is expected almost to balance in 2013, cf. Chart 8.3.3. This is because the volume of short-term liabilities (variable leg of portfolio interest-rate swaps, variable-rate foreign loans and T-bills) will be more or less offset by the balance on the central government's account. Consequently, new interest-rate swaps will not contribute to a closer match between the central government's short-term assets and liabilities. In addition, the current very low short-term interest rates mean that the risk of increasing net interest costs for the central government as a result of lower interest income on the central government's account is low anyway. So the use of interest-rate swaps to "hedge" the variation in interest income from the central government's account is less relevant.

The increase in the central government's short-term interest-rate fixing in the coming years reflects the technical reduction of the account inherent in the baseline scenario for the debt projection.

Conclusion to the strategy for market risk management in 2013

In view of the above, it is assessed that no cost savings can be expected at present from reducing the duration of the portfolio, e.g. by concluding interest-rate swaps in which the central government receives a fixed rate of interest. The issuance strategy's focus on long-term issuance should be viewed against the same backdrop. The favourable effects of

SHORT-TERM REFINANCING VOLUME Chart 8.4.1



Note: The bars indicate redemptions and interest payments in the coming year, calculated at year-end. For each year, nominal GDP from internal projections is applied.

long-term issuance on the refinancing risk makes it more advantageous to increase the duration through issuance than through interest-rate swaps in which the central government pays a fixed rate of interest.

Nor does the current situation require new interest-rate swaps to ensure a better match between the central government's short-term assets and liabilities. The reason is that the central government's short-term interest-rate fixing is expected to turn positive during the coming years.

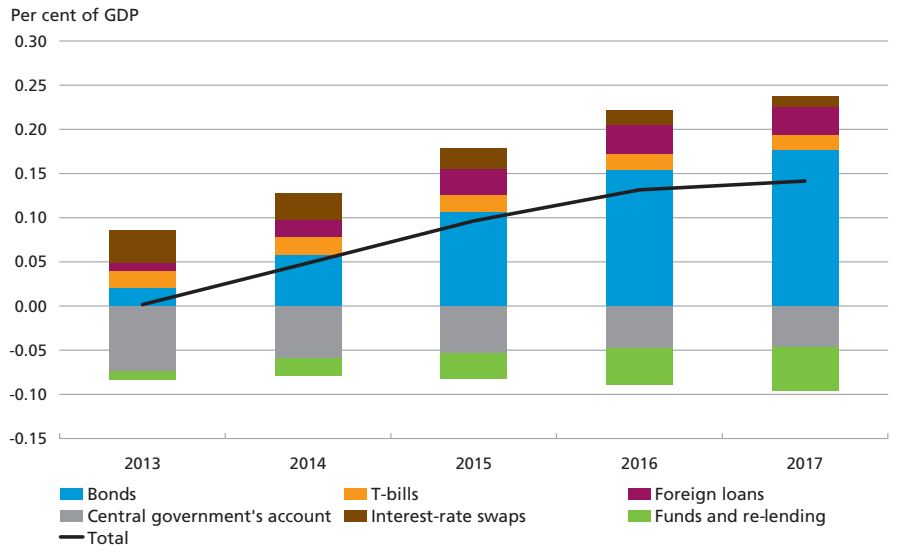
The target band for the average duration in 2013 has been set at 12 years ± 1 year.[1] Uncertainty concerning the size and timing of the revenue from taxation of capital pensions gives rise to extraordinary uncertainty regarding the development in duration in 2013.

PROJECTION OF THE RISK PROFILE OF THE GOVERNMENT DEBT 8.4

This section shows how the refinancing volume and the pass-through from higher interest rates to the central government's interest costs develop in the baseline scenario underlying the CaR analysis.

[1] In future, the duration will be calculated with a discount rate of zero. In this way, discrete jumps in the duration at the turn of the year as a result of changes in the fixed discounting factor will be avoided. The average Macaulay duration will still be calculated.

PASS-THROUGH OF A 100 BASIS POINTS INCREASE IN INTEREST RATES AS OF THE BEGINNING OF 2013 Chart 8.4.2



Source: Own calculations.

The refinancing volume is kept at a low level

The projection shows that, despite a slight increase in the debt, the short-term refinancing volume is kept at a low level of less than kr. 150 billion throughout the projection period, cf. Chart 8.4.1. This is equivalent to around 6 per cent of GDP from 2015 onwards, which is in line with the level in 2006-07, when domestic debt as a share of GDP was approximately 10 percentage points below the level in the projection.

Slow pass-through from interest-rate increases to interest costs

The vulnerability of the central government to interest-rate increases remains low, cf. Chart 8.4.2. The black line shows how a permanent interest-rate increase of 100 basis points at the beginning of 2013 (all maturities) will affect the government's future interest costs. The increase in interest costs is shown as a percentage of GDP, indicating the deterioration of the government budget balance which is attributable to the effect of higher interest rates.

The bars in the Chart show the breakdown of the total effect by the individual portfolio elements: domestic bonds, T-bills, foreign loans, central government's account, interest-rate swaps and funds and re-lending.

It is seen that the (net) pass-through from interest rates is around zero in 2013, rising to approximately 0.14 per cent of GDP in 2017. The slow pass-through can be ascribed to the still low debt ratio, the balance on

the central government's account and the long average interest-rate fixing of the liabilities. The pass-through from an increase in the rate applying to the central government's account declines in the first few years in step with the technical reduction of the balance contained in the baseline scenario. Similarly, the pass-through from interest-rate swaps declines as the portfolio of interest-rate swaps is reduced, reflecting the decision not to conclude any new interest-rate swaps in the current situation.

The Chart emphasises that a negative interest-rate/debt spiral is unlikely to be triggered by the government debt portfolio as long as the deficits do not deteriorate significantly. Moreover, the low and slow pass-through ensures that even in that situation there will be time to make fiscal adjustments.

CHAPTER 9

Credit Risk

At end-2012, the central government's swap portfolio consisted of 195 swaps with a total principal value of kr. 120 billion. A swap with a positive market value exposes the central government to the counterparty's ability to pay. The market value of the central government's swap portfolio was kr. 11 billion at the end of 2012, while the credit exposure was kr. 1.5 billion.

Since the onset of the financial crisis, the central government's counterparties have been downgraded by the rating agencies. As a result, only few banks met the central government's credit rating requirement for concluding swaps. Consequently, the credit rating requirements for counterparties were lowered. Counterparties with low ratings pledge full collateral and adjust the collateral on a daily basis, which limits the central government's credit exposure.

In 2013 the central government will start negotiating with the swap counterparties for a new two-way collateral agreement. The background to this decision is a change in market conditions since the onset of the financial crisis as well as the impact of new regulatory measures. Two-way collateral will enable the central government to conclude swaps on more favourable terms. The negotiations are expected to be concluded during 2013.

THE CENTRAL GOVERNMENT'S SWAP PORTFOLIO 9.1

Swaps are used for managing the central government's interest-rate and exchange-rate exposures. The swaps are either linked to specific loans or they are portfolio swaps.[1]

The central government did not conclude any interest-rate swaps in 2012, cf. Chapter 8. When a dollar loan was raised in May 2012, the foreign-exchange exposure was converted into euro, cf. Box 9.1. The exposure was hedged by concluding cross-currency swaps with a commercial bank and Danmarks Nationalbank, respectively. The two swaps were concluded on identical terms, which ensured that the swap with Danmarks Nationalbank was concluded on market terms.

[1] The central government's use of swaps is described in more detail in *Danish Government Borrowing and Debt 2010*, Chapter 12.

THE CENTRAL GOVERNMENT'S USAGE OF CROSS-CURRENCY SWAPS Box 9.1

When the central government raises loans in foreign exchange, the foreign-exchange exposure on interest payments and repayments is converted into euro. This is done via cross-currency swaps in which the central government exchanges principals and interest payments with a counterparty. When a dollar loan is raised, a cross-currency swap is concluded in which the central government initially pays a principal in dollars (proceeds of the loan) and receives an equivalent amount in euro. Over the lifetime of the swap, the central government receives interest payments in dollars and pays interest in euro. The interest received on the swap corresponds to the interest payments on the dollar loan. In that way the central government has hedged its foreign-exchange exposure on the liability.

Danmarks Nationalbank holds dollar assets as part of the foreign-exchange reserve. With the swap, in which the central government initially supplies dollars to Danmarks Nationalbank and receives euro, both the government and Danmarks Nationalbank hedged their dollar exposure to euro. At the same time, both parties avoided credit exposure to private-sector market participants.

In 2012, the swap portfolio was reduced by almost kr. 70 billion due to the expiry of interest-rate and cross-currency swaps. At end-2012, the portfolio consisted of 195 swaps with a total principal value of kr. 120 billion, cf. Table 9.1.1.

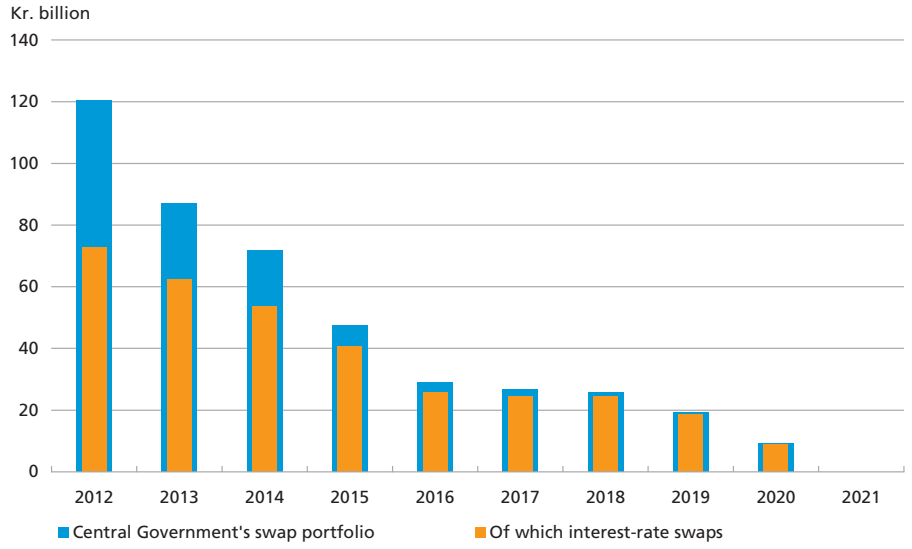
Swaps for kr. 32 billion will mature in 2013, cf. Chart 9.1.1. As a starting point no new portfolio interest-rate swaps will be concluded in 2013, and the foreign loan in dollar that matures in 2013 is not expected to be fully refinanced. Consequently, the swap portfolio is also expected to be reduced in 2013.

CENTRAL-GOVERNMENT SWAP PORTFOLIO, END-2012 Table 9.1.1

	Number of swaps	Principal, kr. billion	Market value, kr. billion
Interest rate swaps for duration management			
Interest-rate swaps in kroner	93	25.6	2.5
Interest-rate swaps in euro	71	47.5	6.5
Swaps related to foreign loans			
Swaps in connection to foreign loans[1]	7	38.4	2.3
Other cross-currency swaps			
Swap from kroner to euro	1	1.5	0.0
Swaps from kroner to dollar[2]	23	7.5	-0.1
Total	195	120.5	11.3

[1] For foreign loans in other currencies than euro, the loan proceeds are swapped to euro.
[2] In connection with re-lending to Danish Ship Finance.

MATURITY PROFILE OF SWAP PORTFOLIO Chart 9.1.1



Note: Principal of swap portfolio at year-end if no new swaps are concluded.

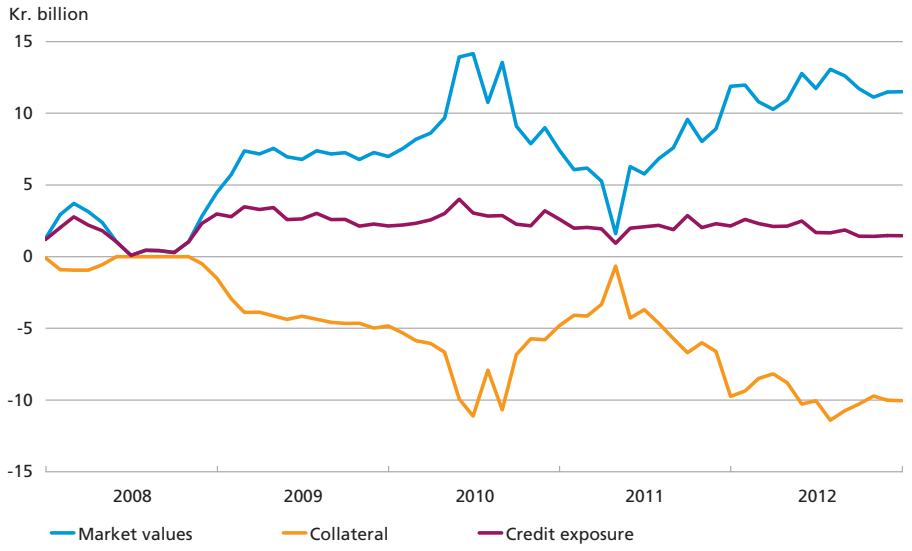
When the central government transacts a swap, its market value is zero, but over time it may become either positive or negative for the central government, depending on the development in interest and exchange rates. At end-2012, the market value of the central government's swap portfolio was kr. 11 billion, which was primarily attributable to interest-rate swaps. The central government uses interest-rate swaps for conversion from long to short duration. This means that the central government pays a variable short-term interest rate and receives a fixed long-term interest rate. The market value of the portfolio of interest-rate swaps thus increases when interest rates fall.

CREDIT EXPOSURE ON SWAP COUNTERPARTIES 9.2

Credit risk is the risk of a financial loss as a consequence of a counterparty's default on its payment obligations. A swap with a positive market value is an asset for the central government and exposes it to the counterparty's ability to pay.

The credit exposure on the individual counterparty is calculated as the positive market value for the central government of the individual counterparty's swap portfolio less the collateral pledged by that counterparty. The central government's total credit exposure is the sum of the credit exposures on all counterparties. At end-2012, the central government's total credit exposure was kr. 1.5 billion, which is a small decrease relative to the preceding year, cf. Chart 9.2.1.

CREDIT EXPOSURE ON THE CENTRAL-GOVERNMENT SWAP PORTFOLIO Chart 9.2.1

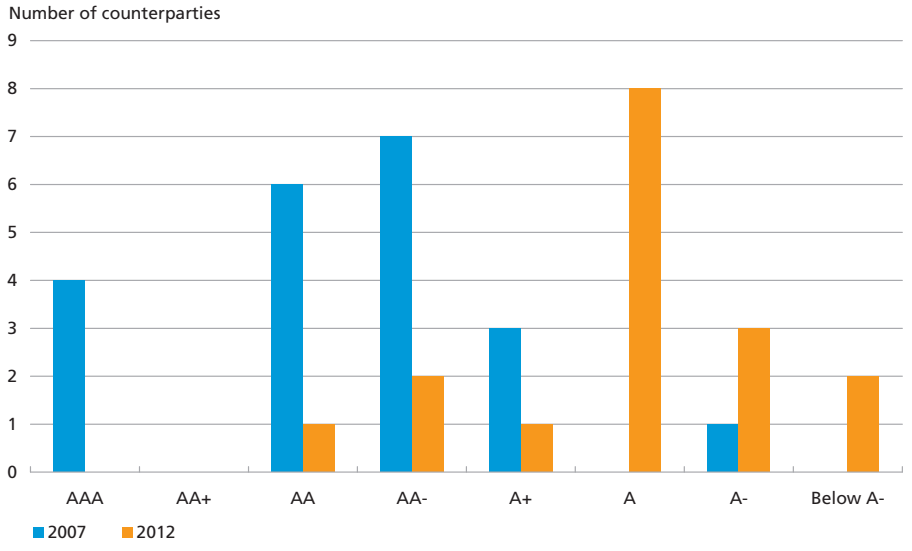


Note: The market value has been calculated exclusive of the cross-currency swap concluded with Danmarks Nationalbank. The collateral value is indicated with a negative sign.

The credit quality of the counterparties has deteriorated

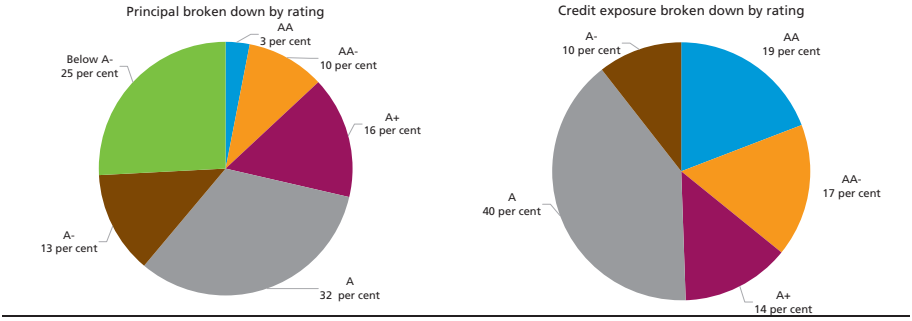
The central government's swap portfolio is distributed on 17 banks. Furthermore, a cross-currency swap has been concluded with Danmarks Nationalbank. Concluding swaps with many counterparties spreads the credit risk.

CREDIT RATINGS OF THE CENTRAL GOVERNMENT'S SWAP COUNTERPARTIES Chart 9.2.2



Note: The lowest credit ratings from Fitch Ratings, Standard & Poor's and Moody's have been applied. The rating scale of Standard & Poor's and Fitch Ratings has been applied. Excluding Danmarks Nationalbank.

THE SWAP PORTFOLIO'S PRINCIPAL AND CREDIT EXPOSURE BROKEN DOWN BY COUNTERPARTIES, END-2012 Chart 9.2.3



Note: The lowest credit ratings from Fitch Ratings, Standard & Poor's and Moody's have been applied. The rating scale of Standard & Poor's and Fitch Ratings has been applied. Excluding swap with Danmarks Nationalbank.

Since the onset of the financial crisis, the central government's counterparties have been downgraded by the rating agencies, cf. Chart 9.2.2. As a result, fewer banks met the central government's credit rating requirement for concluding new swaps.[1] Consequently, the credit rating requirements for counterparties were eased. The new rules entail that the central government can conclude swaps in all currencies with counterparties with a credit rating of at least A-. Moreover, counterparties with credit ratings down to BBB are accepted, provided that the counterparty is resident in a country with a credit rating of at least AA.

At year-end most of the swap portfolio had been concluded with counterparties with credit ratings of A or lower, cf. Chart 9.2.3. The central government's credit exposure is still limited as counterparties with credit ratings below A- must pledge full collateral on a daily basis for the market value of their swap portfolios. So the central government has no credit exposure to counterparties with credit ratings below A-.

THE CENTRAL GOVERNMENT INTRODUCES TWO-WAY COLLATERAL 9.3

The central government's current collateral agreements, CSAs, are one-way agreements. This means that the counterparties pledge collateral when the market value of the swap portfolio is positive for the central government, while the government does not pledge collateral when the swap portfolio is positive for the counterparties.

Higher funding costs for the banks and new regulation mean that the central government can obtain better swap terms by introducing two-way collateral, cf. Box 9.2. In addition, more counterparties will be able to

[1] Under the previous credit rules, the central government could conclude swaps in other currencies than euro and kroner with counterparties whose credit ratings were at least AA-, while counterparties with ratings of at least A- were accepted for swaps in kroner and euro.

