Long-Term Yield Spreads to Germany

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INTRODUCTION AND SUMMARY

In the years leading up to the introduction of the euro, the government yield spreads among the euro area member states were virtually eliminated. The narrowing of yield spreads took place despite the remaining considerable variations between the euro area member states in terms of government debt levels and the extent of macroeconomic imbalances. In light of recent years' debt crisis in certain European countries, there is renewed focus on credit risk in the pricing of government bonds from different sovereign issuers.

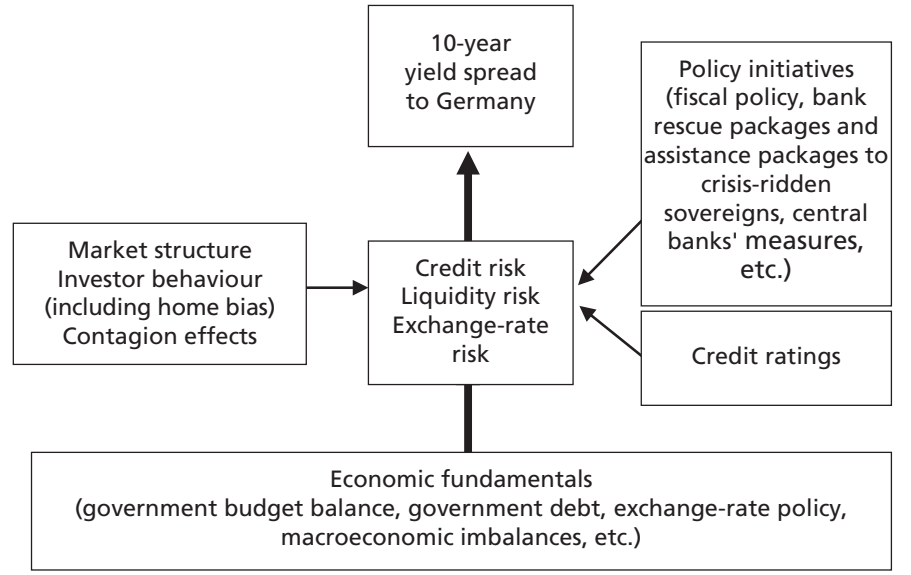
Cross-country yield spreads reflect differences in the credit, liquidity and exchange-rate risks that are perceived as being inherent in investment in the respective government bonds. The size of yield spreads depends on historical and expected future patterns in countries' macroeconomic fundamentals, on the one hand, and on market-related and institutional factors such as market structure, regulation and other policy initiatives, investor behaviour and contagion effects, on the other, cf. Chart 1.

Part 2 of this Monetary Review presents four analyses[1] with focus on various determinants of the development in long-term government yield spreads across countries in the short and the long term. This overview article contains a non-technical summary of the most important findings and conclusions of the articles.

According to the analysis, long-term yields tend to be lower in countries with sound public finances and macroeconomic balances under control than in countries with substantial government debts and macroeconomic imbalances. This emphasises that fiscal consolidation and addressing macroeconomic imbalances are important if the European coun-

[1] The analyses have benefited from lectures and discussions at the conference "The European Sovereign Debt Crisis: Background and Perspectives", which was held in Copenhagen by UC Santa Cruz, Copenhagen Business School and Danmarks Nationalbank on 13-14 April 2012. The conference documents are available at the website: https://conference.cbs.dk/index.php/crisis/crisis/index.

DETERMINANTS OF 10-YEAR YIELD SPREADS Chart 1



tries that have been hit by the debt crisis in recent years are to obtain low government yield spreads to Germany.

However, the analysis also shows that government yield spreads are far from always driven only by economic fundamentals. In the years up to and after the introduction of the euro, several southern European countries' long-term yield spreads to Germany narrowed to a very low level clearly below the level warranted by real economic factors according to the estimated models. The market did not focus on the macroeconomic imbalances which were accumulating in the countries that were later hit hard by the debt crisis.

