Danmarks Nationalbank

Danish Government Borrowing and Debt

2010

Danish Government Borrowing and Debt 2010

The front cover shows the Great Belt Bridge.

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- - Magnitude nil
- 0 Less than one half of unit employed
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Highlights of Government Debt Policy

The Danish market for government securities functioned well in 2010. Demand for Danish bonds was strong, and Danish borrowing costs remain low. However, the turmoil in the European sovereign debt market is still contributing to high uncertainty. Consequently, the focus of the central government's issuance policy and risk management is to:

- move forward bond issuance for the year and to prefund the following year's financing requirement,
- maintain a large liquidity reserve. The central government's cash balance can fully cover the central government's redemptions and estimated budget deficit in 2011,
- ensure a broad investor base in the central government's domestic and foreign borrowing by means of broad-based key on-the-run issues,
- maintain low exposure to rising interest rates.

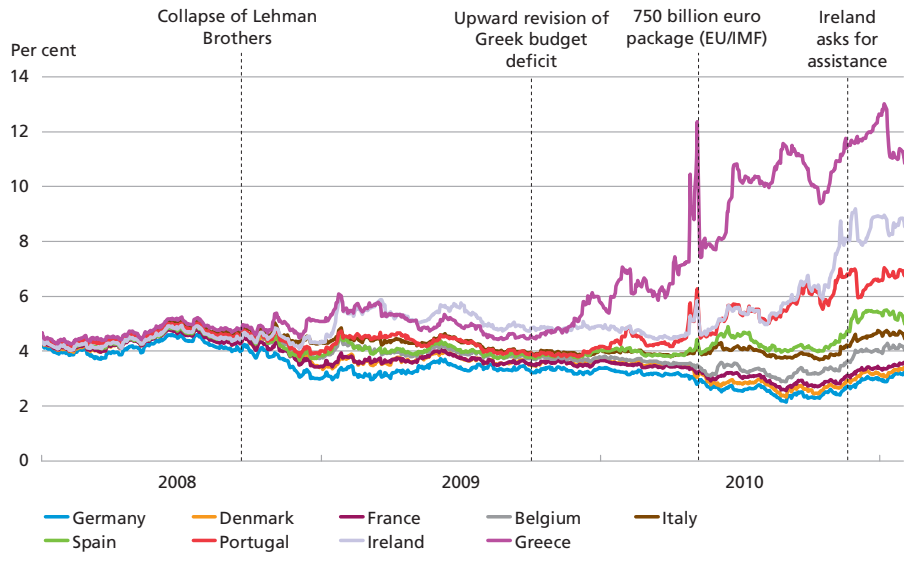
THE EUROPEAN SOVEREIGN DEBT MARKETS IN 2010

The government debt of many European countries is mounting rapidly and for the first time in the euro's history, euro area member states have been cut off from the capital markets. Greece and Ireland have received financial assistance from the EU member states and the IMF.

The European sovereign debt crisis has underscored the importance of confidence in a country's economic policy when it comes to maintaining favourable borrowing terms. Large government deficits and low growth prospects caused interest rates to rise substantially in several member states, cf. Chart 1.

As a result of the turmoil in the European sovereign debt market, there was strong demand for government bonds issued by the countries with the highest credit standings, including Denmark. During the spring and summer, Danish government bond yields declined for all maturity segments, cf. Chart 2.

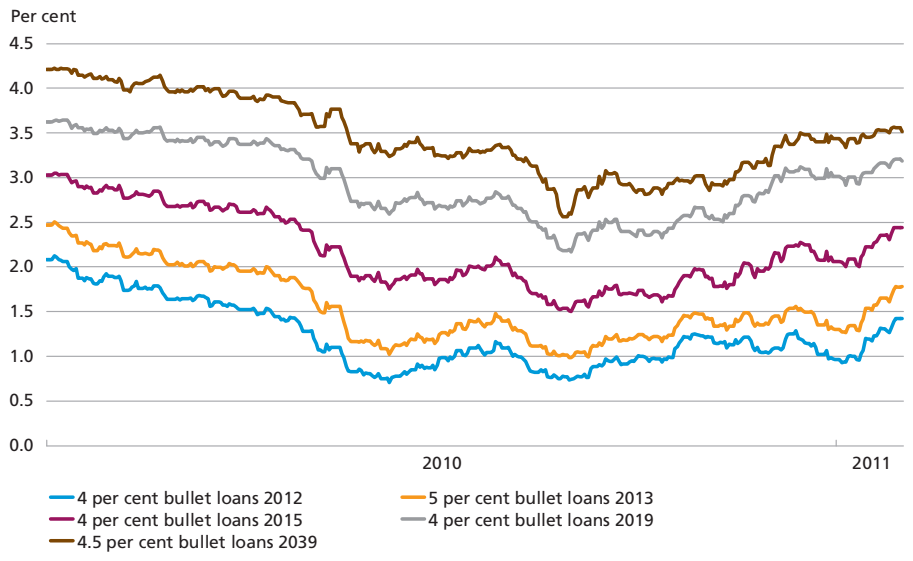
DEVELOPMENTS IN 10-YEAR YIELDS FOR SELECTED COUNTRIES Chart 1



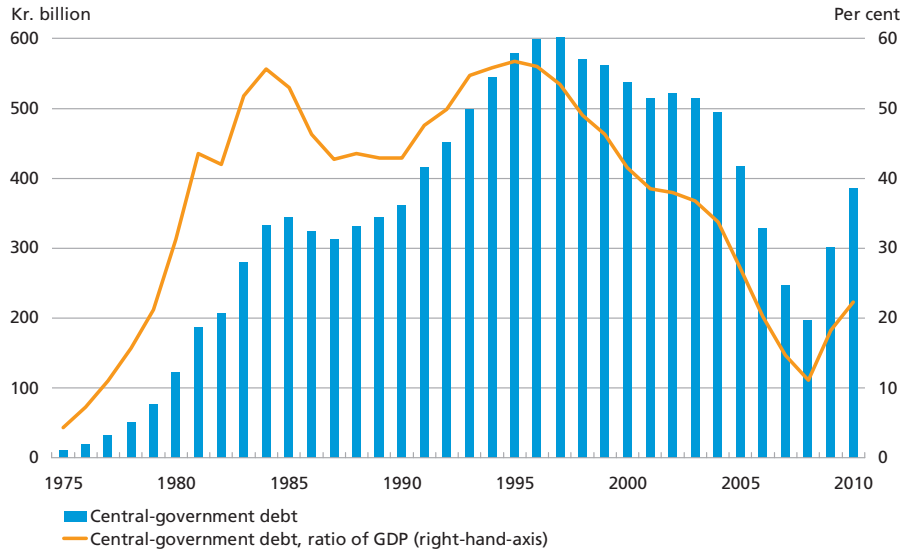
Source: Bloomberg.

In accordance with developments in Germany and other European countries, long-term yields especially rose in the 4th quarter. In the beginning of 2011 the rise in interest rates was primarily in the shorter maturity segments.

YIELDS TO MATURITY OF KEY ON-THE-RUN BONDS Chart 2



CENTRAL-GOVERNMENT DEBT, 1975-2010 Chart 3



CENTRAL-GOVERNMENT DEBT IN 2010

In 2010, the central-government debt increased by kr. 85 billion (11.4 billion euro) to kr. 386 billion (51.8 billion euro), cf. Chart 3. This corresponds to a debt of 22 per cent of GDP or kr. 69,000 per capita. Despite the increase, Denmark's debt remains low compared with that of other EU member states, and Danish government bonds are still enjoying the highest ratings from the credit rating agencies. Interest costs on government debt totalled kr. 18 billion, corresponding to 1 per cent of GDP.

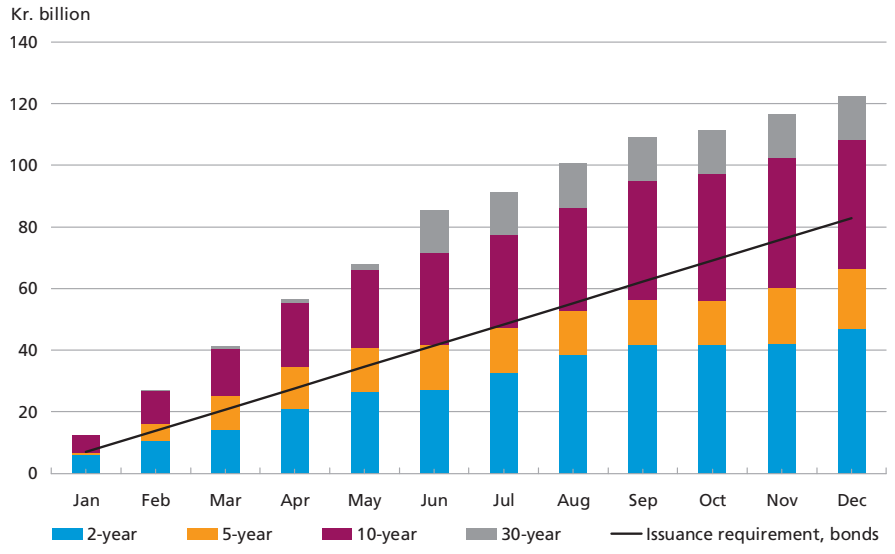
GOVERNMENT BORROWING IN 2010

Demand for Danish government securities was strong, and the government deficit was financed at an average interest rate on the bond issuance of 2.4 per cent.

Issuance of government bonds totalled kr. 123 billion, cf. Chart 4. In 2010, the central government moved forward issuance to a considerable extent, and by the end of the 1st half of the year, the issuance requirement in bonds for 2010 had been fulfilled. At year-end, the central government had financed kr. 40 billion of the 2011 financing requirement.

The T-bill programme was reopened in 2010 in order to expand the central government's investor base. Monthly auctions have been held since February 2010, and by year-end the outstanding amount was kr. 25 billion.

ISSUANCE OF DOMESTIC GOVERNMENT BONDS IN 2010 BROKEN DOWN BY MATURITY SEGMENTS — Chart 4

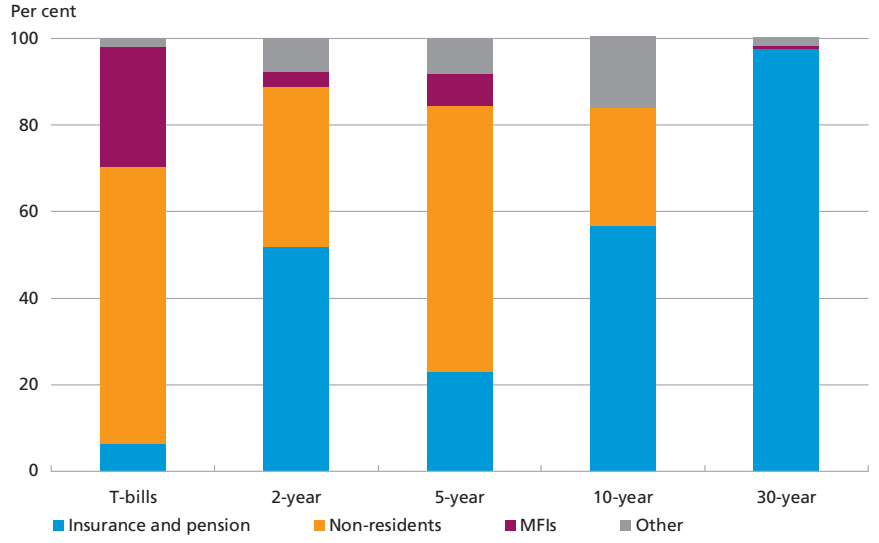


Note: Issuance and issuance requirement are accumulated over the months.

Broad-based investor group for central-government issuance

Responses from banks and ongoing investor relations indicate that domestic issuance is to a diversified investor group and that the investor group has expanded in recent years.

OWNERSHIP SHARES OF DOMESTIC SECURITIES — Chart 5



Note: Ownership shares are calculated on the basis of nominal stocks excluding the portfolios of the government funds.

Source: Danmarks Nationalbank, *Securities Statistics*.

At the end of 2010, the non-resident ownership share was around one third of domestic Danish government bonds, cf. Chart 5. The non-resident ownership share is largest in T-bills and government bonds with a maturity of up to 5 years, while the ownership share for the insurance and pension sector is largest in the longer maturity segments.

Issuance of foreign loan of 1.5 billion euro

The financial crisis has demonstrated that it is important for the central government to be regularly present in the international capital markets to ensure access to loans denominated in foreign currency. Against this backdrop, the central government issued a euro loan of 1.5 billion euro in the 2nd half of 2010. The euro loan was issued to more than 100 different investors – a broad-based investor group both in terms of regions and investor types.

ISSUANCE STRATEGY IN 2011

The central government's domestic issuance requirement is low

The central government's domestic financing requirement in 2011 is kr. 110 billion (14.8 billion euro). Excess sales of government securities of kr. 40 billion in 2010 entail a low issuance requirement in 2011.

In view of the large redemptions in 2012, the strategy is to begin to finance next year's borrowing requirement and to buy back domestic debt maturing after 2011. This increases issuance of government bonds in 2011, thereby contributing to the build-up of the new key on-the-run issues.

A high balance of the central government's account reduces the refinancing risk. The central government's cash balance can fully cover redemptions and the estimated budget deficit in 2011.

Replacement of key on-the-run issues

At auctions on 11 January and 8 February 2011, respectively, new 10- and 5-year on-the-run issues were opened. The 2-year on-the-run issue will be replaced in the 2nd quarter. The new bonds will expire in 2014, 2016 and 2021, years in which none of the existing government bonds expire. The issuance strategy for government bonds is based on a 40-20-40 percentage distribution on the 2-, 5- and 10-year maturity segments.

Foreign borrowing in order to maintain the foreign-exchange reserve

The central government raises foreign loans in order to maintain the foreign-exchange reserve. As a main rule, the government issues debt denominated in foreign currency equivalent to the redemptions on the

ISSUANCE STRATEGY 2011 Box 1

Domestic strategy

- Government bonds are issued on the basis of a 40-20-40 percentage distribution on the 2-, 5- and 10-year maturity segments
- T-bills account for around kr. 40 billion of the domestic issuance requirement
- On 11 January 2011, a new 10-year on-the-run issue was opened, i.e. 3 per cent bullet loans 2021. The series will be built up to an outstanding volume of around kr. 80 billion
- On 8 February 2011, a new 5-year on-the-run issue was opened, i.e. 2.5 per cent bullet loans 2016. The series will be built up to an outstanding volume of around kr. 40 billion
- In the 2nd quarter of 2011, a new on-the-run issue in the 2-year segment will be opened, maturing in 2014. The series will be built up to an outstanding volume of around kr. 40 billion
- Issuance in 4.5 per cent bullet loans 2039 may continue
- In the event of special market conditions, issuance will be possible in the other bullet loans.

Foreign strategy

- A 5-year euro loan for 1-2 billion euro will be issued
- Supplementary issuance will primarily take place in euro or dollars in the 2-5-year maturity segments
- Issuance in Commercial Paper continues on a limited scale in order to maintain the liquidity of the programmes.

foreign debt. The central government's foreign redemptions total 4.3 billion euro (kr. 32 billion) in 2011.

Government Debt Management's issuance strategy for 2011 is summarised in Box 1.

ISSUANCE AND TRADING IN GOVERNMENT SECURITIES

Danish government bonds are issued to and bought back from banks that have entered into primary dealer contracts with the central government. The primary dealers in government bonds comprise 12 banks, cf. Table 1. In 2010, the group was increased to include Deutsche Bank, HSBC and Spar Nord Bank. A broad group of primary dealers boosts interest in Danish government securities and supports competition in connection with issuance and buy-backs by the central government.

Positive experience from issuance by auction

Since the autumn of 2009, government bonds have been sold via regular auctions supplemented with tap sales. In 2010, 70 per cent of the issuance took place via auctions. Demand was strong at the auctions in 2010, as the

PRIMARY DEALERS AND MARKET TAKERS, BEGINNING OF 2011 Table 1

Primary dealers in government bonds	Primary dealers in T-bills	Market takers in government securities
Barclays Bank	Danske Bank	Bank of America Merrill Lynch
BNP Paribas	Nordea	Citigroup
Danske Bank	Nykredit Bank	DZ Bank
Deutsche Bank	SEB	Jyske Bank
HSBC	Sydbank	Royal Bank of Scotland
J.P. Morgan		
Morgan Stanley		
Nordea		
Nykredit Bank		
SEB		
Spar Nord Bank		
Sydbank		

Note: A market taker can trade at prices quoted by primary dealers, but cannot itself quote prices.

bids totalled more than doubled the issuance volume. Allocation has taken place at prices equivalent to the secondary market. Consequently, the central government did not pay any issuance premium.

At auctions, investors can buy a large amount of government bonds directly from the central government by bidding at the auction via a primary dealer. Issuance on tap makes it easier for banks to meet the demand from investors outside the auction days. In 2011, government bonds will continue to be issued via auctions, supplemented with tap sales.

Main Principles

CHAPTER 1

Main Principles of Government Debt Management

The central-government debt comprises domestic and foreign debt, the assets of three government funds and the balance of the central government's account. Management of government debt is carried out by Government Debt Management at Danmarks Nationalbank, which borrows in the financial markets on behalf of the Ministry of Finance to cover the central government's financing requirement.

The overall objective of the government debt policy is to cover the central government's 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 crisis in the European sovereign debt markets has emphasised the importance of ensuring government access to the capital markets. Even creditworthy governments have, at times during the crisis, found it difficult to achieve the desired issuance volumes. Government Debt Management focuses on maintaining a low refinancing risk, e.g. by meeting the financing requirement well in advance, ensuring a large investor base for government issues and by having substantial liquidity reserves.

GOVERNMENT DEBT MANAGEMENT PORTFOLIOS 1.1

The central-government debt is compiled as the nominal value of domestic and foreign debt less the balance of the central government's account at Danmarks Nationalbank and the assets of three government funds[1]. At end-2010, the central-government debt amounted to kr. 386 billion, equivalent to 22 per cent of GDP, cf. Table 1.1.1.

Domestic and foreign debt is defined by the currency exposure. Domestic debt is in kroner, while foreign debt is in euro.

The assets of the three government funds administered by Government Debt Management are invested in Danish government securities and other listed bonds denominated in kroner. The central government's

[1] The Social Pension Fund, the Preventive Measures Fund and the Advanced Technology Foundation.

CENTRAL-GOVERNMENT DEBT, END-2010 Table 1.1.1

	Kr. billion	Per cent of GDP
Domestic debt	576	33
Foreign debt	115	7
Government funds	-128	-7
Central government's account at Danmarks Nationalbank	-177	-10
Central-government debt	386	22
Re-lending	-80	-5
Capital injections into banks and mortgage banks	-46	-3
Central-government debt adjusted for re-lending and capital injections	261	15

Note: A positive figure indicates a liability; a negative figure indicates an asset.

large receipts and disbursements are settled via the government's account at Danmarks Nationalbank. In addition, the government's account serves as a buffer to cover unforeseen increases in the government financing requirement on a temporary basis.

In addition to managing government debt, Government Debt Management administers the central government's re-lending. Re-lending is not included in the definition of the central-government debt, but constitutes an asset to the government. Government debt adjusted for government re-lending and capital injections into banks and mortgage banks in connection with the Credit Package amounted to kr. 261 billion, equivalent to 15 per cent of GDP, at end-2010.

OBJECTIVES AND RESPONSIBILITIES 1.2

Objectives

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 crisis in the European sovereign debt markets has emphasised the importance of ensuring government access to the capital markets. Even creditworthy governments have, at times during the crisis, found it difficult to achieve the desired issuance volumes. Government Debt Management focuses on maintaining a low refinancing risk by meeting the financing requirement well in advance, ensuring a large investor base for government issues and by having substantial liquidity reserves.

Responsibilities

Government Debt Management manages the central-government borrowing within the following areas:

Issuance of government securities

- Preparation of issuance strategy on the basis of the 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 government securities, e.g. through agreements with primary dealers in Danish government securities for ongoing price quotation.

Risk management

- Analysis and management of risk on the central-government debt portfolio. The risk on central-government financial assets and liabilities 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 a number of government-owned companies.
- Management of bilateral loans to Ireland, Iceland and Latvia.

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 other government debt management offices.
- Participation in international cooperation in the area of government debt management, including in the OECD and the EU.

Contacts with credit rating agencies and investors

- Contacts with credit rating agencies.
- Information to investors on the issuance requirement, government debt policy and financial and economic conditions.

GOVERNMENT DEBT MANAGEMENT STRATEGY 1.3

The strategy for management of central-government debt is agreed at quarterly meetings between the Ministry of Finance and Government Debt Management on the basis of a strategy proposal prepared by Government Debt Management. The Ministry of Finance authorises Government Debt Management 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 three 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 government debt 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 1.4

The Danish government and Danmarks Nationalbank have agreed on the framework for the distribution and magnitude of the central government's domestic and foreign borrowing. The domestic and foreign funding rules[1] support the separation of fiscal and monetary policy.

Domestic borrowing

Under the domestic funding rule, the central government borrows in kroner to cover its current deficit and redemptions on the domestic debt. This means that the central government's payments in principle have no impact on domestic liquidity. This supports the separation of fiscal and monetary policy.

The central government may continue to issue government securities even though the issuance requirement for the year has been reached. In that case, it will begin to finance the following year's borrowing requirement so that the central government's refinancing risk for the coming year will be reduced.

Under the EU Treaty, the central government's account at Danmarks Nationalbank must never show a deficit, as this would be monetary

[1] The funding rules are formulated in *Agreement on the division of work in the area of government debt between Danmarks Nationalbank and the Ministry of Finance*, www.governmentdebt.dk.

financing of the central government's borrowing requirement. Borrowing is planned so as to ensure that there is always a sufficient balance to cover the central government's receipts and disbursements.

Foreign borrowing

The foreign debt is issued in order to maintain the foreign-exchange reserve. The foreign funding rule entails that, as a general rule, the central government issues debt denominated in foreign currency equivalent to the redemptions on the foreign debt. In situations where the foreign-exchange reserve decreases by more than is appropriate, it may be necessary for the central government – out of concern for the exchange-rate policy – to raise further loans in foreign exchange in order to strengthen the foreign-exchange reserve. In situations where the foreign-exchange reserve increases by more than necessary, the government's foreign debt may be reduced. As borrowing in foreign exchange is included directly in the foreign-exchange reserve, domestic liquidity is not affected by foreign borrowing. In this way central-government borrowing is separated from Danmarks Nationalbank's monetary-policy management of domestic liquidity.

The government may raise short-term foreign loans via its Commercial Paper programmes. This allows rapid build-up of the foreign-exchange reserve or the balance of the central government's account. Issuance in the CP programmes takes place on an ongoing basis so as to keep the programmes liquid.

STRUCTURE OF GOVERNMENT DEBT MANAGEMENT 1.5

The Minister of Finance is authorised by law to raise government loans, cf. Box 1.1. In addition, the Minister of Finance holds the overall political

ACT ON THE AUTHORITY TO RAISE LOANS ON BEHALF OF THE CENTRAL GOVERNMENT Box 1.1

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 government*[1], which authorises the Minister of Finance to raise loans on behalf of the central government for a maximum amount. In 2010, the maximum was raised from kr. 950 billion to 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.

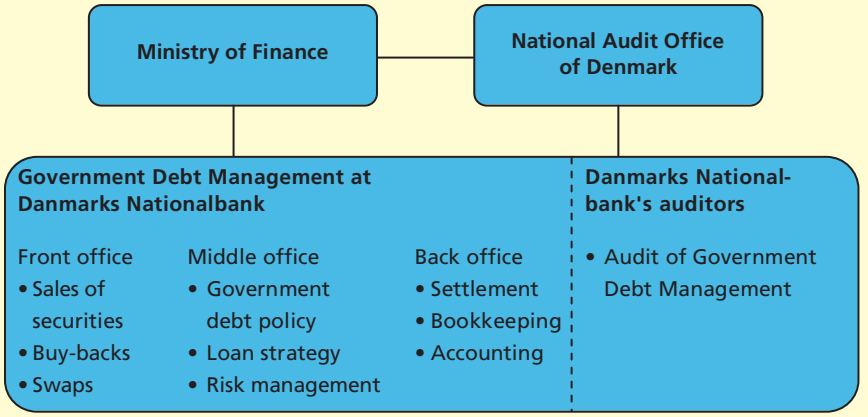
responsibility for central-government borrowing and debt, including relations with the Folketing (Parliament).

In most countries, management of the central-government debt is organised under the ministry of finance or a separate government debt management office. In Denmark, the central-government debt is managed by Government Debt Management at Danmarks Nationalbank on behalf of the Ministry of Finance. Its 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*.

The framework for management of the assets of the Social Pension Fund is laid down in the *Regulations governing the management of the Social Pension Fund*. Tasks undertaken by Government Debt Management in relation to the management of the assets of the other two government funds and the management of re-lending and government guarantees are specified 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 1.2. Separation of functions and clear procedures reduce operational risks and ensure a clear distribution of responsibilities. This facilitates internal control. A well-defined division of responsibilities also ensures that tasks related to the management of government debt are undertaken independently of other activities at Danmarks Nationalbank.

STRUCTURE OF GOVERNMENT DEBT MANAGEMENT Box 1.2



The middle office formulates the general principles concerning government debt policy and prepares proposals for borrowing strategies and risk management. The middle office also lays down monthly guidelines for the front office with regard to issuance, buy-backs and swap transactions in accordance with the agreed strategies. In addition, the middle office undertakes the overall management of re-lending and government guarantees, participates on the Board of the Social Pension Fund and has an advisory role regarding the financing of subsidised housing.

The front office is responsible for the operational element of the government debt policy within the framework of the monthly guidelines. This applies to e.g. sale of government securities, buy-backs 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. It also prepares the national accounts together with the Danish Agency for Governmental Management under the Ministry of Finance.

Government Debt Management is audited by Danmarks Nationalbank's auditors on behalf of Rigsrevisionen (the national audit office of Denmark). Danmarks Nationalbank's auditors ascertain that the accounts of Government Debt Management give a true and fair view, i.e. that they are without significant errors and omissions. Rigsrevisionen may assess whether the funds received by Government Debt Management are applied in the best possible way. The results of its investigations are published at www.rigsrevisionen.dk.

INFORMATION ON THE CENTRAL-GOVERNMENT DEBT 1.6

An important element of government debt policy is to give market participants and the public access to information on the central-government borrowing strategies, borrowing requirement, as well as information of a more general nature on the framework for government debt management. The aim is to be clear and unambiguous in the communication to market participants.

At www.governmentdebt.dk information about government debt is available. In addition, information is published via other sources on an ongoing basis, cf. Box 1.3.

An overview of the information regularly published on Danish government borrowing and debt is presented in the Appendix *Information on Government Borrowing and Debt*.

SOURCES OF INFORMATION ON DANISH GOVERNMENT BORROWING AND DEBT Box 1.3

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 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.

Report Section

CHAPTER 2

Sovereign Debt Markets in 2010

The repercussions of the financial crisis triggered a sovereign debt crisis in the euro area in 2010. The government debt of many European countries is mounting rapidly and for the first time in the euro's history, euro area member states have been cut off from the capital markets. Greece and Ireland have received financial assistance from the EU member states and the IMF.

Sovereign debt markets outside Europe were also characterised by considerable volatility in 2010. After many months of strongly declining global interest rates, a reversal was observed in the last months of 2010. Long-term interest rates rose despite the Federal Reserve's extensive purchases of Treasury securities. Market turmoil and uncertainty about the course of interest rates and inflation represent risk factors, given the continued substantial sovereign issuance requirements in 2011 and the coming years.

Against the backdrop of mounting debt and impeded access to the capital markets, many government debt management offices have focus on moving issuance forward and issue bonds with longer maturities. This increase the robustness of government debt policy to future deterioration of market conditions.

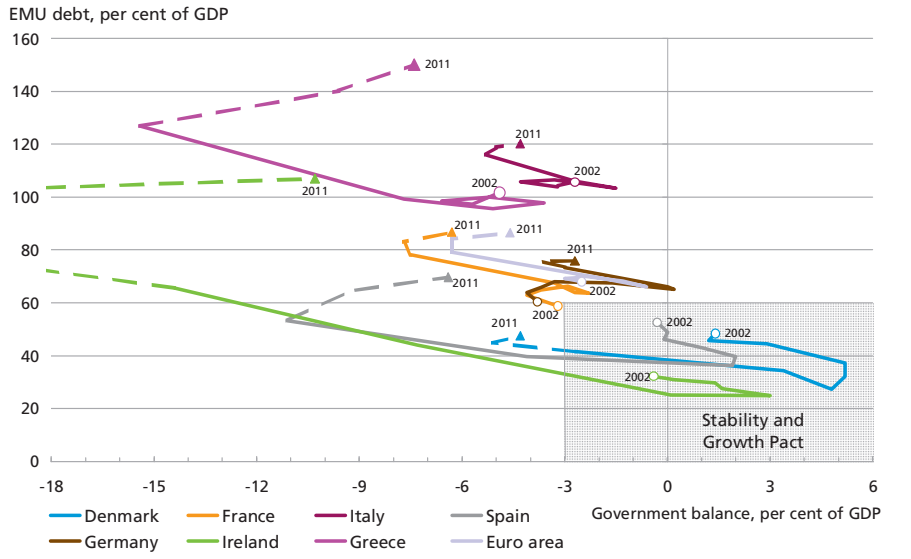
SOVEREIGN DEBT CRISIS IN EUROPE 2.1

The financial crisis and subsequent recession have led to pronounced deterioration of government finances in many European countries, cf. Chart 2.1.1. In some countries, this has caused interest rates to rise strongly. Via a self-reinforcing effect on the deficits, the higher interest rates have reduced the sustainability of future debt dynamics. Moreover, declines in the creditworthiness of sovereign issuers and banks reinforced each other. The escalating yield spreads in the euro area in 2010 have underlined how suddenly these mechanisms can cut off a sovereign borrower from the capital markets. Greece and Ireland have thus received financial assistance from the EU member states and the IMF.

Fears of Greek debt writedown at the beginning of the year

October 2009 saw a substantial upward revision of Greece's government deficit. In the following months, this led to gradual widening of the Greek yield spread and downgrading of Greece on several occasions.

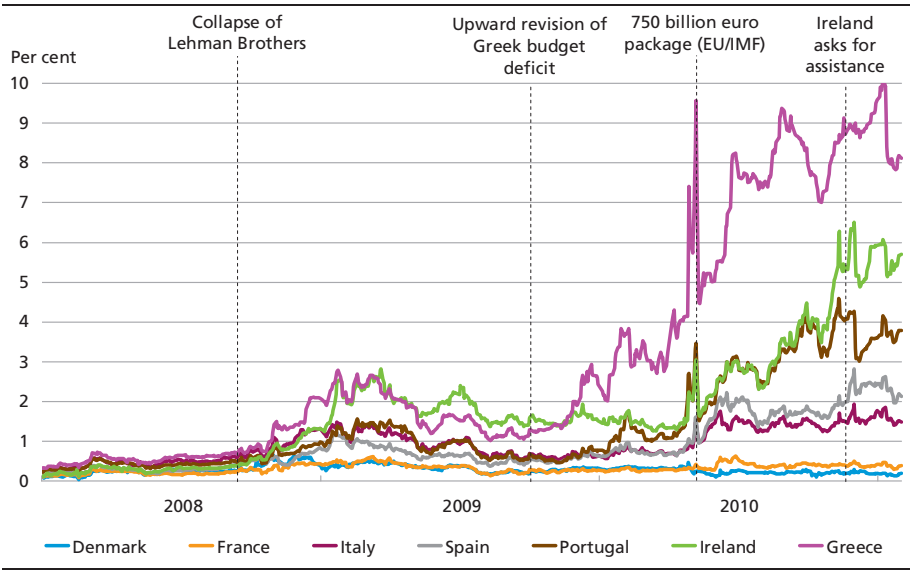
DEBT AND DEFICITS FOR SELECTED EU MEMBER STATES, 2002-11 Chart 2.1.1



Note: Figures for 2010-11 are forecasts, illustrated as the broken lines in the graphs. The deficit forecast for Ireland for 2010 is 32 per cent of GDP.
Source: European Commission autumn forecast, November 2010.

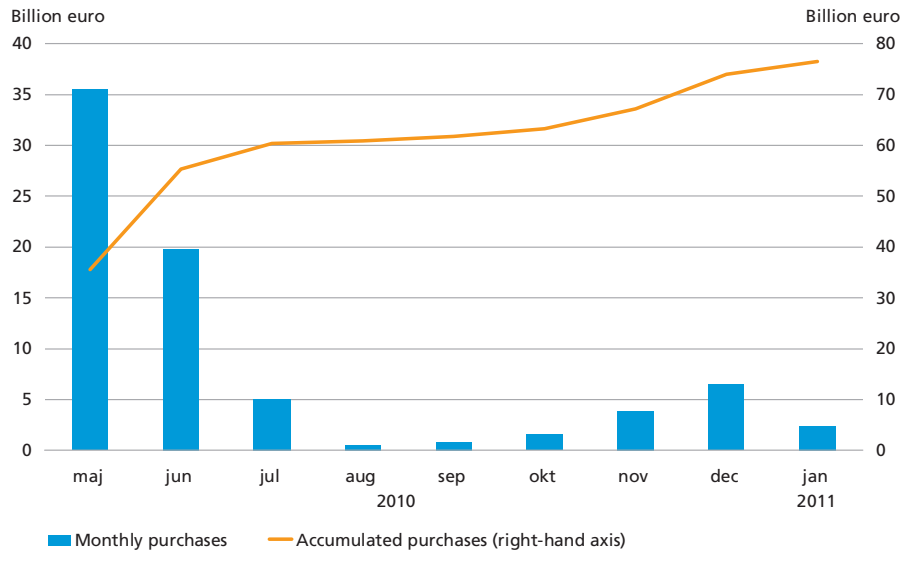
Assessments of fiscal sustainability in Greece and a number of other EU member states changed quickly due to a combination of rapidly growing government deficits and downward revisions of growth expectations. The resulting higher expected debt ratios caused government bond yields to climb, cf. Chart 2.1.2.

10-YEAR YIELD SPREADS TO GERMANY FOR SELECTED EU MEMBER STATES Chart 2.1.2



Source: Bloomberg.