CLOSER LINK BETWEEN SWAP TERMS AND COLLATERAL — Box 9.2

Since the onset of the financial crisis, the banks' method for pricing swaps has changed. For example, the banks have begun to take into account whether the collateral agreement, CSA, is one-way or two-way, as well as the assets accepted as collateral. The change in the pricing method has mainly been driven by increased demands to the banks liquidity and higher cost of liquidity. For the central government it is mainly the latter that affects the swap terms.

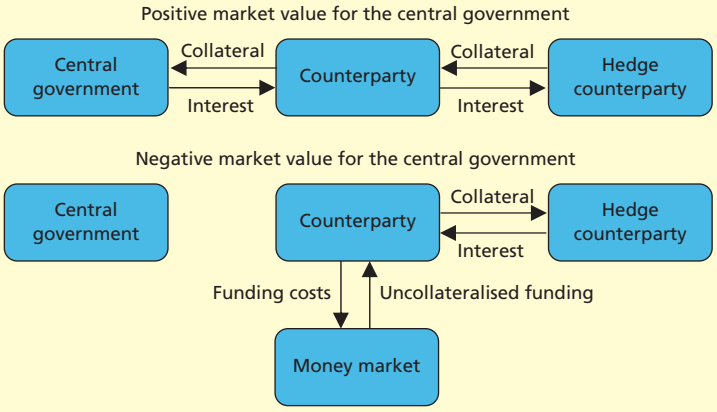
Higher funding costs for banks

When the central government concludes a swap with a counterparty, the latter typically hedges the exposure via an opposite swap with another counterparty, the "hedge counterparty". Hence, the central government's counterparty has no market exposure on the concluded swap.

If both swaps have been concluded under two-way CSAs, the central government's counterparty will not pledge any collateral, as the collateral pledged (by the central government or the hedge counterparty) can be re-used.

For a one-way CSA, the situation resembles two-way collateral when the market value is positive for the central government since the counterparty can re-use the collateral pledged by the hedge counterparty vis-à-vis the central government, cf. Chart A. But when the market value is negative for the central government, the government does not have to pledge collateral as it is a one-way CSA. However, the counterparty must still pledge collateral to the hedge counterparty. In other words, the counterparty must raise liquidity to pledge collateral. If the rate of interest at which the central government's counterparty obtains funding is higher than the rate agreed in the CSA, the counterparty incurs a cost for pledging collateral.

FUNDING REQUIREMENT FOR ONE-WAY COLLATERAL — Chart A

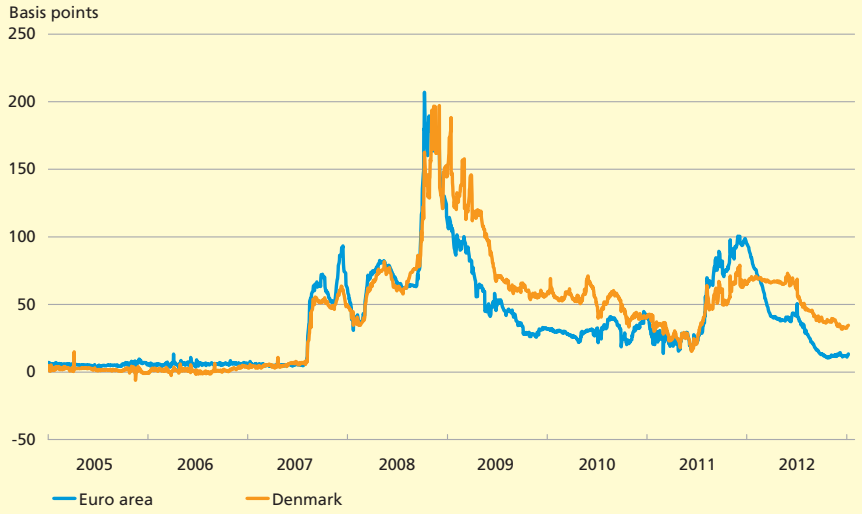


The bank's funding costs can be approximated by the uncollateralised money-market interest rate, while interest on the CSA typically mirrors a collateralised money-market rate. Until the financial crisis, the spread between collateralised and uncollateralised money-market interest rates was stable at a low level. This meant that the spread between the interest rate paid in the funding market and under the CSA was minimal.

CLOSER LINK BETWEEN SWAP TERMS AND COLLATERAL – CONTINUED Box 9.2

Hence the costs were so small that most banks disregarded them when pricing swaps. But during the financial crisis the spread between collateralised and uncollateralised interest rates widened, cf. Chart B. This made it more expensive and riskier for banks to pledge additional collateral under one-way CSAs. In recent years the banks have increasingly begun to pass on these costs to their counterparties.

SPREAD BETWEEN COLLATERALISED AND UNCOLLATERALISED 3-MONTHS MONEY-MARKET INTEREST RATES Chart B



Note: The uncollateralised interest rates are CIBOR and EURIBOR, and the collateralised are swap rates (CITA and EONIA).

New regulation of the derivatives markets

A number of measures to regulate the financial markets with a view to reducing systemic risk affect the pricing of derivatives, even though some of these measures have not been finalised yet. In Europe, they include European Market Infrastructure Regulation (EMIR) and Capital Requirements Directive IV (CRD IV). In future, swaps are to be cleared via a central counterparty (CCP) or comprised by two-way collateral. Central governments are exempt from this requirement, but may still be affected due to changes in market standards. It has not yet been determined to which extent governments will be exempt from the CRD IV requirements.

Rising credit costs

In a one-way CSA, the bank is exposed to the entire market value of the swap when it is positive for the bank. This means that the bank risks a loss corresponding to the market value if the counterparty defaults on its payment obligations. To counter this risk, the bank may hedge it by buying CDS contracts on the counterparty. Since the financial crisis began, CDS spreads have in certain periods widened, which has made it more expensive for banks to hedge this risk.

If a two-way CSA has been concluded, the bank's exposure to the counterparty is reduced in that the collateral pledged is offset against the market value before the exposure is calculated. So the amount to be hedged via CDS contracts is smaller. In other words, two-way collateral reduces the bank's costs for concluding swaps.

quote competitive prices, which will increase competition. In 2013 the central government will therefore start negotiating with the swap counterparties for a new two-way CSA agreement. The new two-way collateral agreements are expected to be implemented during 2013.

Collateral will be pledged by way of cash deposits in Danish kroner. When the central government pledges or receives collateral, the amount is drawn on or deposited in the central government's account at Danmarks Nationalbank. Two-way collateral increases the uncertainty in relation to projecting the government's liquidity requirements, but with the large deposit in the government's account, this risk is limited.

Clearing via central counterparties, CCPs

New regulation means that financial institutions must clear standardised swaps via central counterparties, CCPs.[1] Central governments are not covered by this regulation. Central counterparties can help to reduce systemic risk in connection with derivatives trading by increasing the scope for netting between counterparties.[2] The reason is that all swaps concluded can be netted multilaterally in the CCP rather than bilaterally between the individual swap counterparties.

At present only interest-rate swaps are cleared via central counterparties. If the central government's interest-rate swaps are cleared via a CCP and cross-currency swaps bilaterally with banks, the central government's total credit exposure may increase. This reflects that exposures across interest-rate and cross-currency swaps cannot be netted out. Moreover, it remains uncertain on which terms governments will be able to participate in a CCP.[3] Against this backdrop, the central government has no current plans to clear interest-rate swaps via a CCP.

1 Cf. e.g. European Market Infrastructure Regulation, EMIR.

2 Cf. Korsgaard, S., Central Counterparties in the Derivatives Markets, Danmarks Nationalbank, *Monetary Review*, 3rd Quarter 2010.

3 Cf. *Regulatory reform of OTC derivatives and its implications for sovereign debt management practices,* OECD, November 2011.

Special-Topic Section

CHAPTER 10

Costs and Benefits of Issuing Inflation-Linked Bonds

In May 2012, the central government opened an inflation-linked bond maturing in 2023. With this introduction, the government expands its on-the-run issues in order to attract a broader group of investors. At the same time, inflation-linked bonds help to reduce the central government's budget risk. These benefits should be weighted against the costs of issuing inflation-linked bonds.

Whether it is advantageous, seen from a narrow cost perspective, for the central government to issue inflation-linked bonds depends on the future development in consumer prices. If average future inflation turns out to be higher than the "break-even inflation" on issuance, the costs of inflation-linked bonds will exceed the costs of nominal bonds – and vice versa.

Hence, break-even inflation is a key concept in forward-looking assessments of the benefits of inflation-linked bonds. This special-topic chapter describes how break-even inflation is affected not only by expected future inflation, but also by an inflation risk premium, differences in market liquidity between nominal and inflation-linked bonds and seasonal effects in the consumer price index.

WHY DOES THE CENTRAL GOVERNMENT ISSUE INFLATION-LINKED BONDS? 10.1

The benefits of issuing inflation-linked bonds rather than nominal bonds can be assessed from a risk and a cost perspective. As described below, inflation-linked bonds may help to reduce the central government's risk. The relative costs of issuing inflation-linked bonds depend on future price developments.

Inflation-linked bonds contribute to lower risk

Inflation-linked bonds contribute to reducing the central government's risk via three channels. Firstly, the central government has expanded its investor base by opening an inflation-linked bond. This is because inflation-linked bonds, along with other assets whose nominal return is closely linked to changes in price levels, are often seen as a separate asset class by institutional investors. For example, pension companies often use

DEMAND SHOCKS AND EFFECT ON INTEREST COSTS — Table 10.1.1

Type of shock to the economy	Expected effect on price level	Expected effect on primary deficit	Effect on interest costs	
			Inflation linked bonds	Nominal bonds
Negative demand shock	Lower	Higher	Lower	Unchanged
Positive demand shock	Higher	Lower	Higher	Unchanged

inflation-linked bonds to ensure the future purchasing power of pension savings. A broad investor base increases demand for Danish government securities, thereby contributing to lower interest costs and refinancing risk for the central government.

Secondly, inflation-linked bonds dampen fluctuations in the debt ratio, i.e. government debt as a share of GDP. If the debt is inflation-linked, both the numerator (the debt) and the denominator (GDP) of the debt ratio will be affected proportionally by changes in the level of prices. Consequently, the debt ratio will be unaffected by changes in price levels. In contrast, if the debt consists of nominal bonds, only the denominator will be affected, so that the debt ratio will fluctuate with the price level.

Thirdly, inflation-linked bonds may, under certain conditions, reduce the central government's overall budget risk.[1] This is the case if the economy is predominantly hit by demand shocks. In that case, inflation will tend to be procyclical, i.e. it is low in an economic slowdown and high in an upswing. As a result, the central government's interest payments on the inflation-linked bonds are typically low when the government budget balance is most under pressure. Conversely, payments are higher in upswing periods, when the room for manoeuvre is greater, cf. Table 10.1.1.

However, the latter two effects remain small in Denmark's case due to the low volume of inflation-linked bonds compared with the total outstanding volume.

Relative costs depend on future inflation

The risk-reducing properties of inflation-linked bonds should be weighed against the expected costs. In that context, the yield spread between nominal and inflation-linked bonds with the same maturity – referred to as break-even inflation – is a key concept.

[1] The central government's nominal deficit is the sum of the nominal primary deficit and the nominal interest costs. This entails that variance(deficit) = variance(primary deficit) + variance(interest costs) + 2 * covariance(primary deficit, interest costs). If the covariance term is negative for inflation-linked bonds and dominates the variance term for the inflation-linked bonds' nominal interest costs, the inclusion of inflation-linked bonds will reduce the variance of the overall balance. This is the case even if interest costs are more variable in nominal terms for inflation-linked bonds – for debt already issued – than for nominal, fixed-rate securities.

10-YEAR BREAK-EVEN INFLATION FOR DENMARK AND THE EURO AREA Chart 10.1.1

Note: Danish bonds are DGB 1.5'23 and DGBi 0.1'23. German bonds are DBR 1.75'22 and DBRi 0.1'23. French bonds are OAT€i 1.1'22 and OAT 3'22.
Source: Bloomberg.

Break-even inflation is an expression of the future average realised inflation level at which the costs for the central government (ex post) of issuing inflation-linked and nominal bonds are the same:[1]

Break-even inflation = nominal yield – real yield

If the realised average inflation turns out to exceed the break-even inflation (observed at issuance), it would, viewed in isolation, have been cheaper for the government to issue nominal bonds rather than inflation-linked bonds, and vice versa. Since September[2] 2012, break-even inflation for the government's inflation-linked bond has fluctuated in the interval 1.7-2.0 per cent, which is in line with the break-even inflation calculated on the basis of German government bonds, cf. Chart 10.1.1.

When assessing the cost efficiency of inflation-linked bonds, a distinction is made between retrospective (ex post) and forward-looking (ex ante) analyses. Ex post analyses compare the actual costs related to the inflation-linked bond – after it has matured – with the hypothetical costs to the central government, had it chosen to issue nominal bonds with the same maturity instead. Such ex post analyses are fairly simple to per-

[1] This expression is a first-order Taylor approximation to the Fisher equation, which describes the relation between the nominal interest rate, inflation and the real interest rate. When the variables are small (e.g. 2 per cent), the approximation error is insignificant.

[2] It has been possible to calculate the break-even inflation directly since 4 September 2012, when the central government's nominal bond maturing on 15 November 2023 was opened.

form, but contain only limited information about the future advantages of inflation-linked bonds. Furthermore, they cannot be performed until an issuer has issued inflation-linked bonds for a number of years.

An ex ante assessment of the cost efficiency must be based on the level of break-even inflation compared with other forecasts or scenarios of future inflation. As described below, break-even inflation is affected by a number of factors besides expected future inflation. The implications of a change in break-even inflation for the assessment of the advantages of inflation-linked bonds depend on the factors triggering the change. These implications are discussed at the end of this chapter.

INTERPRETING BREAK-EVEN INFLATION 10.2

From a theoretical perspective, break-even inflation is affected not only by the expected average inflation over the bond's term to maturity, but also by an inflation risk premium, by the relative liquidity spread between nominal and inflation-linked bonds and by seasonal effects:

Break-even inflation = Expected average inflation
± Inflation risk premium
± Relative liquidity spread
± Seasonal effects

Inflation risk premium

The purchasing power of the return on a nominal bond depends on future price developments. If realised inflation turns out to be higher than expected, the real return on the nominal bond will be smaller than originally assumed, and vice versa. Since the owner of a nominal bond is exposed to inflation risk, the nominal interest rate includes an inflation risk premium.

However, uncertainty about future inflation does not necessarily imply that the inflation risk premium is positive. The sign of the risk premium depends on whether inflation tends to fall or rise when the economy deteriorates. This is because investors prefer assets that give a high real return when the economy is weak and other important assets (such as equities) give a modest or negative return.[1]

As a result, the inflation risk premium may even be negative if market participants expect that an economic downturn will typically go hand in

[1] In a consumption-based CAPM model, the risk on nominal bonds can be expressed as the covariance between the real discounting factor and inflation. If inflation is expected to be procyclical, the inflation risk premium may become negative. This gives nominal bonds a high real return when investors appreciate it the most (i.e. when the real discounting factor is high).

SIGN OF THE INFLATION RISK PREMIUM Table 10.2.1

Expected primary reason for economic slowdown	Expected inflation level during slowdown	Inflation risk premium
Negative demand shock	Low	Negative
Negative supply shock	High	Positive

hand with lower inflation. In that case, a nominal bond will provide some insurance against a slowdown, as the purchasing power of the return on the bond is high when investors appreciate this the most.

Whether inflation tends to be high or low during a slowdown depends on the relative strengths and frequencies of the various types of shock that hit the economy. A negative demand shock typically leads to lower inflation, while a negative supply shock (such as an energy crisis) usually increases inflation. Viewed in isolation, a positive inflation risk premium will make it cheaper to issue inflation-linked bonds rather than nominal bonds, and vice versa.

The inflation risk premium may vary, and its sign may change, if market participants over time change their perception of the covariation between inflation and the cyclical position of the economy, cf. Table 10.2.1. Empirical studies find that the inflation risk premium has generally been positive, but that it may have been negative in periods of great uncertainty.[1]

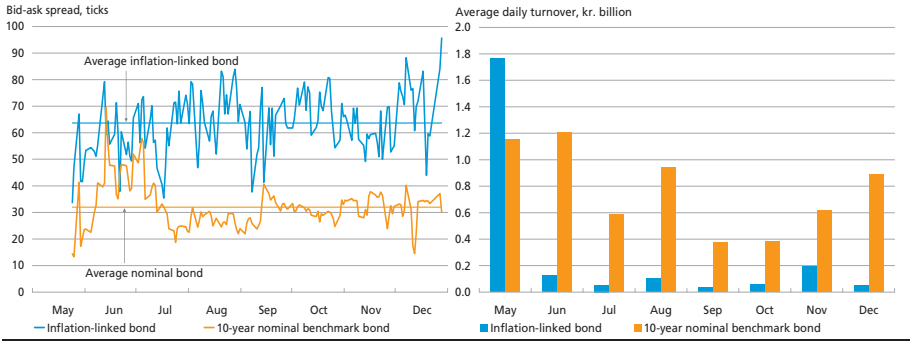
As mentioned in connection with the discussion of the central government's budget risk above, the risk properties of inflation-linked bonds, seen from the government's perspective, also depend on whether inflation is procyclical or countercyclical. In other words, the central government should not necessarily refrain from issuing inflation-linked bonds when the inflation risk premium is negative. This could simply mean that private investors, in periods when inflation is assessed to be procyclical, prefer nominal bonds and that the central government must therefore pay an insurance premium in order to achieve the budget diversification that inflation-linked bonds can provide.

Relative liquidity spread

Investors who risk that external factors make it necessary for them to liquidate their bond portfolios are exposed to liquidity risk. For example, hedge funds had to sell off large parts of their portfolios during the

[1] See e.g. A. Ang, G. Bekaert and M. Wei, *The term structure of real rates and expected inflation*, Journal of Finance, 2008 and J. Christensen, J. Lopez and G. Rudebusch, *Inflation expectations and risk premiums in an arbitrage-free model of nominal and real bond yields*, Journal of Money, Credit and Banking, 2010.

LIQUIDITY INDICATORS FOR INFLATION-LINKED AND NOMINAL BONDS Chart 10.2.1



Note: The 10-year nominal benchmark bond in 2012 is 3 per cent 2021. The bid-ask spreads are based on the primary dealers' price quoting on MTS and defined as the time-weighted spread between the best bid and ask prices. Average daily turnover is based on trades reported to NASDAQ OMX Copenhagen and calculated on the basis of market value. Market making in the inflation-linked bond on MTS took place on a best-effort basis until 1 January 2013.

Source: Nasdaq OMX Copenhagen, MTS and own calculations.

financial crisis when their counterparties tightened their credit policies.[1] If liquidity in the market is low in such periods, investors will achieve lower prices for their assets, thereby incurring a cost.[2] To compensate for this risk, investors demand a positive interest-rate premium, the liquidity spread, when buying the bond.[3]

In practice, inflation-linked bonds tend to be less liquid than nominal bonds. Since its introduction, the government's inflation-linked bond has had a higher bid-ask spread and lower daily turnover than the equivalent 10-year nominal benchmark bond, cf. Chart 10.2.1. The lower liquidity of the inflation-linked bond is attributable to several factors, including a lower outstanding volume and a tendency for owners of inflation-linked bonds, e.g. pension companies, to invest with a view to holding the bonds for longer.

Indicators of current market liquidity give an immediate impression of the relative liquidity of inflation-linked and nominal bonds. But they do not reveal the extent to which this liquidity spread is reflected in prices. The size of the liquidity spread depends on unobservable factors such as expected future market liquidity and the market price of liquidity risk.

