The 10-Year Yield Spread between Denmark and Germany

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INTRODUCTION AND SUMMARY

The yield spread between countries is usually calculated on the basis of government bonds with the same maturity. Government bonds are benchmark bonds since they are normally highly liquid and entail only a minimum credit risk.

Traditionally, the 10-year yield spread between Denmark and Germany is measured as the difference between the yields to maturity of government bonds in the 10-year maturity segment in the two countries. The remaining term to maturity of bonds in the 10-year segment in Denmark and Germany is not always exactly 10 years, however, and the remaining term to maturity automatically declines over time. When an "old" 10-year government bond is replaced by a "new" bond as the 10-year benchmark in Denmark or Germany, there may be a leap in the yield level and thus in the traditional yield spread, reflecting the difference in remaining term to maturity between the old and the new benchmark bonds rather than the market development in interest rates.

Such technically based leaps in the yield spread may give rise to misunderstandings. Consequently, it may be necessary to supplement the traditional yield spread with calculations of alternative 10-year yield spreads that are not influenced by benchmark switches. Under certain circumstances, such alternative spreads may give a more true and fair view of the development in interest rates over time, e.g. in connection with general macroeconomic analyses.

This article analyses the pros and cons of alternative methods of calculating the yield spread between Denmark and Germany. No clear-cut answer is given to the question of what the "correct" yield spread is, but the article presents two alternative 10-year government yield spreads which do not include leaps on the switch of benchmark and that may

therefore be useful supplements to the traditional yield spread. At the beginning of February 2005, the traditional 10-year government yield spread was 10 basis points[1], while the two alternative yield spreads were 3-4 basis points.

Finally, certain yield spreads calculated on the basis of swaps are considered. The 10-year swap rates in Denmark and the euro area always have a maturity of 10 years, but since the swap rates reflect the credit risk on private banks, the spread between swap rates cannot immediately substitute the government yield spread. In some contexts, the yield spread derived from 10-year "asset swap packages" is applied as an alternative to traditional 10-year government yield spreads within the euro area, but this method cannot simply be transferred to spreads between krone-denominated Danish government bonds and euro-denominated German government bonds.

BACKGROUND

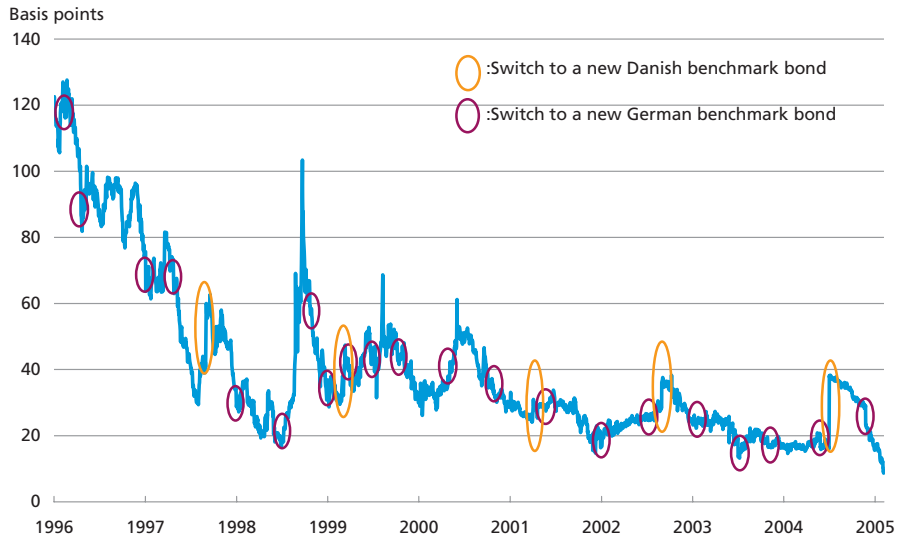
Traditionally, the 10-year yield spread between Denmark and Germany is measured as the difference between the yields to maturity of 10-year government bonds in the two countries. This is a spread between yields that can be observed directly in the market and that reflect the actual borrowing conditions for the Danish and German governments, respectively, in the 10-year maturity segment. Therefore this is the yield spread focused on by participants in the financial markets and used in e.g. the EU's convergence criteria[2].

A switch to a new 10-year benchmark bond in either Germany or Denmark may lead to large or small changes in the traditional yield spread that do not reflect the market development in interest rates. The effect on the yield spread of a switch to a new German 10-year benchmark bond is normally limited to around 5 basis points since the difference in the term to maturity between new and old German benchmark series is usually 6 months. A switch to a new 10-year benchmark bond in Denmark may, on the other hand, result in a far greater leap in the yield spread since the difference in the terms to maturity of the old and new 10-year Danish benchmark bonds is usually around 2 years. The latest

[1] One basis point is 0.01 percentage point.