Conversely, during the recent sovereign debt crisis, some crisis-ridden countries' yield spreads to Germany have been wider than the spreads that can be explained by economic fundamentals. This indicates that yield spreads have been more influenced by market-related and institutional factors in certain periods.

The analysis also indicates that contagion effects across euro area member states have caused rising interest rates in the most heavily indebted member states to be reflected in higher interest rates in other member states with large government debts. This has rendered it difficult for the debt-ridden member states to obtain sustainable market financing. As a result, global financial firewalls have been created as part of the efforts to address the sovereign debt crisis. These include European support facilities (EFSF, European Financial Stability Facility, and ESM, European Stability Mechanism), on the one hand, and IMF lending, on the other.

The analyses in this article focus on the determinants of the 10-year yield spread to Germany for selected European countries. Box 1 discusses the real economic factors that, in principle, determine the level of

REAL ECONOMIC DETERMINANTS OF THE GERMAN LONG-TERM GOVERNMENT BOND YIELD — Box 1

The German long-term government bond yield can be assumed to have two elements:
(a) The long-term risk-free interest rate.
(b) A premium for the credit and liquidity risks perceived by the investors as being associated with bonds issued by the German government.

Re (a): The long-term risk-free interest rate

According to the expectations hypothesis, the long-term risk-free interest rate can be calculated as an average of the expected future short-term risk-free interest rates over the relevant horizon plus a premium reflecting the uncertainty about the development in the future short-term risk-free interest rates in the given period.

The short-term risk-free interest rate can also be assumed to consist of two parts: inflation and real interest rates. For euro area member states, the inflation element can, in practice, be equated with the ECB's target of keeping inflation below, but close to, 2 per cent p.a. According to the theory of economic growth, the real-interest-rate element corresponds to real growth in the potential gross domestic product, GDP, plus a (usually modest) time preference premium. The time preference premium depends on the households' willingness to substitute between their current and future consumption. The sum of the inflation and real-interest-rate elements is approximately equal to the economy's nominal potential growth rate.

The premium for the uncertainty about the future course of the short-term risk-free interest rate reflects firstly an inflation risk and thus the credibility of the ECB's monetary policy. Secondly, it reflects uncertainty about the future real growth in potential GDP, which is influenced by technological advances and the use of new technology, among other factors.

Re (b): Credit and liquidity risk premium

The credit risk on German government bonds is the risk of the German government failing to meet its payment obligations. The credit risk will depend on the level of government debt and the expected future budget deficits in Germany. Macroeconomic imbalances (e.g. large current-account deficits) may be indicators of future budget deficits, given the risk that macroeconomic imbalances may entail future public spending.

Liquidity risk is the risk that it will not be possible to sell the bonds without considerable costs and loss of value. Real economic determinants of liquidity risks are difficult to pinpoint, but one indicator may be the absolute size of Germany's government debt: the larger the bond market, the better the opportunities, all else equal, of trading in securities without any notable effect on the price.

In conclusion, economic growth, the credibility of the ECB's monetary policy and the perception of fiscal sustainability in Germany are the principal determinants of long-term government yields in Germany.

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MACROECONOMIC FUNDAMENTALS

Given free capital flows, the long-term nominal yield spread between government bonds from two countries depends on the investor perception of the differences in credit risk on the bonds (i.e. the risk of the issuer failing to meet its payment obligations), liquidity risk (i.e. how easily the bonds can be sold without significant costs and loss of value) and exchange-rate risk (if the bonds are denominated in different currencies). In the longer term, these factors will predominantly be determined by differences in economic fundamentals between the countries, e.g. variations in government debt levels and macroeconomic imbalances.

Abildgren and Thomsen (2013) analyse the relationship between developments in 10 countries' 10-year yield spreads to Germany and economic fundamentals since the early 1990s.