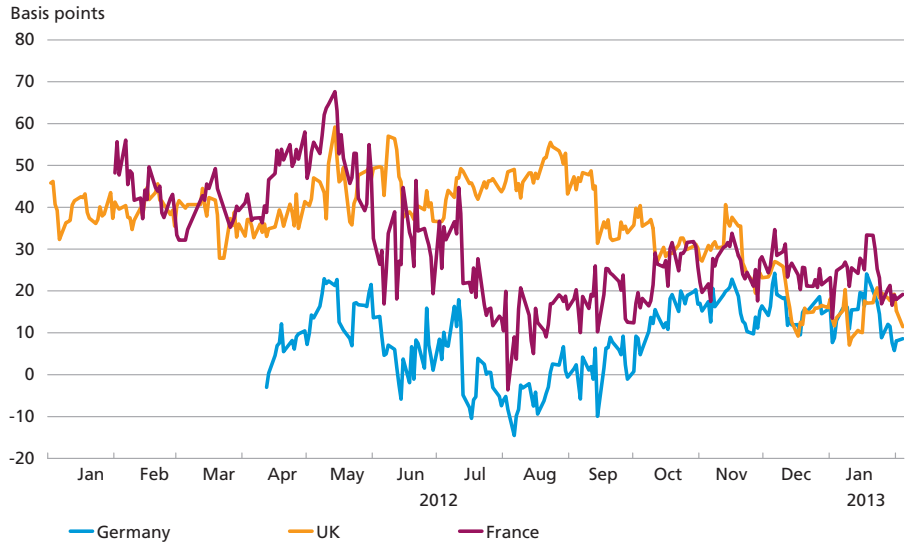
Asset-swap spreads can be used as quantitative indicators of relative liquidity spreads. The asset-swap spread can be interpreted as the inves-

1 See e.g. M. Mitchell and T. Pulvino, *Arbitrage crashes and the speed of capital*, Journal of Financial Economics, 2012.

2 The loss can be estimated by looking at the spread between the sales price and the fundamental value. In the literature, the fundamental value of an asset is typically defined as its mid price (average of bid and ask prices). Hence, a wide bid-ask spread and/or low market depth means that the sales price is considerably below the fundamental value, which entails a value loss for an investor who is forced to liquidate.

3 The liquidity spread can be broken down into compensation for the expected loss (which depends on the probability of a sale and the expected related costs) and compensation for liquidity risk.

RELATIVE LIQUIDITY SPREADS FOR 10-YEAR INFLATION-LINKED BONDS Chart 10.2.2



Note: The chart shows asset-swap spreads for inflation-linked bonds less asset-swap spreads for nominal bonds. The maturities of the two bonds are not identical, but vary by no more than ¾ year. The current revaluation of the principals of the three inflation-linked bonds is limited so the asset-swap spread quoted as "par-par" is relatively accurate. German bonds are DBRi 0.1'23 and DBR 1.75'22. UK bonds are UKTI 1.875'22 and UKT 4'22. French bonds are OAT€i 1,1'22 and OAT 3'22.

Source: Bloomberg.

tor's compensation for the credit and liquidity risk linked to owning a bond.[1] Since credit risk is, as a main rule, comparable for bonds with the same issuer[2], the difference in the asset-swap spreads of inflation-linked and nominal bonds provides an indication of the relative liquidity premium.[3]

At the beginning of 2013, the relative liquidity spread between inflation-linked and nominal bonds was 10-20 basis points for Germany and the UK, while it was higher for French government bonds, cf. Chart 10.2.2. The predominantly positive liquidity spreads indicate that investors typically require a certain degree of compensation for the lower liquidity of the inflation-linked bonds. This contributes to narrowing the

1 An asset swap is an interest-rate swap, where interest payments on the fixed leg of the swap exactly mirror the coupon rate for a given underlying bond. The variable interest rate is the money-market rate plus a spread, the asset-swap spread, which compensates the investor for the liquidity and credit risk associated with holding the underlying bond.

2 However, the credit risk will not be the same for two bonds with the same issuer if the bonds have different durations and the slope of the credit curve is positive. Inflation-linked bonds have more back-loaded cash flows than nominal bonds since payments are to a large extent concentrated towards the maturity date. If the slope of the credit curve is positive, an inflation-linked bond will therefore, all other things being equal, involve greater credit risk.

3 In addition to potential spreads in credit risk for nominal and inflation-linked bonds, two other factors may also affect the asset-swap spread. Firstly, asset-swap spreads are often quoted as "par-par", which entails a price error for the inflation-linked bond as the principal is regularly indexed and therefore exceeds par. Secondly, inflation-linked bonds are not always accepted as collateral in repo transactions. This reduces the value of the asset as a means of financing, which is reflected in a higher real yield.

yield spread between nominal and inflation-linked bonds, i.e. lower break-even inflation. In periods of market stress, the asset-swap spread between inflation-linked and nominal bonds tends to widen notably as investors turn to the most liquid assets.

SEASONAL FLUCTUATIONS IN CONSUMER PRICES — Box 10.1

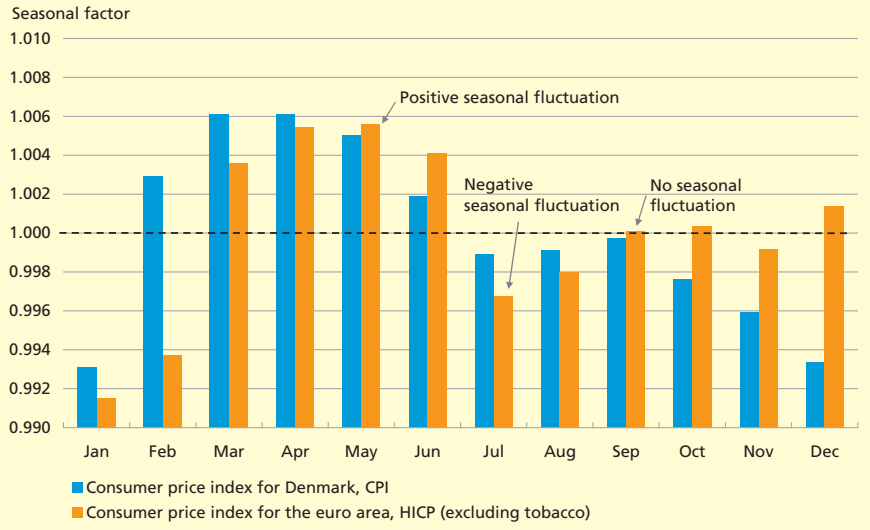
Periodically recurring fluctuations, i.e. seasonal fluctuations, can be identified by breaking down the observed time series into two unobservable factors.[1] The trend factor, *T*, expresses the long-term development in the time series, while the seasonal factor, *SF*, expresses the periodical fluctuation within a single year. In order to estimate these factors it is necessary to make an assumption regarding the relationship between the two unobservable factors. For seasonal fluctuations in consumer prices, a multiplicative form is often assumed, which means that seasonal fluctuations scale the level of the time series:

$$CPI_t = T_t SF_t$$

In this case, the trend factor expresses the seasonally adjusted consumer price index. So when the seasonal factor is higher than 1, the consumer price index is higher than the trend in the relevant month, and vice versa.

Consumer prices in Denmark and the euro area are affected by seasonal fluctuations in most months, cf. Chart A. For example, the Danish consumer price index is, on average, approximately 0.7 per cent below the long-term trend in January, while it is approximately 0.6 per cent higher, on average, in the spring months.

SEASONAL FACTORS FOR DENMARK AND THE EURO AREA — Chart A



Note: Multiplicative seasonal factors calculated using X-12-ARIMA. A seasonal factor of more than 1 means that consumer prices in the month in question are typically above the trend due to seasonal effects. The estimation period is 1995-2012. For the euro area, HICP excluding tobacco has been applied as the consumer price index.
Source: Statistics Denmark, Eurostat and own calculations.

[1] In addition to the trend factors and seasonal factors, other factors may be added for business cycle and irregularity (e.g. strikes). For further information on estimation of seasonal factors, see O. Andersen, *Seasonal Adjustment*, Statistics Denmark, 2002.

SEASONAL ADJUSTMENT OF REAL YIELD — Table 10.2.2

Seasonal factor, SF, on maturity relative to value date	Seasonal adjustment of bond price entails:	Seasonal adjustment of real yield entails:
$SF_{maturity} > SF_{value}$	Lower prices	Higher real yield
$SF_{maturity} < SF_{value}$	Higher prices	Lower real yield

Since the market for inflation swaps indexed to Danish inflation is not as well-developed as that of the euro area, it is not yet possible to calculate a reliable relative liquidity spread for Danish inflation-linked bonds on the basis of an asset-swap spread. But given the very close covariation between break-even inflation calculated on the basis of Danish and German bonds, cf. Chart 10.1.1, it is likely that this spread is also relatively modest in Denmark's case.

Seasonal effects in break-even inflation

Seasonal effects also have an impact on break-even inflation. These effects arise because consumer prices, on the basis of which interest and repayments on inflation-linked bonds are indexed, are affected by periodically recurring fluctuations, known as seasonal fluctuations, cf. Box 10.1.[1] As seasonal fluctuations are, by definition, recurring and hence to some extent predictable, it can be expected that the part of the future returns that is attributable to seasonal fluctuations has been factored into the bond price.

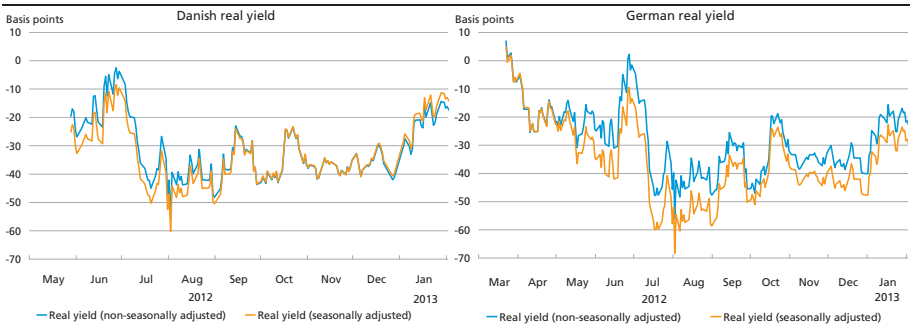
The degree to which seasonal fluctuations affect the value of the bond depends on the relative size of seasonal factors on the maturity and trade dates, cf. Appendix, Box 10.A.1. For example, if the seasonal factor is greater on the maturity date than on the trade's value date, the investor can look forward to an upward adjustment for inflation which exceeds the underlying rate of increase in consumer prices. If this extra upward adjustment due to (deterministic) seasonal fluctuation is, say, 1 per cent of the price index over the term to maturity, the value of the bond will basically also be 1 per cent higher on the trade date.

In connection with seasonal adjustment of real yields, the idea is to calculate the hypothetical real yield on the bond, had it been indexed to a non-seasonally adjusted price index. In the above example, seasonal adjustment entails that the bond price is adjusted 1 per cent downwards, so that the seasonally adjusted real yield becomes higher than the non-adjusted real yield. The effect of seasonal adjustment on the real yield becomes stronger when the term to maturity decreases since the difference in value (1 per cent in this example) is distributed over a shorter period of time, cf. Table 10.2.2.

[1] Inflation-linked bonds are indexed to non-seasonally adjusted consumer price indices. The reason is that seasonal adjustment would introduce an inexpedient model dependency in the calculation of payments on the bond.

OBSERVED AND SEASONALLY ADJUSTED REAL YIELDS FOR DENMARK AND GERMANY

Chart 10.2.3



Note: The Danish inflation-linked bond is DGBi 0.1'23. The German inflation-linked bond is DBRi 0.1'23. Seasonal adjustment for Danish and German real yields has been calculated on the basis of the most recent seasonal factors for the Danish consumer price index and the euro area HICP excluding tobacco, respectively.

Source: Bloomberg, Statistics Denmark, Eurostat and own calculations.

Seasonal adjustment of Danish and German real yields

Since the introduction of the inflation-linked government bond, the seasonal effect on the real yield has been limited, cf. Chart 10.2.3. This is because the seasonal factor corresponding to the bond's maturity date includes only limited seasonal fluctuation and that the term to maturity is long.[1] Even though the reference index at maturity includes only limited seasonal fluctuation, there will be fluctuations over the year. Thus, the observed real yield was approximately 6 basis points higher than the seasonally adjusted real yield in June and July. There is some model uncertainty linked to estimates of seasonal factors and hence to the size of the calculated seasonal adjustment.

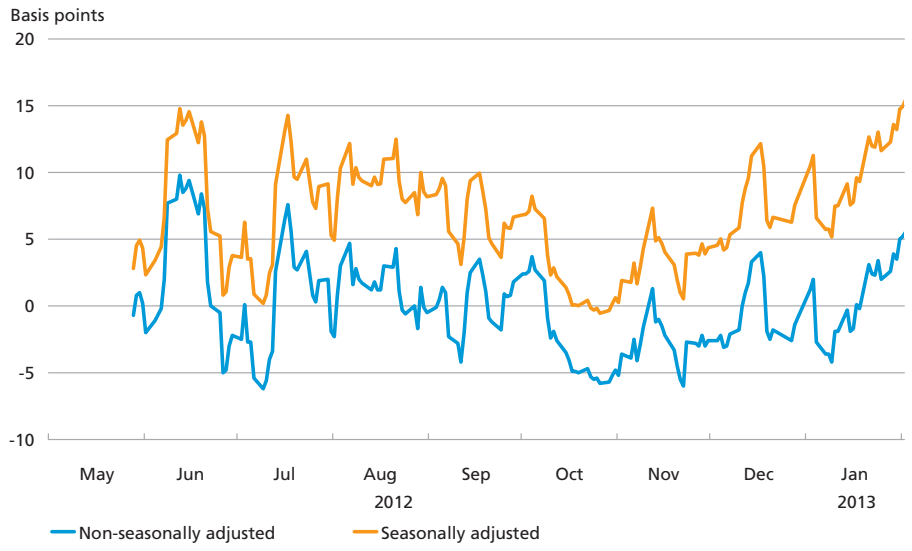
Unlike in Denmark's case, the seasonal effect on the 10-year German real yield is systematically positive. The reason is that the reference index for the bond's maturity date, 15 April 2023, is close to the average of HICP for January and February, which are the months in which the seasonal factors are lowest, cf. Box 10.1. This has a negative impact on the value of the bond, leading to "too high" observed real yields. Except on a few trading days, the seasonal effect is therefore always positive for the German real yield. The seasonal effect is greatest on 1 August (approximately 13 basis points), when the reference index is determined by consumer prices for May, which is the month with the highest HICP seasonal factor.

When comparing real yields and break-even inflation across issuers, it is important to take seasonal effects into account. When the yields on

[1] The reference index for 15 November (almost) corresponds to the average for CPI in August and September, when Danish consumer prices are typically close to the trend and seasonal fluctuation is therefore limited, cf. Box 10.1. It should be noted that the seasonal effect is zero when the seasonal factor for the value date is equal to the seasonal factor for the maturity date. This is the case e.g. if the value date is the same date and month as the maturity date.

OBSERVED AND SEASONALLY ADJUSTED REAL YIELD SPREADS TO GERMANY

Chart 10.2.4



Note: The Danish inflation-linked bond is DGBi 0.1'23. The German inflation-linked bond is DBRi 0.1'23. Seasonal adjustment for Danish and German real yields has been calculated on the basis of the most recent seasonal factors for the Danish consumer price index and the euro area HICP excluding tobacco, respectively.
Source: Bloomberg, Statistics Denmark, Eurostat and own calculations.

the Danish and German inflation-linked bonds are compared, seasonal effects entail that the observed (i.e. non-seasonally adjusted) yield spread is systematically smaller than the seasonally adjusted yield spread, cf. Chart 10.2.4. Assuming constant seasonal factors, this pattern will become still more pronounced as the term to maturity decreases.

IMPLICATIONS FOR ISSUANCE POLICY 10.3

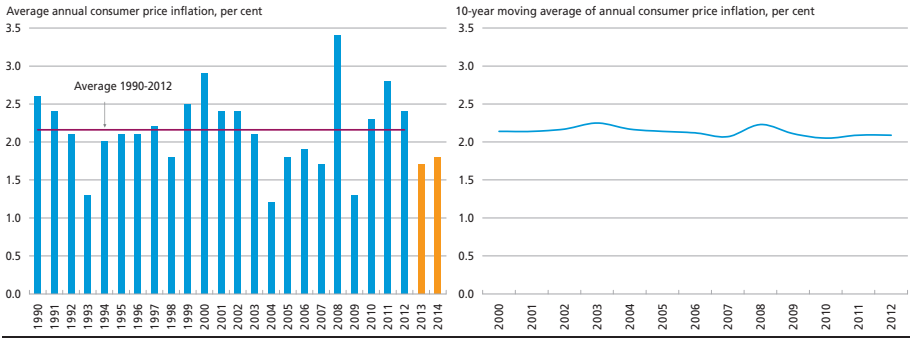
Historical and future price developments

As stated above, forward-looking assessments of the cost efficiency of issuing inflation-linked bonds must be based on the observed break-even inflation compared with other forecasts or scenarios of future inflation.

At present, break-even inflation is just under 2 per cent, which is slightly below the average historical level of inflation in Denmark, cf. Chart 10.3.1. Among other things, this could indicate that inflation in the coming years is expected to be below the historical level due to weak underlying inflationary pressures in the Danish economy. The same picture with low break-even inflation is also seen in other countries.

If the observed break-even inflation deviates significantly from other indicators of future inflation, this could reflect the factors outlined in this chapter. The implications for issuance policy depend on the factors

AVERAGE ANNUAL INFLATION IN DANISH CONSUMER PRICES Chart 10.3.1



Note: Annual observations. Inflation for 2013 and 2014 is based on the forecast in *Monetary Review, 4th Quarter 2012*, Danmarks Nationalbank.
Source: Statistics Denmark, Danmarks Nationalbank and own calculations.

assessed to lie behind the deviation. While the inflation risk premium is difficult to measure empirically, quantitative indicators can be constructed for liquidity spreads and seasonal effects.

A low observed level of break-even inflation could e.g. reflect a high relative liquidity spread due to a lower volume of outstanding inflation-linked bonds. In that case, further build-up of the outstanding volume could potentially reduce the liquidity spread. If, on the other hand, a wide liquidity spread reflects a period of pronounced stress in the financial markets, in which investors typically prefer nominal bonds, the central government may choose to meet this extraordinary demand by temporarily overweighting nominal issuance.

If deviations between break-even inflation and other indicators are attributable to seasonal effects, this basically does not have any implications for issuance policy. The reason is that such effects are to be expected and reflect characteristics of the payments on the bond.

Inflation-linked issuance will continue in 2013

Since the introduction of the inflation-linked government bond in May 2012, it has been priced at a level matching the inflation-linked German bond with a comparable maturity. Adjusted for differences in seasonal effects and maturity, this means that the inflation-linked Danish bond has traded at a real-yield spread which is marginally above the yield spread for the nominal 10-year benchmark government bond. This is assessed to be an acceptable liquidity premium in view of the fact that this is a new product among the on-the-run issues and that the outstanding volume is still modest. The central government will therefore continue to build up the outstanding volume in the inflation-linked bond in 2013.