ECB'S PURCHASES OF GOVERNMENT BONDS Chart 2.1.3



Source: ECB.

The risk of uncontrollable debt dynamics increased, and investors began to consider Greek sovereign debt writedown a real risk.

Financial stability packages to EU member states

For a while, different views on the balancing of acute risks and consideration for the monetary union's underlying principles[1] led to doubts among market participants about the cohesion of the euro area. This contributed to further widening of yield spreads and substantial weakening of the euro. In the context of the escalating market turmoil in April 2010, the euro area member states and the IMF reached agreement on an extensive financial assistance package for Greece totalling 110 billion euro.

However, the announcement of the assistance package for Greece was not sufficient to dampen the market turmoil, which in early May spread beyond Europe and contributed to considerable global market volatility. Against this backdrop, the EU finance ministers and the IMF over the weekend of 8 and 9 May agreed on a far-reaching European stability package in the form of loan facilities for the member states.[2]

On 10 May, the European Central Bank, ECB, took the step of intervening via direct purchase of government securities. Initially, the purchases were considerable, but then they decreased strongly, cf. Chart 2.1.3. The

1 Including Article 125 of the EU Treaty, i.e. the no-bail-out clause.
2 These measures are described in more detail in *Recent Economic and Monetary Trends*, Danmarks Nationalbank, Monetary Review, 2nd Quarter 2010, pp. 8-9.

announcement of the stability package and the ECB's purchases of government securities initially dampened both short- and long-term yields in the most exposed euro area member states.

Ireland was the next country to receive financial assistance

The yield spreads began to widen again from August 2010. The turmoil in the Irish sovereign debt market escalated when the Irish Department of Finance in September revised the 2010 budget deficit upwards to 32 per cent of GDP due to expenditure for recapitalisation of crisis-stricken Irish banks that were cut off from borrowing in the market.

In November, Ireland, the EU and the IMF reached agreement on an 85 billion euro loan package, of which the Irish government contributes 17.5 billion euro from the national pension fund and a cash reserve. It was thus necessary to activate the European financial stability facilities, EFSF and EFSM. They have now commenced issuance of bonds, to the tune of 5 billion euro each in January 2011.

Involvement of private investors and proposals for joint issuance

The financial stability packages have bought the euro area member states and the EU time to find more far-reaching structural solutions in response to the sovereign debt crisis.

In connection with the announcement of the assistance package to Ireland on 28 November 2010, the euro area ministers for economic affairs and finance presented their decision that, as from June 2013, all government bond issuance in the euro area must contain collective action clauses, CACs. The CACs are to ensure that a qualified majority of creditors can negotiate debt restructuring on behalf of all creditors. The purpose is to improve transparency in any future debt restructuring to the effect that involvement of private investors becomes a real alternative to further financial assistance from other member states.

Other structural measures are still being discussed. One of these is issuance of jointly guaranteed government bonds. There have been several similar proposals for joint issuance since the introduction of the euro. Most recently, in December 2010, the president of the Eurogroup, Jean-Claude Juncker, and Italy's minister for finance, Giulio Tremonti, tabled a concrete model enabling the individual member states to finance debt for up to 40 per cent of GDP via joint issuance. The proposal entails that debt beyond this limit will not be covered by joint and several liability. In this way the model sets a clear maximum on the obligations of the other member states. However, this proposal has been met with scepticism by several member states.

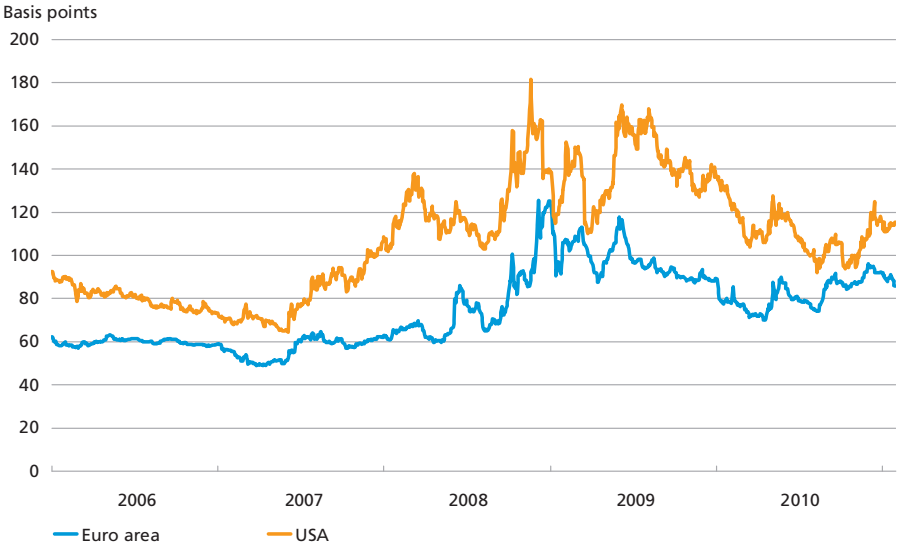
HIGH UNCERTAINTY AND LARGE ISSUANCE REQUIREMENTS 2.2

Strong fluctuations also characterised interest-rate markets outside Europe in 2010. Against the backdrop of weak employment growth and continued low inflation, in November 2010 the Federal Reserve announced new purchases of US Treasury securities for a total amount of 600 billion dollars until mid-2011. The purpose is to stimulate economic activity by exerting downward pressure on medium-term and long-term interest rates.

Despite the announcement of the new purchase programme, long-term interest rates have risen considerably in a global context. The spread between nominal and index-linked government yields in both the US and Europe indicates that the interest-rate increases since the beginning of November 2010 primarily reflect higher real interest rates and only to a lesser extent higher long-term inflation expectations. Higher risk premiums for assuming long-term interest-rate risk can probably explain part of the rise in long-term interest rates.

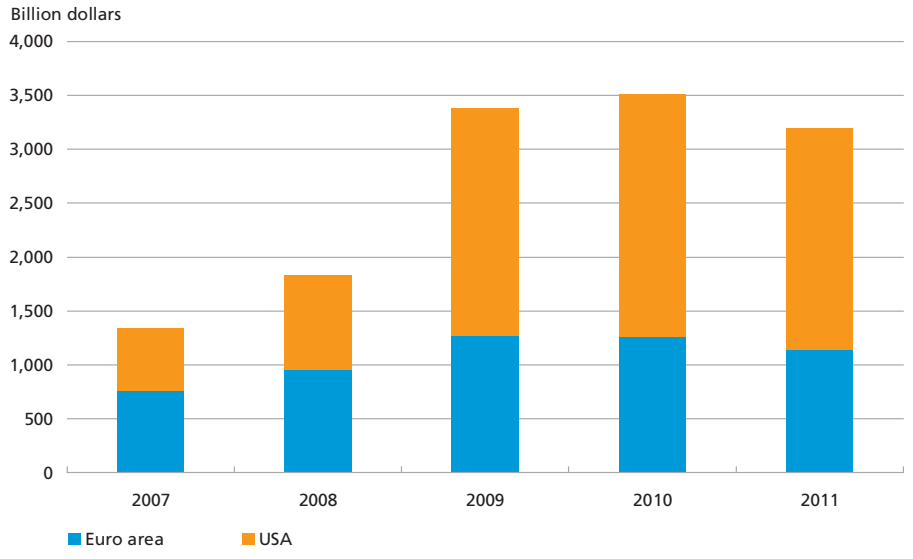
In general, the capital markets have improved markedly for countries with the highest credit standings compared with the peak of the financial crisis at the end of 2008. The turbulence in the sovereign debt markets and the considerable fluctuations in long-term interest rates have, however, contributed to continued high uncertainty. Investor uncertainty about the future course of interest rates measured by the implied volatility is still stronger than before the financial crisis began in mid-2007, cf. Chart 2.2.1.

IMPLIED VOLATILITY FOR 10-YEAR YIELDS Chart 2.2.1



Note: Based on 1-year options on 10-year interest-rate swaps.
Source: Bloomberg.

ISSUANCE OF GOVERNMENT BONDS Chart 2.2.2



Note: Issuance of government bonds. Estimates for 2011.
Source: Barclays Capital and own calculations.

Challenges for government debt management offices remain

Europe and the USA have seen strong growth in the issuance of government bonds in step with the considerable increases in government deficits, cf. Chart 2.2.2. After almost doubling from 2008 to 2009, issuance volumes rose only slightly in 2010. The total issuance volume is expected to decline a little in 2011, but will remain elevated. This means that many sovereign issuers will remain vulnerable to deterioration of market conditions. Moreover, there are indications of considerable pressure on issuance from non-sovereign issuers. The banks are facing refinancing of substantial issuance in the coming years, including a considerable volume of government-guaranteed issuance.

Against the backdrop of mounting debt and impeded access to the capital markets, many government debt management offices have focus on moving issuance forward and issue bonds with longer maturities. This increase the robustness of government debt policy to future deterioration of market conditions.

Furthermore, the implementation of new capital market regulation will present a number of challenges for government debt management offices in the coming years. In the EU talks about introducing new, common rules concerning short selling[1] is taking place. In addition, the im-

[1] See also "Response by Danmarks Nationalbank to the European Commission's public consultation on short selling" at www.nationalbanken.dk.

plementation of new capital adequacy rules for the banks, Basel III, may influence demand for and trade in government securities. Finally, there are measures to clearing standardised swaps through central counterparties, CCPs.[1]

[1] For a general discussion of CCPs, see Søren Korsgaard, *Central Counterparties in the Derivatives Markets*, Danmarks Nationalbank, Monetary Review, 3rd Quarter 2010.

CHAPTER 3

Borrowing in 2010

Danish government bond yields dropped in 2010, and the yield spread to Germany narrowed considerably. Demand was strong at the auctions, where issuance took place at prices equivalent to the secondary market.

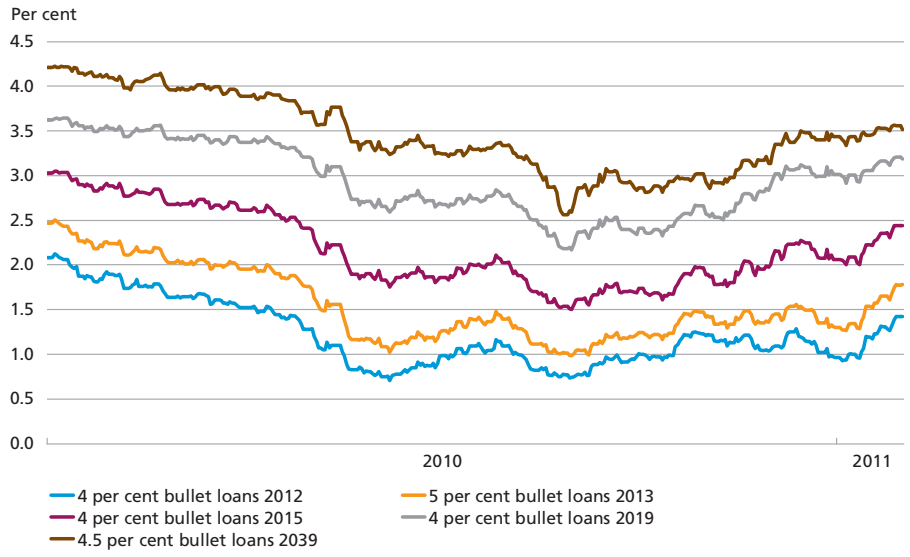
In 2010, the central government sold domestic government securities for a total of kr. 148 billion (20 billion euro), corresponding to excess funding of kr. 40 billion (5.4 billion euro). The excess funding in 2010 reduces the issuance requirement for 2011 by the same amount. The T-bill programme was reopened in order to expand the investor base. During the year, the programme was built up to an outstanding amount of kr. 25 billion (3.4 billion euro).

A 5-year euro loan of 1.5 billion euro was issued in the 2nd half of 2010. The euroloan was issued to a group of more than 100 different investors – a broad-based investor group both in terms of regions and investor types.

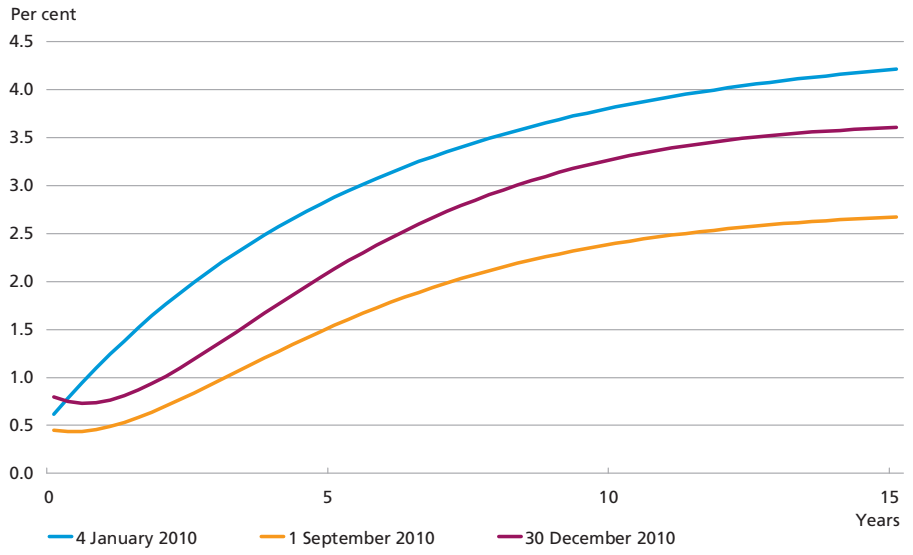
DEVELOPMENT IN DANISH GOVERNMENT YIELDS 3.1

During the spring and summer, Danish government bond yields declined by approximately 150 basis points for all maturity segments, cf. Chart 3.1.1.

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



ZERO-COUPON YIELD CURVES Chart 3.1.2



This was due to e.g. weak growth prospects for the euro area. Furthermore, Denmark benefited from the investors' flight to safety in government bonds due to its high credit rating. In accordance with developments in Germany and other European countries, long-term yields especially rose in the 4th quarter. Consequently, the yield curve steepened towards the end of the year, cf. Chart 3.1.2.

YIELD SPREADS TO GERMANY 3.2

In 2010, yield spreads to Germany narrowed considerably for all maturity segments. In the 2-, 5- and 10-year maturity segments, the spreads narrowed to a level up to 20 basis points, cf. Chart 3.2.1. This matches the level before the financial crisis escalated in September 2008. The narrowing for the 2- and 5-year maturity segments reflects, among other factors, the narrowing of the monetary-policy interest-rate spread between Denmark and the euro area. Moreover the Nordic region has been seen as a safe haven for investors. The narrow yield spread for the long maturities is mainly attributable to the natural demand for high-duration krone-denominated bonds in the domestic pension sector.

DOMESTIC BORROWING 3.3

The turbulence in the sovereign debt markets has increased the focus on refinancing risk. Consequently, in 2010 the central government brought

DANISH GOVERNMENT YIELD SPREADS TO GERMANY — Chart 3.2.1

Source: Bloomberg and Nordea Analytics.

forward the issuance for the year and embarked on financing of the 2011 issuance requirement.

Government securities for a total of kr. 148 billion were sold, whereby the central government has covered kr. 40 billion of the 2011 financing requirement, cf. Table 3.3.1.

Sales of domestic government bonds

In 2010, issuance of domestic government bonds totalled kr. 123 billion, cf. Chart 3.3.1. The average interest rate on the bond issuance was 2.4 per cent.

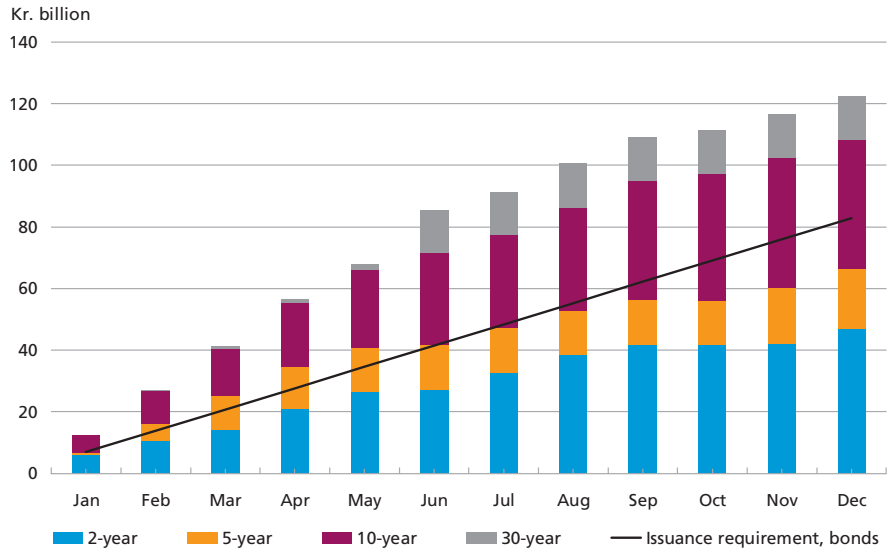
Issuance in the 2-, 5- and 10-year segments was in accordance with the strategic target of a 40-20-40 percentage distribution. Moreover, an auction of the 4.5 per cent 30-year bullet loans 2039 was held in June in response to strong demand. Sales totalled kr. 12 billion.

ISSUANCE AND EXCESS SALES IN 2010 — Table 3.3.1

Kr. billion	
Issuance of government bonds	123
Issuance of T-bills	25
Total issuance	148
The central government's domestic issuance requirement	108
Excess sale in 2010	40

ISSUANCE OF GOVERNMENT BONDS IN 2010 BROKEN DOWN BY MATURITY SEGMENTS

Chart 3.3.1



Note: Issuance and issuance requirement are accumulated over the months.

In 2010, the central government moved forward issuance to a considerable extent and by the end of the 1st half of the year, the issuance requirement in bonds for 2010 had been fulfilled. Consequently, the issuance volume was reduced in the 2nd half of the year.

Government bond auctions

Around 70 per cent of the central government's total bond issuance took place via auctions. Demand was strong at the auctions, as the bids totalled more than double the issuance volume. A high balance of the central government's account and the option to issue on tap in the secondary market provide flexibility at the auctions. Consequently, the average price was equivalent to the mid price in the secondary market and the central government did not pay any issuance premium, cf. Chapter 10.

Reopening of the T-bill programme

The T-bill programme was reopened in 2010 in order to expand the central government's investor base, given the higher government financing requirements. Monthly auctions have been held since February 2010, and by year-end an outstanding amount of kr. 25 billion had been accumulated under this programme. The target at the beginning of the year was to build up the programme to an outstanding amount of around kr. 40 billion. The target for issuance of T-bills was revised downwards during the year as a result of strong demand for bonds.

BUY-BACKS BY THE CENTRAL GOVERNMENT AND NET BUY-BACKS BY THE GOVERNMENT FUNDS IN 2010 Table 3.4.1

Kr. million, market value	Central government	SPF	Preventive Measures Fund	Advanced Technology Foundation	Total buy-backs from the market
4 per cent bullet loans 2010	22,008	-4,269	-115	-41	17,584
6 per cent bullet loans 2011	7,915	-7,099	-28	546	1,334
5 per cent bullet loans 2013	-	-	-	220	220
4 per cent bullet loans 2017	-	7,502	-	1,807	9,309
7 per cent bullet loans 2024	-	837	-	280	1,117
3.5 per cent perpetual	0	-	-	-	0
Securities maturing after 2010	7,915	1,240	-28	2,853	11,980
Government securities, total	29,923	-3,029	-142	2,812	29,564

Note: A negative figure indicates net sales.

BUY-BACKS 3.4

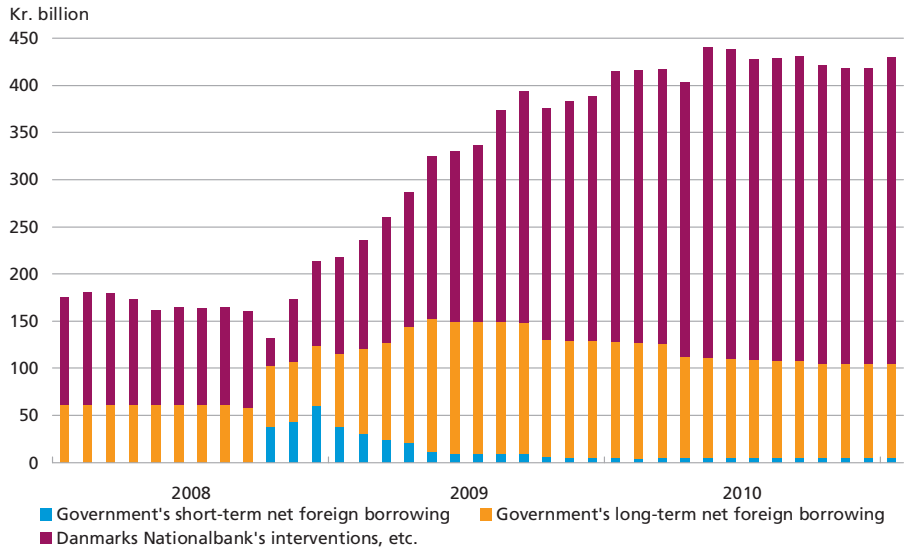
The central government buys back government bonds that are no longer key on-the-run issues. The objective of buying back bonds maturing in the current year is to enable investors to distribute the central government's redemption payments across the year. In addition to buy-backs on tap, the central government held monthly buy-back auctions in 4 per cent bullet loans 2010.

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 smoothes out the redemption profile. Moreover, the three government funds cover their placement needs by buy-backs in the market. In 2010, the Social Pension Fund, SPF, accounted for most of the buy-backs from the market of bonds maturing after 2010. SPF primarily bought 4 per cent bullet loans 2017 in the market financed by sales of 6 per cent bullet loans 2011 to the central government, cf. Table 3.4.1.

FOREIGN BORROWING 3.5

The foreign debt is issued in order to maintain an adequate foreign-exchange reserve. The financial crisis has demonstrated that it is important for the central government to be regularly present in the international capital markets to ensure access to loans denominated in foreign currency. In pursuance of this strategy, the central government issued a euro-denominated loan of 1.5 billion euro in the 2nd half of 2010. During the year, the central government concluded currency swaps from euro into Danish kroner for a corresponding amount. The central government's con-

COMPONENTS OF THE FOREIGN-EXCHANGE RESERVE Chart 3.5.1



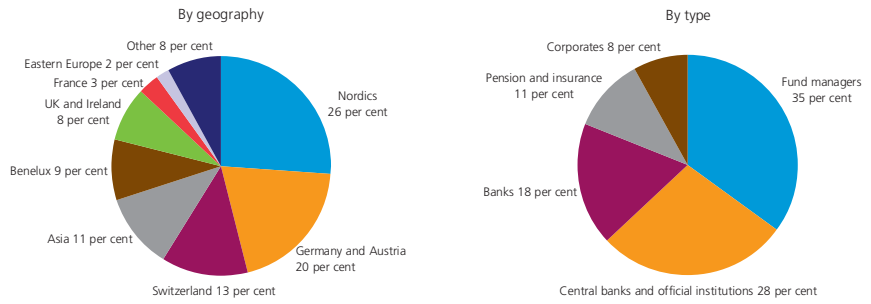
tribution to the foreign-exchange reserve was thus reduced by the foreign redemption payments, totalling kr. 24 billion in 2010, cf. Chart 3.5.1.

Issuance of euro loan in 2nd half of 2010

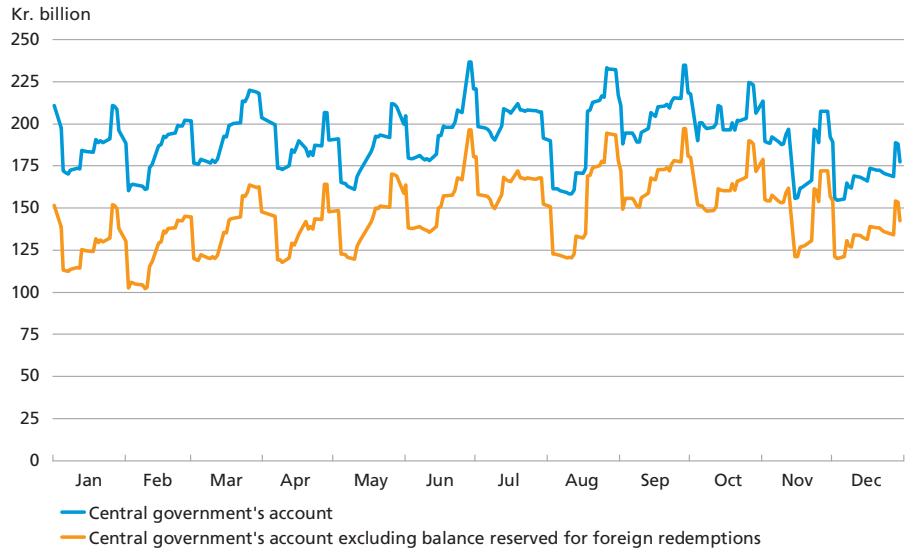
The syndication of the 1.75 per cent euro loan 2015 was effected at an interest rate similar to that of comparable countries, including Finland and the Netherlands. The rate of interest was approximately 10 basis points higher compared with issuance of a 5-year loan in Danish kroner combined with a currency swap to euro. This reflects the build-up of domestic government bonds to larger and more liquid series, among other factors.

The euro-denominated loan was issued to a group of more than 100 different investors – a broad-based investor group both in terms of region and investor type, cf. Chart 3.5.2. Fund managers, central banks and official institutions accounted for the majority of the issuance.

INVESTOR DISTRIBUTION OF THE EURO LOAN Chart 3.5.2



THE CENTRAL GOVERNMENT'S ACCOUNT IN 2010 Chart 3.6.1



THE CENTRAL GOVERNMENT'S ACCOUNT 3.6

The balance of the central government's account averaged kr. 190 billion in 2010, cf. Chart 3.6.1. The value of having substantial liquidity reserves was considerable during the financial crisis and the turmoil in the European sovereign debt markets, as the focus on refinancing risk increased.

The costs for the central government of a deposit at Danmarks Nationalbank cannot be calculated as interest on government issuance less the remuneration of the account. The reason is that the central government manages interest-rate risk by applying a target for the duration of the consolidated government debt portfolio, which includes the account as an asset. A higher balance of the account entails a longer duration of the government debt, which can be offset by means of interest-rate swaps.

A calculation example based on the market situation at end-2010 shows that the costs of increasing the central government's account by kr. 10 billion are approximately kr. 10 million per year for the central government and Danmarks Nationalbank on a consolidated basis, cf. Box 3.1. Government Debt Management finds that the advantages of a higher liquidity reserve are greater than the drawbacks.

OWNERSHIP DISTRIBUTION OF DOMESTIC GOVERNMENT SECURITIES 3.7

The insurance and pension sector is the largest investor group with an ownership share of more than 50 per cent. The insurance and pension sec-

COSTS OF A HIGHER BALANCE OF THE CENTRAL GOVERNMENT'S ACCOUNT Box 3.1

A higher balance of the central government's account results in an increase of an asset, which is offset by an increase of a liability (issuance of government securities). The basis of the calculation is a kr. 10 billion increase in the balance of the central government's account, financed by issuing government bonds in the 2-, 5- and 10-year maturity segments with a 40-20-40 percentage distribution. Transactions of 10.6 billion 2-, 5- and 10-year interest-rate swaps with the same percentage distribution are concluded to keep the duration of the central-government debt unchanged.

The calculations show that the isolated cost for the central government of a kr. 10 billion increase in the central government's account is approximately kr. 20 million a year, cf. the Table. The consolidated yearly cost for Danmarks Nationalbank and the central government is approximately kr. 10 million. Reallocation of the central government's portfolios does not change the central government's interest costs to any material extent if the duration of the total government debt portfolio is kept unchanged.

YEARLY INTEREST COSTS FOR KR. 10 BILLION HIGHER ACCOUNT

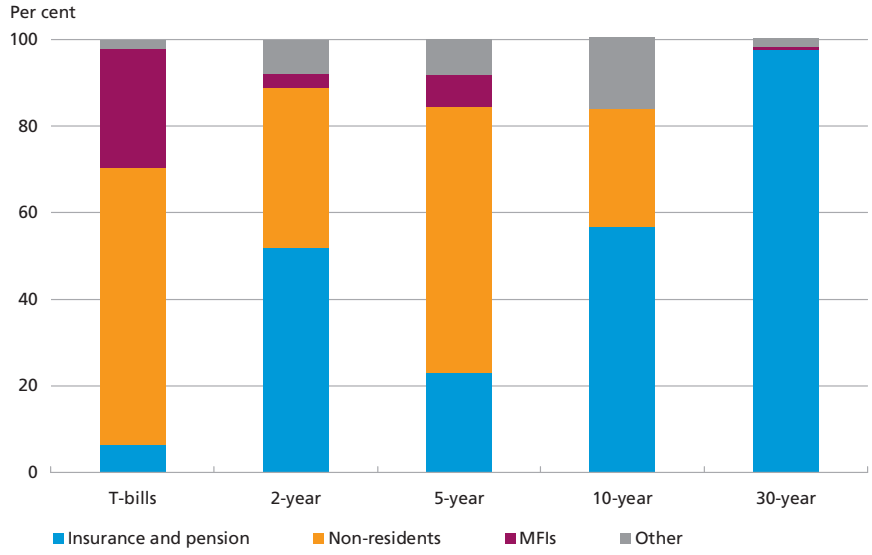
	Interest, per cent	Amount, kr. billion	Costs, kr. million
Central government pays interest on issue	2.12	10.0	212
Central government receives interest on account (current-account interest rate)	0.60	-10.0	-60
Central government pays variable leg of swap (6 month Euribor)	1.23	10.6	130
Central government receives fixed leg of swap	2.48	-10.6	-263
Interest cost for central government			20
Danmarks Nationalbank pays current-account interest rate	0.60	10.0	60
Danmarks Nationalbank saves rate of interest on certificates of deposit	0.70	-10.0	-70
Interest cost for Danmarks Nationalbank			-10
Consolidated interest cost			10

The example is based on the market conditions at end-2010 and assumes unchanged swap spreads. It may provide different results depending on the market development in the various interest elements.

tor's ownership share is highest in the longer maturity segments, cf. Chart 3.7.1. The Danish pension companies have long-term commitments in Danish kroner and therefore have a natural interest in long-term krone-denominated issues.

At the end of 2010, the non-resident ownership share was one third of krone-denominated Danish government bonds. Non-residents primarily own T-bills and government bonds with a maturity of up to five years.

OWNERSHIP SHARES OF DOMESTIC SECURITIES Chart 3.7.1



Note: Ownership shares are calculated on the basis of nominal stocks excluding the portfolios of the government funds.
Source: Danmarks Nationalbank, *Securities Statistics*.

The main explanation for the high non-resident ownership share in the shorter segments is that foreign central banks typically have a mandate to invest in maturities of up to five years.

Responses from the central government's primary dealers and Government Debt Management's investor relations indicate that domestic issuance is to a diversified investor group and that the investor group has been expanded in recent years.

CHAPTER 4

Issuance Strategy 2011

The central government's domestic financing requirement in 2011 is kr. 110 billion (14.8 billion euro). Excess sales of government securities of kr. 40 billion (5.4 billion euro) in 2010 entail a low issuance requirement in 2011. The strategy is for the central government to begin to finance the issuance requirement for 2012 in 2011.

The issuance strategy for government bonds is to build up liquid series on the basis of a 40-20-40 percentage distribution on the 2-, 5- and 10-year maturity segments. The 2-, 5- and 10-year key on-the-run issues will be replaced in 2011. The new bonds will expire in 2014, 2016 and 2021, respectively; years in which none of the existing government bonds expire.

The central government raises foreign loans in order to maintain the foreign-exchange reserve. As a main rule, the government issues debt denominated in foreign currency equivalent to the redemptions on the foreign debt. The central government's foreign redemptions total 4.3 billion euro (kr. 32 billion) in 2011. The strategy for foreign borrowing will be to issue a 5-year euro loan of 1-2 billion euro. Supplementary issuance will primarily take place in euro or dollars in the 2-5-year maturity segments.

ISSUANCE STRATEGY IN THE COMING YEARS 4.1

The long-term strategy for domestic borrowing was presented in *Danish Government Borrowing and Debt 2009*, Chapter 11. This strategy is based on a 40-20-40 percentage distribution on the 2-, 5- and 10-year maturity segments. In addition, a T-bill programme will be built up. The strategy for opening new series is:

- Opening of a 2-year on-the-run issue every year
- Opening of 5- and 10-year on-the-run issues every other year.

When determining the strategy, emphasis has been placed on issuing in internationally recognised benchmark segments, in which series are built up to a volume that is sufficiently large to support liquidity. Issuance in different segments helps to ensure a broad investor base, thereby reducing the risk of declining investor interest in specific segments. In add-

ition, the strategy contributes to ensuring a smooth redemption profile for government debt. This supports a stable issuance policy and reduces the risk that the central government will have to refinance very large volumes in unfavourable market conditions.

ISSUANCE STRATEGY IN 2011 4.2

The central government has a low domestic issuance requirement

The central government's domestic financing requirement in 2011 has been stated at kr. 110 billion, cf. Table 4.2.1. The excess sales of government bonds in 2010 entail a low issuance requirement in 2011.

In view of the large redemptions in 2012, the strategy is to begin to finance next year's borrowing requirement and to buy back domestic debt maturing after 2011. This increases issuance of government bonds in 2011, thereby contributing to the build-up of the new key on-the-run issues.

Issuance of government bonds takes place via regular auctions supplemented with tap sales. A high balance of the central government's account provides for a flexible issuance policy. The central government's cash balance can fully cover the central government's redemptions and estimated budget deficit in 2011.

Replacement of the key on-the-run issues in 2011

The strategy for domestic borrowing in 2011 is to issue bonds in the 2-, 5- and 10-year segments on the basis of a 40-20-40 percentage distribution. In addition, the T-bill programme will be built up to around kr. 40 billion, corresponding to 6 per cent of the central government's domestic liabilities.