[2] To join the euro, a member state must meet the "convergence criteria". One criterion relates to the long-term interest rate, which must not exceed the long-term interest rates in the three EU member states with the lowest rate of inflation by more than 2 percentage points. Article 4 of the Protocol (21) on the convergence criteria referred to in Article 121 of the Treaty establishing the European Community states, *inter alia*, that "Interest rates shall be measured on the basis of long term government bonds or comparable securities, taking into account differences in national definitions". In practice convergence assessments are made on the basis of yields on government bonds with a maturity as close as possible to 10 years, cf. Amerini (2004). No adjustments are made for any maturity differences for bonds from different countries.

TRADITIONAL 10-YEAR GOVERNMENT YIELD SPREAD BETWEEN DENMARK AND GERMANY, 1996-2005 Chart 1



Source: Bloomberg and Danmarks Nationalbank.

switch to a new 10-year benchmark bond in Denmark, which took place on 1 July 2004, thus entailed a leap in the yield spread by around 20 basis points. The leaps in connection with previous Danish benchmark switches have been less pronounced, cf. Chart 1.[1]

This type of technically based leap in the traditional 10-year yield spread does not reflect the market development in interest rates. In certain contexts, Danmarks Nationalbank's publications therefore include adjustments for the effect of the benchmark switch. This article assesses the pros and cons of two alternative methods of calculating the 10-year government yield spread between Denmark and Germany:

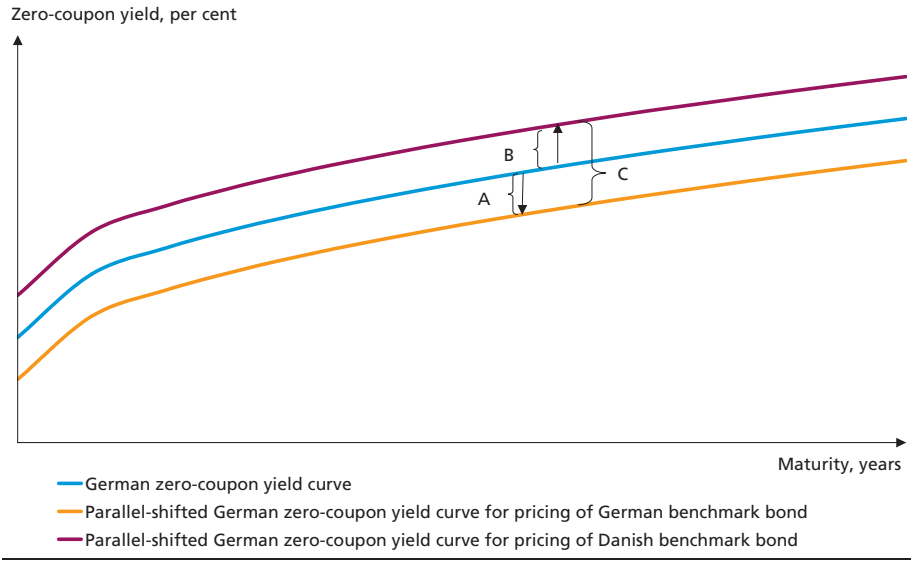
- The yield spread between the 10-year benchmark government bonds in Denmark and Germany calculated relative to the German government zero-coupon yield curve.
- The spread between the 10-year government par yields in Denmark and Germany.

Subsequently two other expressions of the yield spread between countries, calculated on the basis of swaps, are considered.[2]

[1] An overview of the Danish and German 10-year benchmark government bonds since 1995 is given in Appendix A.

[2] The different methods are elaborated on in Appendix B, which also presents concrete examples of the calculation methods.

ILLUSTRATION OF METHOD Chart 2



Note: The interest-rate data is purely hypothetical.

SPREAD BETWEEN 10-YEAR BENCHMARK GOVERNMENT BONDS IN DENMARK AND GERMANY CALCULATED RELATIVE TO THE GERMAN GOVERNMENT ZERO-COUPON YIELD CURVE

An alternative to the traditional 10-year yield spread can be found by pricing both the German and Danish 10-year benchmark government bonds relative to the German government zero-coupon yield curve.