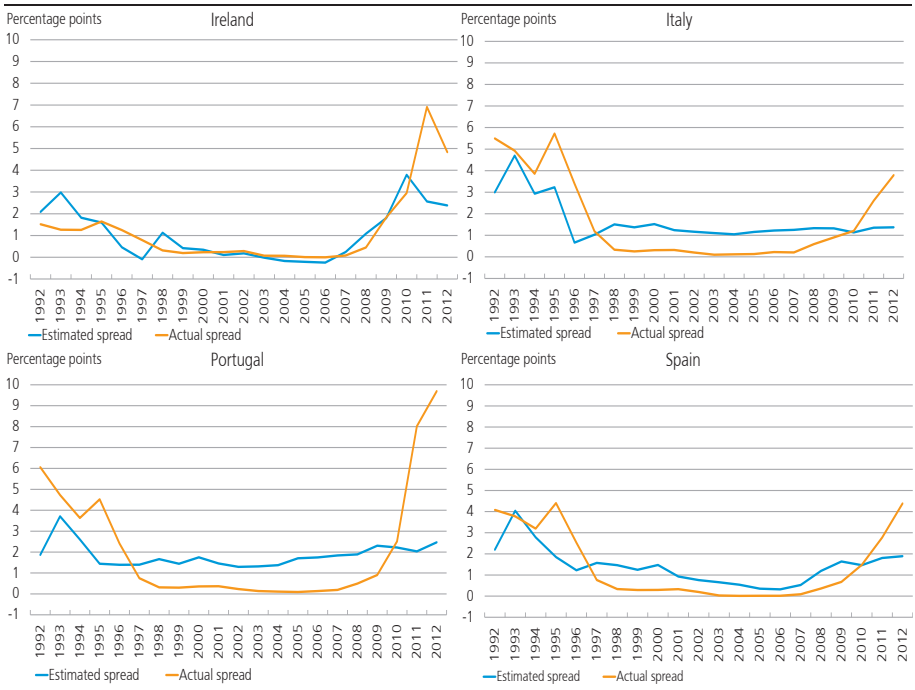
The analysis shows that the larger a country's government budget deficit and debt as a ratio of GDP are, compared with Germany's, the wider the yield spread to Germany is. An increase in the current-account deficit as a ratio of GDP calculated relative to Germany also widens the yield spread.

Using one of the regression models in the analysis, it is possible to estimate the long-term yield spreads to Germany that would have prevailed historically if yield spreads were determined solely by the government budget deficit and debt and (before the introduction of the euro) the bilateral development in exchange rates vis-à-vis Germany. These estimated yield spreads to Germany are compared with the actual yield spreads in Charts 2 and 3.

For Southern European countries, there is a clear tendency for actual yield spreads to be lower than estimated yield spreads in the years from the late 1990s to the outbreak of the debt crisis in recent years. In the period up to the introduction of the euro, yield spreads between the euro area member states were virtually eliminated, although considerable cross-country differences remained as regards fiscal sustainability and marked deterioration of the current account in some member states. The market did not focus on the macroeconomic imbalances which were accumulating in the countries that were later hit hard by the debt crisis.

ESTIMATED AND ACTUAL YIELD SPREADS TO GERMANY – COUNTRIES HARD HIT BY THE DEBT CRISIS

Chart 2



Note: Estimated spreads are calculated based on a regression model in which government budget deficits as a ratio of GDP and gross government debt for the preceding year as a ratio of GDP are used as indicators of credit risk. Both the budget deficit and the gross debt have been calculated relative to Germany, e.g. as the government budget deficit in Ireland as a ratio of GDP less the government budget deficit in Germany as a ratio of GDP. The applied indicator of exchange-rate risk for the period 1991-98 is the year-on-year change in the bilateral exchange rate vis-à-vis Germany.