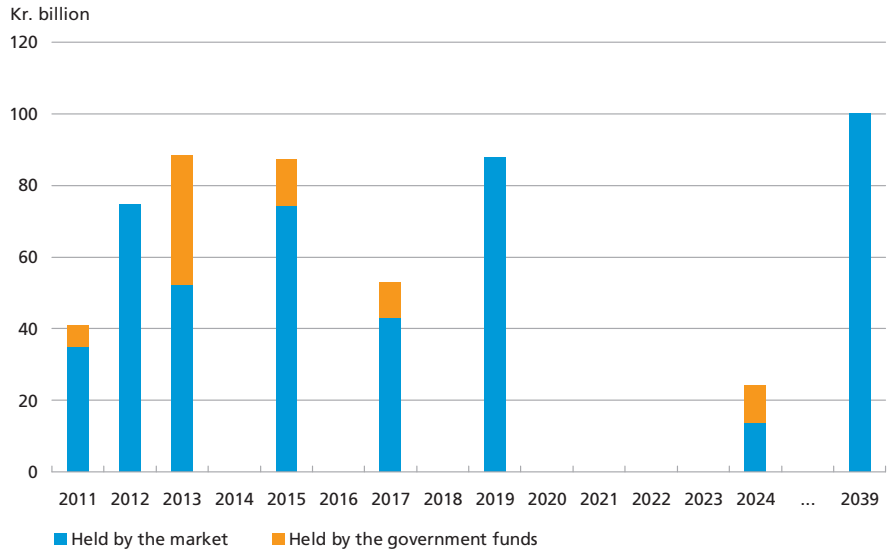
THE CENTRAL GOVERNMENT'S DOMESTIC ISSUANCE REQUIREMENT IN 2011 Table 4.2.1

Kr. billion	
Domestic net financing requirement[1]	50
Redemptions, long-term debt[2]	35
Redemptions, Treasury bills	25
Domestic financing requirement	110
Financing:	
Issuance of domestic government bonds	30
Issuance of Treasury bills	40
Excess sales in 2010	40

[1] *Budget Outlook 3*, December 2010.

[2] Redemptions on long-term debt include the net bond purchases of the three government funds and net payments from currency swaps.

THE CENTRAL GOVERNMENT'S DOMESTIC REDEMPTION PROFILE Chart 4.2.1



Note: Redemption profile, end of 2010, exclusive of Treasury bills. The government funds are the Social Pension Fund, the Advanced Technology Foundation and the Preventive Measures Fund.

The 2-, 5- and 10-year key on-the-run issues will be replaced in 2011. The new bonds will expire in 2014, 2016 and 2021, respectively, years in which none of the existing government bonds expire, cf. Chart 4.2.1.

The replacement of the key on-the-run issues can be summarised as follows:

- A new 10-year on-the-run issue, 3 per cent bullet loans 2021, was opened in an auction on 11 January. This series will be built up to an outstanding volume of around kr. 80 billion.
- A new 5-year on-the-run issue, 2.5 per cent bullet loans 2016, was opened in an auction on 8 February. This series will be built up to an outstanding volume of around kr. 40 billion.
- In the 2nd quarter, a new on-the-run issue will be opened in the 2-year maturity segment, maturing on 15 November 2014. This series will be built up to an outstanding volume of around kr. 40 billion.

Issuance can take place in the 30-year government bond, 4.5 per cent bullet loans 2039, if there is large demand from investors. In the event of special market conditions, issuance will be possible in the other bullet loans.

The key on-the-run issues in 2011 have been summarised in Table 4.2.2.

KEY ON-THE-RUN ISSUES, 2011 Table 4.2.2

Maturity segment	Issuance series	Replacement series
Maturity <1 year	Treasury bills	
2-year segment	5 per cent bullet loans 2013	Bullet loans 2014
5-year segment	2.5 per cent bullet loans 2016	
10-year segment	3 per cent bullet loans 2021	
30-year segment	4.5 per cent bullet loans 2039	

Note: The coupon for the new 2-year key on-the run issue has not yet been determined.

Issuance of bonds

Issuance of government bonds takes place via regular auctions supplemented with tap sales. Dates for the next three months' planned auctions are announced at www.governmentdebt.dk at the start of each month. The government bond(s) to be auctioned will be announced no later than three trading days prior to each auction. The auctions depend on stable market conditions. The terms and conditions for borrowing government bonds and T-bills can be viewed at www.governmentdebt.dk.

Issuance of Treasury bills

Monthly auctions will be held over T-bills with the first banking day of the month as the settlement date. Auctions will be held for all open series. In the auctions with the first banking day in March, June, September and December 2011 as the settlement date, new 9-month T-bills will be opened.

To increase liquidity in the programme, the central government may hold extraordinary auctions to supplement the monthly auctions. In the event of extraordinary market conditions, tap issuance may also take place.

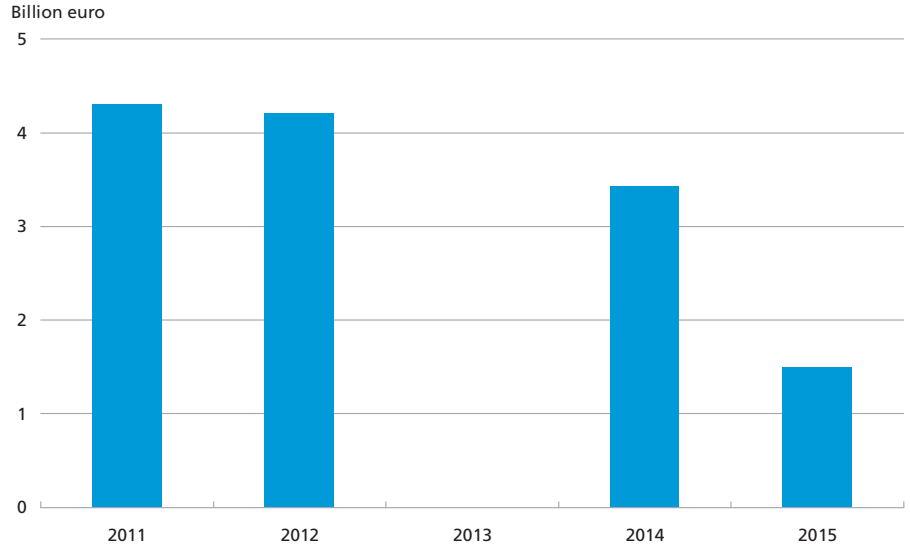
Buy-backs reduce the central government's refinancing risk

The buy-back policy in 2011 is aimed at reducing the central government's refinancing risk. In addition, buy-backs take place in order to meet the placement requirements of the government funds and to ensure a well-functioning market for government bonds.

Buy-back in the market may take place in all domestic and foreign government securities, but as a main rule not in the key on-the-run issues. In this context, it is assessed whether buy-back is advantageous on the basis of an overall evaluation of government debt policy.

Buy-back may take place on tap, in auctions or in switch auctions. Regular buy-back auctions for 6 per cent bullet loans 2011 will be held on the third last banking day of each month.

THE CENTRAL GOVERNMENT'S FOREIGN REDEMPTION PROFILE Chart 4.2.2



Note: Redemption profile, end of 2010, exclusive of Commercial Paper and currency swaps transacted in connection with re-lending to Danish Ship Finance.

Redemption of perpetual bond loans on 1 April 2011

The central government has four perpetual bond loans with a total outstanding volume of kr. 35.6 million. These loans may be redeemed by the government at par, giving three months' notice. The annual coupon rate payable on these loans is 3-3.5 per cent. Under the current interest-rate conditions it is an advantage to redeem the four series. They will be redeemed on 1 April 2011, cf. the announcement *Notice of redemption of perpetual bonds* published on 14 December 2010.

Foreign borrowing in order to maintain the foreign-exchange reserve

The central government raises foreign loans in order to maintain the foreign-exchange reserve. As a main rule, the government issues debt denominated in foreign currency equivalent to the redemptions on the foreign debt. The central government's foreign redemptions total 4.3 billion euro (kr. 32 billion) in 2011, cf. Chart 4.2.2.

The strategy for foreign borrowing is as follows:

- Issuance of a 5-year euro loan of 1-2 billion euro
- Supplementary issuance primarily in euro or dollars in the 2-5-year maturity segments
- Continued issuance of Commercial Paper on a limited scale to keep the programmes liquid.

KINGDOM OF DENMARK'S RATING 4.3

The central-government domestic and foreign debt has the highest rating from Moody's (Aaa), Fitch Ratings (AAA) and Standard & Poor's (AAA).

In December 2010, Moody's affirmed the central-governments Aaa rating. Moody's stressed the following: "*The government's top-notch ratings reflect an assessment of very high economic and institutional strength, characterized by a dynamic and diversified economy, a wealthy population, a stable macroeconomic and political environment and a healthy government balance sheet*".

In the report from July 2010, Fitch Ratings affirmed Denmark's AAA rating. The rating was accompanied by the following rationale: "*A decade of fiscal surpluses averaging over 2 per cent of GDP a year has left Danish public finances among the strongest of its 'AAA' peers. Denmark is in a strong position to reverse the recent deterioration of its budget balance, and continues to be well placed to deal with long-term demographic challenges*".

In the report from December 2010, Standard & Poor's affirmed the long-term AAA rating and short-term A-1+ rating for Danish government securities with an unchanged stable outlook. It was motivated by: "*Robust track record of prudent macroeconomic policies and structural reforms, underpinning low inflation and a stable currency*".

Analytical reports and specific ratings on individual government securities are available on the websites[1]:

- www.moodys.com,
- www.fitchratings.com,
- www.standardandpoors.com.

[1] The latest rating reports regarding Kingdom of Denmark from Moody's, Fitch Ratings and Standard & Poor's are available at www.governmentdebt.dk.

CHAPTER 5

Government Debt and Interest Costs

In 2010, the central-government debt increased by kr. 85 billion (11.4 billion euro) as a result of the government deficit. At end-2010, the central-government debt amounted to kr. 386 billion (51.8 billion euro) corresponding to 22 per cent of GDP. Denmark's debt remains low compared with that of other EU member states.

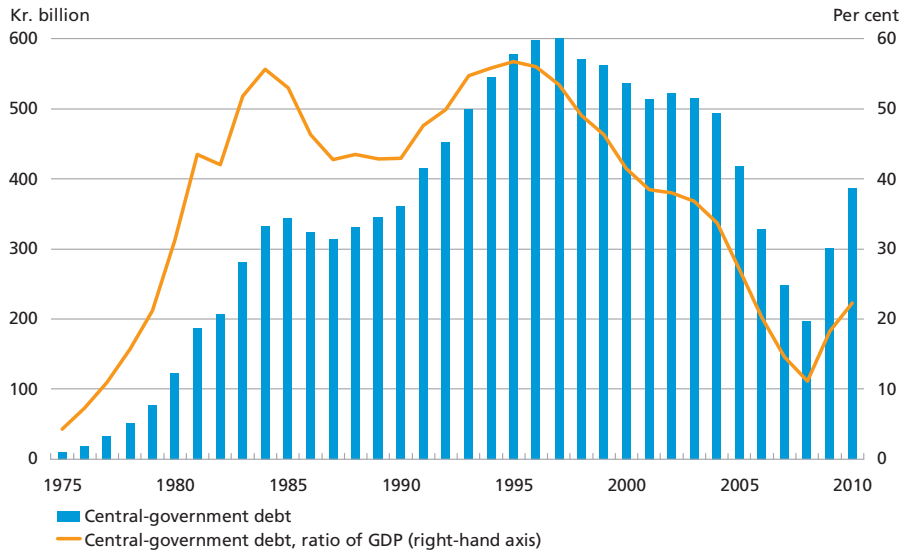
In 2010, central-government interest costs totalled kr. 18 billion (2.4 billion euro), corresponding to 1 per cent of GDP. This is an increase of kr. 2 billion on 2009. Interest costs adjusted for interest revenue from re-lending and capital injections into credit institutions accounted for 0.6 per cent of GDP – unchanged on 2009.

GOVERNMENT DEBT ROSE IN 2010 5.1

In 2010, government debt increased by kr. 85 billion, cf. Table 5.1.1. At year-end, the central-government debt amounted to kr. 386 billion, corresponding to 22 per cent of GDP. Government debt per capita was kr. 69,000.

As a result of government surpluses, central-government debt fell for a number of years from the mid-1990s until 2008, when government debt

CENTRAL-GOVERNMENT DEBT, 1975-2010 Chart 5.1.1



CENTRAL-GOVERNMENT DEBT AT NOMINAL VALUE — Table 5.1.1

Kr. billion, end of year	2008	2009	2010
Domestic debt	429.5	487.9	576.4
Foreign debt	133.1	139.6	114.7
Central government's account[1]	-258.1	-210.9	-177.3
Social Pension Fund[2]	-97.4	-102.6	-113.5
Advanced Technology Foundation	-8.3	-10.4	-12.1
Preventive Measures Fund	-2.5	-2.2	-2.0
Central-government debt	196.2	301.5	386.3
Capital injections into credit institutes	•	-46.2	-45.6
Re-lending to the Financial Stability Company	-4.4	-29.0	-24.5
Other re-lending	-46.1	-53.3	-55.4
Central-government debt adjusted for lending	145.7	173.1	260.7

Note: For 2010, the account is compiled in accordance with Danmarks Nationalbank's monthly balance sheet.
Source: Central-government accounts 2008 and 2009. For 2010, figures are provisional.
[1] At end-2008 and end-2009, the balance of the central government's account included kr. 26 billion and kr. 16 billion, respectively, due to a majority of SPF's purchase of mortgage bonds in December being settled at the beginning of January.
[2] The value of SPF's portfolio at end-2008 and end-2009, including mortgage bonds with settlement in January 2009 and 2010, was kr. 124 billion and kr. 118 billion, respectively.

was 11 per cent of GDP, cf. Chart 5.1.1. Most of the increase in the debt in 2009 is attributable to capital injections into the financial sector and re-lending to the Financial Stability Company, while the increase in 2010 is mainly attributable to a government budget deficit.

The debt at market value increased more in view of falling interest rates

The government debt at market value was kr. 437 billion at end-2010. This is an increase of kr. 112 billion on end-2009, cf. Table 5.1.2.

CENTRAL-GOVERNMENT DEBT AT MARKET VALUE — Table 5.1.2

Kr. billion, end of year	2008	2009	2010
Domestic debt	473.9	521.9	640.9
Foreign debt	132.4	139.0	113.8
Central government's account	-258.1	-210.9	-177.3
Social Pension Fund[1]	-107.8	-111.1	-124.6
Advanced Technology Foundation	-8.9	-11.1	-13.2
Preventive Measures Fund	-2.6	-2.3	-2.2
Central-government debt at market value	228.9	325.5	437.4
Capital injections into credit institutes	•	-46.2	-45.6
Re-lending to the Financial Stability Company	-4.5	-30.3	-26.5
Other re-lending	-50.7	-57.3	-61.1
Central-government debt adjusted for lending	173.7	191.8	304.2

Note: Market value is calculated on the basis of the official stock-exchange prices at year-end. Unlisted instruments, e.g. swaps, are priced at market value in accordance with current market interest rates.
Source: Central-government accounts 2008 and 2009. For 2010, figures are provisional.
[1] The market value of SPF's portfolio at end-2008 and end-2009, including mortgage bonds with settlement in January 2009 and 2010, was kr. 134 billion and kr. 127 billion, respectively.

INTEREST COSTS ON THE CENTRAL-GOVERNMENT DEBT — Table 5.2.1

Kr. billion	2008	2009	2010
Interest costs including interest-rate swaps			
Domestic debt	19.1	21.9	21.7
Foreign debt	2.9	2.7	1.0
Interest income			
Central government's account[1]	-4.2	-1.9	-
Social Pension Fund	-5.8	-6.4	-4.4
Advanced Technology Foundation	-0.3	-0.4	-0.4
Financing Fund	0.0	•	•
Preventive Measures Fund	-0.1	-0.1	-0.1
Interest costs on the central-government debt	11.6	15.7	17.9
Interest income from re-lending	-1.8	-2.4	-2.9
Interest income from capital injections	•	-2.4	-4.4
Interest costs adjusted for lending	9.8	10.9	10.5

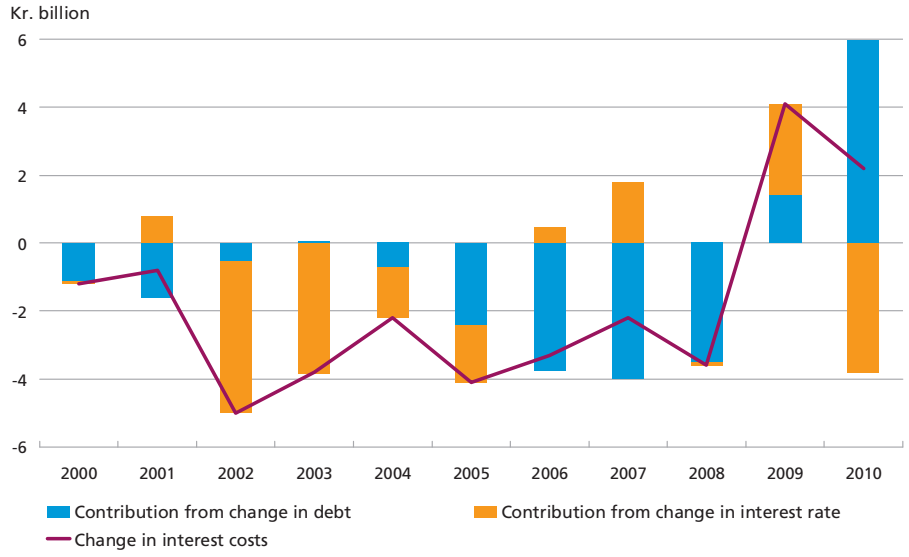
Note: A positive figure indicates interest costs; a negative figure interest income.
Source: *Central-government accounts* 2008 and 2009. For 2010, figures are provisional.
[1] As of 11 May 2009 the interest on the account was lowered from the discount rate to the discount rate less 1 percentage point, but not less than 0 per cent. From 1 January 2011, the account accrues interest at the current-account rate.

INTEREST COSTS ON THE CENTRAL-GOVERNMENT DEBT ROSE 5.2

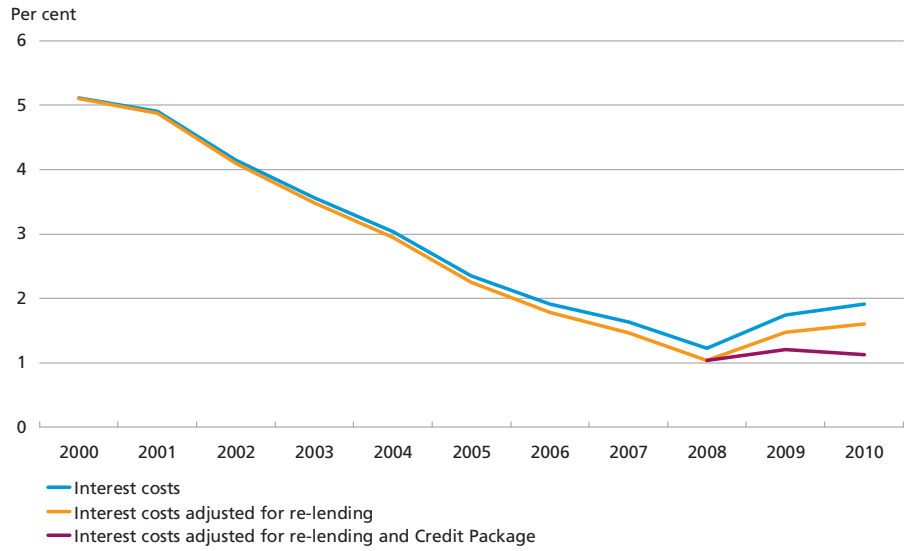
In 2010, interest costs on government debt totalled kr. 17.9 billion, corresponding to 1 per cent of GDP. This is an increase of kr. 2.2 billion on end-2009, cf. Table 5.2.1.

A breakdown of the development in interest costs shows that the increase in 2010 was attributable to rising debt, cf. Chart 5.2.1. This is offset

BREAKDOWN OF ANNUAL CHANGE IN INTEREST COSTS — Chart 5.2.1



INTEREST COSTS AS A PERCENTAGE OF GOVERNMENT REVENUE Chart 5.2.2



Source: Ministry of Finance and own calculations.

by lower yields on new government issues and low interest payments on the central government's portfolio of interest-rate swaps. Part of the increase in interest costs is attributable to non-remuneration of the balance of the central government's account at Danmarks Nationalbank in 2010.[1]

Seen in relation to government revenue, interest costs have fallen considerably over a number of years, cf. Chart 5.2.2. This ratio is an indicator of the proportion of government resources allocated to interest payments.

PUBLIC DEBT MEASURES 5.3

International comparisons of sovereign debt levels operate with EMU debt, a gross debt concept that comprises the major debt items for general government, cf. Box 5.1. Unlike in the compilation of government debt, the central government's account and the mortgage bonds held by the government funds are not offset against EMU debt. Consequently, EMU debt increases if the central government brings forward domestic issuance and deposits the revenue in its account. The balance of the central government's account corresponds to 10 per cent of GDP at end-2010, and SPF's portfolio of mortgage bonds corresponds to 3 per cent of GDP.

[1] The lower remuneration of the central government's account has increased Danmarks Nationalbank's profit and thus the amount payable to the central government. The latter amount is not included in the calculation of the central government's interest income.

DEBT MEASURES Box 5.1

Central-government debt
Compiled as the nominal value of domestic and foreign debt less the balance of the central government's account with Danmarks Nationalbank and the assets of the Social Pension Fund, the Advanced Technology Foundation and the Preventive Measures Fund. In relation to re-lending, the compilation of central-government debt only includes liabilities, i.e. government issues to finance re-lending.

EMU debt
EMU debt is compiled in accordance with the EU Treaty. EMU debt is compiled at nominal value and comprises the debt of the central, regional and local governments as well as social security funds. The debt is compiled on a gross basis, but the general-government sector may consolidate the debt with claims on itself. This means that the government securities portfolios of the government funds are deducted from the debt. On the other hand, SPF's portfolio of mortgage and index-linked bonds and the balance of the central government's account at Danmarks Nationalbank are not deducted.

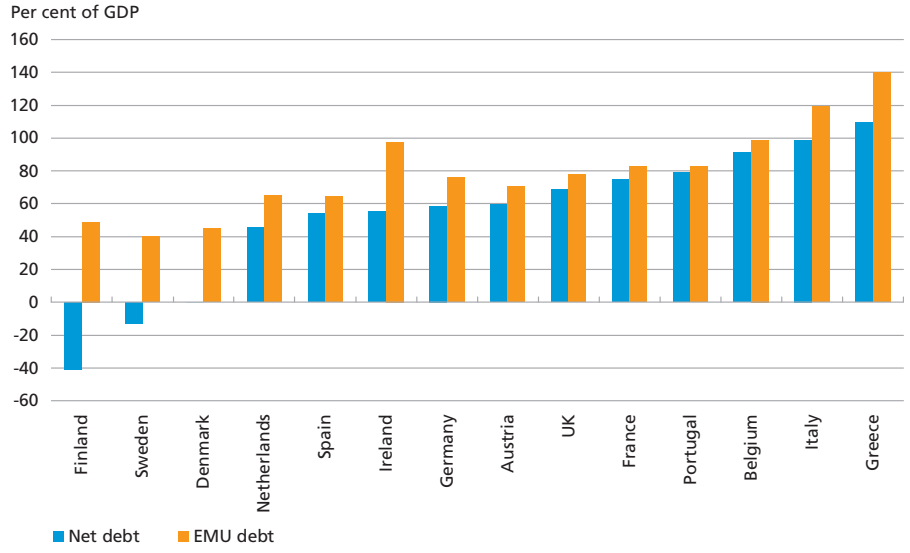
Net general-government debt
Comprises all financial assets and liabilities of the central, regional and local governments as well as social security funds. The net general-government debt is compiled at market value and is thus affected by value adjustments of general-government assets and liabilities. The central government's asset side includes the account at Danmarks Nationalbank, all assets in government funds, re-lending to government-guaranteed companies, capital injections into banks and mortgage banks and the central government's equity portfolio, e.g. shareholdings in DONG Energy, Copenhagen Airports, Post Danmark (the Danish postal service) and Scandinavian Airlines, SAS.

EMU debt has risen, but remains low in an international context

According to the EU Treaty, as a general rule the general-government deficit of member states may not exceed 3 per cent of GDP, and the EMU debt as a general rule may not exceed 60 per cent of GDP. The government deficit in Denmark is expected to exceed the threshold of 3 per cent of GDP in 2010 and 2011. As a result, in July 2010, Denmark received a recommendation to reduce the deficit to below 3 per cent of GDP as soon as possible and by 2013 at the latest and to implement average annual fiscal tightening measures of at least 0.5 per cent of GDP in the period 2011-2013. In January 2011, the European Commission announced that Denmark's fiscal-policy measures are in accordance with the recommendation.

EMU debt was kr. 753 billion at end-2010, corresponding to 43.3 per cent of GDP, cf. *Budget Outlook 3*, December 2010. This means that EMU debt remains within the limits set by the Stability and Growth Pact. Despite increasing EMU debt, Denmark's debt remains low compared with that of other EU member states, cf. Chart 5.3.1.

NET DEBT AND GROSS DEBT OF EU MEMBER STATES, END-2010 Chart 5.3.1

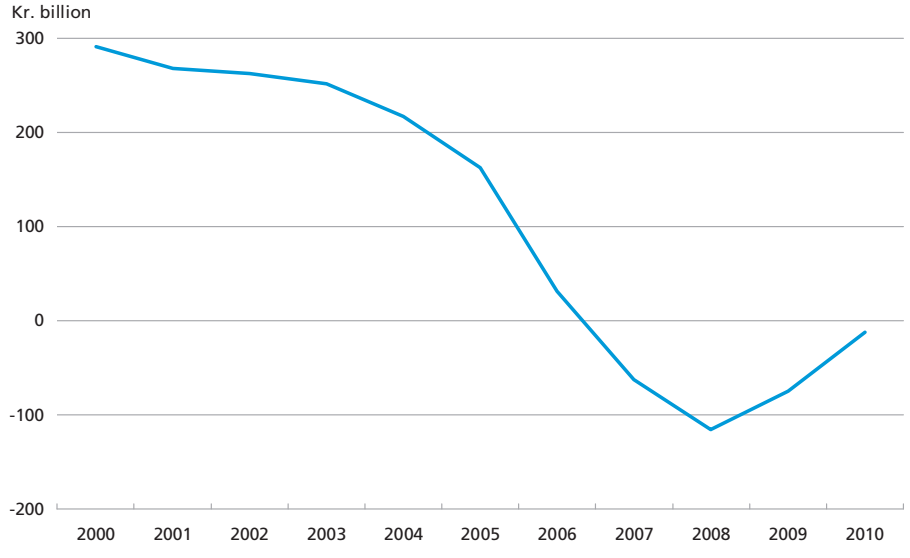


Source: IMF World Economic Outlook, October 2010 and European Commission's autumn forecast, November 2010.

The general government's net worth is around zero

The starting point for assessing the long-term sustainability of government finances is net government debt, which comprises all financial assets and liabilities of the general-government. The general government's net debt was around zero at the end of 2010, cf. Chart 5.3.2.

NET GENERAL-GOVERNMENT DEBT Chart 5.3.2



Note: The 2010 figure is an estimate from *Budget Outlook 3*, December 2010.
Source: Statistics Denmark and Ministry of Finance.

CHAPTER 6

Issuance of and Trading in Danish Government Securities

The market for Danish government securities functioned well in 2010. Denmark's high credit standing is reflected in a low yield spread between Danish and German government securities. The market risk on bonds can be hedged efficiently due to the high degree of covariation between Danish and German government securities, which supports liquidity in the Danish market.

The primary dealers have met the new requirements for market making, and bid-ask spreads were stable at around 10-15 ticks. To enhance competition, banks have been receiving expanded monthly assessments of their price quotation since late 2010. The group of primary dealers in government bonds has increased to 12 banks.

In 2010, government bonds were mainly issued via auctions. The central government has not paid issuance premiums in the auctions despite a significant issuance volume.

PRIMARY DEALER SYSTEM FOR DANISH GOVERNMENT SECURITIES 6.1

Danish government bonds are issued to and bought back from banks that have entered into primary dealer contracts with the central government. Under these contracts, the banks can act as counterparties in the central government's issuance and buy-back transactions. The key obligation of the primary dealers is to ensure effective price discovery (market making), cf. Box 6.1.

Market making by primary dealers gives market makers an opportunity to observe market developments and execute transactions at prices and for volumes known in advance. Effective price discovery boosts tradability on the electronic trading platforms and facilitates trading in the OTC market. This increases investor interest in government securities and contributes to lower financing costs for the central government.

Efficient price discovery in government securities also supports tradability elsewhere in the financial market. On the basis of the prices for government securities, it is possible to estimate a government yield curve that can be used as a benchmark for pricing other types of securities or financial instruments.

PRIMARY DEALER CONTRACTS Box 6.1

Government Debt Management has concluded primary dealer contracts for, respectively, government bonds and Treasury bills. The rights and obligations of primary dealers are defined on the basis of consultation with the group of primary dealers. The contracts can be found at www.governmentdebt.dk. In principle, the primary dealer contracts for Danish government securities contain the same elements as equivalent contracts in other EU member states.

The principal rights of primary dealers are:

- To use the title Primary Dealer in Danish government bonds/T-bills
- To act as counterparties in the central government's issuance and buy-back transactions
- To use the securities lending facilities of the central government and the Social Pension Fund.

The principal obligations of primary dealers are:

- Current quotation of prices for government bonds for at least 5 hours on trading days between 9.00 a.m. and 4.30 p.m. within the current framework, cf. *Danish Government Borrowing and Debt 2009*, Chapter 12
- To be an active counterparty in issuance and buy-back transactions
- Promotion of Danish government securities
- To support a well-functioning market for Danish government securities.

Primary dealers in T-bills must quote prices within predefined spreads for all T-bills with a remaining term to maturity of more than 1 month.

More primary dealers in Danish government securities

In 2010, many government debt management offices in Europe expanded the group of primary dealers. The large supply of government securities, wider bid-ask spreads and lower activity in other banking areas have led to increasing interest in the market for government securities from primary dealers. At the same time, government debt management offices have focused on building up a broader distribution channel in view of a high issuance requirement and periods with more restricted access to the market.

As regards Danish government bonds, Government Debt Management has concluded primary dealer contracts with 12 banks, cf. Table 6.1.1. In 2010, Deutsche Bank, HSBC and Spar Nord Bank joined the group. A broad group of primary dealers boosts interest in Danish government securities and supports competition in connection with issuance and buy-backs by the central government.

In 2010, primary dealer contracts were established for Treasury bills, T-bills, in connection with the re-opening of this programme. At the beginning of 2011, five banks had entered into such contracts.

PRIMARY DEALERS AND MARKET TAKERS, BEGINNING OF 2011 Table 6.1.1

Primary dealers in government bonds	Primary dealers in T-bills	Market takers in government securities
Barclays Bank	Danske Bank	Bank of America Merrill Lynch
BNP Paribas	Nordea	Citigroup
Danske Bank	Nykredit Bank	DZ Bank
Deutsche Bank	SEB	Jyske Bank
HSBC	Sydbank	Royal Bank of Scotland
J.P. Morgan		
Morgan Stanley		
Nordea		
Nykredit Bank		
SEB		
Spar Nord Bank		
Sydbank		

Besides the primary dealers, five banks participate in the market for government securities as market takers. A market taker can trade at prices quoted by primary dealers, but cannot itself quote prices.

POSITIVE EXPERIENCE FROM AUCTIONS 6.2

Since late 2009, government bonds have been sold via regular auctions supplemented with tap sales. Experience with this system has been positive. In the auctions, investors can buy a large amount of government bonds directly from the central government by bidding at the auction via a primary dealer. At the same time, the banks are able to steer clear of the risk linked to holding bonds on their balance sheets.

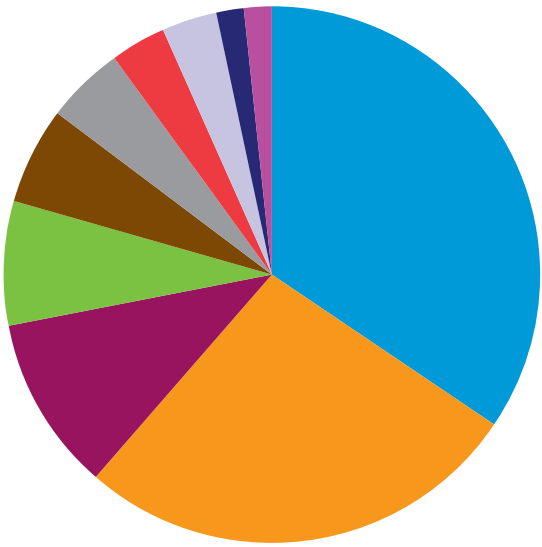
Issuance via tap sales makes it easier for banks to meet the demand from investors outside the auction days. In 2011, government bonds will continue to be issued via auctions, supplemented with tap sales.

Government bond auctions in 2010

In 2010, bonds for kr. 85 billion were issued in 19 auctions, corresponding to 70 per cent of the total issuance volume for bonds. The four largest counterparties purchased around 80 per cent of the total issues, cf. Chart 6.2.1.

Demand has been high in the auctions, the total bid volume being twice as high as the volume allocated. On average, allocation has taken place at the mid price in the secondary market, so the government has not paid any issuance premium. This reflects the strong demand, and the fact that the policy of covering the financing requirement well in advance has provided flexibility to vary the issuance volume in the auctions. Issuance was brought forward, and consequently the volume was stepped down in the 2nd half of the year, cf. Chart 6.2.2.