This is best illustrated by means of Chart 2. The first step is to determine the number of basis points by which the German zero-coupon yield curve must be parallel-shifted if the theoretical value[1] of the German benchmark bond is to correspond to the actual market value of the German benchmark bond (motion A). The next step is to find the number of basis points by which the German zero-coupon yield curve is to be parallel-shifted if the theoretical value[2] of the Danish benchmark bond is to correspond to the actual market value of the Danish benchmark bond (motion B). Subsequently, spread C in Chart 2 can be seen as a yield spread between Danish and German government bonds in the 10-year maturity segment.

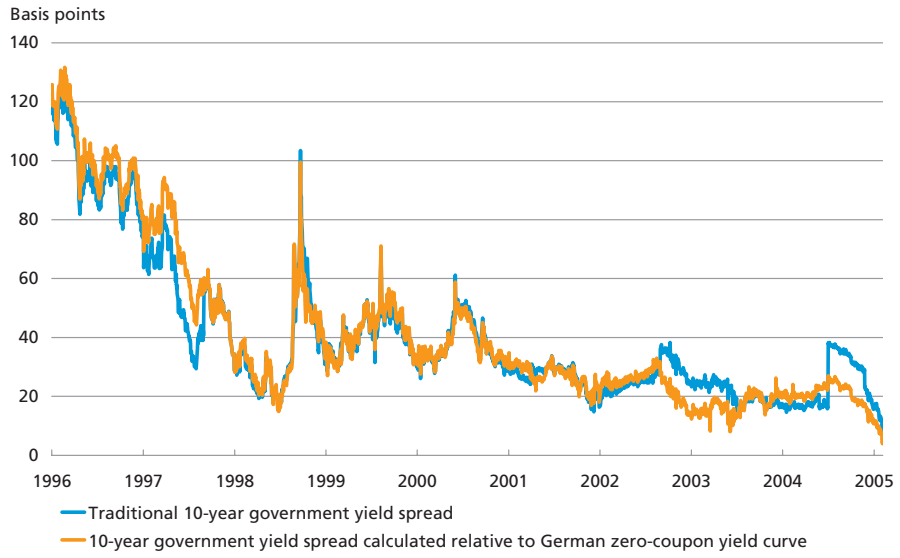
Chart 3 shows the development in this spread (C) since 1996 together with the traditional 10-year government yield spread. When the yield

[1] I.e. the present value of the German bond's cash flow calculated on the basis of the parallel-shifted German zero-coupon yield curve.

[2] I.e. the present value of the Danish bond's cash flow calculated on the basis of the parallel-shifted German zero-coupon yield curve.

10-YEAR GOVERNMENT YIELD SPREAD BETWEEN DENMARK AND GERMANY CALCULATED RELATIVE TO THE GERMAN GOVERNMENT ZERO-COUPON YIELD CURVE

Chart 3



Source: Bloomberg and Danmarks Nationalbank.

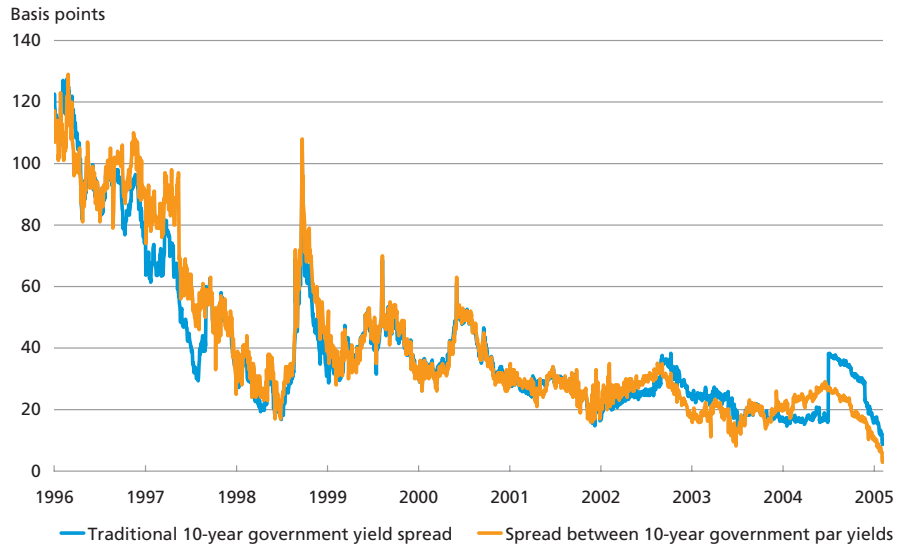
spread is calculated relative to the German zero-coupon yield curve, the effect of a switch to a new benchmark bond in either Denmark or Germany is eliminated.