APPENDIX: SEASONAL ADJUSTMENT OF REAL YIELD

SEASONAL ADJUSTMENT OF REAL YIELD Box 10.A.1

The impact of seasonal effects on the real yield on an inflation-linked bond can be illustrated by a stylised example. Without discounting, the value of an inflation-linked bond with a nominal principal of 1 and a coupon rate of 0 per cent would be determined by the expected revaluation of the principal from the value date (time *t*) until maturity:[1]

$$P_t = \frac{E\left[R_{maturity}\right]}{R_t},$$

where the reference index for a given date, R_t, is calculated by linear interpolation between the consumer price index (CPI) two and three months earlier:[2]

$$R_t = CPI_{m-2} + \frac{t-1}{D_m}\left(CPI_{m-2} - CPI_{m-3}\right) \quad (1)$$

As described in Box 10.1, the consumer price index can be broken down into a trend factor and a seasonal factor. Hence, the reference index can also be broken down into these two components. In the following, T_t and S_t refer to the *lagged* values of the trend factor and seasonal factor, respectively, calculated using the formula in (1). For example, the relevant seasonal factor for the value date 1 April will be given by the seasonal factor for January ($S_{1\ April}$=0.991).

If the seasonal pattern is assumed deterministically, i.e. $S_{maturity}$ and S_t are known, then the observed non-seasonally adjusted market price of the inflation-linked bond can be written as:

$$P_t^{non-seasonally\ adjusted} = \frac{E\left[R_{maturity}\right]}{R_t} = \frac{E\left[T_{maturity}\right]}{T_t}\frac{S_{maturity}}{S_t}$$

This entails that

$$P_t^{seasonally\ adjusted} = \frac{S_t}{S_{maturity}} P_t^{non-seasonally\ adjusted}$$

The seasonally adjusted yield, r_t, can then be calculated as follows:

$$r_t^{seasonally\ adjusted} = -\frac{1}{m}\ln\left(P_t^{seasonally\ adjusted}\right),$$

where *m* denotes the bond's term to maturity in years. The seasonally adjusted yield is equal to the non-seasonally adjusted yield plus a premium, which may be either positive or negative depending on the time of the year:

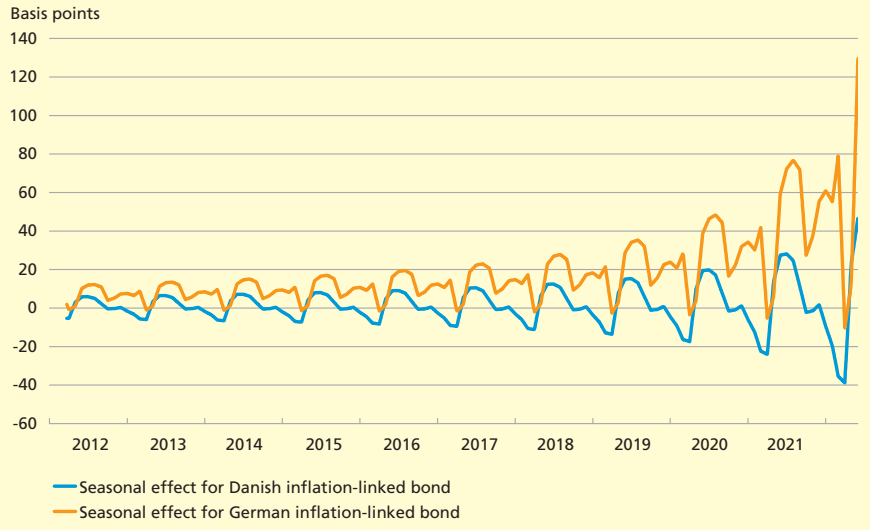
$$r_t^{seasonally\ adjusted} = r_t^{non-seasonally\ adjusted} + \frac{1}{m}\left(\ln S_{maturity} - \ln S_t\right)$$

SEASONAL ADJUSTMENT OF REAL YIELD — Box 10.A.1

When the seasonal factor is greater at maturity than on the value date ($S_{maturity} > S_t$), the observed bond price increases, resulting in a lower observed real yield. So in this case seasonal adjustment leads to a lower bond value and a higher real yield. It is also seen that the seasonal effect on the real yield increases when the bond's term to maturity measured in years, *m*, decreases.

Chart A shows that while the seasonal effect for the real yield on the Danish inflation-linked bond fluctuates around 0, the observed German 2023 real yield is systematically "too high". As the bonds' maturity is reduced, seasonal effects will have a substantial impact on the observed yield spread between the two bonds.

SEASONAL EFFECTS FOR REAL YIELDS ON DANISH AND GERMAN INFLATION-LINKED BONDS — Chart A



Note: Based on the most recent seasonal factors for Danish CPI and euro area HICP (excluding tobacco), respectively. The inflation-linked bonds are DGBi 0.1'23 and DBRi 0.1'23. Estimations until 1 June 2022. A positive value indicates that the observed non-seasonally adjusted real yield is higher than the seasonally adjusted real yield.

Source: Statistics Denmark, Eurostat and own calculations.

Source: P. Canty, *Seasonally adjusted prices for inflation-linked bonds*, Risk, 2009, and J. Ejsing, J.-A. Gárcia and T. Werner, *The Term Structure of Euro Area Break-even Inflation Rates: the Impact of Seasonality*, ECB working paper series No. 830, November 2007.

[1] The example operates with clean market prices, which have been adjusted for known indexation (R_t / R_{base}). As a result, revaluation takes place relative to the value date, not the base year.

[2] For a more detailed description of the index coefficient and reference index, see *Danish Government Borrowing and Debt 2011*, Chapter 10.

CHAPTER 11

Sovereign Credit Default Swaps

After the onset of the debt crisis, government yields have fallen in Denmark and other European countries with high credit ratings. At the same time, the CDS spreads of those countries have widened for periods at a time, indicating higher credit risk. It seems that the wide CDS spreads are difficult to reconcile with low interest rates, and it is therefore likely that the sovereign's credit risk has been priced differently in the markets for government bonds and CDS contracts, respectively. To provide a better understanding of what may drive a widening of the CDS spread, this special-topic chapter gives a thorough introduction to the market for CDS contracts. Against this backdrop, the most important factors behind the widening of the CDS spreads for Denmark and other creditworthy sovereigns are identified. In addition to the risk of a credit event, the CDS spread is also affected by factors such as risk premia, deliverable obligation restrictions, absence of natural issuers, regulatory initiatives, CDS as proxy hedging and credit risk speculation. The chapter concludes with a review of the theoretical arbitrage opportunity resulting from wide CDS spreads and low interest rates.

INTRODUCTION TO CREDIT DEFAULT SWAPS 11.1

As an introduction to credit default swaps, CDSs, the following sections focus on the answers to four key questions; i) what is a CDS? ii) when does a CDS become payable? iii) how is the size of the payment determined? and iv) how are CDS contracts used?

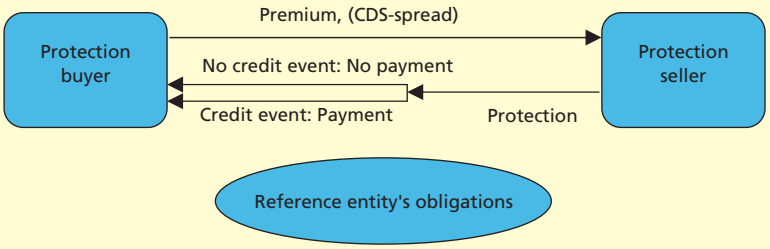
A CDS provides protection against credit risk

A CDS is a product within the asset class of credit derivatives and can be seen as an agreement between two parties to trade the credit risk on the obligations of a third party. The third party is called the *reference entity* and may be a sovereign or a corporation. To be protected against credit risk, the *protection buyer* pays a premium to the *protection seller* until a *credit event* occurs or the contract expires, cf. Box 11.1.

The premium, the CDS spread, is stated as a per-annum percentage of the notional value of the contract[1] (e.g. 100 basis points of 10 million dol-

[1] Notional value indicates the notional principal of a derivative on the basis of which the current payments are calculated.

PAYMENTS IN A CDS CONTRACT Box 11.1



Source: C. Weistroffer, *Credit Default Swaps*, Deutsche Bank Research, 2009.

lars) and is typically divided into quarterly payments[1]. The protection seller only pays compensation to the protection buyer if a predefined credit event occurs within the contract period.

Credit events trigger CDS payment

A key contract element concerns the definition of the credit events that will trigger payment from a CDS. In this connection, a set of rules prepared by the International Swaps and Derivatives Association[2], ISDA, is used, which defines six types of credit events. If the CDS contract has a Western European sovereign as reference entity, only three of the six possible credit events are applied (*failure to pay, repudiation/moratorium and restructuring*). Appendices, Box 11.A.1 provides a more detailed explanation of credit events.

Whether an event can be defined as a credit event is determined by the Credit Derivatives Determinations Committee under the ISDA. The Committee's determination is binding on all CDS contracts referring to the ISDA amendments of 2009, which is the case for the vast majority of outstanding contracts.[3] Greece's debt restructuring in the spring of 2012, cf. Box 11.2, is an example of one of the Committee's determinations.

The CDS contract also defines the set of obligations of the sovereign entity that may potentially trigger a credit event. When the reference entity is a Western European sovereign, the broadest possible definition is applied (*borrowed money*), which includes all issued bonds and loans.

1 In practical terms, the CDS spread is expressed as a round figure (e.g. 100 basis points) in the contract and combined with an up-front payment, if any.

2 The ISDA has more than 800 members, all with links to the over the counter market for derivatives, e.g. banks, investment firms, insurance companies, sovereigns, etc.

3 In 2009, the ISDA introduced two amendments (the "*Big Bang Protocol*" and the "*Small Bang Protocol*") to the guidelines of 2003, *ISDA Credit Derivatives Definitions 2003*. Two of the most significant changes to the existing rules included the establishment of a determinations committee and systematic use of central auctions in connection with credit events.

GREEK DEBT RESTRUCTURING AND CDS PAYOUT Box 11.2

In connection with its debt restructuring in the spring of 2012, Greece made use of retrospectively inserted *collective action clauses*, CACs. This enabled the Greek government to amend, by qualified majority, the bond terms, including a write-down of the principal, for all outstanding sovereign bonds issued under Greek law, as a sufficient number of investors had accepted this.[1] As a result, the ISDA declared the restructuring a credit event on 9 March 2012. The determining factor in this decision was that the amended bond terms would lead to lower future payments, and that the amendment was binding on all bondholders.[2]

On 19 March, an auction was held for Greek government bonds that had been subject to restructuring through CACs. The auction price reached 21.5 euro per 100 euro nominal value, corresponding to a recovery rate of 21.5 per cent. Protection buyers were consequently paid 78.5 per cent of the notional value of the CDS contract. Market participants described the auction price as providing a true and fair view of the bondholders' losses, which was supported by Fitch's estimation of a present value loss of 70-75 per cent.[3]

The net volume of outstanding CDS contracts on Greece amounted to 3.2 billion dollars at the time of the auction, resulting in protection buyers being paid 2.5 billion dollars at a recovery rate of 21.5 per cent as compensation for loss of principal.

[1] For an in-depth description of the Greek debt restructuring, see Write-down of Greek debt and new EU/IMF loan programme, *Monetary Review, Part 1, 1st Quarter 2012,* Danmarks Nationalbank.

[2] The credit event is characterised as restructuring in accordance with section 4.7 (a) of ISDA 2003 Credit Derivatives Definitions (as amended).

[3] See Greece: Debt dynamics post private sector involvement, Fitch Ratings, 2012.

Loss given default determined by auction

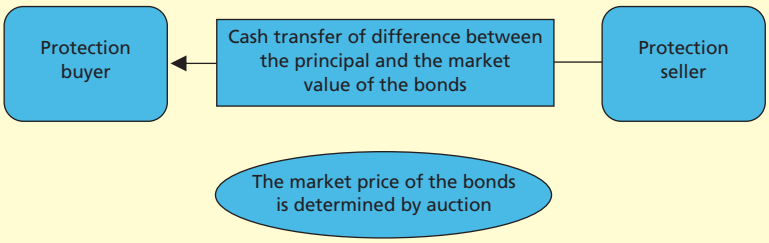
When it has been determined that a credit event has occurred, the protection seller must pay compensation to the protection buyer. The compensation amount is determined as the difference between the principal of the bonds and their market value at the time of the credit event (loss given default), cf. Box 11.3.

The market value is determined by an auction for bonds submitted held by the ISDA.[1] Auction bids are binding and physically executed, thus contributing to a true and fair auction price.[2] The type of bonds to be used for settlement purposes may be subject to restrictions, however, which may impact the payout from a CDS contract, cf. Box 11.4.

[1] Previously, physical settlement was primarily used, which implies that the protection buyer delivers bonds to the protection seller. In return for the bonds, the protection buyer receives the principal value of the bonds in the form of cash. Thus, the net effect does not differ from cash settlement. A drawback of physical settlement is that the bond price may be pushed up if the volume of outstanding CDS contracts is high compared to the volume of deliverable obligations, which may actually undermine the value of the CDS contract.

[2] However, studies in the literature indicate that this is not necessarily the best method, see e.g. S. Du and H. Zhu, *Are CDS auctions biased?, Working Paper,* Simon Fraser University and MIT, 2012.

CASH SETTLEMENT IN CONNECTION WITH A CREDIT EVENT Box 11.3



Hedging and speculation

A CDS enables investors to trade in one specific risk element (credit risk) and may therefore, in principle, lead to improved credit risk allocation for the financial system as a whole. Investors may trade in CDS contracts for many purposes, but one way to tell them apart is to determine whether hedging credit risk is the primary objective of the trade or not.

A simple example of hedging is an investor with a portfolio of government bonds who buys protection via a CDS to hedge the risk of future losses on the bonds. If the sovereign is downgraded by a credit rating agency, the value of the bonds will typically decline, while the value of the CDS contract increases due to a wider CDS spread.

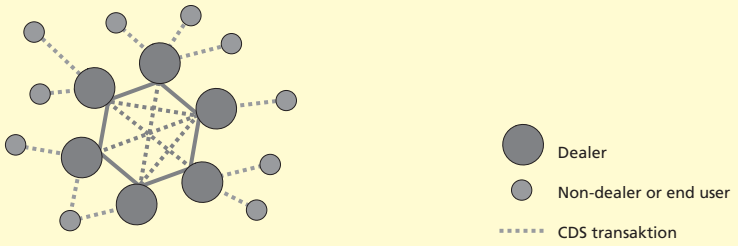
However, the investor need not have direct exposure to the reference entity in order for a CDS position to be seen as hedging. For example, an investor with credit exposure to a government-owned company on which no CDS contracts are traded may choose to buy a CDS contract on the government to (proxy) hedge its credit risk.

DELIVERABLE OBLIGATIONS AND CONTRACT SETTLEMENT Box 11.4

In a CDS contract, a distinction is made between obligations that can trigger a credit event and deliverable obligations that can be used for settlement of the contract. When the reference entity is a Western European sovereign state, obligations that can trigger a credit event have the broadest possible definition (*borrowed money*), which e.g. includes all issued bonds and loans. On the other hand, a narrower definition is typically used for obligations that can be used for settlement purposes. The reason is that these obligations must meet predetermined deliverable obligation characteristics. For example, it is standard that deliverable obligations must be denominated in a specified currency[1] and have a remaining term to maturity of maximum 30 years. Such restrictions may impact the loss given default of a potential auction and thus the value of a CDS contract.

[1] The "specified currency" requirement means that the bond must be denominated in either dollars, euro, pound sterling, Swiss franc, Canadian dollars or yen.

CDS DEALER MARKET Box 11.5



Source: C. Weistroffer, *Credit Default Swaps*, Deutsche Bank Research, 2009.

In recent years, CDS contracts have increasingly been used as pure trading instruments where the transaction is not motivated by hedging. For example, a short or long position in a CDS can be used to take advantage of relative price differences on credit risk in relation to an overall index or the bond market. Furthermore, it is possible to speculate directly in the development in the creditworthiness of a reference entity. In this connection, an investor will typically enter into an opposite contract if the CDS spread develops as desired. Therefore, a CDS need not become payable in order for a speculative position to be profitable.

THE CDS MARKET 11.2

Clearly a dealer market

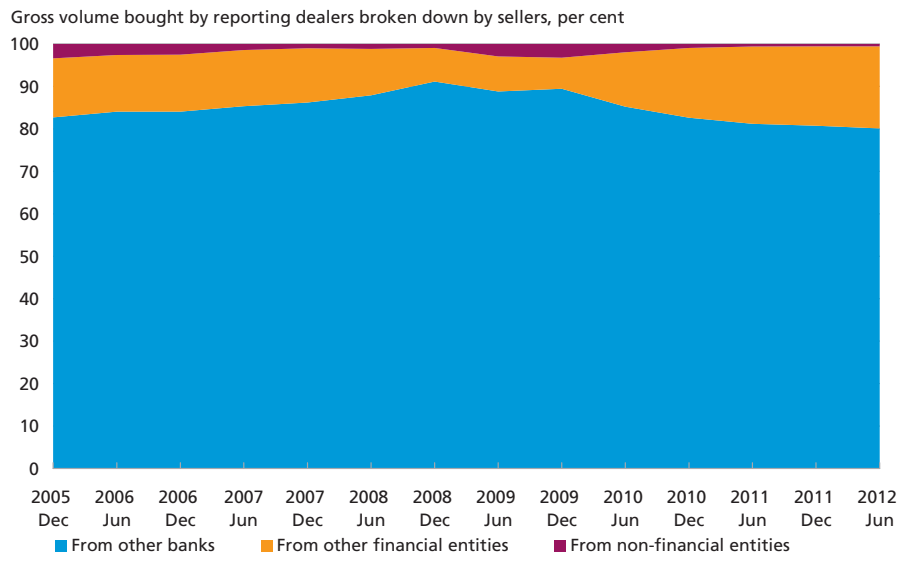
As is the case with other derivatives, CDS contracts are primarily traded over the counter among a group of dealers. The dealers act as market makers and make a profit from offering liquidity by being available as counterparties when a market player wishes to trade. As dealers want to minimise their net exposure, they typically neutralise a transaction by subsequently entering into a new, opposite transaction with another dealer.[1] As a result, one end user's hedging requirement often leads to a number of other transactions in the dealer network, cf. Box 11.5.

An indication of the large volume of inter-dealer trading is that 80 per cent of the contracts entered into are traded among the dealers themselves, cf. Chart 11.2.1.[2] While the dealers primarily try to maintain a balanced portfolio, hedge funds have, in recent years, been net buyers

1 As one result of the extensive hedging practiced by dealers, the net outstanding amount constitutes only around 10 per cent of the gross outstanding amount.

2 In 2008 and 2009, the five largest dealers were counterparties in 88 per cent and 95 per cent, respectively, of all transactions among 29 of the largest banks, see *Global Credit Derivatives Survey 2010*, Fitch Ratings, 2010. In 2009, the five largest banks were JP Morgan, Goldman Sachs, Bank of America, Morgan Stanley and Barclays. The Fitch survey for 2011 does not contain comparable data on volume concentration among the top-5 players.

REPORTING BANKS' CDS PURCHASES Chart 11.2.1



Note: Based on all contracts (single-name and multi-name) concluded by BIS reporting dealers. *Other banks*: BIS reporting and non-BIS reporting banks. *Other financial entities:* insurance companies, hedge funds, CCPs, SPVs and other financial entities. *Non-financial entities:* corporations, sovereigns and others.
Source: BIS and own calculations.

of CDS contracts, whereas pension and insurance companies, investment firms, SPVs and non-financial corporations have been net sellers.