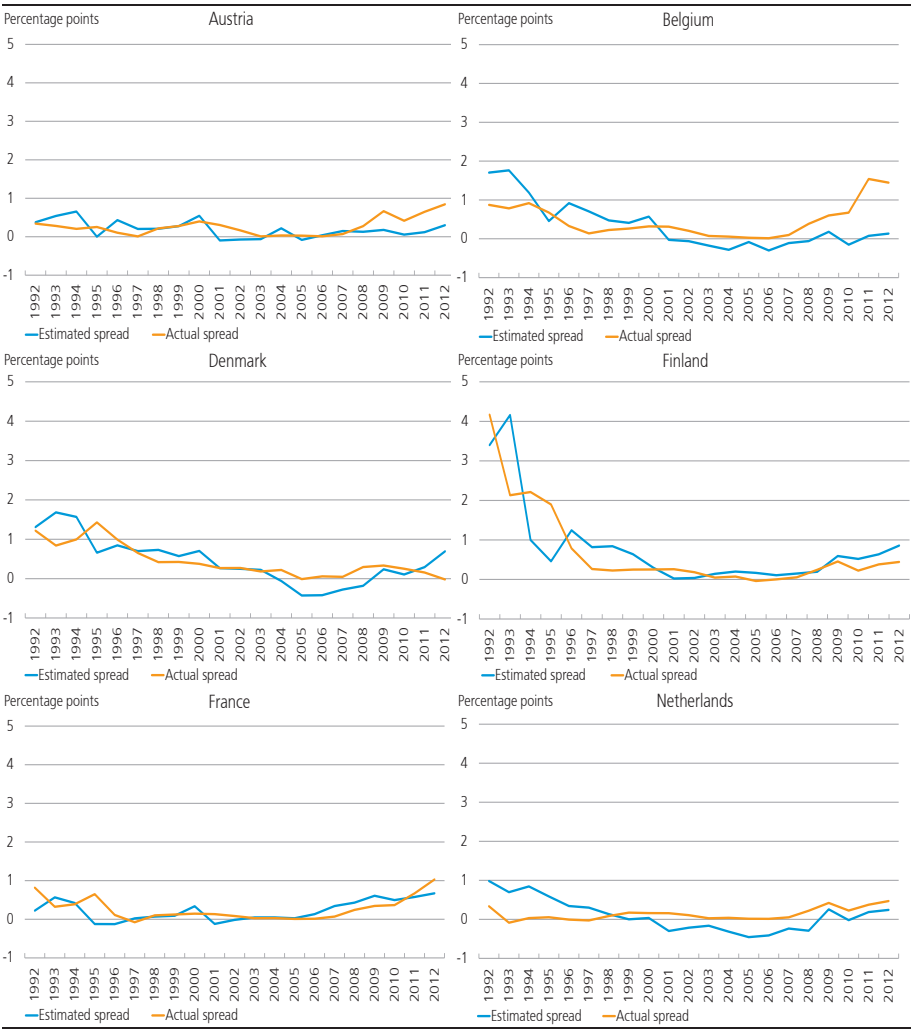
Source: Abildgren and Thomsen (2013).

Conversely, during the crisis in recent years, the yield spreads to Germany of Southern European countries have been wider than the spreads estimated on the basis of economic fundamentals. The reason is that yield spreads have been more influenced by market-related and institutional factors, including contagion effects and the risk of certain member states' exit from the euro. Uncertainty about the strength of the banking sector may also have contributed to recent years' gap between actual and estimated yield spreads. Moreover, international studies in this field show that the significance of government deficits and debts varies over time and that orderly public finances play an even larger role in governments' borrowing costs in times of crisis ("non-linearities").

In addition, it appears from Chart 2 that the actual yield spreads of Italy, Spain and Portugal were also higher than the estimated spreads in the early 1990s. This shows that non-linearity elements, such as contagion and speculation, also played a role in developments in the financial markets during the ERM crisis in the early 1990s.

ESTIMATED AND ACTUAL YIELD SPREAD TO GERMANY – OTHER COUNTRIES

Chart 3



Note: Estimated spreads are calculated based on a regression model in which government budget deficits as a ratio of GDP and gross government debt for the preceding year as a ratio of GDP are used as indicators of credit risk. Both the budget deficit and the gross debt have been calculated relative to Germany, e.g. as the government budget deficit in Denmark as a ratio of GDP less the government budget deficit in Germany as a ratio of GDP. The applied indicator of exchange-rate risk for the period 1991-98 is the year-on-year change in the bilateral exchange rate vis-à-vis Germany.