The calculation method maintains the bond-specific element of the yields since the bonds' actual market values and cash flows are used. Therefore this method can be used to illustrate how the market assesses various specific Danish bonds in relation to specific German bonds. Moreover, the method can be transferred directly to the benchmark bonds of other countries, so that for instance their 10-year government yield spreads in relation to Germany can be compared.

Since the Danish and German zero-coupon yield curves cannot be observed directly in the market, they must be estimated on the basis of a statistical model.[1] This can cause "noise" in the series. In addition, the yield spread is to some extent affected by the difference in maturity between the Danish and German benchmark bonds, so that it is not a "pure" 10-year yield spread. The reason is that the magnitudes of the two spreads, A and B, in Chart 2 are each based on the maturity of the respective benchmark bonds.

[1] Cf. e.g. Svensson (1995).

10-YEAR GOVERNMENT PAR-YIELD SPREAD BETWEEN DENMARK AND GERMANY Chart 4



Source: Bloomberg and Danmarks Nationalbank.

SPREAD BETWEEN 10-YEAR GOVERNMENT PAR YIELDS IN DENMARK AND GERMANY

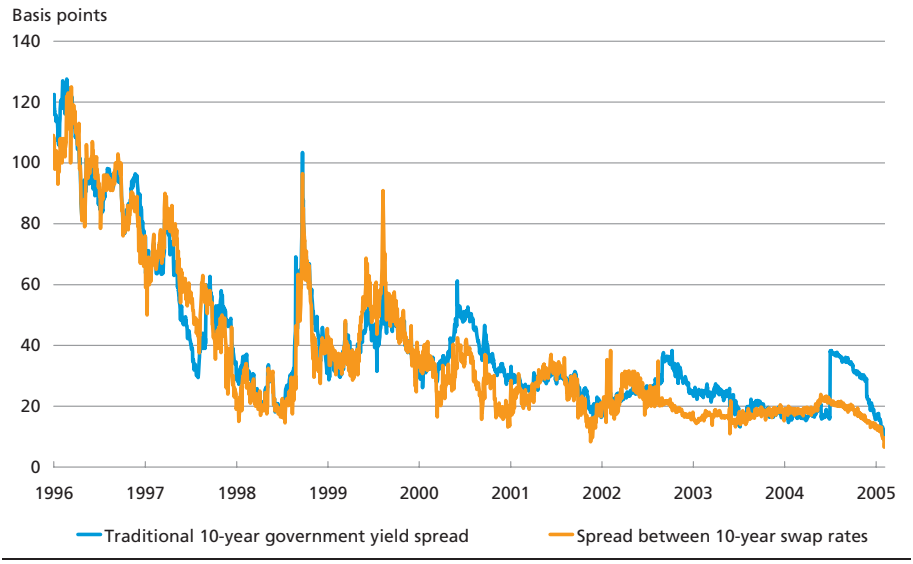
The difference in maturity between the Danish and German benchmark bonds may be taken into account by considering the spread between the 10-year "par yields".

The Danish 10-year par yield 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), calculated on the basis of the Danish government zero-coupon yield curve. The German 10-year par yield is found in the same way – but using the German government zero-coupon yield curve, however. The resulting par-yield spread is shown in Chart 4.

As a comparison of Charts 3 and 4 will show, the par-yield spread and the yield spread measured in relation to the German zero-coupon yield curve give more or less identical pictures of the development in interest rates. At the beginning of February 2005, the traditional 10-year government yield spread was 10 basis points, while the two alternative yield spreads were 3-4 basis points.

Like the spread to the German zero-coupon yield curve, the par-yield spread is based on estimated zero-coupon yield curves, with the uncertainty that this entails. Another characteristic of the par-yield spread is that the bond-specific element of the yield spread is eliminated since it is assumed that the two synthetic 10-year bonds are priced on the respective

SPREAD BETWEEN THE 10-YEAR SWAP RATES IN KRONER AND EURO Chart 5



Note: Before 1999, the euro swap rate is a D-mark swap rate.
Source: Bloomberg and Danmarks Nationalbank.

zero-coupon yield curves of the two countries. This means that the method cannot be applied to e.g. assessment of various specific Danish government bonds in relation to a specific German government bond. On the other hand, the par-yield method is well suited for comparing the overall development in interest rates in respectively Denmark and Germany.[1]

OTHER EXPRESSIONS OF YIELD SPREADS BETWEEN COUNTRIES

Spreads between 10-year swap rates

The 10-year swap rate is the fixed rate of interest in an interest-rate swap where fixed-interest payments are swapped for floating-interest payments over a 10-year period.