Substantial market volume growth

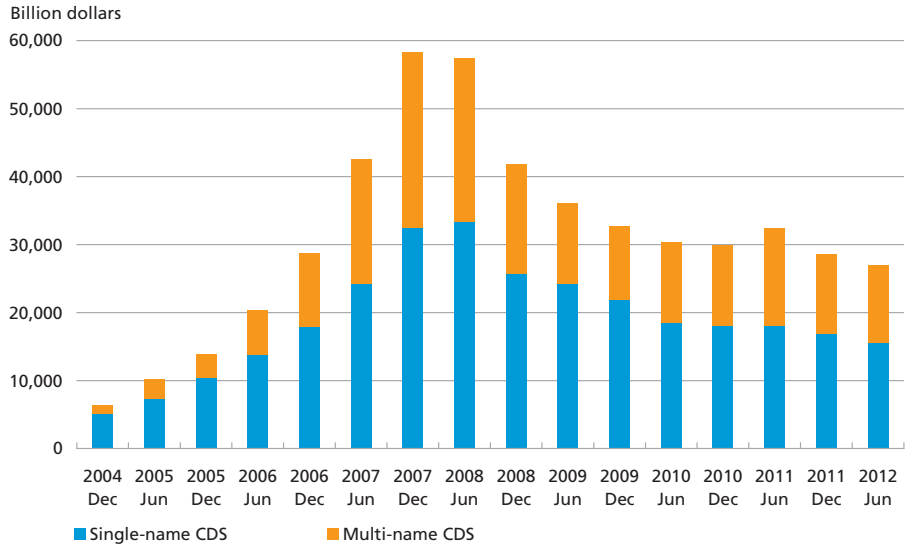
The CDS market has seen substantial growth over the last 10 years, cf. Chart 11.2.2. In the years up to the financial crisis, the volume of outstanding CDS contracts grew almost exponentially, and in mid-2008, the outstanding amount totalled just under 60,000 billion dollars, corresponding to a tenfold increase in just four years.[1] However, the high market growth should be viewed in the light of the fact that a recently concluded contract often leads to a number of hedging transactions.

At the same time, the market composition has shifted. In the early years, the market consisted primarily of CDS contracts written on a single reference entity (e.g. a sovereign or a corporation), but now, CDS contracts written on several reference entities (usually an index) make up around 40 per cent of the total market.[2]

[1] In comparison, the global gross domestic product (current prices) was at around the same level as the volume of gross outstanding CDS contracts in 2008. Compared to the total derivatives market, which is dominated by interest-rate derivatives, the CDS market constituted approximately 5 per in 2012.

[2] The outstanding volume of index contracts on Western European sovereigns in particular has been substantially reduced in 2012 due to the new short-selling regulation, under which a CDS on a sovereign can only be purchased for hedging purposes, cf. the discussion below. Since index contracts have several underlying reference entities (e.g. 15 Western European sovereigns), the buyer of the contract must be able to document exposure to all the reference entities included in the index. See e.g. *SovX grinds to a halt*, International Financing Review, 6 July 2012.

GROSS AMOUNT OUTSTANDING IN CDS Chart 11.2.2



Note: As the majority of CDS contracts are traded over the counter, the market size is estimated on the basis of information from national central banks receiving input from market participants. BIS publishes data in a semi-annual report, *OTC derivatives market activity*.
Source: BIS.

The decrease in the outstanding volume since mid-2008 is attributable to several factors. After the onset of the financial crisis, increased risk aversion and limited access to risk capital naturally dampened the supply of credit derivatives in particular.[1] However, the main reason for the lower outstanding volume was extensive trade compression, cf. the following section.

Systemic risk and trade compression

A CDS contract involves counterparty risk, and when the volume of outstanding contracts grows substantially, the market may potentially constitute a systemic risk. The counterparty risk is that the protection buyer suffers a loss if the protection seller is unable to meet its obligations in case of a credit event.[2] As the CDS market dealers act as both buyers and sellers of protection, a single dealer's inability to pay compensation for CDS contracts issued may lead to losses for many other banks and thus potentially jeopardise systemic stability.[3] This was exactly what was feared

1 The gross outstanding amount on Lehman Brothers was approximately 400 billion dollars in the autumn of 2008, so the settlement of the contracts can only partially explain the decrease in the gross amount outstanding.

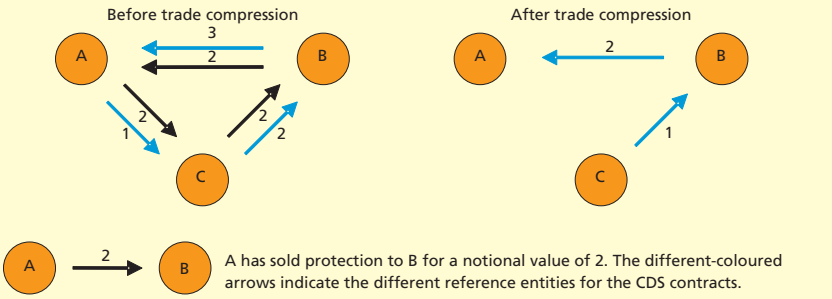
2 The pledging of collateral, however, ensures the buyer of insurance part of the pre-arranged compensation, but since a credit event is typically sudden, the collateral pledged will not necessarily reflect the compensation amount in full (often referred to as jump-to-default).

3 It is important to emphasise that the default of an issuer of CDS contracts does not necessarily result in losses for other banks. What threatens financial stability is the combination of the simultaneous defaults of the reference entity and a large issuer.

TRADE COMPRESSION Box 11.6

To minimise net exposure, a transaction concluded is subsequently neutralised by concluding a new, opposite transaction. When a dealer enters into two opposite contracts, both contracts will be associated with counterparty risk, even though the net exposure is 0. If other dealers have acted in a similar way, it is possible to reduce the counterparty risk by eliminating excess contracts without this changing the dealers' net exposure. Motivated by the financial crisis and the collapse of Lehman Brothers, extensive compression of outstanding contracts, trade compression, took place in 2008 in particular, but also in the following years. TriOptima, Markit og Creditex, all market infrastructure specialists, were in charge of the trade compression.

EXAMPLE OF TRADE COMPRESSION



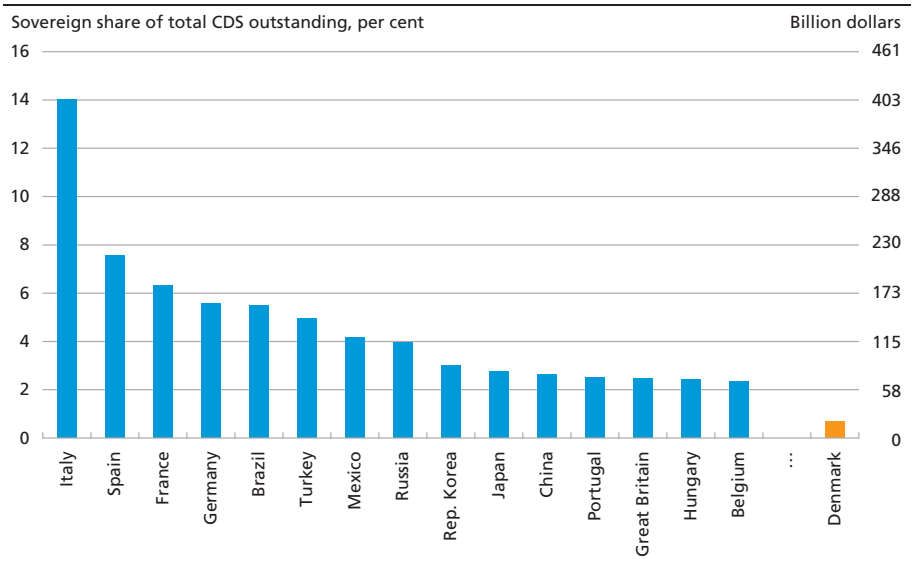
Source: N. Vause, *Counterparty risk and contract volumes in the credit default swap market*, BIS Quarterly Review, 2010.

by the market after the collapse of Lehman Brothers in the autumn of 2008 when especially CDS contracts issued by AIG were in focus.

Measures to reduce counterparty risk have therefore been taken, including increased use of central counterparties, greater trade transparency and a higher degree of standardisation of contract terms.[1] In addition, extensive trade compression has reduced unnecessary counterparty risk. This is done by cancelling excess contracts without changing the market players' net exposure, cf. Box 11.6. Especially 2008 saw extensive trade compression where outstanding contracts totalling up to 30,000 billion dollars were cancelled. Accordingly, the drop in the gross amount outstanding in the autumn of 2008 should be seen in this perspective. Adjusted for trade compression, the gross amount outstanding would have shown moderate growth in 2008 and 2009 rather than a drop.

[1] For a more detailed review of counterparty risk and regulatory measures, see *Credit default swaps and counterparty risk*, ECB, 2009.

GROSS OUTSTANDING CDS CONTRACTS ON SOVEREIGNS Chart 11.2.3



Note: Depository Trust & Clearing Corporation, DTCC, publishes data on a weekly basis and at reference entity level. DTCC does not necessarily use the same sources as BIS, meaning that the total outstanding amounts in statements from BIS and DTCC, respectively are not necessarily identical. The above data are from 25 January 2013.
Source: DTCC and own calculations.

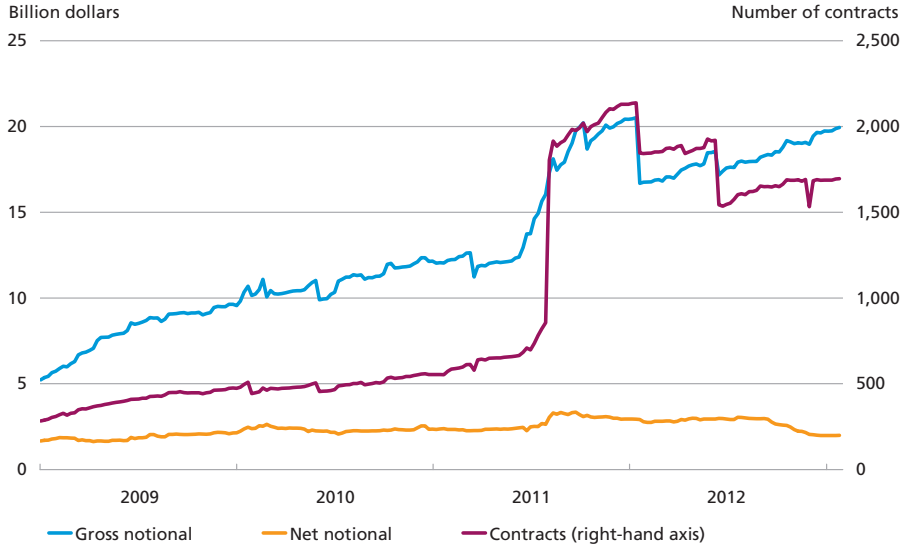
Outstanding CDS contracts on sovereigns

Of the total CDS market, contracts with a single sovereign as reference entity constitute around 12 per cent, dominated by contracts written on euro area member states and developing economies, cf. Chart 11.2.3. Contracts written on Italy and Spain account for around one fifth of the total gross outstanding contracts on sovereigns. The gross outstanding CDS contracts on Denmark are limited to 19 billion dollars, corresponding to just under 1 per cent of the total gross outstanding contracts on sovereigns, or around 15 per cent of outstanding in Danish government bonds.[1]

Taking a closer look at Denmark, there has clearly been substantial growth in the gross amount outstanding and the number of contracts in recent years, cf. Chart 11.2.4. Notably, the number of contracts more than doubled over a couple of weeks in August 2011. However, since the new contracts had a lower notional value than the existing contracts, the effect on the total outstanding amount was more moderate.

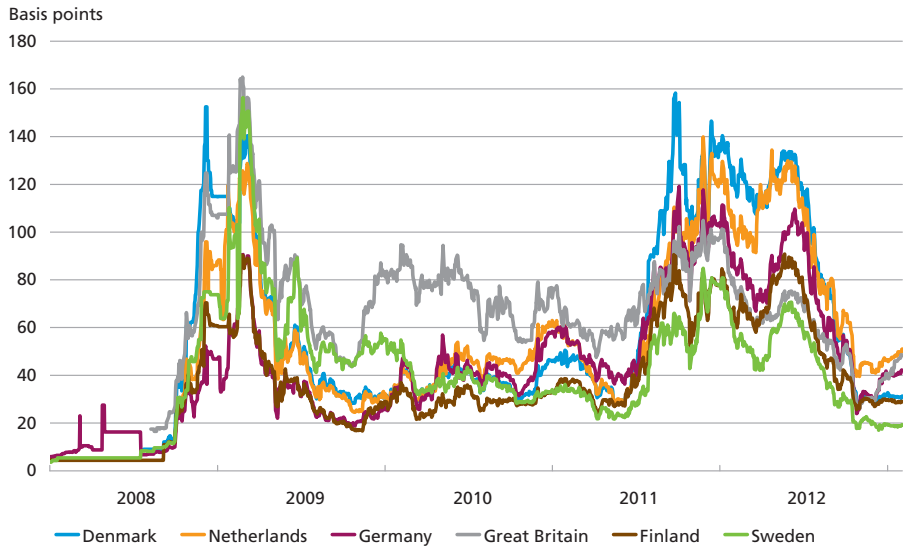
[1] Based on quarterly statements from DTCC in the period from the 1st quarter of 2009 to the 3rd quarter of 2012, the average daily trading volume of CDS contracts on Denmark can be estimated at around 60 million dollars, corresponding to 5-10 per cent of the estimated daily turnover in Danish government securities. The CDS trading figures are uncertain as DTCC reports trading volume at wide intervals. In addition to new transactions, the figures also reflect the transfer of a contract to a third party and cancellation of existing contracts. The estimated trading volume of Danish government bonds is based on reports to Nasdaq OMX.

CDS VOLUME AND NUMBER OF CONTRACTS ON DENMARK — Chart 11.2.4



Note: The net outstanding for a specific reference entity is defined as the sum of protection bought across all net buyers (similar to protection sold across net sellers). The net outstanding reflects e.g. the total notional amount to be settled between market agents under a credit event.
Source: DTCC.

5-YEAR CDS SPREADS FOR SELECTED EUROPEAN AAA COUNTRIES — Chart 11.2.5



Note: Data for Denmark, Great Britain and the Netherlands available from 23 July 2008, 8 August 2008 and 5 September 2008, respectively.
Source: Bloomberg.

Historical CDS spreads for selected AAA countries

In recent years, the CDS spread for Denmark and other European AAA countries widened considerably for periods at a time, cf. Chart 11.2.5. The CDS spread widened the most when market uncertainty was most pronounced. After the collapse of Lehman Brothers in the autumn of 2008, the CDS spread was periodically 150-160 basis points for Denmark, Sweden and the UK, while the widening was more subdued for three euro area member states: the Netherlands, Germany and Finland. The same pattern applied in the autumn of 2011 when the European debt crisis flared up. The widening of the Danish CDS spread in the autumn of 2011 coincided with a substantial increase in the gross amount outstanding, cf. Chart 11.2.4. The spreads narrowed in the second half of 2012, partly due to short-selling regulation, cf. below.

DANISH GOVERNMENT YIELD AND CDS SPREAD 11.3

The periodically wide Danish CDS spread reflects higher credit risk on exposures to the Danish government. At the same time, Danish government yields have decreased considerably. Therefore, it is interesting to look into the development of the credit spread for the Danish government yields relative to the CDS spread.

Credit in Danish government yield and CDS spread

The yield to maturity on a government bond reflects the compensation received by an investor for binding capital in the asset. Such compensation is a function of the risk-free interest rate[1] and an interest-rate spread compensating for credit and liquidity risk. If an expression of the risk-free interest rate is deducted from the government yield, the residual is a measure of the sum of the credit and liquidity spreads.[2]

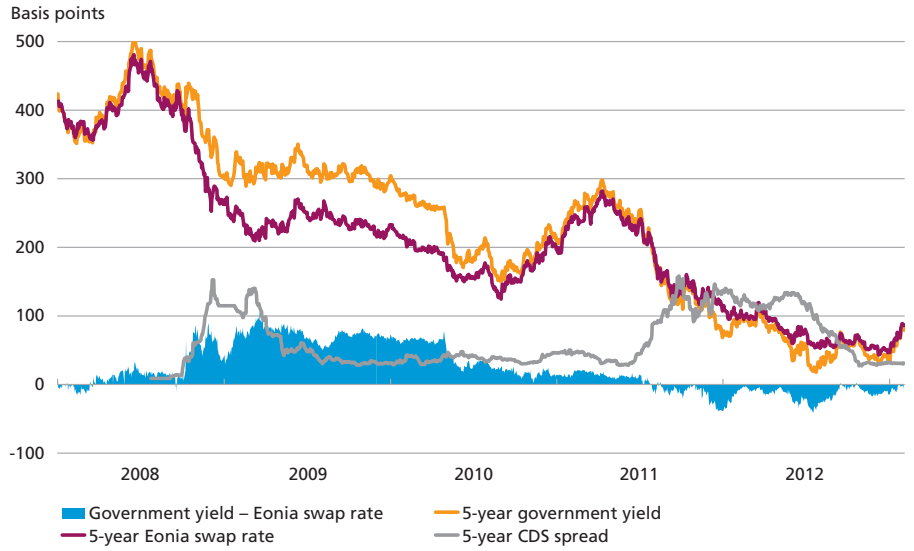
Government yield - risk-free interest rate = credit spread + liquidity spread

Since mid-2010, the Danish government yield has been very close to the level of the risk-free interest rate, cf. Chart 11.3.1. This implies that the total compensation for credit and liquidity risk in the Danish govern-

[1] The primary characteristic of the risk-free interest rate in a given currency is that it reflects the return on a claim free of credit risk. In practice, no issuer is free of credit risk, however, and the concept is therefore basically theoretical. EONIA swap rates are often used in practice, and here the credit element is deemed to be very small.

[2] The credit spread reflects the expected loss (which depends on the combination of the probability of default and the expected loss in that connection) and a credit risk premium (which depends on the correlation between the returns on the bond and the market portfolio). The liquidity spread reflects the expected loss (which depends on the combination of the probability of a sale and the expected cost thereof) and a liquidity risk premium. For a further discussion, see Decomposing government yield spreads into credit and liquidity elements, *Monetary Review, 1st Quarter 2013,* Danmarks Nationalbank (forthcoming).

DANISH GOVERNMENT YIELD AND CDS SPREAD Chart 11.3.1



Note: Data on CDS spread for Denmark available from 23 July 2008. The government yield is a 5-year par yield.
Source: Bloomberg and own calculations.

ment bond market is close to zero. At the same time, the Danish CDS spread has been wide, periodically exceeding the Danish government yield as well as the risk-free interest rate, which indicates a significant credit risk on exposures to the Danish government.

The apparent inconsistency in the pricing of credit risk between the two markets can be explained from two perspectives.

- Firstly, the yield on safe assets such as Danish government bonds has been pushed to very low levels during periods of great uncertainty. The reason is that investors have been willing to pay a premium for liquid assets which can most certainly be sold at a price corresponding to the fundamental value.[1] Hence, a possible interpretation of the low government yield is that the liquidity premium has been negative, or that Danish government bonds, like e.g. US government bonds, have a positive convenience yield.[2]
- Secondly, the CDS spread is also affected by factors not directly related to credit risk. This may result in a wider CDS spread than warranted by the underlying credit risk. These factors and their impact on the Danish CDS spread are examined in the following section.

1 See e.g. A. Fontana and M. Scheicher, *An analysis of Euro area sovereign CDS and their relation with government bonds*, ECB Working Paper No. 1271, 2010.
2 See e.g. P. Feldhütter and D. Lando, *Decomposing swap spreads*, Journal of Financial Economics, 2008.

WHAT DETERMINES THE CDS SPREAD? 11.4

Components of the CDS spread

When a CDS is entered into, the size of the effective CDS spread is determined so that the market value of the swap is zero. This means that the size of the premium payments must equal the present value of the loss that the issuer can expect to incur. The present value of the expected loss depends on the probability of a credit event, the expected loss given default and a risk premium. In addition, the CDS spread may be affected by supply and demand factors.