BOND SALES BY AUCTION IN 2010 BROKEN DOWN BY PRIMARY DEALERS Chart 6.2.1

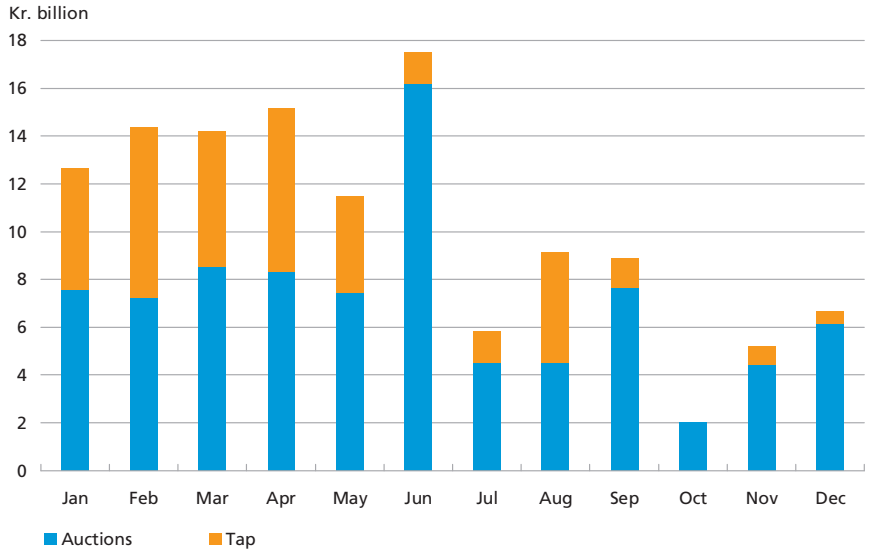


Note: The primary dealers have been anonymised.

Auction method

At least three days before an auction the government bonds to be issued will be announced, cf. Box 6.2. In the 2nd half of 2010, the auction calendar was extended to include tentative dates for the next three months, rather than just one month. This reflects a wish to give investors a better opportunity to plan their investments.

ISSUANCE IN 2010 BROKEN DOWN BY AUCTIONS AND TAP SALES Chart 6.2.2



TURNOVER IN DANISH GOVERNMENT SECURITIES 6.3

In the interdealer market, Danish government securities are traded on, inter alia, MTS Denmark and ICAP/BrokerTec. Besides the interdealer market, trading in Danish government securities takes place on a number of other electronic platforms, e.g. Bloomberg, Bondvision and TradeWeb, which are primarily aimed at end-investors. In addition to electronic trading in government securities, considerable trading takes place via telephone. This is often used in situations where a market participant wishes to execute a large-volume transaction.

Turnover on the electronic trading platforms

Turnover in Danish government securities on the electronic trading platforms rose throughout 2009 and the level remained stable in 2010, cf. Chart 6.3.1. Investors can effectively hedge their interest-rate risk via German government securities or German interest-rate futures due to the high correlation between the markets. Consequently, investors have had less need to adjust their portfolios by trading in Danish securities, compared with the more volatile markets.

AUCTION METHOD FOR DANISH GOVERNMENT BONDS Box 6.2

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

Announcement and auction calendar

An auction calendar is published with preliminary auction dates for the next three months. At least three days before an auction the government bonds issued will be announced. Auctions and auction results are announced via DN News[1] and published at www.governmentdebt.dk. The auctions depend on stable market conditions.

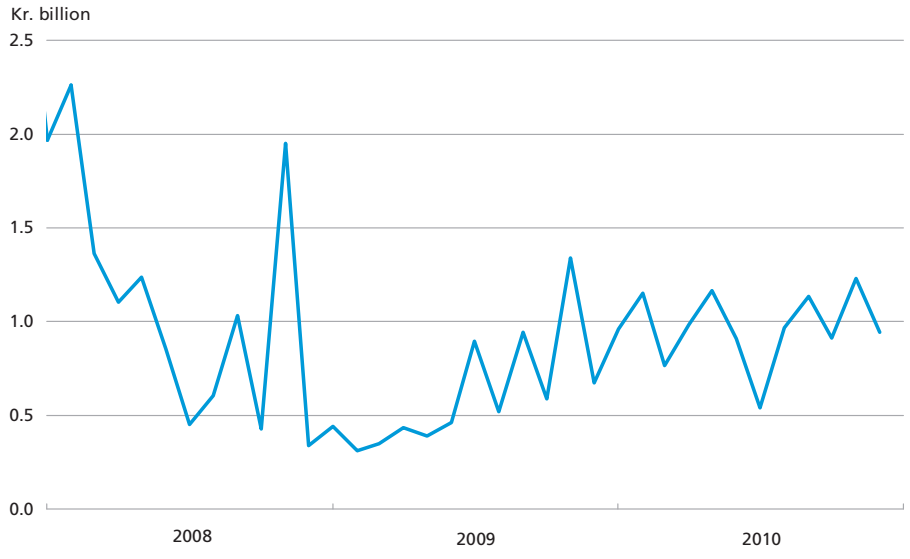
Bids and allocation

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, so that all investors with bids at the cut-off price are allotted the same share of their bids. An auction can be completed without allotment.

In the auctions, the primary dealers state their volumes and prices up to 3 decimals. Each primary dealer may submit a broad range of bids. The deadline for submitting bids on the auction day is 10.15 am. A cut-off price is then fixed by Government Debt Management as quickly as possible, and within 10 minutes after the deadline. At the auctions in 2010, the cut-off price and allotment volumes were fixed within five minutes on average.

[1] Danmarks Nationalbank's system for distribution of information to subscribing news agencies.

AVERAGE DAILY TURNOVER IN GOVERNMENT SECURITIES Chart 6.3.1



Note: The electronic trading platforms are BondVision, MTS Denmark, Nasdaq OMX and TradeWeb.
Source: Reports from the respective trading platforms.

MARKET MAKING IN DANISH GOVERNMENT SECURITIES 6.4

With effect from 2010, the market maker system was amended so that the requirements imposed on each primary dealer depend on the average bid-ask spread for all primary dealers. Under the new setup, requirements are automatically adapted to market conditions.

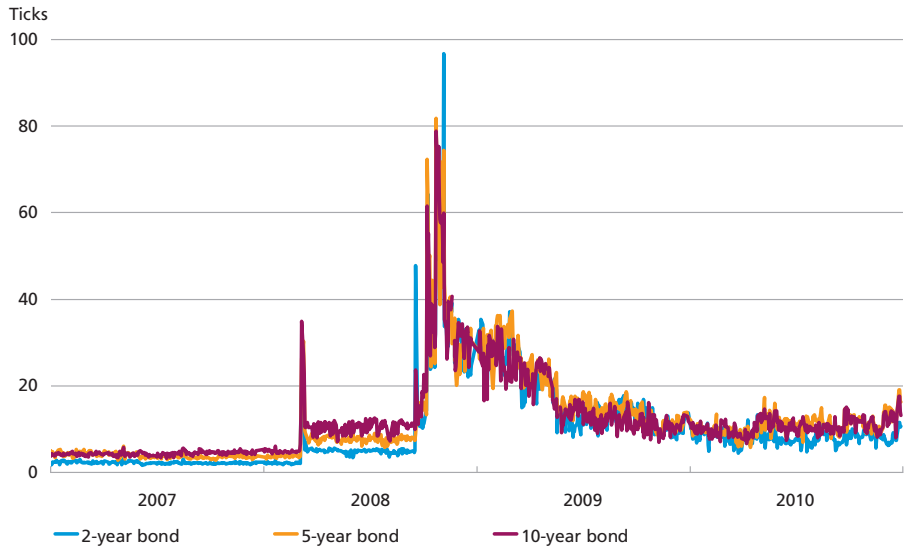
The bid-ask spreads were stable at around 10-15 ticks on MTS Denmark, the platform used for market making, cf. Chart 6.4.1. Market making by primary dealers is supported by the opportunity for effective hedging of positions in Danish bonds, primarily via the market for German government securities or futures.

The bid-ask spreads should be viewed in the context of market depth. The market depth reflects the volume that can be traded at the best price, and thereby the volume of Danish government securities that can be traded without affecting the price. The depth on MTS Denmark increased considerably in 2010 compared with 2009 and averaged kr. 120, 110 and 70 million for 2-, 5- and 10-year benchmark securities, respectively.

Ongoing evaluation of market making enhances competition

Once a month, the primary dealers receive a report on compliance with the market making requirements. The price-quoting requirement is based on the average spread for all primary dealers, cf. *Danish Government Bor-*

DAILY TIME-WEIGHTED SPREADS ON MTS DENMARK Chart 6.4.1



Note: Bid-ask spreads are stated as averages of the day's best bid and ask prices. 1 tick corresponds to 0.01 price quotation points.
Source: MTS Denmark.

rowing and Debt 2009, Chapter 12. The banks generally met the market making requirements in 2010.

To boost competition between primary dealers, Government Debt Management has expanded its monthly reporting to the banks. Since late 2010, the individual primary dealers have been able to view their price quotation relative to the lowest, highest and average primary dealers in each security, cf. Box 6.3. Government Debt Management holds information about the prices quoted by all primary dealers and will in future use this information more actively when evaluating the banks.

INFORMATION TO PRIMARY DEALERS ON MARKET MAKING Box 6.3

On a monthly basis the following bid-ask spreads are calculated for the primary dealers for each security, based on the five hours during each day when the bank has the lowest spread:

- The average spread for all primary dealers
- The spread for the primary dealer with the highest average spread
- The spread for the primary dealer with the lowest average spread
- The average spread for the individual primary dealer.

If a primary dealer has not quoted prices for a security for five hours on a given day, the spread is adjusted upwards. Every month all primary dealers receive information on the most recent and previous months of the year. It is not possible to read the spreads for other primary dealers.

Platforms for the interdealer market in 2011

Every year, the primary dealers evaluate the infrastructure of the Danish market for government securities, including the platforms chosen for market making. In the annual report[1] from the end of 2010, the recommendation was to retain a structure with market making on a single platform in the interdealer market in 2011.

The assessment was that fragmentation of the Danish market as a result of market making on several platforms could reduce liquidity and price transparency in the market. It was estimated that the costs of a multiplatform market would exceed the potential benefits. If several platforms are introduced, several banks would also reconsider their status as primary dealers, which would reduce competition in the Danish market for government securities.

On the basis of the above and an assessment of the service and cost levels in 2010, the primary dealers decided to continue with market making on MTS Denmark in 2011.

Price-quoting system aimed at the retail market

Government Debt Management has a price-quoting system on Nasdaq OMX with five banks (Danske Bank, Nordea, Nykredit Bank, Spar Nord Bank and Sydbank). The participants commit to quoting bid and ask prices within predefined spreads and depths for 90 per cent of the time between 9.00 am and 4.30 pm.

Through the price-quoting system, investors have ongoing access to pretrade information for 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.

Primary dealers can borrow government securities

The central government's securities lending facilities support an efficient market for trading in Danish government securities, as primary dealers can borrow government securities in the event of a shortfall in the market. This makes it easier for primary dealers to undertake market making and reduces the risk that market positions are used to push prices upwards (squeezes). The lending facilities also facilitate settlement of trades by banks.

The central government's primary dealers have access to the securities lending facilities of the central government and the Social Pension Fund.

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[1] The key elements and conclusions have been published in *Infrastructure in Danish government securities market in 2011*, www.governmentdebt.dk.

SECURITIES LENDING, 2008-10 Table 6.4.1

Kr. billion	2008	2009	2010[1]
Central government	25.0	53.2	80.4
SPF	142.5	38.4	47.1
Securities lending, total	167.6	91.6	127.6

[1] Weighted by market value the average loan period was 1.2 days.

The government's lending facility comprises key on-the-run and benchmark securities. The remaining government securities with a term to maturity of more than one month can be borrowed from SPF to the extent that the Fund holds these securities. Until SPF's holding of 4 per cent 2012 is sufficient, it is lent by the central government.

In 2010, lending under the government's and SPF's securities lending facilities totalled kr. 80 billion and kr. 47 billion, respectively, cf. Table 6.4.1.

ISSUANCE OF AND TRADING IN FOREIGN GOVERNMENT SECURITIES 6.5

The central government's foreign loans are syndicated, cf. Box 6.4. Syndication provides a number of benefits that are particularly relevant for smaller issuers. The banks in the syndicate generate interest in the issue via their investor contacts, thereby creating a basis for a broad investor distribution. A large initial outstanding volume and the syndicate's obligation to quote bid-ask prices for the loans subsequently support liquidity of the securities.

SYNDICATION OF FOREIGN LOANS Box 6.4

Syndication of loans entails that a syndicate of banks act as intermediaries vis-à-vis investors and handle the practical aspects of the sale against a fee. Government Debt Management puts together a syndicate of banks that have a good reputation and extensive experience with syndicated issuance in the international bond markets. Moreover, the banks must complement each other so as to ensure access to a broad geographical and institutional investor distribution.

Prior to the time of issuance, the banks in the syndicate work together to find investors for the bonds issued. Bids are placed in a joint pool on a current basis (book-building). Each bid comprises a price, e.g. stated as a spread to the equivalent German benchmark bond or the swap curve, and a volume. This gives the issuer information about the aggregate demand at different price levels. At the conclusion of the book-building, Government Debt Management sets a price to match the desired issuance volume. In this way, the pricing resembles an auction.

The central government's issuance of foreign debt involves comparison of the borrowing costs with e.g. equivalent German issuance and issuance by a peer group of other countries with high ratings, e.g. Finland and the Netherlands. Furthermore, the borrowing costs are compared with alternative loan types, e.g. domestic issuance combined with currency swaps into euro or issuance in other currencies linked to swaps into euro. Foreign loans, totalling kr. 104 billion, are predominantly denominated in euro or dollars, cf. Chart 6.5.1. For loans in other currencies than the euro, the central government always concludes swaps, so that the ultimate currency exposure is in euro.

Issuance of Commercial Paper

Short-term foreign loans are raised via the central government's Commercial Paper programmes, cf. Box 6.5. The objective is to ensure a liquidity contingency for rapid adjustment of the level of the foreign-exchange reserve or the central government's account at Danmarks Nationalbank.

COMMERCIAL PAPER — Box 6.5

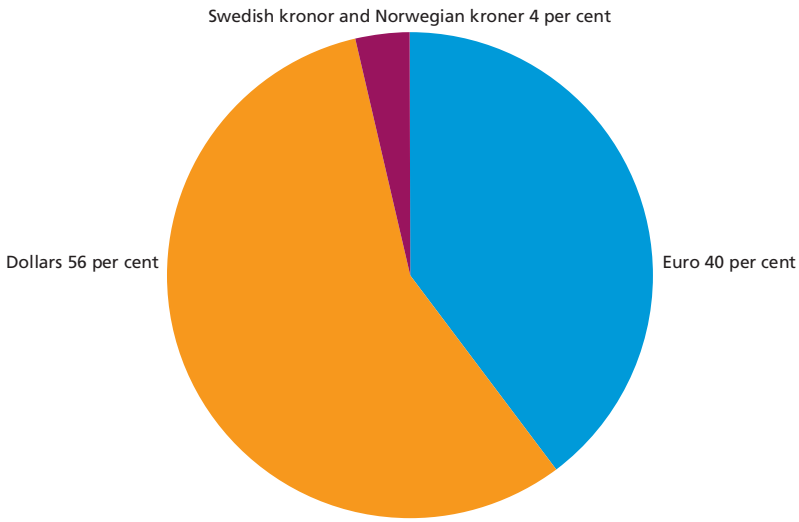
Commercial Paper, CP, are short-term non-standardised instruments with maturities of up to one year. CP are issued as zero-coupon bonds directly to investors via a number of banks acting as market makers for the central government, cf. the Table. CP are not admitted for trading, but investors may trade CP bilaterally.

MARKET MAKERS IN THE CENTRAL GOVERNMENT'S TWO CP PROGRAMMES, BEGINNING OF 2011

ECP	USCP
Bank of America Merrill Lynch	Bank of America Merrill Lynch
Barclays Bank	Barclays Bank
Citigroup	J.P. Morgan
Credit Suisse	
Deutsche Bank	
UBS	

The central government's two CP programmes are aimed at the European market (ECP programme) and the US market (USCP programme), respectively. Under the USCP programme, all issuance is in dollars, while it is possible to issue in a number of currencies, including dollars and euro, under the ECP programme. The USCP programme has a maximum outstanding volume of 6 billion dollars, while the ECP programme has a maximum of 12 billion dollars. When issuing CP in dollars, the central government simultaneously carries out forward agreements between dollar and euro with Danmarks Nationalbank.

OUTSTANDING FOREIGN BONDS BEFORE CURRENCY SWAPS Chart 6.5.1



CHAPTER 7

Assets in the Government Funds

Government Debt Management manages the assets of the Social Pension Fund, SPF, the Advanced Technology Foundation and the Preventive Measures Fund. The assets of the government funds are included in the total central-government debt and are managed on a consolidated basis.

At the end of 2010, the assets of SPF amounted to kr. 114 billion (15.3 billion euro). SPF's portfolio of non-callable mortgage bonds of kr. 44 billion is maintained in 2011 by reinvesting maturing amounts in new non-callable mortgage bonds.

The assets of the Advanced Technology Foundation and the Preventive Measures Fund at end-2010 totalled kr. 12 billion and kr. 2 billion, respectively.

THE SOCIAL PENSION FUND 7.1

The Social Pension Fund, SPF, was established in 1970. Payments to SPF ceased in 1982. SPF is managed by a committee with representatives from the Ministry of Finance, the Ministry of Employment and Government Debt Management. The day-to-day management of the assets is undertaken by Government Debt Management.

The principles for asset management are laid down in a set of regulations. SPF's assets may be invested in Danish listed bonds – including index-linked bonds and mortgage bonds – taking the government debt policy into account. The risk on SPF's assets is assessed separately, but is included in the consolidated risk management of the total central-government debt. At the beginning of 2011, the duration of the SPF portfolio was around 4 years, i.e. unchanged from the beginning of 2010.

The Finance Act stipulates the amount to be transferred to the Ministry of Employment on an annual basis to cover the costs of pension improvement measures. If the sum of the amount transferred to the Ministry and payments of pension-yield tax exceeds SPF's interest income, the core capital is reduced.

In 2010, kr. 10.6 billion was transferred from SPF to the Ministry of Employment, cf. Table 7.1.1. SPF's pension-yield tax for 2010 of kr. 1.0 billion will be paid in 2011 due to a general rescheduling of payments. SPF's interest income totalled kr. 4.4 billion.

THE GOVERNMENT FUNDS' REVENUES AND EXPENDITURES IN 2010 Table 7.1.1

Kr. million	SPF	Advanced Technology Foundation	Preventive Measures Fund
Revenue			
Interest, etc.[1]	4,370	396	87
Injection of capital	-	2,000	-
Expenditure			
Transfer to the relevant ministry	-10,630	-398	-350
Pension-yield tax	-	•	•
Net	-6,260	1,997	-263

Note: A positive figure indicates revenue; a negative figure expenditures.
[1] Net statement of interest received, interest receivable, and distributed capital losses on buy-backs.

At year-end SPF's assets totalled kr. 113.5 billion, cf. Table 7.1.2, which means that they were reduced by kr. 6.5 billion in 2010.

SPF's portfolio of non-callable mortgage bonds for hedging the central government's interest-rate risk on subsidised housing is maintained at kr. 44 billion in 2011. At the beginning of January 2011, SPF had maturing non-callable mortgage bonds amounting to kr. 16 billion. The amounts were reinvested in 1-, 3- and 5-year non-callable mortgage bonds. The kr. 6 billion of maturing non-callable mortgage bonds in the remainder of 2011 will also be reinvested in non-callable mortgage bonds.

THE GOVERNMENT FUNDS' ASSETS, END-2010 Table 7.1.2

Kr. billion, nominal value	SPF	Advanced Technology Foundation	Preventive Measures Fund	Share of total outstanding, per cent
6 per cent bullet loans 2011	2.4	3.0	0.6	15
5 per cent bullet loans 2013	31.8	3.6	0.7	41
4 per cent bullet loans 2015	8.9	3.4	0.7	15
4 per cent bullet loans 2017	7.9	1.9	-	19
7 per cent bullet loans 2024	10.5	0.2	-	44
Government bonds, total	61.4	12.1	2.0	
Mortgage bonds, etc.[1]	46.3	•	•	
Index-linked bonds[2]	5.8	•	•	
Balance of account	0.0	0.1	0.1	
Total	113.5	12.1	2.1	

[1] Mortgage bonds, municipal, Ship Finance and Fisheries Bank bonds other than index-linked bonds.
[2] Indexed value.

THE ADVANCED TECHNOLOGY FOUNDATION 7.2

The Advanced Technology Foundation was established by Act of Parliament in 2004. The objective of the Foundation is to strengthen growth and employment by supporting Denmark's further development as an advanced technological society. The aim is to build up the Foundation's capital to at least kr. 16 billion by 2012. In accordance with the 2011 Finance Act, kr. 2 billion was transferred to the Advanced Technology Foundation in January 2011.

In 2010, the interest income of the Advanced Technology Foundation was kr. 396 million, while kr. 398 million was transferred from the Foundation to the Ministry of Science, Technology and Innovation, cf. Table 7.1.1. At end-2010, the assets of the Foundation totalled kr. 12.1 billion, cf. Table 7.1.2

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 PREVENTIVE MEASURES FUND 7.3

The Preventive Measures Fund was established in 2007 for the purpose of supporting projects to forestall and prevent physical and mental impairment. A contribution of kr. 3 billion was made to the Fund when it was established. There are no plans to build up further capital in the Fund.

Every year, kr. 350 million is paid by the Fund to the Ministry of Employment. In 2010, the Fund's interest income amounted to kr. 87 million, resulting in net expenditure of kr. 263 million in 2010, cf. Table 7.1.1. At end-2010, the assets of the Fund totalled kr. 2.1 billion, cf. Table 7.1.2.

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

CHAPTER 8

Government Re-Lending and Loan Guarantees

Government Debt Management 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 standing.

At end-2010, re-lending totalled kr. 80 billion (10.7 billion euro), of which kr. 25 billion (3.4 billion euro) had been issued to the Financial Stability Company. The loan guarantees totalled kr. 48 billion (6.4 billion euro).

PURPOSE AND FRAMEWORK FOR RE-LENDING AND GUARANTEES 8.1

A number of government-owned companies may raise loans directly from the central government (re-lending) or raise government-guaranteed loans, cf. Table 8.1.1.[1] Re-lending and government loan guarantees derive from the political wish to support certain projects.

Re-lending and government loan guarantees give the companies access to cheaper funding than loans without guarantees would. The lower costs reflect the central government's assumption of the credit risk for which the companies would otherwise have to pay in the market. Since the government owns these companies, it is an advantage to the government that they obtain inexpensive funding.

Guidelines for borrowing by the companies

Government Debt Management formulates the general guidelines for borrowing by the companies that have access to loan guarantees or re-lending. The aim is to ensure that the companies do not assume financial risks that the central government itself will not assume.

The guidelines for borrowing by the companies are stated in a set of agreements comprising two main elements[2]:

[1] In addition, Danish Ship Finance (Danmarks Skibskredit A/S) has access to a special re-lending facility, cf. *Danish Government Borrowing and Debt 2003*, Chapter 10.

[2] As far as Øresundsbron is concerned, a tripartite agreement has also been concluded between Øresundsbron, Riksgäldskontoret (the Swedish National Debt Office) and Government Debt Management.

PUBLIC COMPANIES WITH ACCESS TO RE-LENDING OR LOAN GUARANTEES Table 8.1.1

	Re-lending	Government-guaranteed loans
CPH City & Port Development	X	-
The Danish Broadcasting Corporation	X	-
The Danish North Sea Fund	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 Great Belt Bridge	X	X
The Metro Company	X	-
Statens Serum Institut	X	-
Sund & Bælt Holding	X	X
The Øresund Bridge	-	X
Øresund Landworks	X	X

Note: Administered by Government Debt Management. (X) indicates that the company has access, while (-) indicates that the company does not have access.

- An agreement between the ministry in question, the Ministry of Finance, Danmarks Nationalbank and the individual company
- A list of eligible loan types, which is specified and updated by Government Debt Management, cf. Box 8.1.

RE-LENDING 8.2

Re-lending means that loans are raised directly from the central government. Most of the central government's re-lending mirrors loans in existing government bonds, so that coupon rates, interest-payment dates and redemption dates correspond to the characteristics of underlying 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 revenue of the loan are paid from the central government's account. The resulting financing requirement is met via current issuance in the key on-the-run issues. No specific issuance takes place to hedge the risk on individual re-lending transactions. Re-lending is part of the consolidated risk management of the central-government debt.

Re-lending in 2010

Re-lending in 2010 amounted to kr. 27 billion, cf. Table 8.2.1. Due to redemptions on existing re-lending, the total outstanding volume fell to kr. 80 billion.

GUIDELINES FOR BORROWING AND RISK MANAGEMENT — Box 8.1

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' consolidated approach to risk management of their assets and liabilities. 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 market risk management by the company.

The list of eligible 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

- 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-interest government bonds denominated in Danish kroner in the maturity segments between 2 and 10 years[1]
- Other types of re-lending, including forward-rate agreements, may be granted, subject to a motivated request.

Risk-management requirements

- The 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 the Øresund Bridge).

[1] The Financial Stability Company has access to re-lending in bullet loans at maturities ranging from 1 month to 10 years and re-lending in foreign currency. 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.

RE-LENDING — Table 8.2.1

Kr. billion, nominal value	Re-lending in 2010	Redemptions in 2010	Portfolio end-2010
CPH City & Port Development	1.0	2.5	9.0
The Danish Broadcasting Corporation	0.2	0.3	3.6
The Danish North Sea Fund	0.1	-	0.3
Danish Ship Finance	-	1.2	10.2
Eksport Kredit Fonden	1.5	1.2	2.9
Energinet.dk	0.5	-	5.5
Femern Belt	0.5	-	0.5
Femern Landworks	-	-	-
The Financial Stability Company	17.7	22.1	24.5
The Great Belt Bridge	3.1	1.8	13.9
Lending to Iceland	1.2	-	1.8
The Metro Company	-	-	-
Statens Serum Institut	0.2	-	0.3
Sund & Bælt Holding	-	-	0.4
Øresund Landworks	0.8	0.7	7.0
Total	26.6	29.8	80.0

In March 2010, Femern Belt and Femern Landworks gained access to re-lending and government-guaranteed loans. Femern Belt is tasked with the preparation and planning of the coast-to-coast connection across the Fehmarn Belt, while Femern Landworks will be in charge of preparation of the Danish onshore installations for the fixed link. Subsequently, Femern Belt has raised re-lending of kr. 500 million.

Four companies redeemed re-lending for a total of kr. 8.1 billion prematurely in 2010, of which kr. 7.0 billion matured in 2010. The companies may not redeem re-lending prematurely for speculative reasons, but only as a result of changes in their funding framework. In these cases, the redemptions reflected excess liquidity in the companies.

Falling volume of outstanding re-lending to the Financial Stability Company

In 2010, the Financial Stability Company reduced its portfolio of re-lending by kr. 4.4 billion to kr. 24.5 billion. This is attributable to the paid-up guarantee commissions from the financial sector exceeding the costs for winding up ailing banks, cf. Box 8.2. In 2011 the Financial Stability Company expects to reduce its portfolio of re-lending further as a result of the payment of the kr. 10 billion loss guarantee by the financial sector.

RE-LENDING TO THE FINANCIAL STABILITY COMPANY — Box 8.2

The Financial Stability Company was formed in October 2008 under an agreement between the Danish government and the Danish financial sector to ensure financial stability in Denmark. The Company has covered the current financing requirement in connection with the acquisition of ailing banks by means of government re-lending.

Following the expiry of the general government guarantee on 30 September 2010, the Financial Stability Company prepared the final accounts for winding up ailing banks, cf. *Finansiel Stabilitet A/S – regnskab for Bankpakken*[1] (in Danish only). The government's result for winding up ailing banks is kr. 2.5 billion per 30 September 2010. The result is attributable to paid-up guarantee commissions of kr. 25 billion from the financial sector and losses of kr. 22.5 billion.

Sustained access to re-lending following the expiry of the general government guarantee

Following the expiry of the general government guarantee the Financial Stability Company can still participate in the winding-up of ailing banks. The Financial Stability Company has access to re-lending to finance capital and liquidity injections. Any losses as a result of developments in ailing banks are to be borne by the financial sector. Hence, the new arrangement entails no direct economic risk to the central government.

[1] www.finansielstabilitet.dk

LOAN GUARANTEES ADMINISTERED BY GOVERNMENT DEBT MANAGEMENT Table 8.3.1

Kr. billion	Loan guarantees in 2010	Portfolio end-2010
The Danish Broadcasting Corporation	•	0.9
The Danish State Railways	1.6	8.0
Femern Belt	0.0	0.0
Femern Landworks	0.1	0.1
The Great Belt Bridge	-	14.8
Sund & Bælt Holding	0.0	0.0
Øresund Landworks	0.6	3.6
The Øresund Bridge	2.7	20.2
Total	5.0	47.6

Note: The numbers are inclusive guaranteed swaps.

Denmark grants bilateral loans to Ireland, Iceland and Latvia

In November 2010, the other EU member states and the IMF granted Ireland an 85 billion euro loan programme.[1] In that connection Denmark contribute with a bilateral loan up to 400 million euro.

To support the Icelandic and Latvian economic stabilisation programmes, Denmark, jointly with the other Nordic countries and the IMF, has committed itself to bilateral loans. Denmark's share of these loans is up to 480 million euro for Iceland and up to 378 million euro for Latvia.

So far, Iceland has received 240 million euro under the loan programme. The rest of the loan is expected to be paid out during 2011. Latvia has not yet made use of its loan facility, but expects to do so in 2011.

GOVERNMENT LOAN GUARANTEES 8.3

At the end of 2010, government-owned companies whose loan guarantees are managed by Government Debt Management had issued government-guaranteed loans totalling kr. 48 billion, cf. Table 8.3.1.

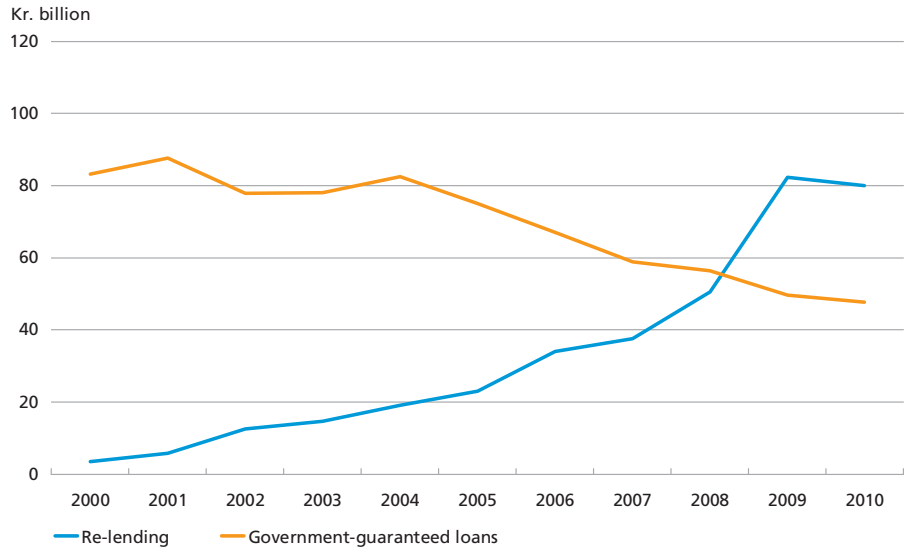
In addition the Danish government has concluded agreements to provide government guaranteed loans totalling kr. 193 billion. The total guaranteed amount will be reduced progressively as debt expires in the period until 31 December 2013.

COMPARISON OF RE-LENDING AND LOAN GUARANTEES 8.4

Loan guarantees and re-lending are, in principle, equivalent with regard to purpose, economic significance and the central government's risk. However, their impact on the central government's financing requirement and debt diverge.

[1] The loan programme is described in more detail in *Economic Survey*, December 2010.

RE-LENDING AND GOVERNMENT LOAN GUARANTEES Chart 8.4.1



Note: Administered by Government Debt Management.

As opposed to loan guarantees, re-lending increases the government's borrowing requirement. Hence, in the years with large government surpluses and low borrowing requirements, more extensive use of re-lending supported the opportunity to build up liquid series of government securities. Unlike loan guarantees, re-lending increases the government debt and EMU debt. Re-lending is financed via increased issuance of government securities, which increases the debt, while the assets by way of re-lending is not offset against the debt.

Increased use of re-lending in recent years

In recent years, the government-owned companies have tended to opt for re-lending rather than government-guaranteed borrowing in the private market, cf. Chart 8.4.1. This development reflects conversion of government-guaranteed loans in the market to re-lending, as the pricing of the latter has been more attractive to the companies than loan guarantees. Moreover, new government-owned companies have primarily been given access to funding by way of re-lending. Finally, the government has facilitated the companies' risk management by offering a wider range of re-lending options.

CHAPTER 9

Risk Management

In 2010, the duration of the central government's debt portfolio was considerably longer than before the financial crisis. The long duration entails a low exposure to rising interest rates for the central government.

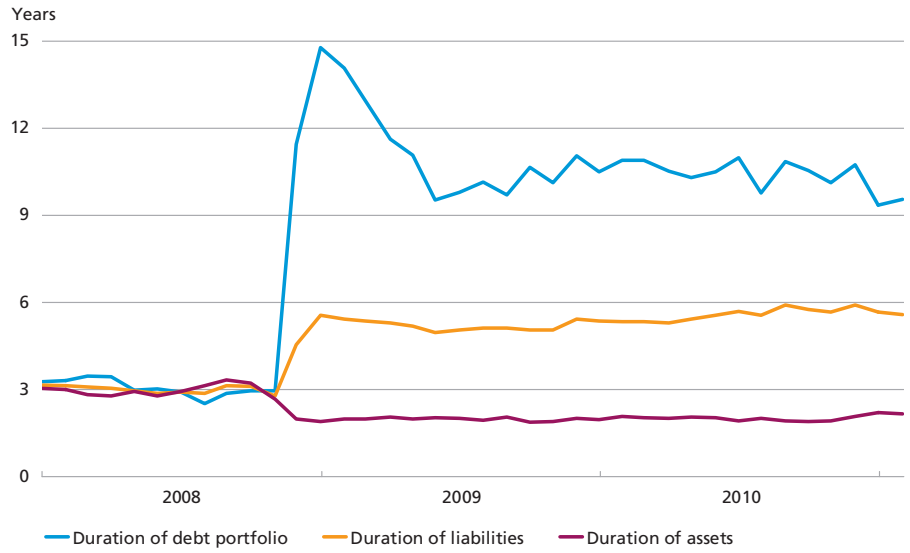
The aim for 2011 is for a moderate reduction of the duration to 9 years +/- 1 year. According to analyses using the Cost-at-Risk model, it is possible to reduce the central government's expected interest costs by shortening duration. Due to the central government's portfolio of short-term assets, this can be achieved without increasing the risk of higher interest costs.