When an interest-rate swap is transacted, the swap rate is determined as the value that gives the swap a market value of zero at that time. The difference between the 10-year swap rate in respectively kroner and euro can be seen as a 10-year yield spread between Denmark and the euro area based on interest rates that can be observed directly in the market, cf. Chart 5.

[1] Alternatively, a yield spread might also be calculated directly on the basis of the 10-year government zero-coupon yields in Denmark and Germany. The price sensitivity of a zero-coupon bond with a remaining term to maturity of 10 years is, however, greater than for a bullet loan with an equivalent maturity, and a 10-year zero-coupon yield spread would therefore not necessarily be representative of the Danish and German government bonds in this maturity segment.

In long-term interest-rate swaps denominated in Danish kroner, the floating leg often matches 6-month Cibor, while it usually matches 6-month Euribor for interest-rate swaps denominated in euro. Cibor and Euribor are reference interest rates that reflect the credit risk on a short-term uncollateralised loan to a creditworthy private bank. The fixed rate in the interest-rate swap will thus also reflect this credit risk. Creditworthy private banks typically have a rating of AA/Aa, which is lower than the rating of Danish and German government bonds (AAA/Aaa). The credit-risk element is not necessarily identical for Euribor and Cibor – and not necessarily constant over time either. The spread between the 10-year swap rates in kroner and euro may thus be affected by circumstances that do not necessarily affect the traditional 10-year government bond yield spread between Denmark and Germany in the same way.

The yield spread calculated on the basis of asset swap packages for 10-year government bonds

In the euro area there are examples of yield spreads between two countries being calculated on the basis of "asset swap packages".

An asset swap is an interest-rate swap where the amounts and settlement dates for one leg of the swap are identical to those on an underlying bond, while the other leg is tied to a floating interest rate. If a fixed-yield government bond is combined with an asset swap, the result is a "package" at a floating interest rate, cf. Appendix B.

For instance, an asset swap package may be constructed such that the payments on the fixed leg of the swap exactly match the interest payments on the French 10-year benchmark government bond, and where the floating leg of the swap pays 6-month Euribor with addition of a spread, usually referred to as the "asset swap spread" for the French bond in question. In the same way, an asset swap package may be constructed such that the payments on the fixed leg of the swap exactly match the interest payments on the German 10-year benchmark government bond, and where the floating leg of the swap pays 6-month Euribor with addition of an asset swap spread for the German bond in question. The difference between the floating interest rates thus found can then be seen as a 10-year yield spread between France and Germany. The reason is that Euribor "nets out" when the yield spread is calculated, leaving only the difference between the French and German asset swap spreads. The French government's debt management office applies asset swap packages to comparison of the French government's borrowing terms with those of other government issuers in the euro area, cf. Box 1.

ASSET SWAP PACKAGES AND YIELD SPREADS IN THE EURO AREA Box 1

In order to achieve an indication of the French government's borrowing terms compared to other government issuers in the euro area, the French government debt management office calculates an average asset swap spread for the euro area on an ongoing basis.[1] The average spread is calculated on the basis of the asset swap spreads of the individual euro area member states weighted by the circulating volume of government securities for each issuer relative to the total circulating volume of government securities for all issuers in the euro area. Since all asset swap spreads for the euro area member states are calculated relative to Euribor (the issues being euro-denominated), an issuer's borrowing terms relative to the euro-area average can then be calculated as the difference between the asset swap spread for the selected issuer and the average asset swap spread in the euro area.

In December 2004, the difference between the French asset swap spread and the average asset swap spread for the whole euro area was approximately -5 basis points. This can be interpreted to mean that in this month the French government could issue bonds at a yield to maturity that was approximately 5 basis points below the average for the euro area.

[1] See Agence France Trésor (2003) for a technical description, and http://www.aft.gouv.fr for current updates of the indicator.

In the euro area, all such asset swap packages for euro-denominated government securities are based on Euribor. For a euro area member state, the yield spread to Germany calculated on the basis of asset swap packages can therefore roughly be interpreted as the difference between the yield to maturity on 10-year bonds in the euro area member state in question and in Germany. Moreover, this yield spread does not leap on the switch to a new 10-year benchmark bond. However, the yield spread is to some extent affected by the difference in maturity between the benchmark bonds in the two countries so that it is not a "pure" 10-year yield spread. It should also be noted that the pricing of asset swap packages is based on the swap zero-coupon yield curve, and that an asset swap package may entail an "up front" payment to the swap counterparty at the time of its transaction, cf. Appendix B. In that case the yield spread will partly reflect the credit risk on private banks and will thus not be based purely on government credit risk, as is the case for a traditional 10-year government yield spread.