CDS spreads are determined by:
- Probability of a credit event
- Loss given default
- Risk premium
- Supply and demand factors

Knowledge of these factors is necessary to understand the development in CDS spreads. The factors are described in the following section with the focus on a Danish context.

Probability of a credit event: Sovereigns and banking sector risk

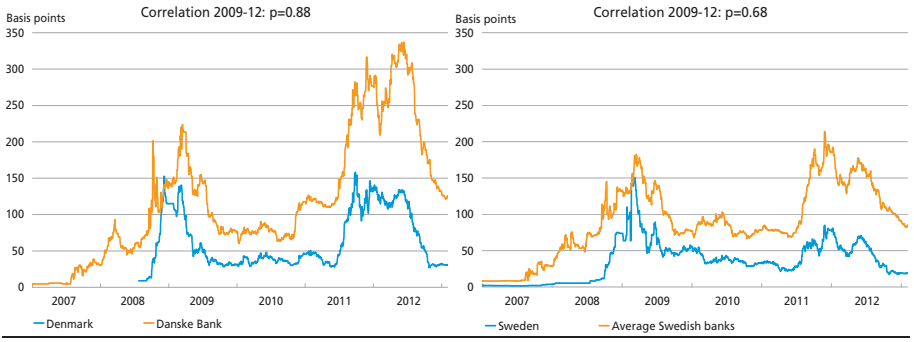
Denmark has the highest possible credit rating, and so the probability of a credit event should be very small. However, the boundary between credit risk for the banking sector and sovereign issuers has become increasingly fluid in recent years, as Denmark and many other countries have recapitalised the banking sector and issued government guarantees.[1] Sovereign issuers' substantial exposure to credit risk on banks has led to closer covariation between the credit risk of sovereign issuers and banks.[2] This has been seen in a large number of countries, including Denmark and Sweden, the CDS spreads of which have had a high positive correlation with the CDS spreads for the countries' largest banks since the end of 2008, cf. Chart 11.4.1.[3]

The exposure to the banking sector may therefore have led some market players, e.g. hedge funds, to revise their subjective credit event probability estimates. This is not immediately reflected in the government bond market, which may be due to the fact that investors such as hedge funds play a relatively larger role in the CDS market than in the sover-

1 For an overview of guarantees and capitalisation of banks, *see Financial-sector support by high-grade sovereigns – an update*, Fitch Ratings, 2009.
2 See e.g. J.W. Ejsing and W. Lemke, *The Janus-headed salvation: Sovereign and bank credit risk premia during 2008-2009*, Economic Letters, 2009.
3 A similar pattern applies to other Western European countries, see e.g. *Global financial stability report*, p. 144, IMF, 2009.

5-YEAR CDS SPREAD ON THE GOVERNMENT AND BANKS IN DENMARK AND SWEDEN

Chart 11.4.1



Note: An unweighted average of CDS spreads for SEB, Swedbank, Handelsbanken and Nordea is used as an expression for the Swedish banks taken as one. It should be noted that CDS contracts on the banks are denominated in euro, while CDS contracts on the Danish and Swedish governments are denominated in dollars. This means that expectations of exchange-rate developments also impact the relative CDS spreads between sovereigns and banks.

Source: Bloomberg.

eign debt market. One of the reasons is that the CDS market provides for pure exposure to credit risk with a limited amount of tied-up capital, which increases the scope for leverage, cf. subsequent sections.

Loss given default: Settlement with only foreign bonds

Bonds to be used for settlement of a CDS contract must meet certain predetermined requirements, cf. Box 11.4. This means that it would only be possible to use Danish government bonds denominated in euro or dollars in potential settlement of CDS contracts written on the Danish government.

If the bonds denominated in foreign currency are worth less than government bonds issued in kroner, the loss given default from the CDS contract would be higher compared to a hypothetical situation in which government bonds denominated in kroner are used for settlement, and vice versa. Due to lower liquidity, the price of Danish government bonds issued in foreign currency would be lower under normal market conditions than the price of comparable government bonds issued in kroner.[1] However, this correlation may not apply during a credit event, since bonds issued under international law may possibly provide better protection for investors than bonds issued under domestic law.

In addition, the protection buyer has a cheapest-to-deliver option in connection with settlement of CDS contracts. Due to uniform pricing, the final auction price for each maturity segment will tend to reflect the

[1] For example, the yield to maturity on the Danish government's euro loans maturing in 2016 has been 30 basis points higher, on average, than the yield on a synthetic government bond in Danish kroner with the same time to maturity.

value of the bond with the lowest value. This results in a higher loss given default and a more valuable CDS contract. The protection seller will consequently demand a higher CDS spread.

It may therefore be problematic to compare the credit spread for government bonds denominated in Danish kroner with a CDS spread that is affected by the expected value of the sovereign's foreign loans during a credit event.

Risk premium: Credit events occur in economic downturns

Of the two parties to a CDS, the protection seller is subject to the greatest uncertainty as the future payments can vary from zero to the total notional value of the contract.[1] At the same time, it should be taken into account that if a sovereign with a high credit rating experiences a credit event, this will most likely occur at a time when the general economy is very weak. A payment will therefore be of substantial value to the protection buyer and will, conversely, be inconvenient for the protection seller, according to CAPM logic.

As a consequence, the protection seller must be compensated for risk in connection with the size of future payments and the fact that the latter will fall at a time when the seller least wants it. For the contract to have a value of zero when entered into, the premium payments (CDS spread) must be higher than immediately warranted by the actual risk of bankruptcy.[2]

Supply conditions: Absence of natural CDS sellers

To ensure a natural market balance, it is important that there is a group of natural issuers. Before the financial crisis, some insurance companies such as AIG were active as net sellers. The companies regarded CDS contracts as a new market where profits could be made by assuming a risk premium like conventional insurance products (e.g. contents insurance).[3] The collapse of Lehman Brothers and more restrictive regulation dampened this activity, and at the end of 2011, insurance companies acted as protection sellers in less than 1 per cent of the reporting BIS dealers' transactions.[4]

---

1 Counterparty risk may also affect the CDS spread. Both parties to a CDS have a counterparty risk, but this is higher for the protection buyer. All other things being equal, this will lead to a lower CDS spread. All or most of the counterparty risk can be eliminated by continuous collateralisation and/or clearing through a CCP.

2 Moody's has attempted to estimate the risk premium in connection with CDSs, see *Modelling methodology: CDS-implied EDF™ credit measures and fair-value spreads*, Moody's Analytics, 2010.

3 However, a major difference in relation to traditional insurance markets is that since the credit risk between reference entities is closely correlated, it may be difficult to create a well-diversified credit portfolio.

4 See *OTC derivatives statistics at end-June 2012*, BIS, 2012. BIS did not get access to detailed counterparty data from all reporting dealers until 2010, this service only being offered by a selection of dealers in the period prior to 2010. Consequently, it was not possible to make a direct comparison of counterparty shares in the two periods. As an alternative, reference is made to the annual Fitch Credit Derivatives Survey, see *Global Credit Derivatives Survey*, Fitch Ratings, 2009 and 2010.

The absence of natural issuers means that demand shocks may have a strong impact on the market price. The appetite for issuing CDS contracts may even be cyclical, reducing supply in step with growing market uncertainty. In periods of increasing risk aversion, demand for hedging is typically particularly high, in turn leading to rapidly widening CDS spreads.

Demand conditions: Proxy hedging of credit risk

The high level of covariation between CDS spreads for sovereigns indicates that the development in the spreads is driven by a few common underlying factors, cf. Chart 11.2.5. This potentially paves the way for proxy hedging of risk exposure to a given reference entity by buying protection on an alternative reference entity.

Investors exposed to the economically most vulnerable sovereigns in Europe, where the CDS spreads have periodically widened substantially, may therefore have chosen to enter into CDS contracts on other European sovereigns with narrower CDS spreads. Similarly, investors exposed to systemically important banks may have hedged their credit risk by concluding a CDS on the home country of the bank.[1]

Proxy hedging strategies may consequently have contributed to a wider CDS spread on Denmark in periods of growing uncertainty when the need for hedging is most pronounced.

Demand conditions: Speculation with limited tied-up capital

An investor speculating in rising credit risk may choose to go short on a bond. But in addition to credit risk exposure, the investor will also be exposed to unwanted interest-rate risk and potentially to foreign-exchange risk. If the bond is borrowed in the repo market, this also requires that the investor grants the counterparty a loan, which requires capital. By going long on a CDS instead, the investor will be subject to pure credit exposure, which requires limited capital only. A CDS is therefore a more attractive instrument for this purpose, which increases the investors' willingness to pay and ultimately widens the CDS spread.

Demand conditions: Regulation

Regulatory initiatives may affect demand for CDS both ways. The CRD IV proposal will impose higher capital requirements on investors in connection with derivative transactions.[2] As an alternative to setting aside capital, investors can buy CDS contracts on the counterparty. Hedging by means of CDS contracts is preferred if the CDS spread is lower than the

[1] See e.g. S. Becker, *EMU sovereign spread widening*, Deutsche Bank, 2009.

[2] The proposal includes a regulation and a directive. The latter is CRD IV, short for Capital Requirement Directive IV. Due to several delays in the process, the legislation is expected to come into force in 2014.

price of setting aside the necessary capital. The original plan was for sovereigns to be covered by the proposal, which undoubtedly induced investors to start hedging counterparty risk in 2011. Sovereigns were exempted in the subsequent draft, including out of fear of a "CVA-CDS loop", where CDS spreads on sovereigns widen unnaturally, as the capital requirement in itself is an increasing function of the CDS spread.[1]

On the other hand, the EU short-selling regulation implemented on 1 November 2012, has reduced demand for CDS contracts on sovereigns and thus also narrowed the CDS spread.[2] Under this regulation, investors are only allowed to create a long position in a CDS on a sovereign if the contract is used to hedge risk on exposure to government bonds from the issuer in question or other assets the value of which is dependent on government bonds from the issuer in question.[3]

DO WIDE CDS SPREADS CONSTITUTE ARBITRAGE OPPORTUNITIES? 11.5

If the sovereign's credit risk is not consistently priced across two markets, this will generally enable a risk-free gain. This section takes a closer look at the theoretical arbitrage opportunity resulting from wide CDS spreads and low government yields and at the restrictions in terms of exploiting the opportunity in practice.

Theoretical arbitrage opportunity

The term basis is often used to determine whether there is consistency between CDS spreads and the credit spread of a bond:

$$\text{Basis} = \text{CDS spread} - \text{bond credit spread}$$

The asset swap spread can be used as an expression of the unobservable credit spread. In an asset swap the fixed coupon payments are swapped for a floating interest rate with a premium, the asset swap spread, which compensates for the liquidity and credit risks involved in owning the bond. Under a number of conditions, it can be demonstrated that the basis should theoretically be around zero, cf. Appendices, Box 11.A.2.

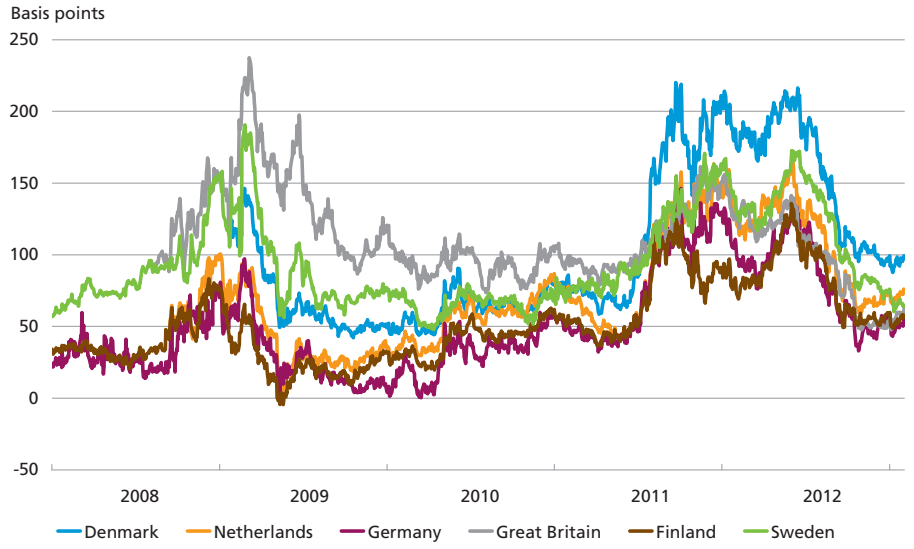
Hence, it is remarkable that the basis for Denmark and other European AAA countries has been positive in recent years, cf. Chart 11.5.1. The

[1] On 1 March 2012, the European Commission presented a revised edition of CRD IV in which derivative trades with sovereigns as counterparties are not comprised by the capital requirement.

[2] See e.g. Liquidity falls as "naked" CDS ban approaches, International Financing Review, 25 October 2012.

[3] The price of the government bond and the price of the asset/liability must have a Pearson correlation coefficient of minimum 70 per cent. Besides, it is always permitted to buy CDS contracts on sovereigns to hedge a risk on regional, local or municipal entities in the same country and/or entities owned by or having a government guarantee from the country in question. Primary dealers and market makers may be exempted from the ban.

BASIS FOR SELECTED EUROPEAN AAA COUNTRIES Chart 11.5.1



Note: The basis is defined as a 5-year CDS spread less the asset swap spread of a 5-year government bond. However, a 5-year swap rate is used for Germany and Great Britain in order to derive the credit element for the government yield.
Source: Bloomberg and own calculations.

basis has been particularly high during periods of great uncertainty, with a high negative correlation between government yields and CDS spreads as previously stated.

Utilisation of a positive basis

A positive basis implies that the CDS spread is theoretically too wide relative to the credit spread on a bond. The price difference can be utilised by creating a portfolio the return on which equals the basis. This can be done by selling an asset swap package while at the same time issuing a CDS, cf. Appendices, Box 11.A.2. During the term of the contract, the investor receives a net term payment that equals the basis, but which is also fully hedged against credit events. If it had been possible to implement such a strategy for Denmark free of charge at the end of 2011, the investor would have achieved an annual risk-free gain of just over 2 per cent of the notional value, cf. Chart 11.5.1.

In practice, however, the theoretical arbitrage opportunity is limited by three factors. All the factors either reduce the economic gain or increase the risk incurred by utilising the positive basis.

Uncertainty related to going short on government bonds

In order to go short on a government bond, the investor must be able to borrow the bond in the market, typically via the repo market.[1] By entering into a reverse repo, the buyer gets the right of disposal of a bond against granting the seller a loan. At a specified future time, the two transactions are reversed, the seller receiving the bond while at the same time repaying the loan to the buyer plus interest, i.e. the repo rate.

However, an investor trying to utilise a positive basis is only interested in borrowing government bonds that best match the maturity of the CDS contract, which is typically five years. It is therefore necessary to enter into a special repo transaction where the asset is specifically defined, which is not the case in a standard repo transaction. Stricter requirements regarding the nature of the asset in a special repo transaction increase the risk that it will not be possible to roll the government bond loan over a 5-year period.[2]

If a credit event occurs during a period when the investor has been unable to borrow the bond in the repo market, this will result in a significant loss. The reason is that the CDS issued will become payable without this being offset by the gain from having gone short on a bond.

A short position in government bonds may therefore be both costly and risky to maintain over a 5-year period.

Exchange rate risk

CDS contracts on sovereigns are often denominated in dollars, while the majority of government bonds are settled in local currency. This creates exposure to exchange rate fluctuations.

Investors who have tried to utilise a positive basis are generally hedged if a credit event occurs. The gain from going short on a bond that is now worth less compensates for payment to the protection buyer in the CDS contract. If the local currency depreciates against the dollar, which is to be expected during a credit event, the figures will not tally, however. The reason is that the cost of the CDS payment in dollars will exceed the gain from having gone short on the bond that is settled in local currency.

---

1 In addition to repo transactions between banks, the governments in Denmark and many other countries act as lenders of last resort, having introduced securities lending schemes. Only primary dealers in Danish government bonds have access to the scheme against payment of 0.2 per cent p.a. of the value of the borrowed bonds.

2 The maturity of a repo may be as long as two years, but it is typically much shorter. In addition to the risk associated with rolling a short position, the buyer in a special repo also receives a lower interest rate on its lending compared with a standard repo, which can be interpreted as an opportunity cost for the investor.

The exchange rate risk can be partially hedged by a currency swap and a currency option, but as the rate of dividend is not known in advance it is not possible to hedge the risk completely.[1]

Raising capital is difficult when market uncertainty is most pronounced

Arbitrage opportunities may exist over a prolonged period if investors' access to conducting transactions that may eliminate the arbitrage opportunity is restricted.

In over the counter markets, including the CDS market, transactions are usually made via dealers who match buyers and sellers in their capacity as market makers. During periods of great uncertainty in the market, access to risk capital may be limited, in turn hampering the dealers' ability to offer liquidity to market players. Lower market liquidity results in wider bid-ask spreads and lower market depth, reducing or completely diluting the potential profit from an arbitrage strategy. To evade the higher price of liquidity reflected in the dealers' bid-ask spreads, investors may choose to identify the final counterparty themselves, which involves search costs.

Slow-moving capital may therefore result in arbitrage opportunities, e.g. a significantly positive basis, for prolonged periods of time.[2] For example, this was the case in the period following the collapse of Lehman Brothers.

CONCLUSION 11.6

A CDS enables trading in credit risk and may, in principle, lead to improved credit risk allocation for the financial system as a whole. Trading is dominated by a few large dealers and the market has seen strong growth over the last 10 years. In recent years, outstanding contracts on Denmark have increased considerably while the CDS spread has widened substantially over periods of time.

The combination of a wide CDS spread and historically low government yields can be explained from two perspectives. Firstly, the government yields for Denmark and other countries with high credit ratings were very low during periods of pronounced market uncertainty, which can be interpreted as a negative liquidity premium (or convenience yield).

[1] A currency swap ensures the dollar value of the current asset swap spread. The currency swap must be terminated if a credit event occurs, which may involve a cost. An American-style currency option can be used for hedging purposes in connection with the payment of compensation during a credit event. However, the notional value of the option cannot be determined ex ante as it is dependent on the recovery rate that will not be known until after a potential credit event. In addition to this uncertainty, the acquisition of an option involves an initial cost.

[2] See e.g. D. Duffie, *Presidential address: Asset price dynamics with slow-moving capital*, Journal of Finance, 2010.

Secondly, the CDS spread is affected by factors other than pure credit risk. The most important factors include risk premia, deliverable obligation restrictions, absence of natural issuers, regulatory initiatives, CDS as proxy hedging and credit risk speculation. Due to those factors, the CDS spread may be wider than warranted by the underlying credit risk.

While a wide CDS spread and a government yield close to the risk-free interest rate theoretically enables a risk-free gain, the arbitrage opportunity is reduced, in practice, by exchange rate risk, uncertainty related to going short on government bonds and limited access to capital during periods of pronounced market uncertainty.

Finally, it should be noted that the periodically widened CDS spread did not impact the central government's borrowing costs as the government yields were historically low in the same period.

APPENDICES: DEFINITION OF CREDIT EVENTS AND RELATIONSHIP BETWEEN ASSET SWAP SPREAD AND CDS SPREAD

DEFINITION OF CREDIT EVENTS — Box 11.A.1

Credit derivatives, including credit default swaps, are mainly traded over the counter. To avoid having to renegotiate contract terms every time a new contract is entered into, reference is made to a mutually accepted market standard (master agreement) defined by the ISDA. As part of this framework agreement, a set of guidelines define all important contract elements, *ISDA Credit Derivatives Definitions* (typically the 2003 version as amended). Article 4 of the guidelines sets out the definition of a credit event and, overall, six types are defined. As regards CDS contracts on Western European sovereigns, only *failure to pay, repudiation/moratorium* and *restructuring* are used.