At end-2010 the central government's swap portfolio consisted of 277 swaps at a total notional value of kr. 204 billion. The central government's credit risk is mainly attributable to currency swaps related to dollar loans. The central government's credit exposure adjusted for collateral was kr. 2.6 billion.

MANAGEMENT OF INTEREST-RATE RISK IN 2010 9.1

The duration of the central government's net debt portfolio remains high, cf. Chart 9.1.1, entailing a low exposure to rising interest rates viewed in

DURATION OF DEBT PORTFOLIO, LIABILITIES AND ASSETS Chart 9.1.1



REFINANCING RISK Box 9.1

In the context of government debt management, refinancing risk can be defined as the risk of having to issue securities at significantly wider yield spreads (relative to a relevant reference yield), including, in extreme cases, being completely cut off from the capital markets. Consequently, the refinancing risk depends on the probability of such widening of yield spreads and on the central government's exposure to it.

Probability of widening of yield spreads

Studies have shown that yield spreads across countries depend on both internal factors within a country and external factors. The sustainability of a country's fiscal policy plays a key role in the probability of widening of yield spreads. The European sovereign debt crisis has illustrated that investor assessments of fiscal sustainability may change rapidly in the event of major adverse shocks to government finances. This may lead to sudden, considerable widening of yield spreads. An example of external factors is sudden shifts in global risk aversion – as observed after the collapse of Lehman Brothers in the autumn of 2008. However, this effect will generally be modest and short-lived if a country pursues a sustainable fiscal policy. Moreover, pressure on the exchange rate may also lead to spread widening.

Exposure to widening of yield spreads

Essentially, the above factors, determining the probability of widening of Danish yield spreads, are beyond Government Debt Management's control. Nevertheless, it is possible to mitigate the consequences via government debt policy planning, i.e. by reducing the central government's exposure to strong, short-lived widening of yield spreads.

The volume of liabilities maturing within a given time horizon is an important factor that can be influenced via the government debt policy. An issuance strategy primarily based on bonds will, for example, entail a lower annual refinancing volume than a strategy based on large issuance volumes in T-bills. Besides the issuance strategy, Government Debt Management also has other means of influencing the refinancing risk. Building up considerable liquidity reserves on the balance of the central government's account provides flexibility in the event of sudden deterioration of market conditions. Another method applied is buying back government securities before they mature in order to reduce the refinancing volume in the coming years and to smooth out the redemption profile.

Interaction between exposure and probability

The probability of substantial widening of yield spreads is mainly the result of fiscal policy and external factors. Government debt policy can primarily influence the profile of the central government's exposure. However, in all probability, a reduction of the central government's short-term exposure to widening of yield spreads will in itself contribute to a lower probability of such widening occurring.

Indicators of refinancing risk

In general, the probability of future widening of yield spreads is difficult to quantify. Consequently, refinancing risk is primarily measured by means of relatively simple and model-free indicators focusing on the central government's exposure to spread widening. One concrete measure is the short-term refinancing burden, i.e. the volume of redemptions and interest on already issued government securities maturing within the next 12 months, cf. Chart 9.2.1.

an international context. The marked increase in duration from around 3 years before the financial crisis to around 10 years in 2010 is attributable to two main factors. Firstly, issuance in the 30-year government bond has entailed longer duration of liabilities. Secondly, building up the central government's account has reduced the duration of assets.

The 2010 strategy for management of interest-rate risk aimed at a modest reduction of duration. Calculated using a fixed discounting factor, the average duration has been reduced from 11 years in 2009 to 10 years in 2010. A considerable share of this reduction can be attributed to the re-opening of the T-bill programme and to the central government's conclusion of 10-year interest-rate swaps for a total of kr. 10 billion.

RENEWED FOCUS ON REFINANCING RISK 9.2

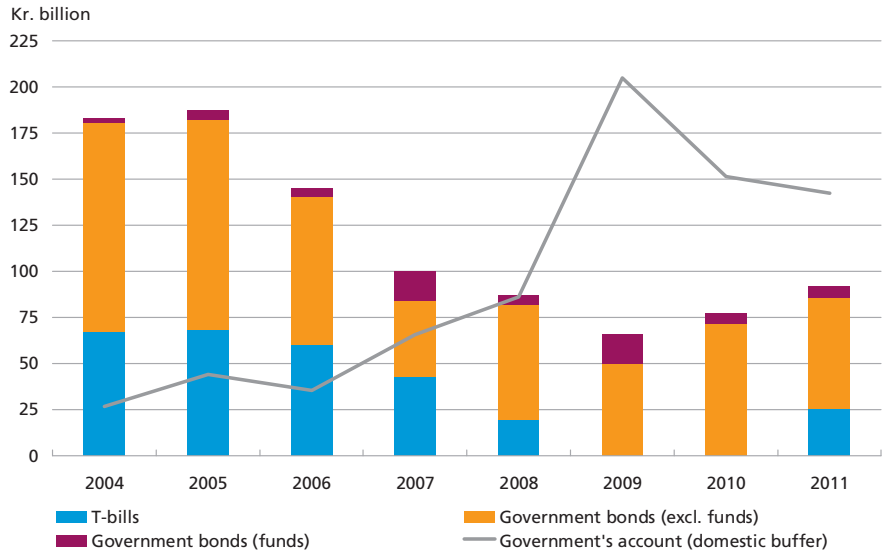
Even creditworthy governments have at times during the financial crisis found it difficult to achieve the desired issuance volumes. Consequently, government debt management offices have generally increased their focus on refinancing risk. In principle, the refinancing risk can be regarded as an element of the overall interest-rate risk. In practice, however, separate measures of refinancing risk are required as it is difficult to quantify this risk component by means of generally applied interest-rate models, cf. Box 9.1.

Relative to the two preceding years, the central government's short-term domestic refinancing burden in 2011 has grown moderately with the reintroduction of the T-bill programme, cf. Chart 9.2.1. Nevertheless, the refinancing burden is still low compared with many other countries and with historical levels in Denmark. Part of the explanation is the relatively low volume of government bonds maturing in 2011, following the years of declining debt. Another factor is buy-backs by the central government of bonds with shorter maturities. Since 2008, the end-of-year balance of the central government's account has exceeded the amount maturing in the following year.

MARKET RISK MANAGEMENT IN 2011 9.3

The management of the central government's interest-rate risk in 2011 should be viewed in the light of the prospects of rising debt in the coming years and greater uncertainty than usual concerning the sovereign debt markets. Consequently, a reduction of duration to the level before the financial crisis is not desirable in the current situation. However, assuming that the swap markets are well-functioning, the conclusion of interest-rate swaps will facilitate the reduction of expected

SHORT-TERM DOMESTIC REFINANCING BURDEN AND THE CENTRAL GOVERNMENT'S ACCOUNT — Chart 9.2.1



Note: The refinancing burden is the sum of maturing bonds, maturing existing T-bills and coupon yield payments calculated on the basis of balances at the end of the previous year. The domestic buffer is the central government's account less the amount reserved for foreign redemptions.

interest costs. This will contribute to a moderate, gradual reduction of duration.

The refinancing risk remains low

The central government continues to focus on maintaining a low refinancing risk. The refinancing risk is reduced on an ongoing basis via buy-backs in securities maturing in the next few years, and by moving issuance forward.

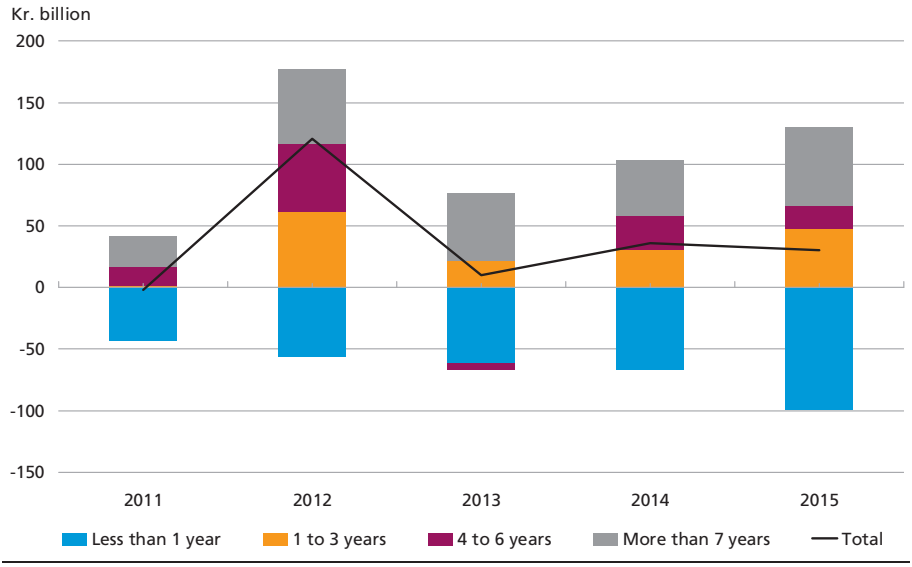
Viewed in isolation, moving issuance forward increases the duration of the debt portfolio, and hence the expected interest costs. The reason for the higher costs is that the average yield on new bonds issued by the central government exceeds the remuneration of the central government's account, given the usually upward sloping yield curve. However, when moving issuance forward it is possible to keep duration unchanged and costs largely neutral by concluding interest-rate swaps, cf. Box 3.1 in Chapter 3.

Interest-rate fixing

Interest-rate fixing denotes the net amount for which a new interest rate is to be fixed in a given year. It is calculated as interest-rate fixing for liabilities less interest-rate fixing for assets.

CENTRAL GOVERNMENT'S INTEREST-RATE FIXING ON MATURITY SEGMENTS WITHOUT NEW SWAPS

Chart 9.3.1



Due to the substantial portfolio of short-term assets, the central government in 2011 has negative interest-rate fixing in the very short maturity segment and positive interest-rate fixing in the longer maturity segments, cf. Chart 9.3.1. Overall, the central government's interest-rate fixing in 2011 is close to zero. Consequently, in the first year after a parallel shift in the yield curve the central government's interest costs will be almost unchanged as a result of the interest-rate change.

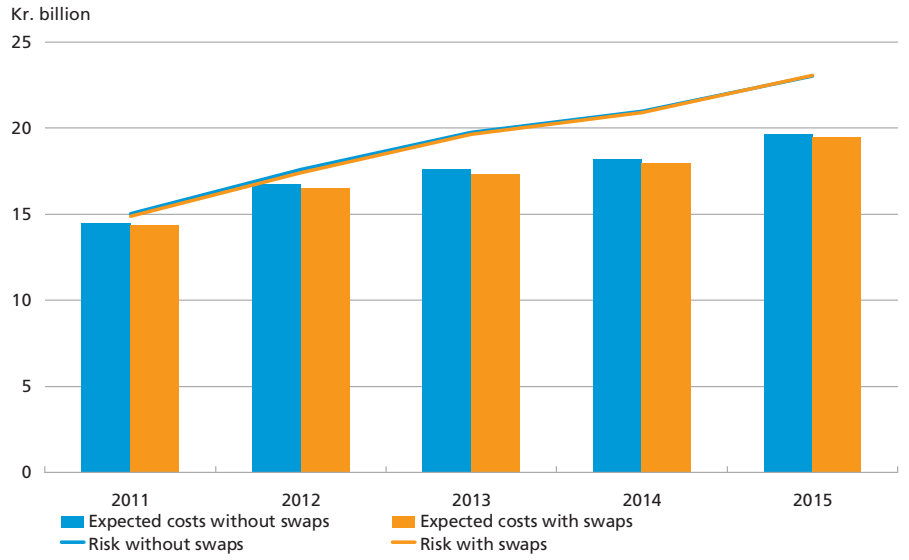
The negative interest-rate exposure at the short end reflects that the balance of the central government's account is more than enough to hedge the interest-rate risk related to the current portfolio of interest-rate swaps, the T-bill programme and other short-term liabilities. In the coming years, a considerable proportion of the central government's existing interest-rate swaps will mature. Viewed in isolation, this will amplify the negative short-term interest-rate fixing. Against this background, the central government can conclude new interest-rate swaps without entailing positive net exposure to rising short-term interest rates. Conclusion of new interest-rate swaps for kr. 20 billion annually will bring the short-term interest-rate fixing close to zero up to 2015.

Cost-at-Risk model

To analyse the costs and risk of a given strategy, a baseline scenario for future issuance, buy-backs and re-lending is constructed in the Cost-at-

THE CENTRAL GOVERNMENT'S EXPECTED INTEREST COSTS AND INTEREST-RATE RISK

Chart 9.3.2



Note: Risk is defined as the 95th percentile in the distribution of future interest costs.

Risk, CaR, model, cf. *Danish Government Borrowing and Debt 2009*, Chapter 10. The baseline scenario is the foundation for simulation of future interest costs. The interest-rate scenarios determine the trade-off between costs and risk in the CaR model and are currently calculated using a 2-factor Cox-Ingersoll-Ross interest-rate model estimated on Danish government yields over the last 10 years, cf. Chapter 11.

The analyses using the Cost-at-Risk model show that in the baseline scenario, a moderate reduction of the central government's expected interest costs can be achieved by concluding interest-rate swaps for a notional amount of kr. 20 billion annually. The reduction can be achieved without noticeably increasing the risk of higher interest costs, cf. Chart 9.3.2, because the central government's account hedges the interest-rate exposure in the variable leg of the new interest-rate swaps. Assuming continued gradual normalisation of the short-term swap spread, the expected annual savings rise with the horizon to around kr. 250 million by 2015.

The aim for 2011 is for moderate reduction of duration. This reflects, among other factors, a wish for a higher effective yield on the revenue of the expected excess sales of government bonds. The target for average duration in 2011 has been set at 9 years +/- 1 year, calculated using a fixed discounting factor.

EXCHANGE-RATE RISK 9.4

Exchange-rate risk is the risk that the value in kroner of the central-government debt increases as a result of changes in exchange rates. The exchange-rate risk is contained by the central government's conclusion of currency swaps in connection with foreign loans in other currencies than euro. Consequently, the foreign debt is exposed in euro. The exchange-rate risk is low due to Denmark's fixed-exchange-rate policy vis-à-vis the euro. In addition, Danmarks Nationalbank's foreign-exchange reserve is predominantly exposed in euro.

Re-lending to Danish Ship Finance in dollars is financed in kroner and swapped to dollars, thereby hedging the exchange-rate risk.

CREDIT RISK 9.5

Credit risk is the risk of a financial loss as a consequence of a counter-party's default on its payment obligations.

The central government's swap portfolio may entail a credit risk for the central government. When a swap is transacted, its market value is zero, but over time the market value may become either positive or negative for the central government, depending on the development in interest and exchange rates. A swap with a positive market value is an asset for the central government and therefore subject to credit risk since the central government is exposed to the swap counterparty's ability to pay.

The central government's credit risk is minimised by observing a number of credit management principles. Credit risk is diveded between several counterparties with high credit ratings that have concluded agreements on unilateral pledging of collateral. The central government's credit management is described in more detail in the Appendix *Principles for Management of Credit Risk on Government Swaps*.

The swap portfolio 2010

The central government concluded 19 swaps in 2010 with a total principal value of kr. 15.7 billion. At end-2010, the swap portfolio comprised 277 swaps with 18 counterparties, with a total principal of kr. 204 billion, cf. Table 9.5.1. The swap portfolio was reduced by approximately kr. 21 billion in 2010. This is primarily due to a maturing dollar loan.

Especially the dollar affects the market value of the central government's swaps

The development in the market value of the central government's swaps reflects fluctuations in interest and exchange rates.

CENTRAL-GOVERNMENT SWAP PORTFOLIO, END-2010 Table 9.5.1

	Number of swaps	Principal, kr. billion
Interest-rate swaps for duration management[1]		
Interest-rate swaps in kroner	133	37.5
Interest-rate swaps in euro	95	71.2
Swaps related to foreign loans		
Interest-rate swaps in dollars	4	14.0
Cross-currency swaps[2]	12	62.9
Other cross-currency swaps		
Kroner-euro and euro-kroner	10	8.9
Kroner-dollar related to dollar re-lending[3]	23	9.8
Total	277	204.4

[1] Interest-rate swaps in kroner and euro have been transacted in connection with management of the duration of the government debt.
[2] For foreign loans in other currencies than euro, the loan proceeds are swapped to euro.
[3] In connection with re-lending to Danish Ship Finance.

The market value of the currency swap portfolio is primarily influenced by fluctuations in the dollar rate. When issuing dollar loans, the central government also concludes dollar-to-euro swaps, thereby avoiding exposure to dollar fluctuations. As a result of the issuance of dollar loans, dollar-to-euro swaps account for a large share of the swap portfolio. An increase in the dollar rate implies a higher market value of the swap portfolio as the central government pays euro and receives dollar. As a result of the fixed-exchange-rate policy, the central government's portfolio of currency swaps between kroner and euro does not give rise to major fluctuations in market value.

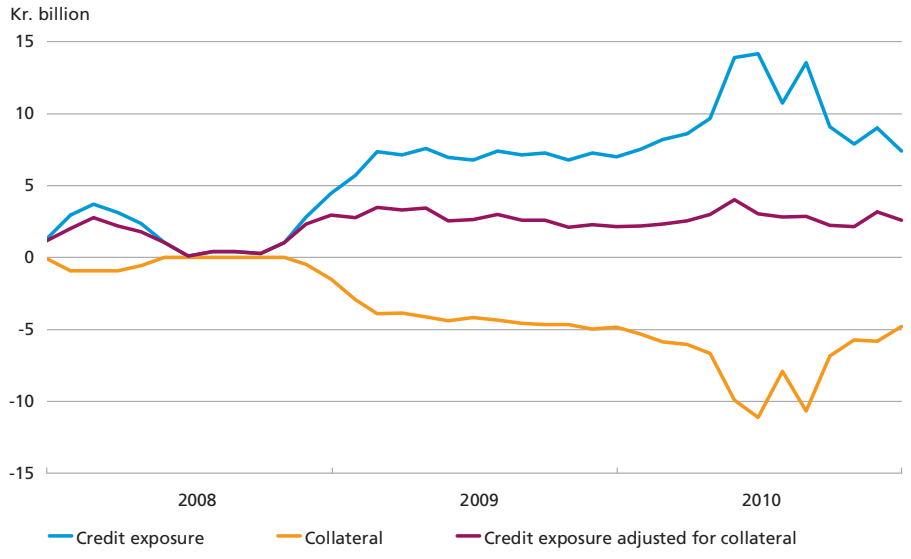
Interest-rate swaps are typically used by the central government to lower the duration, which means that the central government primarily pays interest at a floating rate and receives interest at a fixed rate. The market value of the central government's portfolio of interest-rate swaps thus increases when interest rates decline.

Slightly higher credit exposure

The central government's credit exposure (without adjustment for collateral) is the sum of the market values for the individual counterparties with a positive market value.

The credit exposure rose by kr. 0.4 billion to kr. 7.4 billion. The collateral pledged by counterparties was almost unchanged, cf. Chart 9.5.1. The central government's credit exposure adjusted for collateral was kr. 2.6 billion at year-end, distributed primarily on counterparties with a rating of at least AA-, cf. Chart 9.5.2. 2010 saw considerably fewer downgradings of the central government's counterparties compared with 2008-09.

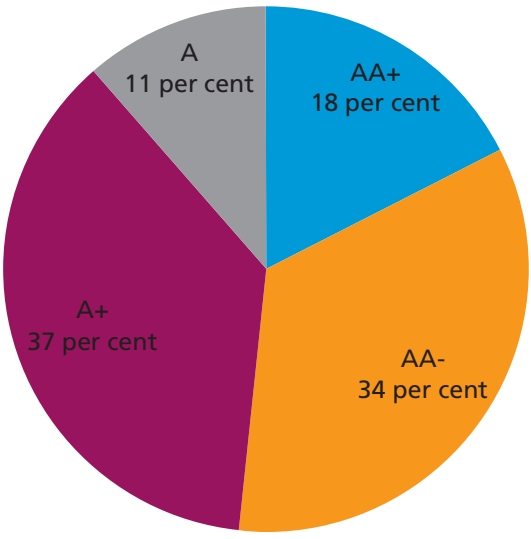
CREDIT EXPOSURE ON THE CENTRAL-GOVERNMENT SWAP PORTFOLIO Chart 9.5.1



Pledging of collateral for the central government's swaps and CCPs

When concluding swaps with counterparties, the central government also concludes a legal agreement with the counterparty, specifying the details for pledging of collateral. The agreements are based on unilateral pledging of collateral. Consequently, the central government's swap

CREDIT EXPOSURE ADJUSTED FOR COLLATERAL, BROKEN DOWN BY COUNTERPARTY RATING Chart 9.5.2



counterparties pledge collateral if the market value of the counterparty's swaps becomes positive, while the central government does not pledge collateral if the market value becomes negative.

The upcoming regulation of the derivatives markets will probably mean that in the longer term banks will have to use central counterparty, CCP, clearing for standard derivatives. CCP clearing of swaps means that the individual participants are exposed to the CCP instead of being bilaterally exposed to all swap counterparties.

The aim of the new measures is to enhance transparency and registration of the markets for over-the-counter products. Another consequence is that the overall collateral requirement diminishes since CCP clearing allows netting across counterparties. In 2011, Government Debt Management will look into the new measures.

Special-Topic Section

CHAPTER 10

Government Bond Auctions

Since the autumn of 2009, issuance of government bonds has primarily taken place via auctions. In 2010, the central government sold around 70 per cent of its bonds via auctions. Danish government bond auctions are based on uniform pricing – i.e. all winning bids are allotted at the cut-off price.

It is not possible to determine theoretically or empirically which auction format is most suitable for sale of government bonds. The choice depends on conditions in the individual government bond market. This is emphasised by the fact that the two formats are used with more or less the same frequency by OECD countries.

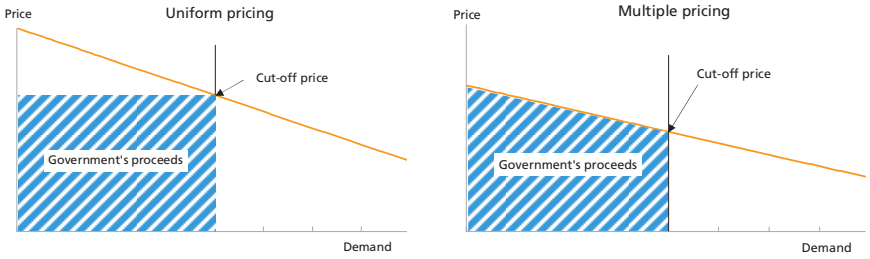
Analyses of the Danish auctions show that no issuance premiums were paid and that there are no indications of strategic bidding among the participants.

INTRODUCTION 10.1

In an international context, two primary auction formats are used for government bonds – uniform-price auctions and multiple-price auctions. In addition, auction formats combining the two are used. In uniform-price auctions, all bids at the cut-off price or higher are allocated at the cut-off price. In multiple-price auctions, bids above the cut-off price are allocated at the bid price, cf. Chart 10.1.1.

Since the autumn of 2009, issuance of government bonds has primarily taken place via auctions. In 2010, the central government sold around 70 per cent of its bonds via auctions. Danish government bond auctions are

AUCTIONS BASED ON UNIFORM AND MULTIPLE PRICING Chart 10.1.1



AUCTION FORMATS FOR OECD COUNTRIES Table 10.2.1

Multiple-price	Uniform-price	Both
Australia	Denmark	Canada
Austria	Finland	Czech Republic
Belgium	Greece	Iceland
France	Italy	Japan
Germany	Korea	Mexico
Hungary	Norway	Netherlands
Ireland	United Kingdom	New Zealand
Portugal	United States	Poland
Spain[1]		Slovak Republic
Sweden		Turkey

Source: Blommestein (2009) – OECD.
[1] The Spanish auction mechanism includes elements of both uniform and multiple pricing.

based on uniform pricing – i.e. all winning bids are allotted at the cut-off price.

WHAT DOES THEORY SAY ABOUT THE CHOICE OF AUCTION MECHANISM? 10.2

From a theoretical perspective it is not possible to say which auction format generally gives the highest revenue for the central government[1] as this depends on conditions in the individual markets for government securities. This is supported by the fact that the two auction types are used with more or less the same frequency by OECD countries, cf. Table 10.2.1.

If there is uncertainty about the value of the bonds, auctions based on uniform pricing may lead to more aggressive bidding because participants are less exposed to paying excess prices than in auctions based on multiple pricing. In uniform-price auctions, there is an increased risk that participants coordinate their bidding, thereby lowering the cut-off price, and thus the revenue for the central government.

A well-functioning secondary market for government bonds reduces the differences between the two auction formats. If there is full transparency and liquidity, uniform- and multiple-price auctions should, in theory, give the central government the same revenue.

The value of a government bond

The value of a government bond for a participant in an auction is often closely correlated to the assessment of the bond's value by other participants. In contrast, the value of e.g. consumer goods depends more on their utility value to the buyer.

[1] In a theoretical model with asymmetrical, risk-averse participants, Wang and Zender (2002) show that in general it is not possible to rank the two auction formats in terms of revenue for the central government.

In the theoretical literature it is typically assumed that government bonds are common value goods. This means that they are assumed to have one "true" value, and that they do not have any private, independent value to participants.

Winner's curse

In auctions over a common value good, the winner of the auction will be the participant submitting the highest bid and thus presumably also the one with the highest estimate of the value of the good. In other words, the winner of the auction has typically overestimated the value of the good and hence a negative return can be expected if the winner pays its own bid. This phenomenon, known as winner's curse, is most pronounced in cases where the value of the good is subject to considerable uncertainty and if there are many participants in a given auction. Due to winner's curse, the optimum strategy in a common value auction is to submit a lower bid than the expected true value.

Winner's curse means that participants in an auction of a common value good will bid more aggressively if they are not paying their own bid.[1] If this argument is transferred to government bond auctions (where several units of the same good are sold), uniform pricing will reduce winner's curse. [2]

Initiatives to reduce winner's curse

Especially bidders with little information are exposed to winner's curse as their estimate of the value of the bond must be assumed to be less certain. In the long term, this may lead to fewer participants in auctions based on multiple pricing, with a risk of less competition and hence lower revenue for the central government. To limit the participants' exposure to winner's curse in multiple-price auctions, smaller participants are often permitted to submit "non-competitive" bids, i.e. to submit a volume without stating a price. These bids are met at a price corresponding to the average price for the winning competitive bids.

Risk of strategic bidding in uniform-price auctions

In government bond auctions there is a risk that participants coordinate their bidding, thereby lowering the cut-off price, and thus the revenue

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1 Milgrom and Weber (1982) show that on sale of one good where the value depends on other participants' assessment of its value, 2nd price auctions (where the winner pays the second highest bid) give higher revenue than 1st price auctions (the winner pays its own bid).

2 Friedman (1960) argued that uniform pricing would give higher revenue in the US Treasury bond auctions than the multiple-pricing auctions applied. His argument was that when participants pay their own bid prices, the market tends to be dominated by a few specialists who thus have a strong incentive to form a cartel.

for the central government. This risk is particularly pronounced in connection with uniform-price auctions.

In a multiple-price auction, each participant has an incentive to submit higher bids than the others if the bids are lower than the "true value".

In a uniform-price auction it is easier for participants to keep the cut-off price low as more aggressive bidding could entail a loss since a potential higher cut-off price will increase the price of all units allocated, cf. Box 10.1.

Initiatives to reduce strategic bidding in uniform-price auctions

If it is critical to issue a fixed volume in an auction, it will be easier for participants to maintain a strategic equilibrium. The risk of strategic bidding is reduced if the government reserves the right not to determine the cut-

STRATEGIC BIDDING IN A UNIFORM-PRICE AUCTION — Box 10.1

An auction is held for nominally kr. 4 billion bonds with a true value of 100. Two participants both bid kr. 2,001 million at a price of 90 and kr. 1,999 million at a price of 99. This adds up to kr. 4,002 million at a price of 90 and kr. 3,998 million at a price of 99. To issue kr. 4 billion at nominal value, a cut-off price of 90 is required. Each participant is allocated kr. 2 billion. A participant in this auction can ensure a further allocation of kr. 1 million by raising its price to 90.01. However, this will not pay off as the cost arising from the higher cut-off price exceeds the gain from the extra allotment, cf. the Table.[1]

EXAMPLE OF UNDERPRICING RELATED TO STRATEGIC BIDDING

	Bidder A		Bidder B	
	Price	Kr. million	Price	Kr. million
Strategic equilibrium				
Bid 1	90	2,001	90	2,001
Bid 2	99	1,999	99	1,999
Price and allocation	90	2,000	90	2,000
Value of bonds	2,000		2,000	
Costs of buying at the auction	2,000*(90/100)		2,000*(90/100)	
Profit	200.0		200.0	
Bidder A pursues an alternative strategy				
Bid 1	90.01	2,001	90.00	2,001
Bid 2	99.00	1,999	99.00	1,999
Cut-off price and allocation	90.01	2,001	90.01	1,999
Value of bonds	2,001		1,999	
Costs of buying at the auction	2,001*(90.01/100)		1,999*(90.01/100)	
Profit	199.9		199.7	

[1] Back and Zender (1993) present a similar example with three participants.

off price – and thus the volume issued – until the bids have been observed.

Letting the bidding in the auction determine the issuance volume reduces the risk of strategic bidding because participants know that the central government will issue fewer bonds if there are indications of strategic bidding. Some countries choose to issue fewer bonds in the auction if bids are low and to issue in the secondary market afterwards. Others choose to give the auction's winners the option to purchase more bonds after the auction.

The degree to which the central government can vary the volume in the individual auctions will depend on the flexibility in relation to the desired issuance in the auction. If the government has alternative financing sources (tap sales, syndicated issuance or drawing on its account), this provides flexibility to reject bids that indicate strategic bidding.

EMPIRICAL ANALYSES 10.3

Which auction format to choose depends on how dominant winner's curse and the risk of coordinated bidding are in the individual market for government securities. Finding the right auction mechanism is therefore an empirical issue.

Like theoretical studies, empirical analyses provide mixed results. In government bond markets with considerable asymmetry between participants or with a high degree of volatility, empirical research points to uniform pricing giving the highest revenue.

Experience from countries that have switched to another auction format

Until 1992, the USA used multiple pricing in its Treasury bond auctions. In September 1992, the USA switched to uniform pricing for its 2- and 5-year series. The US Treasury evaluated the effect of the switch and concluded that uniform pricing in US auctions led to a lower concentration of allotments to the largest participants.[1] Underpricing in the auctions was reduced, but due to higher volatility in the underpricing the results were not statistically significant.

An analysis of Mexican auctions shows that the Mexican government's switch from multiple to uniform pricing led to lower yields for the large participants in the auctions and hence higher revenue to the central government.[2]

1 Archibald, Flynn and Malvey (1995) and Archibald and Malvey (1998).
2 Umlauf (1993).

Analyses of auctions on the basis of structural models

An empirical approach to comparing auctions is to use structural models. Estimating the participants' bids if another auction format had been applied enables comparison of the revenue from these "hypothetic" auctions with the revenue from the format applied.

A study of French multiple-price auctions[1] applies a model in which participants are symmetrical as regards risk aversion and information. The analysis shows that the revenue in the multiple-price auctions were higher than they would have been in auctions with uniform pricing. The same method was used to study Mexican multiple-price auctions, but with the opposite conclusion – uniform pricing would have given higher revenue. The explanation offered is that volatility in the Mexican government securities market was relatively high in the period in question.

Another study of French government bond auctions shows that if participants are asymmetrical as regards information and risk aversion, the revenue would have been higher with uniform pricing than with the existing multiple-price auctions.[2] The reason given is that the small banks – that, according to the analysis, have more uncertain information and are more risk averse – would be ready to take on the risk linked to more aggressive bidding if the auctions were based on uniform pricing. If the asymmetry between participants is disregarded, the conclusion changes, with uniform pricing giving lower revenue. A study of Canadian multiple-price auctions based on the same model shows that, unlike the French government, the Canadian government would not obtain higher revenue by switching to uniform pricing.[3] The reason given is that there is not the same pronounced degree of asymmetry among the Canadian auction participants as the French, and consequently the advantages of uniform pricing are smaller in Canada.

THE DANISH GOVERNMENT BOND AUCTIONS 10.4

28 auctions of 2-, 5- and 10-year government bonds were held from June 2009 to end-2010. On average the auctions had a bidding volume of kr. 10 billion and issuance for kr. 4 billion. The total revenue for the central government amounted to kr. 121 billion at market value.

A characteristic of the auctions was that a few large primary dealers took a substantial share of the volume issued, but this masks a consid-

1 Février, Préget and Visser (2002). Hortarcsu (2004) applies the same model to Turkey and demonstrates that the multiple-price auctions used give higher revenue. For Mexican auctions based on multiple pricing, Castellanos and Oviedo (2008) show that a switch to uniform pricing would have given higher revenue for the Mexican government.

2 Armantier and Sbaï (2006).

3 Armantier and Lafhel (2009).

COMPARISON OF PRICES IN AUCTIONS AND IN THE SECONDARY MARKET Table 10.4.1

Per cent of nominal value	2-year	5-year	10-year
Bid prices	-0.054	-0.045	-0.059
Mid prices	-0.017	0.001	0.003
Ask prices	0.020	0.047	0.065

Note: Prices in the secondary market are from two minutes before the auctions close. The Table shows an average difference between mid prices and auction prices in the 2-year segment of 0.017. This means that the auction price for 2-year government bonds was on average 0.017 higher than the mid price in the secondary market.
Source: MTS Denmark, Bloomberg and own calculations.

erably higher number of end-investors who submit bids via the primary dealers.

No issuance premium in the auctions

Prices in the Danish government bond auctions roughly correspond to prices in the electronic secondary market before the auction, cf. Table 10.4.1. In all three maturity segments, the price in the auctions have, on average, been within the bid-ask spread in the secondary market. Consequently, no issuance premium was paid in the Danish auctions.