In principle it is also possible to calculate a yield spread between Denmark and Germany on the basis of asset swap packages for 10-year bonds in the two countries. However, this would not be a 10-year yield spread. The reason is that the yield spread between Danish krone-denominated government bonds and German euro-denominated government bonds would in that case be based on asset swap packages

calculated in relation to Cibor and Euribor, respectively, which do not "net out" when the yield spread is calculated. For Denmark a yield spread to Germany based on such asset swap packages would therefore be a short-term yield spread, the size of which depends partly on the borrowing terms of the Danish and German governments in the 10-year maturity segment, and partly on the development in the spread between Cibor and Euribor.[1]

SUMMARY

Purely technically based leaps may occur in the 10-year government yield spread between Denmark and Germany on a switch to a new benchmark bond. Such leaps are not related to the market development in interest rates and could give rise to misunderstandings. Consequently, it may be necessary to supplement the traditional yield spread with calculations of alternative 10-year yield spreads that are not influenced by benchmark switches.

Two alternative government yield spreads are found that may be useful supplements to the traditional yield spreads in various contexts. With the alternative spreads, leaps in the yield spread are avoided in connection with benchmark changes. At the beginning of February 2005, the traditional 10-year government yield spread was 10 basis points, while the two alternative yield spreads were 3-4 basis points.

[1] The development in the spread between Cibor and Euribor can at times be influenced by fluctuations in liquidity conditions in the money markets. For instance, it has been observed for a number of years that Euribor is relatively high around the turn of the year, cf. e.g. ECB (2000) and Bindseil, Weller & Würtz (2003).

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APPENDIX A: BENCHMARK BONDS IN DENMARK AND GERMANY

The benchmark government bond in the 10-year segment in Denmark is determined and published by Government Debt Management following deliberation in the Danish government's Primary Dealer Committee. Prior to the introduction of the Danish government's Primary Dealer system in 2003, the 10-year benchmark government bond in Denmark was determined by the market participants (the Danish Securities Dealers Association).

In Germany, the market participants determine the 10-year benchmark government bond.

The Table below gives an overview of the 10-year Danish and German benchmark government bonds since 1995.

10-YEAR BENCHMARK GOVERNMENT BONDS 1995-2004

Denmark			Germany		
Coupon rate	Maturity date	Benchmark with effect from	Coupon rate	Maturity date	Benchmark with effect from
7 %	15 Dec. 2004	9 May 1994	7.375 %	3 Jan. 2005	30 Dec. 1994
8 %	15 Mar. 2006	4 Dec. 1995	6.875 %	12 May 2005	10 May 1995
7 %	15 Nov. 2007	1 Sep. 1997	6.5 %	14 Oct. 2005	18 Oct. 1995
6 %	15 Nov. 2009	8 Mar. 1999	6 %	5 Jan. 2006	04 Jan. 1996
6 %	15 Nov. 2011	1 Apr. 2001	6 %	16 Feb. 2006	14 Feb. 1996
5 %	15 Nov. 2013	2 Sep. 2002	6.25 %	26 Apr. 2006	24 Apr. 1996
4 %	15 Nov. 2015	1 Jul. 2004	6 %	4 Jan. 2007	08 Jan. 1997
			6 %	4 Jul. 2007	23 Apr. 1997
			5.25 %	4 Jan. 2008	07 Jan. 1998
			4.75 %	4 Jul. 2008	08 Jul. 1998
			4.125 %	4 Jul. 2008	28 Oct. 1998
			3.75 %	4 Jan. 2009	06 Jan. 1999
			4 %	4 Jul. 2009	24 Mar. 1999
			4.5 %	4 Jul. 2009	01 Jul. 1999
			5.375 %	4 Jan. 2010	20 Oct. 1999
			5.25 %	4 Jul. 2010	03 May. 2000
			5.25 %	4 Jan. 2011	18 Oct. 2000
			5 %	4 Jul. 2011	23 May. 2001
			5 %	4 Jan. 2012	02 Jan. 2002
			5 %	4 Jul. 2012	03 Jul. 2002
			4.5 %	4 Jan. 2013	08 Jan. 2003
			3.75 %	4 Jul. 2013	02 Jul. 2003
			4.25 %	4 Jan. 2014	29 Oct. 2003
			4.25 %	4 Jul. 2014	26 May. 2004
			3.75 %	4 Jan. 2015	24 Nov. 2004

Note: Bullet loans.
Source: Danmarks Nationalbank and Bloomberg.