1. Bankruptcy. Covers situations such as insolvency and winding up of the reference entity. As sovereigns are not subject to bankruptcy legislation in the same way as e.g. corporations, this type of credit event is not relevant for sovereigns.
2. Failure to pay. Covers failure to make payments of principal or interest. In general, a minimum amount of USD 1 million must be exceeded before this event is triggered.
3. Obligation acceleration. Covers a reference entity's payments being accelerated by reason of e.g. the reference entity's bankruptcy or breach of covenants.
4. Obligation default. Covers the reference entity defaulting on technical obligations included in the contract. Corporate bonds may include covenants that limit the issuer's room for manoeuvre (e.g. a cap on dividend payments).
5. Repudiation/moratorium. Covers a reference entity repudiating or declaring a moratorium over its debts. To be characterised as a credit event, the repudiation/moratorium must take place in connection with a failure to pay (item 2) or restructuring of the debt (item 6). No minimum amount is required for failure to pay (item 2) or restructuring (item 6).
6. Restructuring. Covers change of the terms for the reference entity's obligations. Overall, this can be done in five ways: reducing interest payments or principal, postponing payments, changing the priority of the bond (e.g. to junior status) and changing the payment currency to a non-specified currency.

Source: *The 2003 ISDA Credit Derivatives Definitions*, Mayer Brown, 2008 and *Sovereign state restructurings and credit default swaps*, Allen & Overy, 2011.

RELATIONSHIP BETWEEN ASSET SWAP SPREAD AND CDS SPREAD — Box 11.A.2

An asset swap is an interest-rate swap where the fixed leg exactly mirrors the coupon payment from a bond. Thus, the fixed leg is not necessarily identical with the interest rate in a plain vanilla interest-rate swap. To achieve a present value of zero for the swap on conclusion, it is necessary to add a spread to the floating interest rate, i.e. the asset swap spread, which compensates for the liquidity and credit risk of holding the bond.

Combining the asset swap with the underlying bond results in an asset swap package. Under a number of assumptions[1], it is illustrated below that the sale of an asset swap package has the same risk profile as buying protection via a CDS contract. This is illustrated by an investor who sells an asset swap package having to pay the asset swap spread (*ASW*) in all periods until maturity ($t=T$) or until the time of a credit event ($t=\tau$). If a credit event occurs, the investor obtains a gain equal to the loss of value of the bond ($1-\delta$).

Assets with identical risk profiles should have the same price in the absence of arbitrage. When the CDS spread exceeds the asset swap spread, the investor can lock a risk-free gain by issuing a CDS contract and selling an asset swap package. In this way, the investor will receive the basis (the CDS spread less the asset swap spread, *CDS-ASW*) in all periods until expiry ($t=T$), or until a credit event, if any, occurs ($t=\tau$). The investor is fully hedged in a credit event, and the net payment is zero.

The relationship between the CDS spread and the asset swap spread reflects the relative pricing of credit risk in the two markets. If the basis is positive, the compensation for credit risk is higher in the CDS market relative to the bond market, and vice versa.

Payments without a credit event		*t=0*	*t=1*	…	*t=T*
Asset swap package	Go short on a bond	1	-C	…	-(1+C)
	Asset swap (receive fixed leg)	0	C-(CIBOR+ASW)	…	C-(CIBOR+ASW)
	Lending in money market	-1	CIBOR	…	1+CIBOR
	Net payments, asset-swap-package	0	-ASW	…	-ASW
CDS	Issued CDS	0	CDS	…	CDS
Total	*Net payments, total*	0	CDS-ASW	…	CDS-ASW

Payments if credit event occurs		*t=0*	*t=1*	…	*t=τ*	*t=T*
Asset swap-package	Go short on a bond	1	-C	…	-δ	0
	Asset-swap (receive fixed leg)	0	C-(CIBOR+ASW)	…	0	0
	Lending in money market	-1	CIBOR	…	1	0
	Net payments, asset swap package	0	-ASW	…	1- δ	0
CDS	Issue CDS	0	CDS	…	-(1- δ)	0
Total	*Net payments, total*	0	CDS-ASW	…	0	0

Source: D. Lando, *Credit Risk Modeling*, 2004, J. D. Wit, Exploring the CDS-bond basis, *Working paper research No. 104*, Banque Nationale de Belgique/Nationale Bank van België, 2006 and The 10-year yield spread between Denmark and Germany, *Monetary Review, 1st Quarter 2005*, Danmarks Nationalbank.

[1] The calculation is based on the following assumptions: initially ($t=0$) the bond is traded at par value 1 with a fixed coupon payment (C) and with the principal maturing on expiry ($t=T$). If a credit event occurs ($t=\tau$), the market value of the bond is δ. A credit event occurs immediately after a settlement date, to avoid outstanding coupon payments or interest payments on the money-market loan. During a credit event, the loan is prematurely redeemed, and the asset swap is terminated free of charge (e.g. via an opt-out clause). The investor may, free of charge, go short on the bond throughout the lifetime of the CDS contract. Payments from the asset swap package and the CDS contract are not subject to any exchange-rate risk, and money-market lending is without credit risk.

Appendices

Main Principles of Government Debt Management

The management of the government debt, as well as related tasks, is carried out by Government Debt Management at Danmarks Nationalbank on behalf of the Ministry of Finance. The Minister of Finance holds the overall and political responsibility for central-government borrowing and debt, including relations with the Folketing (Parliament).

OBJECTIVES A.1

The overall objective of the government debt policy is to cover the central-government financing requirement at the lowest possible long-term borrowing costs, while taking the degree of risk into account. Furthermore, the aim is to facilitate the central government's access to the financial markets in the longer term and to support a well-functioning domestic financial market. The objectives of Denmark's government debt policy are in accordance with international standards.[1]

The market turmoil in recent years has emphasised the importance of ensuring government access to the capital markets. This is mainly achieved via a transparent and flexible issuance policy and continuous presence in the financial markets. Government Debt Management at Danmarks Nationalbank focuses on maintaining a low refinancing risk by meeting the financing requirement well in advance, ensuring a large investor base and holding substantial liquidity reserves.

STRUCTURE OF GOVERNMENT DEBT MANAGEMENT A.2

The Minister of Finance is authorised by law to raise government loans, cf. Box A.1, and has the overall and political responsibility for central-government borrowing and debt, including relations with the Folketing (Parliament).

In most countries, the government debt is managed by the Ministry of Finance or a designated government debt management office. In Denmark, these tasks are undertaken by Government Debt Management at

[1] Guidelines for Public Debt Management:
http://treasury.worldbank.org/bdm/pdf/PDM_Guidelines_2001_english.pdf.

ACT ON THE AUTHORITY TO RAISE LOANS ON BEHALF OF THE CENTRAL GOVERNMENT Box A.1

Under the Danish Constitution, debt can be issued by the central government on a statutory basis only. The statutory basis for central-government borrowing is set out in the *Act on the authority to raise loans on behalf of the central governrment*[1], which authorises the Minister of Finance to raise loans on behalf of the central government for a maximum of kr. 2,000 billion. This amount is the upper limit for domestic and foreign gross debt. In connection with current debt management, the Minister of Finance is moreover authorised to enter into swap agreements and other financial transactions. The central government's costs of borrowing, i.e. interest costs and capital losses on issues and buy-backs, must be appropriated under the annual finance acts.

[1] Act no. 1079 of 22/12/1993 as amended, www.governmentdebt.dk.

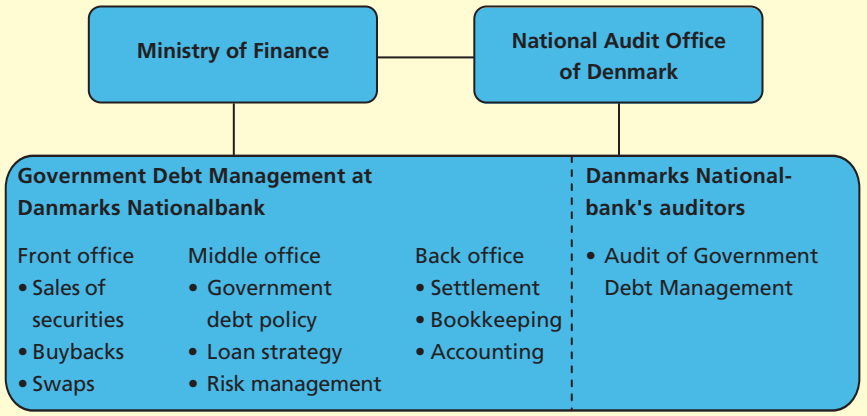
Danmarks Nationalbank on behalf of the Ministry of Finance. Tasks and organisation correspond to those of government debt management offices in other countries. The distribution of responsibilities is specified in the *Agreement on the division of work in the area of government debt between Danmarks Nationalbank and the Ministry of Finance*.[1]

Besides managing central-government borrowing and debt, Government Debt Management administers re-lending and government guarantees and the assets of the three government funds: the Social Pension Fund, SPF, the Advanced Technology Foundation and the Fund for Better Working Environment and Labour Retention. The framework for management of the assets of SPF is laid down in the *Regulations governing the management of the Social Pension Fund*.[2] Tasks in relation to the management of the assets of the Advanced Technology Foundation and the Fund for Better Working Environment and Labour Retention are laid down in separate agreements.

The internal structure of Government Debt Management reflects international standards and recommendations. Government Debt Management is divided into front, middle and back offices, cf. Box A.2. Separation of functions and clear procedures reduce operational risks and ensure a clear distribution of responsibilities. This facilitates internal control. The placement of the tasks at Danmarks Nationalbank makes it easier to monitor interaction between government debt policy, monetary policy and financial stability. This is consistent with the IMF's recommendations (Stockholm principles).[3]

[1] The agreement is available at www.governmentdebt.dk.
[2] *Regulations governing the management of the Social Pension Fund* are available at www.governmentdebt.dk.
[3] Guiding Principles for Managing Sovereign Risk and High Levels of Public Debt, http://www.imf.org/external/np/mcm/Stockholm/principles.htm.

STRUCTURE OF GOVERNMENT DEBT MANAGEMENT Box A.2



The middle office formulates the government debt policy and prepares proposals for borrowing strategies and risk management. The middle office also lays down guidelines for the front office with regard to issuances, buy-backs and swap transactions in accordance with the agreed strategies. Moreover, the middle office lays down the framework for the individual auctions and undertakes the overall administration of foreign borrowing, re-lending and government guarantees and participates on the SPF Board and in the financing group for subsidised housing.

The front office is responsible for the operational element of the government debt policy within the framework of the monthly guidelines. This comprises issuance of government securities, including holding of auctions, buy-backs, securities lending and swap transactions. It also determines market terms for re-lending.

The back office settles payments concerning central-government debt, including servicing of debt and swaps. The back office also prepares the national accounts together with the Ministry of Finance.

The government debt is audited by Danmarks Nationalbank's auditors on behalf of Rigsrevisionen (the national audit office of Denmark). Danmarks Nationalbank's auditors ascertain that the government debt accounts give a true and fair view, i.e. that they are without significant errors and omissions. In addition, Rigsrevisionen may assess whether the government debt is managed in an appropriate way. The results of its investigations are published at www.rigsrevisionen.dk.

RESPONSIBILITIES OF GOVERNMENT DEBT MANAGEMENT A.3

Government Debt Management at Danmarks Nationalbank must ensure that the overall objective of government debt policy is met. This is achieved by carrying out the tasks specified in *Agreement on the division of work in the area of government debt between Danmarks Nationalbank and the Ministry of Finance*. Government Debt Management undertakes the following responsibilities:

Preparation of issuance strategy and issuance of government securities

- Preparation of issuance strategy on the basis of the latest government budget forecast from the Ministry of Finance.
- Issuance of domestic government securities to cover the central government's domestic financing requirement.
- Issuance of foreign government securities in order to maintain an adequate foreign-exchange reserve.
- Supporting a well-functioning market for domestic government securities, e.g. through agreements with primary dealers in Danish government securities for ongoing price quotation (market making).
- Managing the central government's account in order to ensure a sufficient liquidity buffer and to enable the central government to transact current payments.

Risk management

- Analysis and management of market risk on the central-government debt portfolio. The risk on financial assets and liabilities of the government debt is managed on a consolidated basis.
- Credit risk management in connection with interest-rate and currency swaps.

Management of government funds, re-lending and government guarantees

- Management of the assets of the three government funds.
- Management of government guarantees and re-lending to certain government-owned companies.
- Administration of special lending, e.g. bilateral loans to other sovereign states.

Advisory services and international cooperation

- Advising the Ministry of Finance concerning the central government's other financial risks, e.g. interest-rate risk in relation to the financing of subsidised housing.
- Advising ministries and agencies.
- Advising other government debt management offices.

- Participation in international cooperation in the area of government debt management, including the OECD, the IMF, the World Bank and the EU.

Contacts with credit rating agencies and investors

- Contacts with credit rating agencies concerning the central government's credit rating.
- Information to investors on the government debt policy and financial and economic conditions.

STRATEGY AND FUNDING RULES FOR GOVERNMENT BORROWING A.4

Determination of strategy

The strategy for management of central-government debt is agreed at quarterly meetings between the Ministry of Finance and Danmarks Nationalbank on the basis of a strategy proposal from Government Debt Management at Danmarks Nationalbank. The Ministry of Finance authorises Danmarks Nationalbank to implement the agreed strategy, including the central government's issuance strategy and risk management.

In December, the overall strategy for the following year is determined. At the subsequent quarterly meetings, Government Debt Management reports on the implementation of the strategy and any adjustments of the overall strategy for the year are adopted.

The government debt strategy is announced to the market immediately after the meetings in June and December. The strategy is assessed on an ongoing basis in order to ensure the best possible fulfilment of the objectives, and to ensure that Danish government debt policy complies with international standards formulated by the OECD, the IMF and the World Bank.

Domestic and foreign funding rules

The Danish government and Danmarks Nationalbank have agreed on funding rules for the distribution and volume of the central government's domestic and foreign borrowing. The funding rules describe the framework for central-government borrowing, laying down the overall principles warranted by the government debt policy. There are two sets of funding rules: domestic and foreign. Together they support the separation of fiscal and monetary policy.

Domestic funding rule

Under the domestic funding rule, the central government borrows in kroner to cover its financing requirement given by the current budget deficit and redemptions on the domestic debt.

Government Debt Management at Danmarks Nationalbank may continue to issue government securities even though the financing requirement for the year has been met. This increases the balance on the central government's account, enabling the central government to build up a liquidity buffer to cover any shocks to the financing requirement. At the same time it will contribute to prefunding of the borrowing requirement for the following year, thereby reducing the central government's refinancing risk.

Under the EU Treaty, the central government's account at Danmarks Nationalbank must never show a deficit.[1]

Foreign funding rule

The central government raises foreign loans in order to maintain the foreign-exchange reserve. The foreign funding rule determines that, as a general rule, the central government raises foreign loans equivalent to the redemptions on the foreign government debt.

If the foreign-exchange reserve decreases by more than what is deemed appropriate, it may be necessary for the central government – out of concern for the exchange-rate policy – to raise loans abroad in order to strengthen the foreign-exchange reserve. Conversely, it is possible to reduce the foreign government debt if there has been an unnecessarily large increase in the foreign-exchange reserve.

As borrowing in foreign currency is included directly in the foreign-exchange reserve, domestic liquidity is not affected by foreign borrowing.

The government may raise short-term foreign loans via its Commercial Paper, CP, programmes. This contributes to the central government's liquidity reserves and facilitates quick build-up of the foreign-exchange reserve. Issuance in the CP programmes takes place on an ongoing basis in order to maintain easy access to the market.

FURTHER INFORMATION ON THE CENTRAL-GOVERNMENT DEBT A.5

An important element of government debt policy is to give market participants and the public information on the central-government borrowing strategy and borrowing requirement, as well as information of a more general nature on the framework for government debt management.

Information about government debt and Government Debt Management is available at www.governmentdebt.dk. In addition, information is regularly published via other sources, cf. Box A.3.

[1] Cf. Article 123 of the EU Treaty.

SOURCES OF INFORMATION ON DANISH GOVERNMENT BORROWING AND DEBT — Box A.3

Strategy announcements and publications

- The annual publication Danish Government Borrowing and Debt (February)
- The semi-annual announcement Danish Government Debt Management Strategy (June and December).

News and announcements

- Danmarks Nationalbank's news service (DN News)
- Danish and international trading platforms and news agencies, e.g. Bloomberg, ICAP/BrokerTec, MTS Denmark, Nasdaq OMX, Reuters, Ritzau, etc.

Websites

- Government Debt Management's website: www.governmentdebt.dk[1]
- The Ministry of Finance: www.fm.dk.

Contacts

For more information, please e-mail Government Debt Management at: governmentdebt@nationalbanken.dk.

[1] Subscribers to the news service automatically receive e-mail notifications of news concerning Danish government borrowing and debt.

Appendix of tables

CENTRAL-GOVERNMENT DEBT, YEAR-END 2002-12 Table 1

Kr. million	2002	2003	2004
A. Loan			
Domestic Debt			
- Fixed-rate bonds, nominal	497,938	480,874	480,590
- Inflation-linked-bonds[1]	-	-	-
- Fisheries Bank bonds	-	-	-
- Lottery bonds	400	400	400
- Treasury notes	79,371	78,532	71,690
- Treasury bills	63,404	67,347	68,602
- Index-linked loans and loan package[2]	-	-	-
- Currency swaps from kroner to euro (net)[3]	-16,200	-16,200	-16,200
- Currency swaps from kroner to dollars	-	-	-524
Domestic debt, total	624,913	610,953	604,558
Foreign debt[4]			
- in dollars	-	-	518
- in euro	83,689	83,861	83,370
- in other currencies and multi-currency	42	42	40
Foreign debt, total	83,730	83,903	83,929
Domestic and foreign debt, total	708,644	694,856	688,487
B. Government deposits with the central bank[5]	-45,975	-40,621	-57,559
C. The Social Pension Fund, The Fund for Better Working Environment and Labour Retention and The Advanced Technology Foundation			
- Government Securities	-113,132	-118,138	-120,799
- Other Securities	-28,230	-20,576	-16,065
The three funds, nominal value, total[1]	-141,362	-138,714	-136,864
Central-government debt, total (A+B+C)	521,308	515,521	494,064
Central-government debt, per cent of GDP	38.0	36.8	33.9

Note: A positive sign indicates a liability, a negative sign an asset.

[1] Inflation-linked bonds are compiled as indexed value.

[2] Loans transferred from the Mortgage Bank of the Kingdom of Denmark.

[3] Currency swaps from kroner to euro less currency swaps from euro to kroner.

[4] Foreign loans are compiled after end-exposure.

[5] Deposits include deposits of the Government funds. For 2012, government deposits are measured as in the Danmarks Nationalbank's balance sheet.