No signs of strategic bidding in Danish auctions

A study of the individual demand curves for the Danish auctions can reveal signs of strategic bidding. It should be noted that data from the individual auctions only shows the primary dealers' bids at the auction and not end-investors' individual demand curves.

The analysis compares the skewness and kurtosis of the individual demand curves with the theoretical predictions resulting from two models for strategic bidding.[1] The results show that the Danish data differs significantly from the models' predictions concerning strategic bidding, cf. Table 10.4.2.

CONCLUSION 10.5

Both empirical and theoretical studies show that the choice of auction mechanism depends on conditions in the individual government securities markets. This is emphasised by the fact that the two formats are used with more or less the same frequency by OECD countries.

Danish government bond auctions are based on uniform pricing. This auction format reduces the risk that participants will pay an excess price for the bonds, but increases the risk of low revenue for the central government as a result of strategic bidding.

[1] Back and Zender (1993) and Kyle (1989). The analysis corresponds to the Finnish analysis in Keloharju, Nyborg and Rydqvist (2005).

SKEWNESS AND KURTOSIS IN STRATEGIC BIDDING — Table 10.4.2

	Danish auctions[1]	Indications of strategic behaviour in two models[2]	
		Kyle	Back og Zender
Skewness	-0.10 to 0.22	0	-2.2
Kurtosis	2.06 to 2.86	1.8	7.0

Note: The Table shows that the kurtosis of individual demand curves for the Danish participants is significantly higher than 1.8 and significantly lower than 5.67, contrasting with the theoretical models.

[1] Intervals are 95-per-cent confidence intervals.

[2] Differences in skewness and kurtosis in the two models is due to different assumptions on the bidders' risk profile.

The risk of strategic bidding is mitigated as the government has the option to vary the issuance volume in the auctions after having observed the bids submitted. A high liquidity reserve and the option to sell on tap in the secondary market provide sufficient flexibility to adjust the issuance volume in the auctions to match the bids received. This is emphasised by the fact that the data does not indicate strategic bidding in the Danish auctions. Furthermore, the Danish auction results show that prices in the Danish government bond auctions roughly correspond to prices in the secondary market.

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CHAPTER 11

Interest-Rate Models for Cost-at-Risk Analysis

In connection with the management of interest-rate risk on the central-government debt, the development in future interest costs is analysed using the Cost-at-Risk model. The analysis is performed using simulations of interest-rate developments in an interest-rate model.

Since 2005, Government Debt Management has used a 2-factor Cox-Ingersoll-Ross (CIR) model. This chapter compares this model with a 3-factor Nelson-Siegel model which describes not only the level and slope of the term structure, but also its curvature.

The analysis shows no significant difference between the results of the two models, but in a few cases the 3-factor Nelson-Siegel model projects inexpediently narrow confidence bands. In 2011, 2-factor Cox-Ingersoll-Ross will still be used as the primary interest-rate model, while 3-factor Nelson-Siegel will be used as a supplement. This reflects that both the mean-reversion level and speed of the projected interest rates is higher in 2-factor CIR.

RISK MANAGEMENT AND INTEREST-RATE MODELS 11.1

Government Debt Management manages the interest-rate risk on the central-government debt by analysing developments in future interest costs applying different scenarios for interest-rate developments. Interest costs are analysed in the Cost-at-Risk (CaR) model on the basis of the current debt portfolio, budget projections, a strategy for future borrowing and simulated interest-rate projections.

In practice, interest-rate models are used to generate the interest-rate input to the CaR model. An interest-rate model is a mathematical description of the dynamics of the term structure. The term structure describes the relationship between maturity and yield level on interest-bearing claims, in this case government bonds.

Interest-rate models are used to simulate a large number of different interest-rate developments, thereby generating a probability distribution for interest-rate developments. This distribution is used to calculate a probability distribution of the central government's future interest costs. Hence, the results of the CaR model to some extent depend on the interest-rate model chosen.

On the basis of a working paper[1] this chapter compares the current 2-factor Cox-Ingersoll-Ross model, 2-factor CIR, with a 3-factor Nelson-Siegel model, a dynamic version of the classical static Nelson-Siegel model, cf. Appendix, Box 11.A.2.

CHOICE OF INTEREST-RATE MODEL 11.2

Class of term-structure model

CaR models simulate interest costs over a long-term horizon, typically up to 10 years. The long horizons mean that the relevant type of interest-rate model differs from models used for pricing and hedging interest-rate derivatives.

Models for hedging interest-rate derivatives are typically forward-rate models[2] and market models[3]. Forward-rate models are characterised by describing developments over the entire forward curve, while market models are based on observable, discretely compounded interest. Both model types allow for exact replication of the current term structure and very flexible specification of the volatility structure. These two properties are especially important when pricing and hedging interest-rate derivatives, and particularly the market models have become prevalent in the financial sector. But these models are less suited for long-term risk management as they do not use historical data and are typically difficult to implement.[4]

For models used for risk management over longer horizons, exact replication of the observed term structure is not as important as the description of developments in the general level of interest rates and covariation between interest rates for different maturities. The following properties are desirable in an interest-rate model for simulating interest rates over a longer horizon:

- The covariation between interest rates for different maturities must reflect the historically observed pattern.
- The term structure must fluctuate around a mean level (mean reversion) so as to avoid an explosive rise in interest rates.
- The model must be well-documented and easy to communicate.

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1 The analysis on which the results are based can be found in Andersen, A.S.T, 2011, Affine Nelson-Siegel Models and Risk Management Performance, *Working Paper*, Danmarks Nationalbank, which will be published in the spring.

2 See Heath, D., Jarrow, R. and Morton A., 1992, Bond Pricing and the Term Structure of Interest Rates: A New Methodology for Contingent Claim Valuation, *Econometrica*, vol. 60, no. 1, pp. 77-105.

3 See Miltersen, K., Sandmann, K. and Sondermann, D., 1997, Closed Form Solutions for Term Structure Derivatives with Log-Normal Interest Rates, Journal of Finance, vol. 52, pp. 409-430 and Brace, A., Gatarek, D. and Musiela M, 1997, The Market Model of Interest Rate Dynamics, *Mathematical Finance*, vol. 7, no. 2, pp. 127-155.

4 An example of implementation of a forward-rate model on historical data is Trolle, A. and Schwartz, E., A general stochastic volatility model for the pricing of interest rate derivatives, 2009, *Review of Financial Studies*, vol. 22, No. 5, pp. 2007-2057.

- The model must be manageable, i.e. it must be possible to estimate it and interest-rate output can be generated within a reasonable period of time.
- Uncertainty (volatility) in the individual maturity segments must reflect the historically observed uncertainty.
- The term structure should not give rise to arbitrage opportunities. This is to prevent investors or borrowers from obtaining a risk-free gain within the framework of the model.

A class of models that have the above properties are the affine term structure models[1], which include both 2-factor CIR and 3-factor Nelson-Siegel. The affine term structure models are popular as they permit flexible modelling of the term structure of interest rates and easy calculation of e.g. zero-coupon rates and risk premiums. Affine interest-rate models are described in more detail in Appendix, Box 11.A.1.

Choice of number of factors

Since 2005, Government Debt Management has applied 2-factor CIR, cf. *Danish Government Borrowing and Debt 2005*, Chapter 10. The model comprises two independent factors identified as the level and slope of the term structure. It is not possible to say beforehand which of the estimated factors are level and slope, respectively. This lack of identification can affect the robustness of the model's estimation.[2] In practice the problem can be solved by using reasonable starting values when estimating the model, or by imposing parameter restrictions so that the model's factors must be level and slope.

In the financial literature, 3-factor models are often used on the basis of a principal component analysis. A principal component analysis describes developments in the level of interest rates (or changes in interest rates) across maturities using as few independent factors as possible. In this way, a principal component analysis provides information about the desirable structure of an interest-rate model.

If the principal component analysis is performed at the interest-rate level, a third factor provides less than 1 per cent additional explanatory power, while the additional explanatory power is 10 per cent if the analysis is performed on changes in interest rates, cf. Box 11.1. The effect of including a third factor is therefore expected to be moderate. Finally, the

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1 See Duffie, D. and Kan, R., 1996, A Yield-Factor Model of Interest Rates. *Mathematical Finance*, vol. 6, no. 4, pp. 379-406. In this context, affine refers to the structure of the model, i.e. interest rates are given as a constant and as a linear function of the model's factors.

2 This is because affine models have a number of equivalent representations that have different factor dynamics but identical bond prices. See Dai, Q. and Singleton, K, 2000, Specification Analysis of Affine Term Structure Models, *The Journal of Finance*, vol. 55, no. 5, pp. 1943-1978 for a further discussion of this topic.

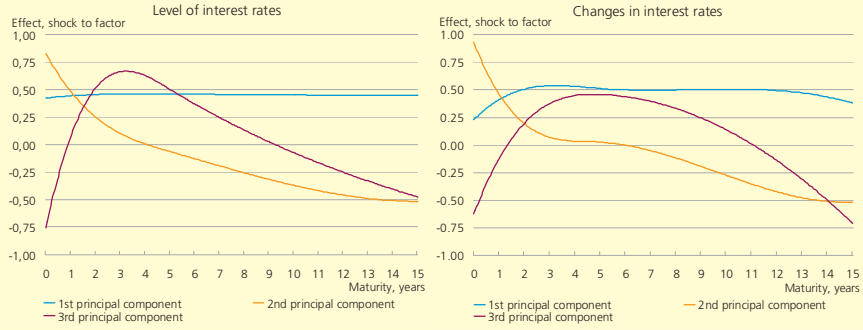
PRINCIPAL COMPONENT ANALYSIS OF THE DANISH TERM STRUCTURE Box 11.1

Principal component analysis is a statistical method for summarising the variation in multi-dimensional data. In connection with interest-rate modelling, the multi-dimensional data comprises time series of zero-coupon yields for different maturities. If the time series are closely correlated, a large part of the variation can be described by means of a few independent factors. This is the case for interest rates, where three principal components (factors) typically describe more than 99 per cent of the variation in the term structure.[1]

A principal component analysis of the level of Danish government bond yields from January 1987 to May 2010 shows a similar pattern. The first two factors describe 94.6 per cent and 4.8 per cent, respectively, of the variation in data, while the third factor describes 0.5 per cent. If the analysis is performed on monthly changes in the term structure, the three factors describe 67.0 per cent, 19.5 per cent and 10.3 per cent, respectively, of the variation.

The interpretation of the individual factors is often based on factor loadings that describe how changes in the individual factors affect interest rates at a given maturity, cf. the Chart.

FACTOR LOADINGS FOR THE LEVEL OF INTEREST RATES AND CHANGES IN INTEREST RATES, 1987-2010



Factor loadings for the level of and changes in interest rates display the same pattern. The first factor can be interpreted as a parallel shock to the term structure and determines changes in its general level. The second factor determines the slope of the term structure as it declines over the maturities and has the greatest effect on interest rates at maturities shorter than 5 years. Finally, the third factor determines the curvature of the term structure, as this factor has a positive impact on interest rates at maturities of 2 to 10 years and a negative impact on other interest rates.

[1] See e.g. Litterman, R. and Scheinkman, J., 1991, Common Factors Affecting Bond Returns, Journal of Fixed Income, June, pp. 54-61.

principal component analysis shows that the three factors can be interpreted as the level, slope and curvature of the term structure.

To examine whether a model with three factors can improve the interest-rate input for CaR, the effect of including an extra factor in the

interest-rate model is analysed. One way to include a third factor is to expand a 2-factor CIR by adding an extra factor. However, this increases the problem of identifying the model. Particularly estimation of the factors related to the slope and curvature of the term structure can give problems. The lack of identification of the model's factors is a general problem in 3-factor models if there are no restrictions on the model's dynamics.[1]

A possible solution is to use 3-factor Nelson-Siegel where the parameter restrictions ensure identification of the driving factors as level, slope and curvature.

THE MODELS' DESCRIPTIONS OF HISTORICAL INTEREST RATES 11.3

First, the models are estimated on the basis of data from the entire period January 1987 to May 2010. Using the estimation results, it is possible to assess whether the model dynamics are generally consistent with the factor structure disclosed by the principal component analysis, cf. Box 11.1. In addition, the modelled and actually observed interest rates are compared across maturities. The deviations are relatively modest, indicating that the models are sufficiently flexible to describe the overall patterns in the movements of the Danish term structure.

Factor loadings

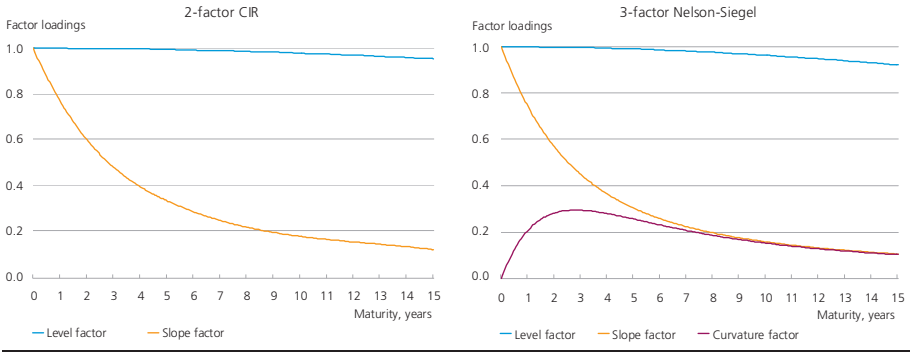
A factor loading describes the change in the zero-coupon rate with a maturity of τ on a change in the *i*'th factor, X_i. Mathematically, factor loadings are calculated as

$$\text{Factor loading against factor i} = \frac{\partial y(\tau)}{\partial X_i}$$

Unlike factor loadings from the principal component analysis, which are based solely on the covariance between interest rates, factor loadings from interest-rate models depend on the model structure chosen. Plotting factor loadings as functions of the maturity provides insight into the sensitivity of interest rates to shocks to the individual factors. Factor loadings for the level and slope factors are virtually identical in the two interest-rate models, cf. Chart 11.3.1. Consequently, a change in the level or slope factor in the two models will have an almost identical impact on the term structures generated. 2-factor CIR can thus be inter-

[1] For example, both Duffee, G. R., 2002, Term Premia and Interest Rate Forecasts in Affine Models, *Journal of Finance*, vol. 57, pp. 405-443, and Kim, D., Challenges in Macro-Finance modeling, *BIS Working Paper no. 240*, describe problems in relation to estimating parameters in 3-factor models.

FACTOR LOADINGS Chart 11.3.1



preted as a 2-factor Nelson-Siegel in which only level and slope are included as descriptive factors.

The difference between the two models is primarily attributable to the curvature factor in 3-factor Nelson-Siegel. The third factor has the greatest impact for interest rates at maturities of between 2 and 5 years as the curvature of the term structure is highest for these maturities.

Deviations between observed and estimated interest rates

Deviations between the actual interest rates and the interest rates estimated in the models are generally relatively modest, cf. Table 11.3.1. 2-factor CIR shows deviations of 23-38 basis points, while 3-factor Nelson-Siegel shows deviations of 20-35 basis points. The improvements obtained by using 3-factor Nelson-Siegel are greatest for the shorter maturities, which is consistent with the interpretation of the third factor as a description of the curvature of the term structure.

To examine whether 2-factor CIR and 3-factor Nelson-Siegel are able to describe interest-rate volatility, the models should be compared with a benchmark that is less dependent on model assumptions. A frequently used model which is able to describe time-varying volatility for historical

DEVIATIONS BETWEEN ACTUAL AND ESTIMATED RATES (IN BASIS POINTS) Table 11.3.1

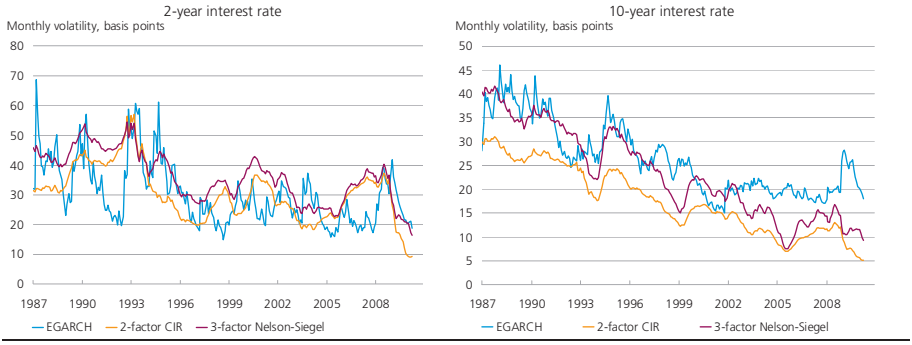
Maturity	3 months	2 years	5 years	10 years	15 years
2-factor CIR	34	32	29	23	38
3-factor Nelson-Siegel	27	22	24	20	35

Note: Deviations stated as root mean squared errors (RMSEs), i.e.

$$\mathrm{RMSE} = \sqrt{\frac{1}{T}\sum_{t=1}^{T}\left(Y_t^O - Y_t^M\right)^2}$$

where Y^O is the observed yield and Y^M is the estimated yield based on the entire data period.

INTEREST RATE VOLATILITY Chart 11.3.2



interest rates is an EGARCH model[1]. The model is estimated on interest-rate changes for each of the maturities observed.

The analysis shows that 3-factor Nelson-Siegel describes historical volatility better than 2-factor CIR, cf. Chart 11.3.2. This is particularly true for interest rates at maturities of 10 years.

For the period since 2005, both models have shown lower interest-rate volatility for the 10-year interest rate than the actual volatility, measured by the EGARCH volatility. This is attributable to a combination of the model structure and low interest rates. The variance for interest rates at a given maturity is identical to the model's factor loadings with this maturity multiplied by the underlying factors. The 10-year interest rates are mainly affected by the level factor, so volatility is low when the level factor is also low.

TEST OF THE MODELS' INTEREST-RATE PROJECTIONS 11.4

To examine how the interest-rate models perform in projections out-of-sample, they are estimated on 10-year data window, after which interest rates are predicted 1 month, 1 year and 2 years ahead. Then the estimation window is shifted forward by 1 month, and the interest rates are projected again. This is repeated for all 10-year data samples, i.e. from January 1987 to December 1996, from February 1987 to January 1997, etc. until June 2000 to May 2010. This results in 161 predictions 1 month ahead, 150 predictions 1 year ahead and 138 predictions 2 years ahead.

Projections of interest-rate levels

The projections of the models' interest-rate levels can be evaluated by calculating the mean absolute differences between actual interest rates and

[1] See Nelson, D., 1991, Conditional Heteroskedasticity in Asset Returns: A New Approach, *Econometrica*, vol. 59, pp. 347-370.

ABSOLUTE DEVIATIONS IN YIELD PREDICTIONS (IN BASIS POINTS) Table 11.4.1

Maturity	3 months	2 years	5 years	10 years	15 years
1 month ahead:					
2-factor CIR	23	26	23	22	30
3-factor Affin Nelson-Siegel	19	21	19	18	24
Difference	4	5	4	4	6
	(1.44)	(3.13)	(2.64)	(2.53)	(2.07)
1 year ahead:					
2-factor CIR	94	80	65	54	62
3-factor Affin Nelson-Siegel	101	81	66	57	59
Difference	-7	-1	-1	-3	3
	(-0.86)	(-0.09)	(-0.35)	(-0.75)	(0.85)
2 years ahead:					
2-factor CIR	133	107	76	62	75
3-factor Affin Nelson-Siegel	133	109	80	67	74
Difference	0	-2	-4	-5	1
	(-0.01)	(-0.20)	(-0.94)	(-1.15)	(0.13)

Note: t test sizes for differences between absolute errors are stated in brackets.

the models' projected average interest rates for each prediction horizon. For projections of interest rates 1 month ahead, 3-factor Nelson-Siegel is more precise than 2-factor CIR, where the differences for all maturities except 3 months are statistically significant, cf. Table 11.4.1.

For projections 1-2 years ahead, there is no major difference between the models. The differences are less than 10 basis points, and none of them are statistically significant.

Projections of percentiles

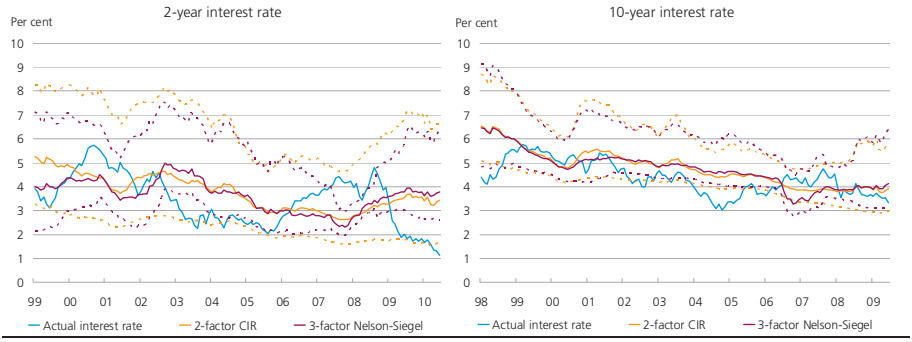
Based on simulated term structures, it is possible to calculate percentiles for the predicted interest rates. Percentiles are important in terms of as-

MEAN ESTIMATES AND CONFIDENCE BANDS FOR INTEREST-RATE PROJECTIONS 1 YEAR AHEAD Chart 11.4.1

Note: Broken lines indicate the 95-per-cent confidence band.

MEAN ESTIMATES AND CONFIDENCE BANDS ON INTEREST-RATE PROJECTIONS 2 YEARS AHEAD

Chart 11.4.2



Note: Broken lines indicate the 95-per-cent confidence band.

sessing the risk of rising interest rates. Projections of interest rates 1 and 2 years ahead show a high degree of covariation in percentiles, but with broader confidence bands for 2-factor CIR for the 2-year interest rate, cf. Chart 11.4.1 and Chart 11.4.2. For the 10-year interest rate, the confidence bands are more alike.

The difference between the two models is primarily attributable to the curvature factor, which also explains why the difference between the two models is greatest for the 2-year interest rates. The narrow confidence bands in 3-factor Nelson-Siegel reflect a low curvature factor.

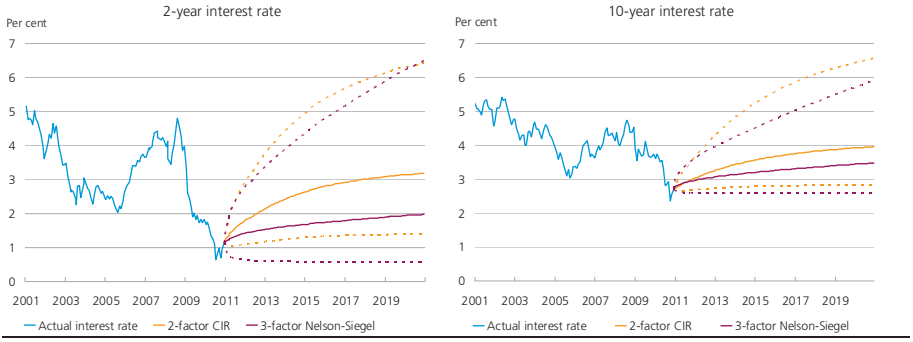
As a main rule, the actual interest rates only break the models' 95th percentiles in a downward direction, reflecting the falling level of interest rates over the analysis horizon. In the period since 1987, 10-year interest rates have fallen from 11-12 per cent to 3-4 per cent, which means that the models typically predict rising interest rates as they have an inherent tendency for mean reversion.

Projection of interest rates at end-2010

A comparison of the models' projections of developments in expected interest rates and confidence bands at end-2010 is part of the basis for the choice of primary interest-rate model for CaR analyses in 2011. Based on a 10-year data period, 2-factor CIR projects interest rates at a higher level than 3-factor Nelson-Siegel, cf. Chart 11.4.3. The reason is that both the mean level and the adjustment speed are higher in 2-factor CIR.

The models' confidence bands also differ. The lower limits of the confidence bands are lower in 3-factor Nelson-Siegel, particularly for the 2-year interest rates. This can be attributed to the lower mean level, which pushes down the lower confidence bands correspondingly. For the upper confidence bands, the difference is less pronounced, but the

PROJECTIONS OF 2-YEAR INTEREST RATE AND 10-YEAR INTEREST RATE, MEAN VALUE AND 95-PER CENT CONFIDENCE BAND Chart 11.4.3



Note: Broken lines indicate 2.5 and 97.5 percentiles, based on the models.

confidence bands for 2-factor CIR are generally higher than for 3-factor Nelson-Siegel. The difference is especially visible for projections of between 3 and 7 years.

EXTENDING THE MODEL 11.5

In the CaR model the description of the relationship between cost and risk can be improved by extending the model to include the spread risk arising from using interest rate swaps, and by achieving a better description of interest rate dynamics when the level of interest rates is low. These extensions are more tractable if the factors are consistently identified, as in the Nelson-Siegel model.

Better description of spread risks

In the CaR model, the spread between government and swap yields is deterministic, i.e. the swap spread is included in the expected costs, but the spread does not add further variation to the simulated interest costs.

Including the swap spread in the interest-rate model provides a better description of the central government's risk on its swap portfolio. Government yields and swap yields display a high degree of covariation, and a model should therefore describe this covariation. To achieve this covariation, the swap yields must be dependent on the same factors as the government yields, and further risk, resulting from fluctuations in the swap spread, can be modelled by including an extra number of factors.[1]

[1] Examples of models with this structure are Feldhütter, P. and Lando, D., 2008, Decomposing Swap Spreads, *Journal of Financial Economics*, vol. 88, pp. 375-405 and Christensen, J.H.E., Lopez, J.A. and Rudebusch, G.D., 2009, Do Central Bank Liquidity Facilities Affect Interbank Lending Rates?, Working Paper, Federal Reserve Bank of San Francisco.

Better description of interest-rate volatility at low interest rates

Another expansion is to improve the model's description of interest-rate volatility, particularly when interest rates are low. One option is to use a purely econometrical model that is not arbitrage-free. This could potentially provide a better description of the term structure dynamics as it does not to the same extent impose restrictions on the model. Among the requirements for the model, absence of arbitrage is the assumption that is easiest to give up as it does not, as such, describe the term structure dynamics, but solely ensures consistent risk premiums.

In a purely econometrical model it is still possible to identify factors such as level, slope and curvature and would also include factors to describe interest-rate volatility[1]. This type of model can also be expanded to include swap spreads.

[1] For a description, see Hautsch, N. and Yang, F., 2010, *Bayesian Inference in a Stochastic Volatility Nelson-Siegel Model*, accepted for publication in Computational Statistics and Data Analysis.

APPENDIX: TECHNICAL DETAILS RELATING TO THE MODELS 11.A

AFFINE TERM-STRUCTURE MODELS Box 11.A.1

An affine[1] term-structure model describes developments in short-term interest rates, *r*, as an affine function of a vector of factors. Hence, at time *t* the short-term interest rate is given by $r(t) = \delta_0 + \delta_1' \mathbf{X}(t)$, where the factors solve the stochastic differential equation

$$d\mathbf{X}(t) = \mathbf{K}(\theta - \mathbf{X}(t))dt + \mathbf{SD}(\mathbf{X}(t))d\mathbf{W}(t)$$

The equation expresses how the factors[2], driving term structures develop over a short period of time. The first term is deterministic. If the factors exceed their mean level, θ, a fall is expected, the speed of which is described by the matrix **K**. Likewise, an increase is expected in the factors if they are below their mean level. This prevents an explosive increase in interest rates.

The second term is stochastic, as **W** is a Wiener process. A Wiener process is characterised by changes in the process d**W**(*t*) being normally distributed with the mean value **0** and the variance **I**d*t*, where **I** is an identity matrix. **D**(**X**(*t*)) is a diagonal matrix describing how volatility depends on the individual factors. Finally, **S** describes the size of the volatility and can, together with **K,** describe the correlation between the individual factors.[3]

In order to derive zero-coupon rates, it is assumed that the market is arbitrage-free. In an arbitrage-free market, investors cannot earn a risk-free profit by taking positions in different bonds. In other words, any return in excess of the short-term interest rate must also be reflected in higher risk. Under this assumption, zero-coupon rates are affine functions of factors **X**:

$$y(t,T) = A(t,T) + \mathbf{B}(t,T)'\mathbf{X}(t)$$

where *y*(*t,T*) is a zero-coupon rate at the time *t* maturing at the time *T*. *A*(*t,T*) and **B**(*t,T*) are functions that are solutions to ordinary differential equations. In a few cases these solutions are explicit, e.g. in the CIR model. Finally, these solutions depend on $\mathbf{K}, \theta, \mathbf{S}, \mathbf{D}(\mathbf{X}(t))$ and a number of risk-premium parameters Λ. To achieve the above zero-coupon yield, a form is assumed for the risk premiums so that θ and **K** are replaced by risk-adjusted variants, θ^Q and $\mathbf{K}^Q$. In this way, risk premiums are incorporated by having different levels and adjustment speeds when the model is risk-adjusted.[4]

Affine interest-rate models can be estimated in various ways. A typical choice is *maximum likelihood*, which is used by assuming that individual interest rates can be observed without measurement errors or by using the Kalman filter (see e.g. *Danish Government Borrowing and Debt 2005,* Chapter 10). An alternative is *Markov Chain Monte Carlo*, which is a simulation-based estimation method and provides more precise information about the uncertainty linked to factors and parameter estimates.

[1] Linear plus a constant.

[2] These factors can be interpreted as factors from a principal component analysis, cf. Box 11.1. In other words **X** can be interpreted as a vector with the level, slope and curvature of the term structure.

[3] Not all parameters in this specification are necessarily identifiable. The relevant restrictions on parameters are discussed in Dai, Q. and Singleton, K., 2000, Specification Analysis of Affine Term Structure Models, *Journal of Finance*, vol. 55, no. 5, pp. 1943-1978.

[4] There are several ways to specify the risk premium, e.g. *Completely Affine* and *Essentially Affine Risk Premia* (see Duffee, G. R., 2002, Term Premia and Interest Rate Forecasts in Affine Models, *Journal of Finance*, vol. 57, pp. 405-443) and the Extended Affine Risk Premia (see Cheridito, P., Filipovic, D. and Kimmel, R. 2007, Market Price of Risk Specifications for Affine Models: Theory and Evidence. *Journal of Financial Economics*, vol. 83, pp. 123-170).

CIR AND AFFINE NELSON-SIEGEL MODELS Box 11.A.2

The method currently used by Government Debt Management to generate interest-rate scenarios for the CaR analyses is based on a 2-factor Cox-Ingersoll-Ross model [1]. In this model, the short-term interest rate is described as a function of two factors, $r(t) = X_1(t) + X_2(t)$, where the factors solve the stochastic differential equation:

$$\begin{pmatrix} \mathrm{d}X_1(t) \\ \mathrm{d}X_2(t) \end{pmatrix} = \begin{pmatrix} \kappa_1 & 0 \\ 0 & \kappa_2 \end{pmatrix} \left[\begin{pmatrix} \theta_1 \\ \theta_2 \end{pmatrix} - \begin{pmatrix} X_1(t) \\ X_2(t) \end{pmatrix} \right] \mathrm{d}t + \begin{pmatrix} \sigma_1 \sqrt{X_1(t)} & 0 \\ 0 & \sigma_2 \sqrt{X_2(t)} \end{pmatrix} \begin{pmatrix} \mathrm{d}W_1(t) \\ \mathrm{d}W_2(t) \end{pmatrix}$$

As described in Box 11.2, interest rates in this type of model are affine functions of the two factors:

$$y(t,T) = A(t,T) + B_1(t,T)X_1(t) + B_2(t,T)X_2(t)$$

It is seen from the dynamics described in the above equations that the order of the two factors may be swapped without any impact on how the model describes the interest rates. This means that a model estimation has several optimums, which can make empirical identification difficult.

A 3-factor affine Nelson-Siegel model is described by level, slope and curvature[2]:

$$y(t,T) = A(t,T) + B_L(t,T)L(t) + B_S(t,T)S(t) + B_C(t,T)C(t)$$

To ensure the interpretation of level, slope and curvature, the short-term interest rate is defined as the sum of level and slope $r(t) = L(t) + S(t)$. The factors follow the risk-adjusted dynamics of the stochastic differential equation:

$$\begin{pmatrix} \mathrm{d}L(t) \\ \mathrm{d}S(t) \\ \mathrm{d}C(t) \end{pmatrix} = \begin{pmatrix} \varepsilon & 0 & 0 \\ 0 & \lambda & -\lambda \\ 0 & 0 & \lambda \end{pmatrix} \left[\begin{pmatrix} \theta_L \\ \theta_S \\ \theta_C \end{pmatrix} - \begin{pmatrix} L(t) \\ S(t) \\ C(t) \end{pmatrix} \right] \mathrm{d}t + \begin{pmatrix} \sigma_L \sqrt{L(t)} & 0 & 0 \\ 0 & \sigma_S \sqrt{S(t)} & 0 \\ 0 & 0 & \sigma_C \sqrt{C(t)} \end{pmatrix} \begin{pmatrix} \mathrm{d}W_L^Q(t) \\ \mathrm{d}W_S^Q(t) \\ \mathrm{d}W_C^Q(t) \end{pmatrix}$$

where ε is a small number and λ is a parameter governing the form of the B functions corresponding to slope and curvature. Precisely the form of the first part of the stochastic differential equation ensures that the factors are *always* identified as level, slope and curvature. The other part describes how interest-rate volatility depends on level, slope and curvature. Finally, the non-risk-adjusted dynamics are the same as for the CIR model, i.e.:

$$\begin{pmatrix} \mathrm{d}L(t) \\ \mathrm{d}S(t) \\ \mathrm{d}C(t) \end{pmatrix} = \begin{pmatrix} \kappa_L & 0 & 0 \\ 0 & \kappa_S & 0 \\ 0 & 0 & \kappa_C \end{pmatrix} \left[\begin{pmatrix} \theta_L^P \\ \theta_S^P \\ \theta_C^P \end{pmatrix} - \begin{pmatrix} L(t) \\ S(t) \\ C(t) \end{pmatrix} \right] \mathrm{d}t + \begin{pmatrix} \sigma_L \sqrt{L(t)} & 0 & 0 \\ 0 & \sigma_S \sqrt{S(t)} & 0 \\ 0 & 0 & \sigma_C \sqrt{C(t)} \end{pmatrix} \begin{pmatrix} \mathrm{d}W_L^Q(t) \\ \mathrm{d}W_S^Q(t) \\ \mathrm{d}W_C^Q(t) \end{pmatrix}$$

This form ensures that a 3-factor Nelson-Siegel is a direct expansion of the CIR model, but with identification of the individual factors.