APPENDIX B: VARIOUS MEASURES OF THE 10-YEAR YIELD SPREAD

This Appendix elaborates on the calculation methods behind the various yield spreads in the Charts in this article. It also includes concrete calculation examples based on data from 20 January 2005.

The yield spread between the 10-year benchmark government bonds in Denmark and Germany calculated relative to the German government zero-coupon yield curve

Let $y(T_i)$ be the T_i-year zero-coupon yield. Then the theoretical price (P_{TEO}) along the zero-coupon curve for a bond of the bullet loan type with principal F, coupon payments C, and maturity date T_N is given by:

$$P_{TEO} = (1 + y(T_N))^{-T_N} \cdot F + \sum_{i=1}^{N} (1 + y(T_i))^{-T_i} \cdot C$$

Then let P_{MV} be the observed market price (including accrued interest) of the bond in question. The bond's spread from the zero-coupon yield curve[1] (ycs) is found on the basis of the following expression:

$$P_{MV} = (1 + y(T_N) + ycs)^{-T_N} \cdot F + \sum_{i=1}^{N} (1 + y(T_i) + ycs)^{-T_i} \cdot C$$

Intuitively, e.g. ycs to the German zero-coupon curve for a given government bond corresponds to the parallel shift to the German zero-coupon curve required for the theoretical value of the bond along the parallel-shifted German zero-coupon curve to be equal to the observed market value of the bond, cf. Chart 2 in the article.

When ycs has been found for both the Danish and German 10-year benchmark government bonds, the Danish-German 10-year government yield spread in relation to the German government zero-coupon yield curve can be calculated as the difference between the two. The time series in Chart 3 of the article is calculated in this way. If the German bond is traded at a higher or lower price than the German zero-coupon yield curve indicates, this will be reflected in the calculated spread.

The trading day 20 January 2005 has been chosen as a concrete illustration of this calculation. On this day, the market price, including accrued interest, of the 10-year Danish benchmark government bond 4 per cent bullet loan 2015 was 103.38. The theoretical value of the bond calculated on the basis of the German zero-coupon yield curve was 104.20.

[1] Often called the "yield curve spread" or the "z spread" in the financial literature.

On this day the German zero-coupon yield curve therefore had to be parallel-shifted upwards by 9 basis points in order to achieve a theoretical value equivalent to the market price. Likewise, the market price of the German 10-year benchmark government bond DBR 3.75 per cent 2015 is found to be 102.08, and the theoretical value 102.07. Consequently, ycs for Germany could be determined at zero basis points. The overall spread between the 10-year benchmark government bonds in Denmark and Germany calculated relative to the German zero-coupon yield curve was thus 9 - 0 = 9 basis points.

The spread between the 10-year par yields in Denmark and Germany

The par-yield spread is found as the difference between a Danish and a German 10-year government par yield. Using the same notation as in the above example, a T_N-year par yield is given by the solution, C_{PAR}, to the following expression:

$$100 = \left(1 + y(T_N)\right)^{-T_N} \cdot 100 + \sum_{i=1}^{N} \left(1 + y(T_i)\right)^{-T_i} \cdot C_{Par}$$

Intuitively, e.g. the 10-year Danish par yield is given as the coupon rate on a synthetic bullet loan with a remaining term to maturity of exactly 10 years that ensures that the synthetic bond has a theoretical value of 100 (par) when the bond is priced on the basis of the Danish zero-coupon yield structure.

In Chart 4 the par-yield spread is given by the difference between the 10-year Danish government par yield and the 10-year German government par yield. On 20 January 2005 the German par yield was 3.58 per cent and the Danish par yield 3.65 per cent. Consequently the par-yield spread was 3.65 - 3.58 = 7 basis points.

Spread between 10-year swap rates in kroner and euro

The swap rate (r_{swap}) is the fixed rate in an interest-rate swap where fixed-interest payments are exchanged for floating-interest payments. Table B.1 illustrates the payments in a 10-year krone-denominated interest-rate swap. CB(t1; t2) is 6-month Cibor between the times t1 and t2, and it is noted that the Cibor coupon is fixed 6 months before the payment is actually exchanged. Payments in a euro-denominated interest-rate swap follow the same pattern – but using Euribor rather than Cibor, however.[1]

[1] For simplification, the illustrations in Tables B.1 and B.2 assume that both the floating and the fixed interest are paid biannually. In practice, only the 6-month floating interest is paid biannually, while the fixed interest is paid annually for the types of swaps and bonds discussed.