CENTRAL-GOVERNMENT DEBT, YEAR-END 2002-12 Table 1

2005	2006	2007	2008	2009	2010	2011	2012
440,351	428,796	403,039	451,394	505,973	556,900	606,627	620,695
-	-	-	-	-	-	-	10,207
-	-	-	-	995	887	786	684
200	200	200	200	100	-	-	-
33,980	-	-	-	-	-	-	-
60,092	42,660	19,660	-	-	25,460	44,200	44,940
-	379	277	-	-	-	-	-
-15,456	-12,755	-13,262	-11,662	-8,197	2,974	2,974	-1,490
-2,688	-4,862	-7,873	-10,423	-10,956	-9,808	-8,660	-7,512
516,479	454,418	402,040	429,509	487,921	576,413	645,927	667,524
2,810	4,583	6,844	9,947	10,218	9,901	8,957	7,662
87,833	75,219	61,738	123,126	129,351	104,811	102,861	82,338
38	21	20	19	19	18	-	-
90,681	79,823	68,642	133,092	139,588	114,731	111,818	90,000
607,160	534,241	470,682	562,600	627,509	691,144	757,745	757,524
-53,297	-70,958	-86,333	-258,131	-210,932	-177,282	-223,100	-161,991
-124,635	-125,111	-128,547	-98,604	-77,720	-75,511	-69,351	-70,859
-11,284	-9,535	-8,686	-9,643	-37,376	-52,075	-51,393	-37,902
-135,919	-134,646	-137,233	-108,247	-115,096	-127,587	-120,744	-108,761
417,944	328,637	247,116	196,222	301,481	386,275	413,901	486,771
26.9	20.1	14.5	11.2	18.1	22.0	23.1	26.8

SERVICE ON CENTRAL-GOVERNMENT DEBT[1] AS OF 31 DECEMBER 2012 Table 2.1

Kr. billion	Interest	Redemption	Total
2013	22.9	66.2	89.1
2014	19.7	57.0	76.7
2015	18.9	86.2	105.1
2016	15.5	20.4	35.9
2017	15.4	51.9	67.3
2018	13.3	-0.8	12.5
2019	13.3	87.3	100.7
2020	9.8	-0.3	9.5
2021	9.9	92.4	102.3
2022	7.1	0.0	7.1
2023	7.1	22.9	29.9
2024	6.9	24.5	31.3
2025	5.2	0.0	5.2
2026	5.2	-	5.2
2027	5.2	-	5.2
2028	5.2	-	5.2
2029	5.2	-	5.2
2030	5.2	-	5.2
2031	5.2	-	5.2
2032	5.2	-	5.2
2033	5.2	-	5.2
2034	5.2	-	5.2
2035	5.2	-	5.2
2036	5.2	-	5.2
2037	5.2	-	5.2
2038	5.2	-	5.2
2039	5.2	114.8	120.0
I alt	237.3	622.6	859.9

[1] Excluding T-bills. Including net interest payments on domestic interest-rate swaps. Krone payments to and from the central government in cross-currency swaps are included in the redemptions. Calculations of interest payments and redemptions on the inflation-linked bond maturing in 2023 are based on the indexed value as of end-2012.

SERVICE ON CENTRAL-GOVERNMENT FOREIGN DEBT[1] AS OF 31 DECEMBER 2012 Table 2.2

Kr. billion	Interest	Redemptions	Total
2013	0.0	22.1	22.1
2014	0.2	26.8	26.9
2015	-0.6	22.6	22.0
2016	-0.5	12.7	12.2
2017	-0.7	1.1	0.4
2018	-0.7	0.9	0.2
2019	-0.7	0.7	0.0
2020	-0.5	0.4	-0.2
2021	-0.3	0.1	-0.2
Total	-3.7	87.2	83.4

[1] Excluding Commercial Paper. Including net interest payments on swaps. Payments in foreign currency to and from the central government in cross-currency swaps are included in the redemptions.

CENTRAL GOVERNMENT'S NET FINANCING REQUIREMENT AND FINANCING REQUIREMENT, 2002-12 Table 3

Kr. billion	2002	2003	2004
Current, investment and lending budget	25.8	12.4	27.7
Re-lending of government loans	-8.9	-0.8	-5.4
Distributed capital losses on issue and due interest[1]	-0.1	-0.7	0.5
Other capital items[2]	-20.0	-4.1	0.9
Net cash balance	-3.2	6.9	23.6
Net financing requirement (=-Net cash balance)	3.2	-6.9	-23.6
Redemption on long-term domestic government debt[3]	112.4	106.3	100.0
Redemption on T-bills[4]	49.2	63.4	67.3
Domestic financing requirement[5]	164.8	162.8	143.7
Redemption on long-term foreign government debt[6]	11.1	17.1	15.5
Redemption on Commercial Paper[4]	0.0	0.0	0.0
Financing requirement	175.9	180.0	159.2

Source: *Central Government Accounts*. 2012 are based on Danmarks Nationalbank's end-year specification, which may differ from accounting figures.

1 Including capital losses on buy-backs.

2 Includes e.g. movements in the central government's holdings, cf. *Budget Outlook* from the Ministry of Finance.

3 Including net purchases of bonds from the Government funds administered by Government Debt Management.

4 Corresponds to the outstanding amount at the end of the year before.

5 Deviations from actual domestic financing requirement are possible due to *inter alia* foreign re-lending.

6 Including net payments on cross-currency swaps.

CENTRAL GOVERNMENT'S NET FINANCING REQUIREMENT AND FINANCING REQUIREMENT, 2002-12 Table 3

2005	2006	2007	2008	2009	2010	2011	2012
80.6	98.6	106.2	72.3	-29.8	-88.7	-33.1	na
-3.2	-12.4	-8.5	-13.5	-82.0	1.1	2.8	na
-0.7	-0.9	0.4	0.3	-1.3	-1.2	-1,7	na
-0.9	5.0	-15.3	-10.7	3.1	-4.9	1.8	na
75.9	90.2	82.8	48.3	-110.0	-93.7	-27.9	-80.4
-75.9	-90.2	-82.8	-48.3	110.0	93.7	27.9	80.4
118.7	75.6	51.8	37.3	61.2	62.5	63.8	60.1
68.6	60.1	42.7	19.7	0.0	0.0	25.5	44.2
111.4	45.5	11.6	8.7	171.2	156.2	119.5	184.7
7.0	10.5	10.4	19.4	17.9	36.5	33.2	32.5
0.0	0.0	0.0	0.0	60.3	5.1	4.6	2.5
118.4	56.0	22.1	28.0	249.4	197.8	157.2	219.7

ISSUANCE OF DOMESTIC CENTRAL-GOVERNMENT SECURITIES, 2012 — Table 4.1

ISIN-code	Coupon, per cent	Name	Redemption date	Issuance, kr. million, nominal	Issuance, kr. million, market value
Government bonds					
DK0009922833	2	Bullet loans 2014 Issued 12 April 2011-	15 Nov 2014	9,045	9,479
DK0009922759	2.5	Bullet loans 2016 Issued 8 Feb 2011-	15 Nov 2016	8,380	9,133
DK0009922676	3	Bullet loans 2021 Issued 11 Jan 2011-	15 Nov 2021	40,375	45,223
DK0009922916	0.1	Index-linked loans 2023[1] Issued 24 May 2012-	15 Nov 2023	9,945	10,493
DK0009923054	1.5	Bullet loans 2023 Issued 4 Sep 2012-	15 Nov 2023	12,625	12,639
DK0009922320	4.5	Bullet loans 2039 Issued 11 Nov 2008-	15 Nov 2039	10,260	14,972
T-bills					
DK0009813974	0	T-bill 2012 I Issued 1 jun 2011-1 Mar 2012	1 Mar 2012	3,220	3,221
DK0009814006	0	T-bill 2012 II Issued 1. Sep 2011-1 Jun 2012	1 Jun 2012	11,340	11,339
DK0009814196	0	T-bill 2012 III Issued 1. Dec 2011-1 Sep 2012	1 Sep 2012	19,300	19,299
DK0009814279	0	T-bill 2012 IV Issued 1. Mar 2012-1 Dec 2012	1 Dec 2012	29,660	29,664
DK0009814352	0	T-bill 2013 I Issued 1. Jun 2012-1 Mar 2013	1 Mar 2013	27,280	27,309
DK0009814436	0	T-bill 2013 II Issued 1. Sep 2012-1 Jun 2013	1 Jun 2013	11,960	11,981
DK0009814519	0	T-bill 2013 III Issued 1. Dec 2012-1. Sep 2013	1 Sep 2013	5,700	5,711

[1] The issuance at nominal value excludes indexation, while issuance at market value includes indexation at the time of issuance.

ISSUANCE OF FOREIGN CENTRAL-GOVERNMENT SECURITIES , 2012 — Table 4.2

ISIN-code	Coupon, per cent	Name	Redemption date	Issuance, kr. million, nominal[1]
Loan				
XS0784646829	0.625	1,750 million dollar-loan Issued 15 May 2012	22 May 2015	10,161

[1] The loan was swapped to 1,367 million euro with fixed interest rate. Loan amount after conclusion of swap to euro.

CENTRAL-GOVERNMENT DOMESTIC DEBT AS OF 31 DECEMBER 2012 Table 5.1

Kr. million, nominal value	Outstanding amount, end-2011	Issuances 2012	Re-demptions 2012	Outstanding amount, end-2012	Redemption date	ISIN-code
Government bonds, fixed interest-rate						
Bullet loans						
4 per cent bullet loans 2012	57,950	-	57,950	-	15 Nov 2012	DK0009922593
5 per cent bullet loans 2013	75,926	-	8,662	67,264	15 Nov 2013	DK0009920894
2 per cent bullet loans 2014	50,455	9,045	-	59,500	15 Nov 2014	DK0009922833
4 per cent bullet loans 2015	87,300	-	-	87,300	15 Nov 2015	DK0009921439
2.5 per cent bullet loans 2016	13,090	8,380	-	21,470	15 Nov 2016	DK0009922759
4 per cent bullet loans 2017	52,870	-	-	52,870	15 Nov 2017	DK0009921942
4 per cent bullet loans 2019	87,870	-	-	87,870	15 Nov 2019	DK0009922403
3 per cent bullet loans 2021	52,120	40,375	-	92,495	15 Nov 2021	DK0009922676
1.5 per cent bullet loans 2023	-	12,625	-	12,625	15 Nov 2023	DK0009923054
7 per cent bullet loans 2024	24,431	-	-	24,431	10 Nov 2024	DK0009918138
4.5 per cent bullet loans 2039	104,585	10,260	-	114,845	15 Nov 2039	DK0009922320
Inflation-linked loans						
0.1 per cent inflation-linked loans 2023[2]	-	10,207	-	10,207	15 Nov 2023	DK0009922916
Amortised loans						
4 per cent amortised loans 2017	29	-	5	24	15 Jun 2017[1]	DK0009902728
Perpetuals						
5 per cent Dansk-Islandsk Fond 1918	1	-	-	1	Perpetuals	•
Government bonds, fixed interest rate, total	606,627	90,892	66,617	630,902		
T-bills						
T-bill 2012 I	27,080	3,220	30,300	-	1 Mar 2012	DK0009813974
T-bill 2012 II	14,040	11,340	25,380	-	1 Jun 2012	DK0009814006
T-bill 2012 III	3,080	19,300	22,380	-	3 Sep 2012	DK0009814196
T-bill 2012 IV	-	29,660	29,660	-	3 Dec 2012	DK0009814279
T-bill 2013 I	-	27,280	-	27,280	1 Mar 2013	DK0009814352
T-bill 2013 II	-	11,960	-	11,960	3 Jun 2013	DK0009814436
T-bill 2013 III	-	5,700	-	5,700	2 Sep 2013	DK0009814519
T-bill, total	44,200	108,460	107,720	44,940		
Fisheries Bank of Denmark bonds						
8 per cent Fisheries Bank Bond 2014	23	-	9	14	1 May 2014	DK0009603573
6 per cent Fisheries Bank Bond 2016	14	-	3	11	1 May 2016	DK0009604035
7 per cent Fisheries Bank Bond 2016	23	-	5	18	1 May 2016	DK0009603656
5 per cent Fisheries Bank Bond 2019	419	-	62	357	1 Nov 2019	DK0009604621
5 per cent Fisheries Bank Bond 2025	306	-	22	284	1 Nov 2025	DK0009604894
Fisheries Bank Bond, total	786	-	101	685		
Domestic government securities, total	651,613	199,352	174,438	676,527		
Swap from kroner to euro	2,974	-	4,465	-1,490		
Swap from kroner to dollar	-8,660	-	-1,148	-7,512		
Central-government domestic debt, total	645,927	199,352	177,754	667,524		

[1] May be redeemed by the central government at three months' notice.
[2] Issuances in the inflation-linked bond are measured at indexed nominal value year-end.

CENTRAL-GOVERNMENT FOREIGN DEBT AS OF 31 DECEMBER 2012 Table 5.2

ISIN-code/loan no[1]	Coupon, per cent	Name	Redemption date	Outstanding amount, kr. million[2]
Loan				
XS0592215239	0.875	2011/13 dollar loan	19 Feb 2013	22,070.5
1450	0.875	2011/13 swap from dollar		-22,070.5
•	var.	2011/13 swap to euro		20,965.9
NO0010490899	3.50	2009/14 Norwegian krone loan	17 Feb 2014	508.4
1215	3.50	2009/14 swap from Norwegian kroner		-508.4
•	var.	2009/14 swap to euro		416.3
XS0417728325	3.125	2009/14 euro loan	17 Mar 2014	20,889.1
XS0419327837	3.165	2009/14 Swedish kronor loan	31 Mar 2014	3,572.7
1229	3.165	2009/14 swap from Swedish kronor		-3,572.7
•	var.	2009/14 swap to euro		2,793.4
XS0784646829	0.625	2012/15 dollar loan	22 May 2015	9,903.4
1563	0.625	2012/15 swap from dollar		-9,903.4
•	0.148	2012/15 swap to euro		10,199.8
XS0546424077	1.75	2010/15 euro loan	05 Oct 2015	11,190.6
XS0605536613	2.75	2011/16 euro loan	16 Mar 2016	9,325.5
XS0642551773	3.125	2011/16 Swedish kronor loan	12 Jul 2016	2,396.4
1485	3.125	2011/16 swap from Swedish kronor		-2,396.4
•	var.	2011/16 swap to euro		2,242.3
Loan, total				78,022.9
Commercial Paper				
ECP-issuances in dollar[3]				2,108.9
USCP-issuances in dollar[3]				713.8
CP-issuances, total				2,822.7
Cross currency swaps in euro				
10045	var.	2009/14 swap from kroner	12 Mar 2014	1,492.1
Cross currency swaps in euro, total				1,492.1
Debt in euro, total				82,337.7

CENTRAL-GOVERNMENT FOREIGN DEBT AS OF 31 DECEMBER 2012 Table 5.2

ISIN-code/loan no[1]	Coupon, per cent	Name	Redemption date	Outstanding amount, kr. million[2]
Currency swaps in dollars				
20001	4.164	2004/16 swap from kroner	30 Jun 2016	81.6
20002	4.164	2004/16 swap from kroner	30 Jun 2016	81.7
20003	4.355	2005/17 swap from kroner	28 Jan 2017	100.6
20004	4.4875	2005/17 swap from kroner	10 Feb 2017	170.0
20005	4.497	2005/17 swap from kroner	11 Aug 2017	181.2
20006	4.66	2005/17 swap from kroner	20 Oct 2017	181.2
20007	4.7925	2005/17 swap from kroner	15 Dec 2017	193.2
20008	4.855	2006/17 swap from kroner	16 Nov 2017	201.6
20009	5.06	2006/18 swap from kroner	12 Apr 2018	212.6
20012	5.27	2006/18 swap from kroner	28 Aug 2018	349.1
20013	4.755	2006/18 swap from kroner	10 Nov 2018	349.1
20014	4.73875	2007/19 swap from kroner	10 Jan 2019	378.2
20015	4.671	2007/19 swap from kroner	26 Mar 2019	378.2
20016	5.1225	2007/19 swap from kroner	15 Jun 2019	397.3
20017	5.164	2007/19 swap from kroner	05 Sep 2019	427.8
20018	5.3875	2007/19 swap from kroner	14 Nov 2019	427.8
20020	5.315	2008/20 swap from kroner	29 Jan 2020	458.4
20021	3.745	2008/20 swap from kroner	25 Mar 2020	456.8
20022	3.78	2008/20 swap from kroner	05 May 2020	456.8
20023	4.18	2008/20 swap from kroner	22 Jul 2020	528.2
20024	4.144	2008/20 swap from kroner	14 Oct 2020	528.2
20028	2.539	2009/21 swap from kroner	23 Jan 2021	561.2
20029	3.585	2009/21 swap from kroner	17 Mar 2021	561.2
Debt in dollar, total				7,662.0
Central-government debt, total				89,999.7

[1] ISIN-codes are used for loans and loan number for swaps and Commercial Paper issuances.

[2] The outstanding amount as of 31 December 2012 is calculated to kroner on the basis of the following exchange rates as per 28 December 2012: euro = 746.04, yen = 6.5730, Norwegian kroner = 101.67, Swedish kronor = 87.14, dollar = 565.91.

[3] A Forward Contract in Foreign-Exchange with Danmarks Nationalbank is attached to issues in dollars. At maturity the Kingdom of Denmark receives an amount in dollars, equivalent to the underlying loan, and pays the agreed amount in euro. The central-government's final exposure is therefore in euro.

CENTRAL-GOVERNMENT PORTFOLIO SWAPS AS OF 31 DECEMBER 2012 Table 6

	Krone interest-rate swaps	Euro interest-rate swaps	
Termination year	Notional amount, kr. million[1]	Notional amount, million euro[2]	Notional amount, kr. million[3]
2013	4,400	810	6,043
2014	8,500	-	-
2015	1,800	1,500	11,191
2016	10,800	575	4,290
2017	-	175	1,306
2018	-	-	-
2019	-	800	5,968
2020	-	1,300	9,699
2021	-	1,200	8,952
Interest-rate swaps, total	25,500	6,360	47,448

Note: The Kingdom of Denmark receives fixed interest rate and pays 6-month Cibor on all krone interest-rate swaps. The Kingdom of Denmark receives fixed interest rate and pays 6-month Euribor on all euro interest-rate swaps.

[1] Moreover, the Mortgage Bank of the Kingdom of Denmark has transferred a kr. 50 million swap expiring in 2019 to the central-government.

[2] Moreover, the Mortgage Bank of the Kingdom of Denmark has transferred a 10 million euro swap with serial redemption profile expiring in 2021 to the central-government.

[3] Converted to kroner on the basis of the following exchange rate as of 28 December 2012: euro = 746.0400.

KINGDOM OF DENMARK'S RATING IN DOMESTIC CURRENCY — Table 7.1

	Moody's	Fitch Ratings	Standard & Poor's
1986, July	Aaa		
1992, July			AAA
1995, October		AAA	
Current rating	Aaa	AAA	AAA

Note: Moody's Investors service, Fitch Ratings and Standard & Poor's use the following ratings:
Moody's: Aaa, Aa, A, Baa, Ba, B, Caa, Ca og C.
For the categories Aa to Caa are used 1, 2 or 3 to indicate a status slightly better or worse within the category.
Fitch Ratings: AAA, AA, A, BBB, BB, B, CCC, DDD, DD, D.
For the categories AA to B are used + or – to indicate a status slightly better or worse within the category.
Standard & Poor's: AAA, AA, A, BBB, BB, B, CCC, CC, C and D.
For the categories AA to CCC are used + or – to indicate a status slightly better or worse within the category .

KINGDOM OF DENMARK'S RATING IN FOREIGN CURRENCY — Table 7.2

	Moody's	Fitch Ratings	Standard & Poor's
1981, March			AAA
1983, January			AA+
1985, April	Aa		
1986, August	AA1		
1987, March			AA
1991, October			AA+
1994, August		AA+	
1999, August	Aaa		
2001, February			AAA
2003, November		AAA	
Current rating	Aaa	AAA	AAA

Note: See the note in Table 7.1 for ranking of the rating categories.