[1] See Cox, J., Ingersoll, J. and Ross, S., 1985, A Theory of the Term Structure of Interest Rates, *Econometrica*, vol. 53, pp. 385-407.

[2] See Christensen, J., Diebold, F. and Rudebusch, G., 2007, The Affine Arbitrage-Free Class of Nelson-Siegel Term Structure Models, *Working Paper, Federal Reserve Bank of San Francisco*, and Christensen, J., Lopez, J. and Rudebusch, G., 2007, Can Spanned Term Structure Factors Drive Stochastic Volatility, *Working Paper, Federal Reserve Bank of San Francisco*..

CHAPTER 12

Use of Swaps by the Central Government

Government Debt Management has been using swaps for almost 30 years. Over time, the trend has gone from relatively complex swaps to plain vanilla swaps.

Swaps are an integral part of government debt management. They are either transacted in connection with specific foreign loans or as portfolio swaps aimed at managing the overall interest-rate and currency exposure. Consequently, swaps cannot be assessed separately from the government debt portfolio.

The use of swaps provides for more flexible debt management, allowing a more distinct separation of issuance policy and the management of interest-rate risk. The focus of the issuance policy can thus be on creating high liquidity in the bond series, building up a broad investor base and keeping the refinancing risk low.

SWAP MARKETS HAVE EXPANDED 12.1

A swap is a financial contract between two parties to exchange payments over a fixed period. The contract contains two opposite payments (legs). The recipient leg of one party is the payment leg of the other party. The number of payments in each leg depends on the maturity of the swap and the payment frequency. The most frequently used swaps are interest-rate and currency swaps, cf. Box 12.1.

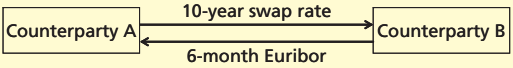
Swaps are flexible financial tools, and the market for plain vanilla swaps is highly liquid. The global notional outstanding volume of interest-rate swaps is far larger than the outstanding volume of bonds. The outstanding volume of currency swaps[1] has mirrored the growth in bonds, accounting for approximately 20 per cent of the outstanding volume of bonds, cf. Chart 12.1.1.

[1] Currency swaps are cross-currency basis swaps with exchange of principals on conclusion and expiry of the contract and ongoing interest payments.

INTEREST-RATE AND CURRENCY SWAPS Box 12.1

Interest-rate swaps

An interest-rate swap is an agreement between two parties to exchange interest payments on a specific principal over a fixed period. Normally, fixed interest payments are exchanged for variable interest payments, cf. the Illustration. The parties to an interest-rate swap do not exchange principals. The principal (notional value) of an interest-rate swap is only used to determine the size of the payments on the individual payment dates.



Payments on the variable leg typically fall due every six months, and the interest rate is often fixed on the basis of a money-market interest rate. The interest rate on the fixed leg is called the swap rate. The swap rate is fixed so that the market value of the swap is zero at the time of transaction. In theory, the swap rate is independent of counterparty credit risk if full collateral is pledged in the event of fluctuations in market value. As a consequence of this, and a high level of liquidity in the swap market, swap rates are often applied as reference interest rates in the financial system.

Currency swaps

A currency swap is an agreement between two parties to exchange principals and interest payments in two currencies (cross-country basis swaps), cf. the Illustration. The exchange of principals on transaction and expiry of the swap takes place at the spot rate. During the maturity of the swap, the counterparties pay interest on the principal they have received. The interest rate is often a 3-month money-market interest rate less a spread (basis swap spread "X") on one currency leg, whereby the market value of the swap is zero at the time of transaction.

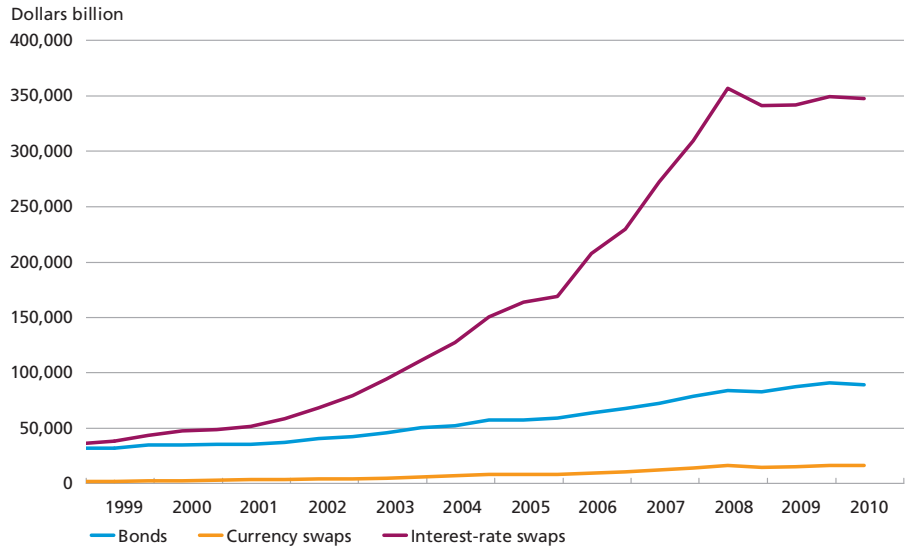
USE OF SWAPS BY GOVERNMENT DEBT MANAGEMENT 12.2

The use of swaps by government debt management offices in both advanced economies and developing countries has increased in recent years.[1]

Government Debt Management in Denmark has been using swaps for almost 30 years. Over time, the trend has gone from relatively complex swaps to plain vanilla swaps. As opposed to structured swaps, plain vanilla swaps are easier to transfer to other counterparties and to price.

[1] Use of derivatives for debt management and domestic debt market development, OECD 2007.

GLOBAL OUTSTANDING AMOUNTS IN SWAP AND BOND MARKETS Chart 12.1.1



Source: BIS Quarterly Review.

Government Debt Management clearly communicates the strategy for the use of swaps, and the transaction of swaps is fully transparent. The swap portfolio is published in the annual publication *Danish Government Borrowing and Debt*.

Swaps enable separation of issuance strategy and risk management

Swaps are an integral part of government debt management. They are transacted either in connection with specific foreign loans or as portfolio swaps aimed at managing the overall interest-rate and currency exposure, cf. Box 12.2. Consequently, swaps cannot be assessed separately from the government debt portfolio.

SWAPS LINKED TO SPECIFIC LOANS AND PORTFOLIO SWAPS Box 12.2

Swaps linked to specific loans (liability swaps)

In a liability swap, the payment dates of one leg are the same as those of the underlying bond loan. The central government uses liability swaps in connection with foreign borrowing in e.g. dollars to limit the currency risk on both interest and redemption to euro.

Portfolio swaps

A portfolio swap is a swap without direct links to a specific underlying loan. In the management of interest-rate risk there is no need to hedge a specific interest-rate risk on the individual issues. The central government typically transacts interest-rate swaps in which it pays a floating short-term interest rate and receives a fixed long-term interest rate. Restructuring of foreign-exchange exposure between kroner and euro is typically performed over a relatively long period by transaction of portfolio currency swaps.

The central government's exchange-rate risk is limited by the foreign debt only having exposure in euro. Currency swaps make it possible to issue in a wider range of currencies, while limiting currency exposure to euro.

Interest-rate risk is managed by a strategic target band for the duration of the debt portfolio. The central government can manage the duration by using swaps rather than adapting its issuance strategy. A stable and predictable issuance strategy is important, since the central government is a key player in the domestic capital market.

Separation of the issuance policy and the management of interest-rate and exchange-rate risk allows for an issuance policy focused on:

- building up high liquidity in the bond series
- reducing the refinancing risk
- ensuring a broad, stable investor base
- exploiting comparative advantages.

Concentration of issuance causes higher liquidity in the bond series

Separation of the issuance strategy and the strategy for management of interest-rate risk via swaps enables the central government to issue in few benchmark segments. The concentration of issuance contributes to higher liquidity in the bond series, for which the investors are often willing to pay a premium. For small government issuers, concentration of issuance is particularly important.

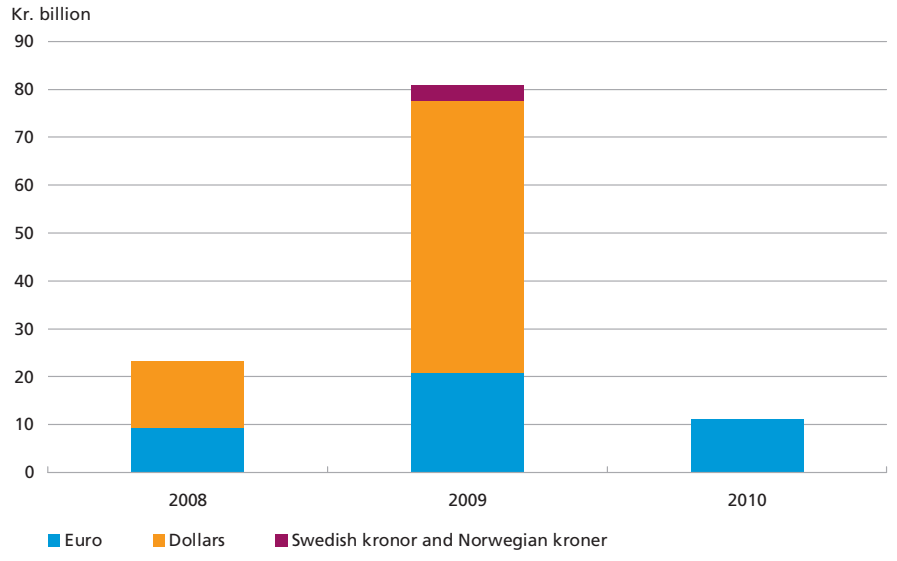
In the period of falling debt, the use of interest-rate swaps enabled Government Debt Management to achieve the desired duration, while consolidating issuance in the 10-year maturity segment. Moreover, currency swaps contributed to the liquidity of domestic issuance in that maturing foreign loans were financed by borrowing in Danish kroner combined with currency swaps from kroner to euro.

Reduction of refinancing risk

The use of interest-rate swaps makes it possible to obtain a given duration by combining issuance in long-term bonds with interest-rate swaps. This reduces the central government's refinancing risk relative to increasing short-term borrowing since no refinancing is required of the principal of the interest-rate swap.

Against the backdrop of mounting debt and the financial turmoil, Government Debt Management focuses on keeping the refinancing risk low by e.g. covering the financing requirement well in advance and by means of a high liquidity reserve. The higher duration and the resulting increase in expected interest costs can be offset by using interest-rate swaps.

ISSUANCE OF FOREIGN BONDS BY TRANSACTION CURRENCY Chart 12.2.1



Issuance targeted to a broad investor base

The use of interest-rate and currency swaps provides for issuance in benchmark segments that are attractive to domestic and foreign investors. A broad, stable investor base reduces the risk of higher borrowing costs as a result of falling demand from one investor group.

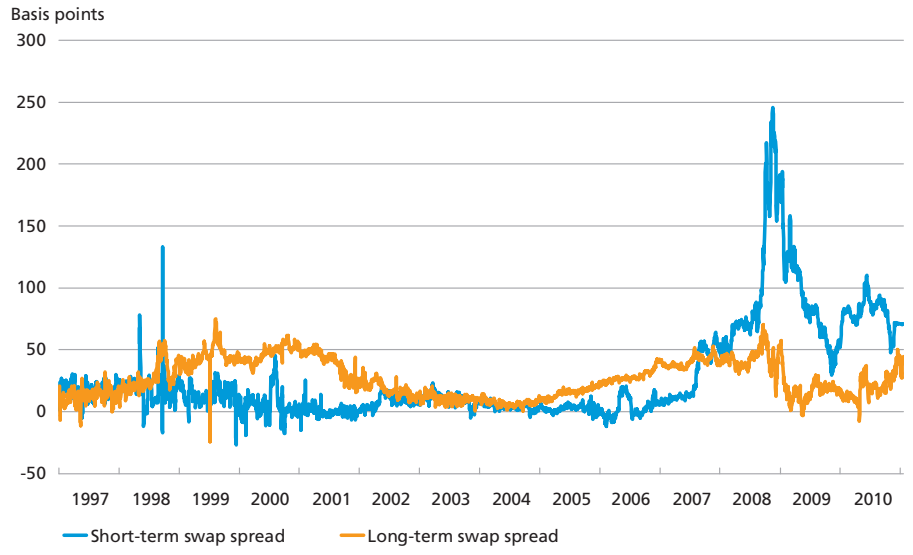
In foreign borrowing, currency swaps contribute to expanding the investor base as e.g. issuance in euro and dollars caters for different investor types. When the central government needed to increase the contribution to the foreign-exchange reserve in connection with the financial crisis, it was particularly important to have flexibility for issuance in other currencies than the euro, cf. Chart 12.2.1. This was among other things attributable to increased issuance from issuers with the euro as their domestic currency.

In the period of falling debt and low borrowing requirements, the liquidity consideration was deemed to be more important than the consideration of a broad investor base. Against this backdrop, the central government's issuance was focused on the 10-year maturity segment. Given the prospects of government deficits in the coming years, the issuance strategy has been expanded to include T-bills and the 2-, 5- and 10-year maturity segments. Interest-rate swaps provide for flexible adjustment of the issuance strategy without changing the interest-rate risk.

Exploiting comparative advantages

Until the financial crisis in 2008, issuance of long-term government bonds and transaction of interest-rate swaps normally gave the central govern-

DEVELOPMENTS IN SHORT-TERM AND LONG-TERM KRONE SWAP SPREADS Chart 12.2.2



Note: The long-term swap spread is the spread between the 10-year swap rate and the 10-year government yield. The short-term swap spread is the spread between 6-month Cibor and the 6-month government yield.
Source: Bloomberg.

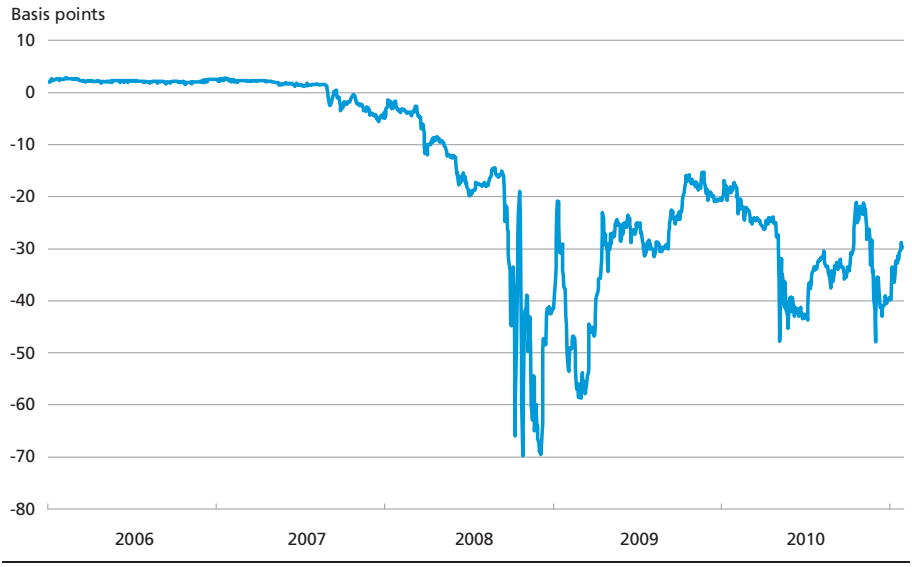
ment a comparative advantage over direct issuance in short-term maturity segments. A wider long-term swap spread relative to the short-term spread entails an immediate comparative advantage for the central government. For a period, the comparative advantage shifted from long-term to short-term issuance due to the financial crisis, cf. Chart 12.2.2. The issuance policy was maintained in order to avoid a high refinancing risk. As a result of the changed conditions in the swap market, the central government did not transact interest-rate swaps for a while.

In terms of foreign borrowing, issuance in e.g. dollars combined with currency swaps into euro sometimes gives the central government a comparative advantage over direct borrowing in euro. This is typically the case when the basis swap spread between euro and dollars is very negative.[1]

In connection with the financial crisis, a need arose among European banks for swaps into dollars as it was difficult for them to borrow directly in dollars. As a result, the basis swap spread became very negative, cf. Chart 12.2.3. During this period, the central government was able to issue in dollars and restructure currency exposure into euro on favourable terms.

[1] The basis swap spread can be interpreted as the savings that an issuer can obtain by choosing one currency over another if the issuance is at the same level relative to the swap curves in the currencies in question.

3-YEAR BASIS SWAP SPREAD BETWEEN EURO AND DOLLARS Chart 12.2.3



Source: Bloomberg.

RISKS ASSOCIATED WITH THE USE OF SWAPS 12.3

While enabling Government Debt Management to manage a number of risks, swaps also give rise to derived risks, primarily credit and instrument risks.

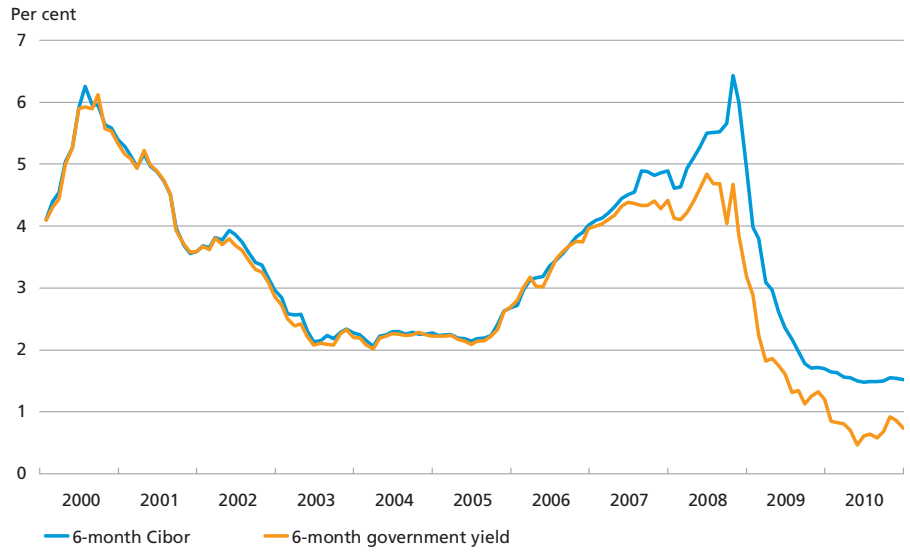
Credit risk on the central government's swaps is reduced via collateral

The market value of swaps may develop in favour of the central government, resulting in credit-risk exposure as the counterparty may default on its payment obligations. The credit risk is reduced by transacting swaps only with counterparties with a high credit standing. Moreover, the counterparties pledge collateral on an ongoing basis if the market value of the swap becomes positive for the central government.

Instrument risk became evident during the financial crisis

Instrument risk is the risk of diverging developments in interest rates on different instruments with the same maturity. The central government's management of interest-rate risk by using swaps entails the risk that the development in the short-term money-market interest rate that the central government pays in a swap will diverge from the short-term government yield. Considering this risk, it must be noted that the long-term swap-spread is received until the swap's maturity.

DEVELOPMENT IN 6-MONTH CIBOR AND THE 6-MONTH GOVERNMENT YIELD Chart 12.3.1



Source: Bloomberg.

The spread between the Danish uncollateralised money-market interest rates and the Danish government yield curve widened considerably from the autumn of 2008, cf. Chart 12.3.1. Consequently, for a period of time the interest-rate fixing on the central government's interest-rate swaps in kroner was considerably higher than the government yield. However, these adverse market conditions in the swap market must be considered in the light of the fact, that the central government for several years has had a comparative advantage using interest-rate swaps.

Appendices

Information on Government Borrowing and Debt

Government Debt Management focuses on transparency in government borrowing and debt. To this end, information on the government debt policy is regularly published. The information is published on Government Debt Management's website, www.governmentdebt.dk, which is also accessible via www.nationalbanken.dk.

A wide range of information concerning government borrowing and debt is published via DN News[1]. Several news agencies transmit the information from DN News, e.g. Bloomberg and Reuters. The information is also available at Government Debt Management's website. It is possible to be notified directly of new information and updates concerning government borrowing and debt by subscribing to Danmarks Nationalbank's electronic news service (see www.nationalbanken.dk under News service).

Enquiries concerning government borrowing and debt should be directed to governmentdebt@nationalbanken.dk.

The following table presents the information on government borrowing and debt that is published on an ongoing basis.

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

INFORMATION ON GOVERNMENT BORROWING AND DEBT

	Overall content	Information at	Frequency
Danish Government Borrowing and Debt, usually in February	• Development the previous year • Detailed debt and transaction statements • Report section, evaluation and strategy	• www.governmentdebt.dk	Annually
Government debt policy, June and December	• Borrowing strategy • Key on-the-run issues	• DN-News • www.governmentdebt.dk	Semi-annually
Opening of new securities	• Coupon • Maturity date • Opening date	• DN-News www.governmentdebt.dk	Irregularly
Budget Outlook, normally in May, August and December	• Net financing and borrowing requirement, current and coming years	• Publication from the Ministry of Finance • www.fm.dk	Normally 3 times a year
Monthly buy-backs and sales, 1st banking day	• Monthly sales by series • Monthly buy-backs by series • Monthly currency swaps	• www.governmentdebt.dk	Monthly
Government funds' holding of government securities, 1st banking day	• Government funds' holding of Danish government securities as of end of previous month	• www.governmentdebt.dk	Monthly
Foreign Exchange and Liquidity, 2nd banking day	• Government net financing requirement	• Press release from Danmarks Nationalbank • www.governmentdebt.dk	Monthly
Day-to-day distribution of government payments, penultimate banking day	• Day-to-day distribution for liquidity impact of central government payments in coming months	• Announcement from Danmarks Nationalbank • www.governmentdebt.dk	Monthly
Daily buy-backs and sales	• Daily sales by series • Daily buy-backs by series • Daily borrowing requirements	• DN-News • www.governmentdebt.dk	Daily

Principles for Management of Credit Risk on government Swaps

Counterparty credit standing (rating): To limit the credit risk on swap counterparties, swaps are only transacted with counterparties with high credit standing. A counterparty must normally be rated minimum Aa3/AA- by at least two well-reputed rating agencies (Fitch, Moody's or Standard & Poor's). If a counterparty is rated by three rating agencies, the minimum requirement is based on the lowest rating. For interest-rate swaps in kroner and euro and currency swaps between kroner and euro, however, counterparties with a rating of minimum A3/A- are permitted.

Legal basis of agreement: Swaps are only transacted with counterparties that have signed an ISDA Master Agreement with appurtenant Credit Support Annex, which governs the business relationship between the central government and the counterparty.

Collateralisation: To limit any losses in the event of counterparty default, swaps may only be transacted with counterparties that have signed collateral agreements (ISDA Credit Support Annex). The key elements of the agreements are:

- The agreements are unilateral, so that only the central government's counterparties pledge collateral.
- The government and the counterparty each calculate the market value of swaps and agree on the Credit Support Amount.
- Collateral is pledged when the market value in the central government's favour exceeds an agreed amount (the threshold value).
- Permitted collateral will normally be government bonds with a rating of minimum Aa3/AA-. Other bonds can also be accepted, subject to individual assessment, e.g. Danish mortgage-credit bonds. The collateral value of the bonds is calculated as the market value after a haircut. Haircuts will depend on the remaining maturity of the bonds and take into account that the value of the bonds can decrease.
- The administration of bonds pledged as collateral to the central government is transferred to the custodian bank with which the securities are deposited. On behalf of the central government, the custodian bank will request the counterparty to provide additional collateral, should the value of the deposited bonds decrease by more than the minimum transfer amount and becomes insufficient to cover the market value of the transacted swaps after deduction of the threshold.

Eligible swaps: Only plain-vanilla interest-rate swaps and plain-vanilla currency swaps may be transacted. The maturity will normally be 10 years or lower. Dual-currency swaps and zero-coupon swaps are considered to be plain-vanilla swaps. Structured swaps are no longer transacted. The same applies to transactions that include option elements, including swaptions, interest-rate caps, etc.

Netting: ISDA Master Agreements contain netting provisions whereby gains and losses on transacted swaps are set off if a counterparty defaults on its payment obligations.

Master Agreements are signed only with counterparties domiciled in countries whose legislation is expected to provide for netting.

Early termination of swaps: It must be possible to terminate all swaps with a counterparty should the counterparty's rating fall to an unsatisfactory level. All new ISDA Master Agreements therefore contain rating triggers. A rating trigger entails that swaps can be terminated should a counterparty's rating fall to a given level. In most of the central government's ISDA Master Agreements, the rating trigger is Baa1/BBB+[1].

Cross-default clauses: If the counterparty defaults on its payment obligations to a third party, cross-default clauses allow swaps to be terminated.

Observation list: The ongoing monitoring of the counterparty credit risk entails that counterparties assessed to involve greater risk are monitored more closely on an "observation list". Only in special circumstances are new swaps transacted with counterparties on this list.

[1] Some Master Agreements, dating from before the rating trigger requirement was formalised, have none or a lower trigger.

Terms for the Securities Lending Facilities of the Central Government and the Social Pension Fund

Primary Dealers have the right to use the securities lending facilities of the central government and the Social Pension Fund, SPF, to which the participants are eligible. The purpose of the securities lending facilities is to supplement and strengthen market efficiency. Considering the functioning of the repo market, Primary Dealers shall make every effort to support a well-functioning market, and to prevent occurrences of intended market failures. Information on the terms for the Central Government's and the SPF's Securities Lending Facilities is given below.

The Central Government's Securities Lending Facility

- The lending facility applies to on-the-run government securities and government securities with benchmark status.
- The Lending facility can also apply to bonds eligible for lending through the SPF's Securities Lending Facility if the SPF does not hold a sufficient amount of the bond.
- The specific terms for lending in the individual government series are published in the central government's announcements concerning on the run issues.
- For government bonds the lending facility is available for Primary Dealers in Danish government bonds.
- For T-bills the lending facility is available for Primary Dealers in Danish T-bills.
- In normal circumstances the maximum lending in bond series is kr. 4 billion and the maximum lending in all T-bills is kr. 10 billion in total. However, these limits may be raised in the event of abnormal price formation on the market for securities lending.
- The fee is 0.2 per cent per year for securities lending of government bonds. The fee is 0.15 per cent per year for securities lending of T-bills.
- The lending facility is available as buy-/sell-back transactions. Participants borrow in one buy-/sell-back transaction and lend (provide collateral) in another buy-/sell-back transaction.
- The securities may be borrowed for a period from 1 to 5 trading days.
- Transactions can be made between 9.00 am and 3.30 pm, but should as far as possible be concluded before 2.00 pm (CET).

- Lending in securities is granted in the order that requests to Danmarks Nationalbank are received from securities dealers on the relevant day. The right to make discretionary allocations is reserved if deemed appropriate.
- Danish government securities denominated in Danish kroner issued via VP Securities in series with an outstanding amount of at least kr. 3 billion are accepted as collateral.
- A haircut of 2.5 per cent is applied to each buy-/sell-back transaction. Hence, the market price of the security lent by the central government is raised by 2.5 per cent and the market price of the security provided as collateral by the borrower is lowered by 2.5 per cent.
- Settlement takes place on the following trading day.
- In case settlement only succeeds for one of the buy-/sell-back transactions, be that the lending transaction or the collateral transaction as it may, borrowers are obliged to ensure immediate settlement of the failed transaction.
- Government Debt Management may from time to time amend the terms and conditions applicable to the Central Government's Securities Lending Facility to reflect market practice and ensure a well-functioning securities lending facility. Government Debt Management informs Primary Dealers at least one week prior to the implementation of any change to the terms of the lending facility.
- Any enquiries concerning securities lending transactions should be made to Danmarks Nationalbank, Market Operations, on tel. +45 3363 6752 or +45 3363 6736.

SPF's Securities Lending Facility

- Lending is in all government securities with more than 1 month remaining maturity of the type bullet loans in SPF's portfolio.
- The lending facility is available to Primary Dealers in government bonds.
- The fee is 0.2 per cent per year.
- The lending facility is available as buy-/sell-back transactions. Participants borrow in one buy-/sell-back transaction and lend (provide collateral) in another buy-/sell-back transaction.
- The securities may be borrowed for a period from 1 to 5 trading days.
- Transactions can be made between 9.00 am and 3.30 pm, but should as far as possible be concluded before 2.00 pm (CET).
- Lending in securities is granted in the order that requests to Danmarks Nationalbank are received from securities dealers on the relevant day. The right to make discretionary allocations is reserved if deemed appropriate.

- Danish government securities denominated in Danish kroner issued via VP Securities in series with an outstanding amount of at least kr. 3 billion are accepted as collateral.
- A haircut of 2.5 per cent is applied to each buy-/sell-back transaction. Hence, the market price of the security lend by the central government is raised by 2.5 per cent and the market price of the security provided as collateral by the borrower is lowered by 2.5 per cent.
- Settlement takes place on the following trading day.
- In case settlement only succeeds for one of the buy-/sell-back transactions, be that the lending transaction or the collateral transaction as it may, borrowers are obliged to ensure immediate settlement of the failed transaction.
- Government Debt Management may from time to time amend the terms and conditions applicable to the SPF's Securities Lending Facility to reflect market practice and ensure a well-functioning securities lending facility. Government Debt Management informs Primary Dealers at least one week prior to the implementation of any change to the terms of the lending facility.
- Any enquiries concerning securities lending transactions should be made to Danmarks Nationalbank, Market Operations, on tel. +45 3363 6752 or +45 3363 6736.

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CENTRAL-GOVERNMENT DEBT, YEAR-END 2000-2010 Table 1

Kr. million	2000	2001	2002
A. Debt			
Domestic debt			
- Fixed-rate bonds	506,992	494,875	497,938
- Fisheries Bank bonds	-	-	-
- Lottery bonds	900	900	400
- Treasury notes	81,257	70,788	79,371
- Treasury bills	36,846	49,224	63,404
- Index-linked loans and loan package[1]	-	-	-
- Currency swaps from kroner to euro (net)[2]	-	-4,800	-16,200
- Currency swaps from kroner to dollars	-	-	-
- Government securities held by the central government	-2,000	-	-
Domestic debt, total	623,995	610,987	624,913
Foreign debt			
- in US dollars	-	-	-
- in Swiss francs	3,822	-	-
- in Japanese yen	1,672	-	-
- in euro	79,287	83,753	83,689
- in other currencies and multi-currency	428	42	42
Foreign debt, total	85,209	83,795	83,730
Domestic and foreign debt, total	709,204	694,782	708,644
B. Government deposits with the central bank[3]	-32,637	-39,627	-45,975
C. The Social Pension Fund, The Preventive Measures Fund and the advanced Technology Foundation			
- Government securities	-106,312	-109,474	-113,132
- Other Securities	-33,244	-31,621	-28,230
The three funds, nominal value, total[4]	-139,556	-141,095	-141,362
Central-government debt, total (A+B+C)	537,011	514,060	521,308
Central-government debt, per cent of GDP	41.5	38.5	38.0

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

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

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

[3] For 2010, the central government's account is compiled in accordance with the monthly balance sheet of Danmarks Nationalbank.

[4] Index linked bonds are compiled as indexed value.

CENTRAL-GOVERNMENT DEBT, YEAR-END 2000-2010 Table 1

2003	2004	2005	2006	2007	2008	2009	2010
480,874	480,590	440,351	428,796	403,039	451,394	505,973	556,900
-	-	-	-	-	-	995	887
400	400	200	200	200	200	100	-
78,532	71,690	33,980	-	-	-	-	-
67,347	68,602	60,092	42,660	19,660	-	-	25,460
-	-	-	379	277	-	-	-
-16,200	-16,200	-15,456	-12,755	-13,262	-11,662	-8,197	2,974
-	-524	-2,688	-4,862	-7,873	-10,423	-10,956	-9,808
-	-	-	-	-	-	-	-
610,953	604,558	516,479	454,418	402,040	429,509	487,915	576,413
-	518	2,810	4,583	6,844	9,947	10,218	9,901
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
83,861	83,370	87,833	75,219	61,738	123,126	129,351	104,811
42	40	38	21	20	19	19	18
83,903	83,929	90,681	79,823	68,642	133,092	139,588	114,731
694,856	688,487	607,160	534,241	470,682	562,600	627,503	691,144
-40,621	-57,559	-53,297	-70,958	-86,333	-258,131	-210,932	-177,282
-118,138	-120,799	-124,635	-125,111	-128,547	-98,604	-77,720	-75,511
-20,576	-16,065	-11,284	-9,535	-8,686	-9,643	-37,376	-52,075
-138,714	-136,864	-135,919	-134,646	-137,233	-108,247	-115,096	-127,587
515,521	494,064	417,944	328,637	247,116	196,222	301,475	386,275
36.8	33.9	26.9	20.1	14.5	11.3	18.1	22.2

SERVICE ON CENTRAL-GOVERNMENT DOMESTIC DEBT[1] AS OF 31 DECEMBER 2010 Table 2.1

Kr. billion	Interest	Redemptions	Total
2011	23.8	40.0	63.8
2012	21.8	78.2	100.0
2013	18.8	87.4	106.2
2014	14.5	-2.5	12.0
2015	14.8	86.1	101.0
2016	11.4	-1.0	10.3
2017	11.7	51.9	63.6
2018	9.7	-0.8	8.9
2019	9.7	87.3	97.0
2020	6.2	-0.3	5.9
2021	6.2	-0.0	6.2
2022	6.2	0.0	6.2
2023	6.2	0.0	6.2
2024	6.2	24.5	30.7
2025	4.5	0.0	4.5
2026	4.5	-	4.5
2027	4.5	-	4.5
2028	4.5	-	4.5
2029	4.5	-	4.5
2030	4.5	-	4.5
2031	4.5	-	4.5
2032	4.5	-	4.5
2033	4.5	-	4.5
2034	4.5	-	4.5
2035	4.5	-	4.5
2036	4.5	-	4.5
2037	4.5	-	4.5
2038	4.5	-	4.5
2039	4.5	100.2	104.7
Total	235.0	551.0	786.0

[1] Excluding T-bills. Including net interest payments on domestic interest-rate swaps. Krone payments to and from the central government in currency swaps are included in the redemptions.