CASH FLOWS IN A KRONE-DENOMINATED INTEREST-RATE SWAP TABLE B.1

	Transaction t=0	1st settlement date, t=0.5 years	2nd settlement date, t=1 year	...	Last settlement date, t=10 years
Fixed leg	0	$-r_{swap}$	$-r_{swap}$	...	$-r_{swap}$
Floating leg	0	CB(0;0.5)	CB(0.5;1)	...	CB(9.5;10)
Net	0	CB(0;0.5) - r_{swap}	CB(0.5;1) - r_{swap}	...	CB(9.5;10) - r_{swap}

Usually the interest payments on the two legs of an interest-rate swap are calculated on the basis of the same principal, and it is therefore not necessary to exchange principals on transaction and expiry of the swap. For certain calculations it is, however, convenient to add exchange of principal since the cash flow for one leg thus matches a floating-rate bullet loan, and the cash flow for the other leg matches a fixed-rate bullet loan with a coupon rate matching the swap interest rate.

In a standard interest-rate swap, the swap rate is determined to give the interest-rate swap a market value of zero at the time of its transaction. A floating-rate loan has a market value at par on each settlement date, provided that the principal accrues interest and is discounted using the same yield structure. Consequently, an interest-rate swap will have a market value of zero on its transaction if the swap rate is determined to give the fixed leg a market value at par. The swap rate for a given maturity thus corresponds to the par yield on a synthetic bullet loan that is priced on the basis of the swap zero-coupon yield curve.

On 20 January 2005, the 10-year euro-denominated swap rate was 3.64 per cent, while the 10-year krone-denominated swap rate was 3.75 per cent. Consequently the 10-year yield spread between Denmark and the euro area based on swaps was 3.75-3.64 = 11 basis points.

Yield spread calculated on the basis of asset swap packages

A 10-year asset swap is an interest-rate swap where the fixed leg of the swap exactly mirrors the cash flow for a given 10-year bond, while the interest rate on the other leg floats. If the investor purchases the underlying bond and at the same time transacts an asset swap, a package is created whereby the investor overall receives interest at a floating rate. For a German bond, this is illustrated in Table B.2, where P_{MV} is the market price of the bond, C_{bond} the bond's coupon rate, and EB(t1; t2) the 6-month Euribor between the times t1 and t2.

Since the fixed leg of the asset swap reflects the coupon rate of the bond, and thus not the corresponding swap rate, the present value of the fixed leg calculated via the swap zero-coupon yield structure will differ from the par value. If the investor wishes the asset swap to have a

CASH FLOWS IN AN ASSET SWAP PACKAGE FOR A 10-YEAR GERMAN GOVERNMENT BOND TABLE B.2

		Conclusion, t=0	1st settlement date, t=0.5 years	2nd settlement date, t=1 year	Last settlement date, t=10 years
Bond		$-P_{MV}$	C_{bond}	C_{bond}	$C_{bond}+100$
Asset swap	Fixed leg	$P_{MV}-100$	$-C_{bond}$	$-C_{bond}$	$-C_{bond}$
	Floating leg		EB(0;0.5)+a	EB(0.5;1)+a	EB(9.5;10)+a
Net		-100	EB(0;0.5)+a	EB(0.5;1)+a	EB(9.5;10)+a+100

present value of zero, compensation must be made for the yield difference to the swap rate on the fixed leg by adding a spread (which might be negative) to the floating leg. Generally, such a spread is referred to as an "asset swap spread" (cf. "a" in Table B.2). In many asset swap packages, the asset swap spread is determined so that the present value of the total asset swap package is par. This construction is called a "par-par asset swap".[1] If the underlying bond is traded at a premium (discount), the investor borrows (lends) the price difference from (to) the swap counterparty, and the loan is amortised over the maturity of the swap via adjustment of the asset swap spread. This means that the asset swap spread is determined so that the present value of the asset swap matches the premium or discount on the underlying bond.

As stated previously, an asset swap package can be seen as a floating-rate issue. The difference between a calculated floating interest rate for a French asset swap package and a floating interest rate for a German asset swap package thus expresses a 10-year yield spread between France and Germany. The reason is that the asset swap packages for both countries are based on Euribor (since the issues are euro-denominated), which means that the short-term interest rate (Euribor) "nets out" when the yield spread is calculated. What remains is the difference between the French and German asset swap spreads, which can be roughly interpreted as the difference between the yields to maturity on 10-year bonds in France and Germany.

[1] Calculation aspects for this type of asset swap are covered by e.g. Lando (2004).