SERVICE ON CENTRAL-GOVERNMENT FOREIGN DEBT[1] AS OF 31 DECEMBER 2010 Table 2.2

Kr. billion	Interest	Redemptions	Total
2011	0.8	33.3	34.0
2012	-0.0	32.5	32.5
2013	0.3	1.2	1.5
2014	0.4	26.7	27.1
2015	-0.4	12.3	12.0
2016	-0.3	1.1	0.8
2017	-0.3	1.1	0.8
2018	-0.3	0.9	0.6
2019	-0.3	0.7	0.3
2020	-0.2	0.4	0.1
2021	0.0	0.1	0.1
Total	-0.3	110.2	109.8

[1] Excluding Commercial Paper. Including net interest payments on swaps. Payments in foreign currency to and from the central government in currency swaps are included in the redemptions.

THE CENTRAL GOVERNMENT'S CURRENT, INVESTMENT AND LENDING BALANCE, NET CASH BALANCE AND GROSS DEFICIT, 2000-2010 Table 3

Kr. billion	2000	2001	2002
Current, investment and lending budget	30.7	24.0	25.8
Re-lending of government loans	-2.8	-2.4	-8.9
Distributed capital losses on issue and due interest[1]	1.4	0.4	-0.1
Other capital items[2]	-2.3	0.9	-20.0
Net cash balance[3]	27.0	22.9	-3.2
Redemptions on domestic government debt	91.3	101.2	112.4
Redemptions on foreign government debt	15.7	17.8	22.5
Gross deficit	-80.0	-96.2	-138.1
Gross deficit financing requirement	62.3	81.1	115.5

Source: *Central Government Accounts*. 2010 are based on Danmarks Nationalbank's end-year specification. The numbers can deviate from the accounting figures.

[1] Including capital losses on buy-back.

[2] Includes e.g. movements in the central government's holdings, cf. *Budget Outlook* from the Ministry of Finance.

[3] Net bond purchases by the Social Pension Fund are not included in the net cash balance, but are instead included in the redemption on the domestic government debt.

THE CENTRAL GOVERNMENT'S CURRENT, INVESTMENT AND LENDING BALANCE, NET CASH BALANCE AND GROSS DEFICIT, 2000-2010 Table 3

2003	2004	2005	2006	2007	2008	2009	2010
12.4	27.7	80.6	98.6	106.2	72.3	-29.8	na.
-0.8	-5.4	-3.2	-12.4	-8.5	-13.5	-82.0	na.
-0.7	0.5	-0.7	-0.9	0.4	0.3	-1.3	na.
-4.1	0.9	-0.9	5.0	-15.3	-10.7	3.1	na.
6.9	23.6	75.9	90.2	82.8	48.3	-110.0	-92.1
106.3	100.0	119.5	78.6	58.5	39.7	67.9	76.3
17.0	16.1	9.3	13.0	20.7	23.0	21.7	36.5
-116.6	-92.5	-52.9	-1.3	3.6	-14.4	-199.7	-204.9
99.7	76.4	43.6	-11.7	-24.3	-8.6	177.9	168.4

CENTRAL-GOVERNMENT DOMESTIC BORROWING, 2010 Table 4.1

ISIN-code	Coupon, per cent	Name	Redemption date	Issuance, kr. million, nominal
Government bonds				
DK0009922593	4	4 per cent bullet loans 2012 Issued 23 Apr 2009-	15 Nov 2012	26,520
DK0009920894	5	5 per cent bullet loans 2013 Issued 19 Feb 2002-	15 Nov 2013	16,780
DK0009921439	4	4 per cent bullet loans 2015 Issued 12 Feb 2004-	15 Nov 2015	18,000
DK0009922403	4	4 per cent bullet loans 2019 Issued 20 Jan 2009-	15 Nov 2019	39,635
DK0009922320	4,5	4,5 per cent bullet loans 2039 Issued 11 Nov 2008-	15 Nov 2039	11,740
T-bills				
DK0009813461	0	T-bill 2010 I Issued 1 Mar 2010-1 Sep 2010	1 Sep 2010	7,480
DK0009813388	0	T-bill 2010 II Issued 1 Mar 2010-1 Dec 2010	1 Dec 2010	8,720
DK0009813545	0	T-bill 2011 I Issued 1 Jun 2010-	1 Mar 2011	12,040
DK0009813628	0	T-bill 2011 II Issued 1 Sep 2010-	1 Jun 2011	9,420
DK0009813701	0	T-bill 2011 III Issued 1 Dec 2010-	1 Sep 2011	4,000

CENTRAL-GOVERNMENT FOREIGN BORROWING, 2010 Table 4.2

ISIN-code	Coupon, per cent	Name	Redemption date	Issuance, kr. million, nominal
Loan				
XS0546424077	1.75	1,500 million euro-loan Issued 5 Oct 2010	5 Oct 2015	11,178

CENTRAL-GOVERNMENT INTEREST-RATE SWAP TRANSACTIONS, 2010 Table 5

Loan no.	Start date	Termination date	Amount, kr. million
Interest-rate swaps in euro			
1324	21-01-10	21-01-20	745
1326	29-01-10	29-01-20	745
1333	15-02-10	15-02-20	745
1336	23-02-10	23-02-20	1,118
1345	15-03-10	15-03-20	1,118
1347	16-03-10	16-03-20	745
1415	19-11-10	19-11-20	745
1419	29-11-10	29-11-20	745
1421	06-12-10	06-12-20	745
1424	10-12-10	10-12-20	745
1429	16-12-10	16-12-20	745
1432	20-12-10	20-12-20	745
Interest-rate swaps, total			9,691

CENTRAL-GOVERNMETN CURRENCY SWAP TRANSACTIONS, 2010 Table 6

Loan no.	Start date	Receiving (at maturity)			Paying (at maturity)			Termination date
		Currency	Million	Interest	Currency	Million	Interest	
10046	29-01-10	Euro	100	6-month Euribor	Kr.	744.50	6-month Cibor-0,225	29-01-12
10047	27-04-10	Euro	100	6-month Euribor	Kr.	744.20	6-month Cibor-0,2075	27-04-12
10048	28-05-10	Euro	100	6-month Euribor	Kr.	744.08	6-month Cibor-0,245	28-05-12
10049	17-06-10	Euro	100	6-month Euribor	Kr.	743.80	6-month Cibor-0,255	17-06-12
10050	24-06-10	Euro	100	6-month Euribor	Kr.	744.00	6-month Cibor-0,261	24-06-12
10051	28-07-10	Euro	150	6-month Euribor	Kr.	1,117.80	6-month Cibor-0,27	28-07-12
10052	16-09-10	Euro	150	6-month Euribor	Kr.	1,116.81	6-month Cibor-0,325	16-03-12

CENTRAL-GOVERNMENT DOMESTIC DEBT AS OF 31 DECEMBER 2010 Table 7.1

ISIN-code	Coupon, per cent	Name[1]	Redemption date	Outstanding amount, kr. million
Government bonds, fixed interest-rate				
Bullet loans				
DK0009919961	6	Bullet loans 2011 Issued 4 May 2000-	15 Nov 2011	41,036.8
DK0009922593	4	Bullet loans 2012 Issued 23 Apr 2009-	15 Nov 2012	74,800.0
DK0009920894	5	Bullet loans 2013 Issued 19 Feb 2002-	15 Nov 2013	88,460.0
DK0009921439	4	Bullet loans 2015 Issued 12 Feb 2004-	15 Nov 2015	87,200.0
DK0009921942	4	Bullet loans 2017 Issued 26 Jan 2006-	15 Nov 2017	52,870.0
DK0009922403	4	Bullet loans 2019 Issued 20 Jan 2009-	15 Nov 2019	87,870.0
DK0009918138	7	Bullet loans 2024 Issued 6 Apr 1994-	10 Nov 2024	24,431.0
DK0009922320	4.5	Bullet loans 2039 Issued 11 Nov 2008-	15 Nov 2039	100,180.0
Amortised loans				
DK0009902728	4	S 2017 Issued 29 Nov 1955-12 Sep 1958	15 Jun 2017[2]	33.7
Perpetuals				
DK0009901597	3.5	Dansk Statslån Issued 11 Dec 1886	Perpetuals[3]	17.3
•	5	Dansk-Islandsk Fond 1918 Issued 20 May 1919	Perpetuals	1.0
Government bonds, fixed interest rate, total				556,899.8

CENTRAL-GOVERNMENT DOMESTIC DEBT AS OF 31 DECEMBER 2010 Table 7.1

ISIN-code	Coupon, per cent	Name[1]	Redemption date	Outstanding amount, kr. million
T-bills				
Zero-coupon loans				
DK0009813545	0	T-bill 2011 I Issued 1 Jun 2010-	1 Mar 2011	12,040.0
DK0009813628	0	T-bill 2011 II Issued 1 Sep 2010-	1 Jun 2011	9,420.0
DK0009813701	0	T-bill 2011 III Issued 1 Dec 2010-	1 Sep 2011	4,000.0
T-bills, total				25,460.0
Fisheries Bank of Denmark bonds				
DK0009604118	6	Fisheries Bank bond 2011	1 May 2011	3.1
DK0009603730	7	Fisheries Bank bond 2011	1 May 2011	3.5
DK0009603490	9	Fisheries Bank bond 2011	1 Nov 2011	1.3
DK0009603573	8	Fisheries Bank bond 2014	1 May 2014	32.6
DK0009604035	6	Fisheries Bank bond 2016	1 May 2016	16.7
DK0009603656	7	Fisheries Bank bond 2016	1 May 2016	28.5
DK0009604621	5	Fisheries Bank bond 2019	1 Nov 2019	473.0
DK0009604894	5	Fisheries Bank bond 2025	1 Nov 2025	328.4
The Fisheries Bank of Denmark bonds, total				887.0
Domestic government securities, total				583,246.8
Swap from kr. to euro				2,974.4
Swap from kr. to dollars				-9,807.9
Central-government domestic debt, total				576,413.3

[1] The issue period refers to the period the series has been open for issuance. Series still open for issuance are marked with "-" after the first day of issuance. Certain securities are only sold on one single date. For these securities only this date is stated.

[2] May be redeemed by the central government at three months' notice.

[3] Are fully redeemed at 1 April 2011, cf. announcement as of 14 December 2010.

CENTRAL-GOVERNMENT FOREIGN DEBT AS OF 31 DECEMBER 2010 Table 7.2

ISIN-code/loan no.[1]	Coupon, per cent	Name	Redemption date	Outstanding amount, kr. million[2]
Euro Commercial Paper – Euro				
298-492	0	2010/11 ECP	12 Jan 2011	74.5
ECP-issuances in euro, total				74.5
Euro Commercial Paper – Dollars				
298-488	0	2010/11 ECP	12 Jan 2011	267.5
298-490	0	2010/11 ECP	12 Jan 2011	53.5
298-494	0	2010/11 ECP	12 Jan 2011	108.3
298-496	0	2010/11 ECP	18 Jan 2011	164.4
298-498	0	2010/11 ECP	18 Jan 2011	87.7
298-500	0	2010/11 ECP	19 Jan 2011	272.7
298-502	0	2010/11 ECP	26 Jan 2011	138.2
298-504	0	2010/11 ECP	31 Jan 2011	111.8
298-506	0	2010/11 ECP	31 Jan 2011	123.0
298-508	0	2010/11 ECP	07 Feb 2011	140.8
298-510	0	2010/11 ECP	09 Feb 2011	139.5
298-512	0	2010/11 ECP	10 Feb 2011	186.4
298-514	0	2010/11 ECP	14 Feb 2011	168.9
298-516	0	2010/11 ECP	23 Feb 2011	226.7
298-518	0	2010/11 ECP	23 Feb 2011	56.7
ECP-issuances in dollars, total				2,246.0
US Commercial Paper – Dollars				
244-446	0	2010/11 USCP	11 Jan 2011	270.9
244-448	0	2010/11 USCP	13 Jan 2011	274.0
244-450	0	2010/11 USCP	19 Jan 2011	276.6
244-452	0	2010/11 USCP	26 Jan 2011	283.6
244-454	0	2010/11 USCP	03 Feb 2011	423.7
244-456	0	2010/11 USCP	02 Feb 2011	169.5
244-458	0	2010/11 USCP	15 Feb 2011	277.5
244-460	0	2010/11 USCP	14 Feb 2011	277.5
US Commercial Paper, total				2,253.2
Euro				
XS0392597026	2.75	2008/11 dollar loan	15 Nov 2011	8,420.0
1079	2.75	2008/11 swap from dollars		-8,420.0
•	var.	2008/11 swap to dollars		8,420.0
•	var.	2008/11 swap from dollars		-8,420.0
•	3.457	2008/11 swap to euro		4,098.8
•	3.468	2008/11 swap to euro		4,098.8
XS0392597026	2.75	2008/11 increase of dollar loan	15 Nov 2011	5,613.3
1079	2.75	2008/11 swap from dollars		-5,613.3
•	var.	2008/11 swap to dollars		5,613.3
•	var.	2008/11 swap from dollars		-5,613.3
•	var.	2008/11 swap to euro		5,902.1
XS0392597026	2.75	2009/11 increase of dollar loan	15 Nov 2011	8,420.0
1079	2.75	2009/11 swap from dollars		-8,420.0
•	var.	2009/11 swap to euro		8,647.8

CENTRAL-GOVERNMENT FOREIGN DEBT AS OF 31 DECEMBER 2010 Table 7.2

ISIN-code/loan no.[1]	Coupon, per cent	Name	Redemption date	Outstanding amount, kr. million[2]
Euro				
XS0401030316	3.125	2008/11 euro loan	28 Nov 2011	9,318.0
XS0408298494	1.875	2009/12 dollar loan	16 Mar 2012	16,839.9
1207	1.875	2009/12 swap from dollars		-16,839.9
•	2.854	2009/12 swap to euro		16,314.0
NO0010490899	3.50	2009/14 Norwegian kroner loan	17 Feb 2014	476.7
1215	3.50	2009/14 swap from Norwegian kroner		-476.7
•	var.	2009/14 swap to euro		416.0
XS0417728325	3.125	2009/14 euro loan	17 Mar 2014	20,872.3
XS0419327837	3.165	2009/14 Swedish kronor loan	31 Mar 2014	3,390.7
1229	3.165	2009/14 swap from Swedish kronor		-3,390.7
•	var.	2009/14 swap to euro		2,791.2
XS0428037823	2.25	2009/12 dollar loan	14 May 2012	19,646.6
1244	2.25	2009/12 swap from dollars		-19,646.6
•	2.2415	2009/12 swap to euro		19,521.4
1401	1.75	2010/15 euro loan	05 Oct 2015	11,181.6
Total				103,162.0
Swaps – Euro				
10036	var.	2007/12 swap from kr.	31 Jan 2012	745.4
10041	var.	2007/12 swap from kr.	27 Apr 2012	745.4
10045	var.	2009/14 swap from kr.	12 Mar 2014	1,490.9
10046	var.	2010/12 swap to kr.	29 Jan 2012	-745.4
10047	var.	2010/12 swap to kr.	27 Apr 2012	-745.4
10048	var.	2010/12 swap to kr.	28 May 2012	-745.4
10049	var.	2010/12 swap to kr.	17 Jun 2012	-745.4
10050	var.	2010/12 swap to kr.	24 Jun 2012	-745.4
10051	var.	2010/12 swap to kr.	28 Jul 2012	-1,118.2
10052	var.	2010/12 swap to kr.	16 Mar 2012	-1,118.2
Total				-2,981.8
Swaps – Dollars				
20001	4.164	2004/16 swap from kr.	30 Jun 2016	127.2
20002	4.164	2004/16 swap from kr.	30 Jun 2016	127.3
20003	4.355	2005/17 swap from kr.	28 Jan 2017	144.2
20004	4.4875	2005/17 swap from kr.	10 Feb 2017	243.5
20005	4.497	2005/17 swap from kr.	11 Aug 2017	251.6
20006	4.66	2005/17 swap from kr.	20 Oct 2017	251.6
20007	4.7925	2005/17 swap from kr.	15 Dec 2017	268.3
20008	4.855	2006/17 swap from kr.	16 Nov 2017	280.0
20009	5.06	2006/18 swap from kr.	12 Apr 2018	287.5
20012	5.27	2006/18 swap from kr.	28 Aug 2018	461.7
20013	4.755	2006/18 swap from kr.	10 Nov 2018	461.7

CENTRAL-GOVERNMENT FOREIGN DEBT AS OF 31 DECEMBER 2010 Table 7.2

ISIN-code/loan no.[1]	Coupon, per cent	Name	Redemption date	Outstanding amount, kr. million[2]
20014	4.73875	2007/19 swap from kr.	10 Jan 2019	490.6
20015	4.671	2007/19 swap from kr.	26 Mar 2019	490.6
20016	5.1225	2007/19 swap from kr.	15 Jun 2019	515.3
20017	5.164	2007/19 swap from kr.	05 Sep 2019	545.6
20018	5.3875	2007/19 swap from kr.	14 Nov 2019	545.6
20020	5.315	2008/20 swap from kr.	29 Jan 2020	575.9
20021	3.745	2008/20 swap from kr.	25 Mar 2020	573.9
20022	3.78	2008/20 swap from kr.	05 May 2020	573.9
20023	4.18	2008/20 swap from kr.	22 Jul 2020	654.9
20024	4.144	2008/20 swap from kr.	14 Oct 2020	654.9
20028	2.539	2009/21 swap from kr.	23 Jan 2021	687.6
20029	3.585	2009/21 swap from kr.	17 Mar 2021	687.6
Total				9.901.1
Loans transferred from the Mortgage Bank of the Kingdom of Denmark				
XS0069330768	var.	1996/11 yen loan	19 Sep 2011	41.3
1074	var.	1996/11 swap from yen		-41.3
•	var.	1996/11 swap to euro		31.2
XS0074733543	3.65	1997/12 yen loan	13 Mar 2012	34.4
1075	3.65	1997/12 swap from yen		-34.4
•	var.	1997/12 swap to euro		26.2
Transferred loans, total				57.4
Kr.				
DK0009901407	3	1894[3]	Perpetuals	9.8
DK0009901670	3.5	1901[3]	Perpetuals	3.6
DK0009901753	3.5	1909[3]	Perpetuals	4.9
Total				18.3
Central-government foreign debt, total				114,730.8

[1] ISIN-codes are used for loans and loan number for swaps and Commercial Paper issuances.

[2] The outstanding amount as of 31 December 2010 is calculated to kr. on the basis of the following exchange rates: Euro = 745.44, Yen = 6.8869, Norwegian kroner = 95.34, Swedish kronor = 82.70, Dollars = 561.33.

[3] Are fully redeemed at 1 April 2011, cf. announcement as of 14 December 2010.

CENTRAL-GOVERNMENT PORTFOLIO SWAPS AS OF 31 DECEMBER 2010 Table 8

Termination year	Krone interest-rate swaps	Euro interest-rate swaps	
	Notional amount, kr. million[1]	Notional amount, million euro[2]	Notional amount, kr. million[3]
2011	11,950	150	1,118
2012	-	4,235	31,569
2013	4,400	810	6,038
2014	8,500	-	-
2015	1,800	1,500	11,182
2016	10,800	575	4,286
2017	-	175	1,305
2018	-	-	-
2019	-	800	5,964
2020	-	1,300	9,691
Interest-rate swaps, total	37,450	9,545	71,152

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 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 expiring in 2021 to the central-government.

[3] Converted to kroner on the basis of the following exchange rate as of end-2010: Euro = 745.44.

KINGDOM OF DENMARK'S RATING IN DOMESTIC CURRENCY — Table 9.1

	Moody's	Standard & Poor's
1986, July	Aaa	
1992, July		AAA
Current rating	Aaa	AAA

Note: Moody's Investors service and Standard & Poor's use the following ratings:
Moody's: Aaa, Aa, A, Baa, Ba, B, Caa, Ca and C.
For the categories Aa to Caa are used 1, 2 or 3 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 til CCC are used + or – to indicate a status slightly better or worse within the category.

KINGDOM OF DENMARK'S RATING IN FOREIGN CURRENCY — Table 9.2

	Moody's	Standard & Poor's
1981, March		AAA
1983, January		AA+
1985, April	Aa	
1986, August	AA1	
1987, March		AA
1991, October		AA+
1999, August	Aaa	
2001, February		AAA
Current rating	Aaa	AAA

Note: See the note in Table 9.1 for ranking of the rating categories.

RATING OF SELECTED COUNTRIES' CENTRAL-GOVERNMENT DEBT, JANUARY 2011 Table 10

	Moody's		Standard & Poor's	
	Domestic	Foreign	Domestic	Foreign
Australia	Aaa	Aaa	AAA	AAA
Austria	Aaa	Aaa	AAA	AAA
Belgium	Aa1	Aa1	AA+	AA+
Canada	Aaa	Aaa	AAA	AAA
Czech Republic	A1	A1	A+	A
Denmark	Aaa	Aaa	AAA	AAA
Finland	Aaa	Aaa	AAA	AAA
France	Aaa	Aaa	AAA	AAA
Germany	Aaa	Aaa	AAA	AAA
Greece	Ba1	Ba1	BB+	BB+
Ireland	Baa1	Baa1	A	A
Italy	Aa2	Aa2	A+	A+
Japan	Aa2	Aa2	AA-	AA-
Netherlands	Aaa	Aaa	AAA	AAA
New Zealand	Aaa	Aaa	AAA	AA+
Norway	Aaa	Aaa	AAA	AAA
Portugal	A1	A1	A-	A-
South Africa	A3	A3	A	BBB+
Spain	Aa1	Aa1	AA	AA
Sweden	Aaa	Aaa	AAA	AAA
Switzerland	Aaa	Aaa	AAA	AAA
UK	Aaa	Aaa	AAA	AAA
USA	Aaa	Aaa	AAA	AAA

Note: See the note in Table 9.1 for ranking of the rating categories.
Source: Moody's and Standard & Poor's.

Glossary

This glossary presents explanations of a number of key terms and concepts in the area of government debt. Terms in *italics* are included elsewhere in the glossary.

Acceptance rate
Issued government securities as a share of the total bid volume.

Accrued interest
Accrued interest is payment for the interest accruing on a paper since the last interest due date. In the Danish bond market trades are with coupon interest. The buyer of the paper pays a proportion of the coupon to the seller for the period from the last due date to the settlement date.

Auction
At an auction, a bond is offered. A group of market participants may submit bids requesting a certain volume of bonds at a given price or interest rate.

Basis points
1 basis point is 0.01 percentage point.

Benchmark bond
A key bond in a given maturity segment. Changes in the benchmark status of Danish government bonds are determined by Government Debt Management after discussion with the *Primary Dealers*.

Bid-ask price
The bid-ask price is the price at which the market maker is willing to buy/sell. The difference between the ask and bid prices is the bid-ask spread.

Bullet loans
Loans on which only interest is paid during the term of the loans. The loans are repaid on the maturity date. Danish government bonds are bullet loans.

Callable bond
A bond which can be prematurely redeemed by the debtor on terms agreed in advance. The debtor's right to redeem is tantamount to having a call option on the bond.

Capital losses/gains on issuance
Capital losses and gains on issuance arise when a loan is issued at prices below and above par, respectively.

Central-government debt
Comprises liabilities in the form of domestic and foreign debt as well as assets in the Social Pension Fund, the Danish National Advanced Technology Foundation, the Preventive Measures Fund and the balance of the central government's account with Danmarks Nationalbank.

Central Counterparty, CCP
A central counterparty, CCP, can act as an intermediary in securities transactions, becoming buyer for the seller and seller for the buyer. Instead of bilateral credit exposures, participants are exposed to the CCP.

Cibor, Copenhagen Interbank Offered Rate
The interest rate at which a bank in the Copenhagen interbank market is willing to lend Danish kroner without collateral to another creditworthy bank. Cibor is the reference interest rate for a large number of financial contracts. See also *Euribor*.

Clearing and settlement
Clearing is the compilation of each participant's purchase and sale, resulting in the net position of each participant. Settlement is completion of a trade by final settlement of agreed commitments.

Collective Action Clause, CAC
Clause in the documentation for government bonds that entitles a qualified majority of creditors to negotiate debt restructuring on behalf of all creditors. See also *Debt restructuring*.

Commercial Paper, CP
Short-term debt instruments with maturities of up to one year. The central government has two CP programmes, directed to the European market (ECP programme) and American market (USCP programme), respectively. Under the USCP programme the issuance is exclusively in US dollar, while under the ECP programme it is possible to issue in several

currencies. The USCP programme has a maximum outstanding of 6 billion dollars, while maximum outstanding in the ECP programme is 12 billion dollars.

Cost-at-Risk, CaR, model
Simulation model developed by Government Debt Management to quantify the risk of the central-government debt portfolio to future interest-rate developments.

Credit Support Annex (CSA agreement)
Is a part of (annex to) ISDA Master Agreement, that regulates collateral.

Credit standing
Assessment of a debtor's willingness and ability to honour its obligations. See also *rating.*

Current-account rate
The rate of interest on the current accounts of the monetary-policy counterparties at Danmarks Nationalbank.

Debt restructuring
A renegotiation of the terms of a debtor's debt resulting in e.g. deferred payments, a reduction in the rate of interest or a reduced principal.

Duration
The average fixed-interest period for a financial portfolio. Long duration of the government debt usually implies low interest-rate sensitivity, since on average smaller proportions of the interest costs are adjusted to changes in the level of interest rates.

Electronic trading
Placement of orders (bid or ask) via electronic facilities to a trading system in which orders are matched and executed automatically.

Emission
Issuance of government securities.

Eonia (Euro Overnight Index Average)
Eonia reflects the interest rate of overnight lending in the euro interbank market. Eonia is used as a reference rate in financial contracts. See also *Euribor*.

Euribor, Euro Interbank Offered Rate
The interest rate at which a bank in the euro interbank market is willing to grant money-market loans in euro to another creditworthy bank without collateral. Used as a reference interest rate in a large number of financial contracts, e.g. swaps. See also *Cibor.*

Exposure
Exposure denotes a financial position that entails a risk of losses or gains if the market conditions change.

Final exposure
Denotes the currency or interest-rate exposure on a loan compiled after *swaps*.

Floating interest rate
An interest rate that is agreed to float as, or in step with, another interest rate listed on the market at specific shorter intervals than the maturity of the loan, typically every third or sixth month.

Forward contract
Agreement on delivery and payment of goods, securities or currency on a future date at a price fixed at the time of the agreement (forward price).

Funding rules
Framework for the distribution of the central government's domestic and foreign borrowing.

Gross financing requirement
The gross financing requirement is compiled as the *net financing requirement* with the addition of redemptions on the domestic and foreign debt, the net bond purchases of government funds, and the central government's currency swap payments.

Haircut
The deduction made from a paper's market value on determining its collateral value. A haircut takes account of the risk of a lower value of the security from the date of compilation of the collateral value until the possible enforced realisation of the paper.

Implied volatility
A forward-looking estimate of volatility based on the market price of an option, e.g. the volatility of a market interest rate. See also *volatility*.

Interest-rate fixing
The interest-rate fixing assessed at a given point in time is the amount of debt that will have the interest rate refixed within one year.

Issuance premium
Interest-rate spread paid by the issuer of a bond relative to the interest rate in the secondary market.

ISDA Master Agreement
Framework agreement whereby all swaps with one and the same counterparty are documented.

Key on-the-run issues
Government series that are being built up and which are issued to cover the current domestic borrowing requirement.

Lead manager
The bank or banks, that organize a syndicated bond loan. Lead manager is responsible for co-ordination, distribution and documentation of the supply of bonds. Distribution of the bond loan is normally handled by a syndicate of banks. See also *syndicated bond issuance*.

Liability swap
A swap attached to specific liabilities, by means of which the investor can alter the interest rate and/or currency on the liabilities concerned.

Liquidity
Liquidity expresses tradability. Liquid bonds are often characterised by a large outstanding amount, high turnover and a narrow spread between *bid and ask prices*. Investors will generally be willing to pay a higher price for a more liquid bond (liquidity premium).

Market depth
Market depth is the maximum size of a market order that can be traded without impacting the price. Market depth is one of the measures describing the level of liquidity in a market.

Market maker
A securities dealer that quotes current tradable bid and ask prices (market making) in securities.

Market risk
The risk that fluctuations in market prices (e.g. interest rates, exchange rates, bond prices and equity prices) will result in losses.

Medium Term Notes, MTN
Bonds issued under a loan programme with standardised documentation. The Central Government has a Euro Medium Term Notes, EMTN, programme that is used for foreign borrowing.

MTS Denmark
A market segment in MTS where wholesale trading in Danish government bonds is conducted at present.

Net financing requirement
The net financing requirement is compiled as the deficit on the central government's current, investment and lending (CIL) account with addition of *re-lending* (net of redemptions) and portfolio movements and accruals.

Non-competitive allocation
Right to bid where a price quotation is not needed. In various countries non-competitive allocations are used in connection with government bond auctions. Dependent on the size of the separate primary dealer's participation in the actual auction, the primary dealer have the option to buy an extra share of bonds at the same price after the auction.

Non-competitive bids
Bids where a volume is submitted without stating a price. These bids are sometimes used at multiple-price auctions. Non-competitive bids are met at a price corresponding to the average price for the winning competitive bids (consisting of both a volume and a price).

Notional amount
The notional amount of a derivative is the nominal amount, on the basis of which periodic payments are calculated.

Over-the-Counter, OTC
Trading in financial instruments outside a stock exchange, e.g. via a dealer network or by telephone.

Par yield
Par yields are adjusted for differences in the remaining maturities of the bonds. For example, the par yield for a 10-year government bond is the

coupon rate which ensures that a synthetic *bullet loan* with a maturity of exactly 10 years has a theoretical value of 100 ("par").

Plain vanilla
Term used for standardised and simple products.

Primary dealer
Primary dealers are financial institutions that by agreement with the issuer, against special rights, are obliged to provide *liquidity* in specific government securities.

Primary market
Market for issuance of bonds. See also *secondary market*.

Private placement
Bond or other loan offered to a small group of buyers and not normally listed.

Rate of interest on certificates of deposit
The rate of interest on certificates of deposit, which usually have a maturity of 7 days.

Rating
Grade of *credit standing* assigned by rating institutes such as Fitch Ratings, Moody's and Standard & Poor's.

Refinancing risk
The risk that a borrower has to finance repayments on its debt in a period with a temporary general high interest level or in a period, where the loan terms of the specific borrower are particularly unfavourable.

Re-lending
Re-lending constitutes central-government loans to government-owned companies and Danish Ship Finance.

Re-lending list
The range of government securities in which *re-lending* can be granted. The re-lending list is specified by Government Debt Management.

Risk aversion
Applied to describe an investor's preference for safe assets. The degree of risk aversion expresses investors' demand for compensation in order to take on a risk.

Risk-free interest rate
The risk-free interest rate is the interest rate that can be obtained in the market without assuming any risk. The risk-free interest rate is often the yield on short-term, liquid government securities with a high credit rating. See also *risk premium*.

Risk premium
Additional payment for holding assets that are subject to risk. See also *risk-free interest rate*.

Secondary market
Market for trading of bonds after they are issued in the primary market.

Securities lending
Securities lending is a transaction whereby the seller is paid to transfer securities to a buyer. On conclusion of the agreement, the parties simultaneously commit to buy back the securities at an agreed price on expiry of the agreement.

Serial loan
A loan for which the debt is repaid in equal redemptions on each interest due date.

Swap
A swap is an agreement between two parties to exchange payments over a fixed period. A swap is a separate financial transaction.

Swap rate
The swap rate is the fixed interest rate paid or received in an interest-rate swap.

Swap spread
The swap spread is the difference between the fixed interest rate received by the central government in an interest-rate swap, and the yield to maturity on a government bond with the same maturity.

Syndicated bond issue
Bond issue intermediated by a syndicate of banks which carry out the practical part of the sale for a payment. At issuance the syndicate banks obtain bids from investors. When the "book" of bids has been build up, the issuer determines price and allocation together with the syndicate banks.

Synthetic re-lending
Bond loans that are included on the *re-lending list*. The loans are granted on the basis of an estimated zero-coupon yield curve and are introduced to bridge the gaps between existing bullet loans in the maturity segments between 2 and 10 years.

Tap sale
Ongoing *issuance* in the same series. In Denmark, the issuance of government bonds is normally via tap sale. See also auction.

T-bills
T-bills (Treasury Bills) are government securities in the short end of the maturity spectrum. T-bills are zero-coupon bonds, i.e. the cost of borrowing is solely a result of a *capital loss* on issuance.

Tick
1 tick is equivalent to 0.01 price quotation points.

Uncollateralised yield
The interest rate payable on bonds and lending agreements connected with credit risks. The spread between an uncollateralised and a *risk-free interest rate* for a given maturity determines the risk premium.

Value date
Settlement date, i.e. the date on which e.g. a securities deal is closed by delivery of securities against payment.

Volatility
Statistical term for the size of variation in the rate of return or price of an asset or an index. It is typically measured by the standard deviation on the yearly rate of return.

Yield curve
Relationship between the interest rate and maturity of securities. A rising yield curve – i.e. where interest rates for short-term securities are lower

than interest rates for long-term securities – is called normal. A falling yield curve is described as inverted.

Yield spread
The spread between the yields on two bonds. On calculating yield spreads, adjustment is often made for differences in the bonds' remaining terms to maturity.

Yield to maturity
The fixed discount rate that makes the present value of payments on the bond equivalent to the actual price of the bond.

Zero-coupon bond
Loan that is not subject to current interest payments, and which is redeemed on maturity. The cost of borrowing is solely a result of a capital loss on issuance. *T-bills* and *Commercial Papers* are zero-coupon bonds.

Zero-coupon rate
The yield to *maturity* on a *zero-coupon* bond. The zero-coupon yield structure indicates the relation between remaining maturity and the zero-coupon rate.