Source: Abildgren and Thomsen (2013).

The actual yield spreads of a number of small European core countries such as Denmark, the Netherlands and Belgium, were higher than the estimated spreads throughout most of the 2000s. The background is that the estimated yield spreads contain only indicators of credit and exchange-rate risk as explanatory variables and not measures of liquidity in the national bond markets. All else equal, the degree of liquidity can be assumed to be lower in the bond markets of small countries than in a

large bond market such as the German one. This is underpinned by the perception of German government bonds as benchmark bonds in Europe even after the introduction of the euro.

For Denmark, another possible influencing factor may be that the yield contains a risk premium because Denmark retains its national currency, notwithstanding the consistent fixed-exchange-rate policy vis-à-vis the euro. As a result, the Danish yield spread to Germany is normally positive and, all else equal, tends to be wider than warranted by real economic factors such as government debt and government budget deficit.

Finally, the differentials between actual and estimated yield spreads may reflect cross-country differences as regards domestic investors' preferences of domestic government securities ("home bias"). As regards Denmark, a home bias may e.g. reflect that the obligations of Danish pension funds are denominated in Danish kroner, implying an incentive for them to hold Danish securities.

CREDIT AND LIQUIDITY RISK DURING THE CRISIS

Long-term yield spreads across countries can be decomposed into various components of yield spreads among euro area member states, mainly credit and liquidity spreads. The credit spread is to compensate investors for the risk that issuers are unable or unwilling to meet their payment obligations. The liquidity spread is compensation for the risk that it will not be possible to sell the bonds without considerable costs and loss of value.

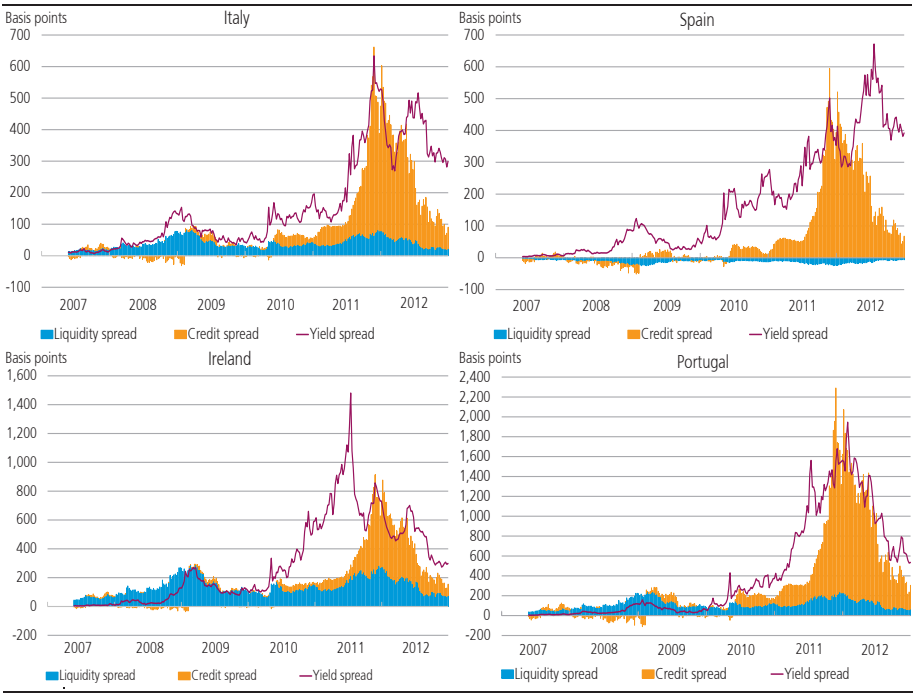
As illustrated above, yield spreads in the euro area reflect differences in economic fundamentals between the issuing countries. However, Christensen and Ejsing (2013) base their analysis directly on indicators of credit and liquidity spreads in yield spreads. It is then examined to which extent yield spreads have been driven by credit and liquidity risks during the recent crisis, cf. Charts 4 and 5.

Following the collapse of Lehman Brothers, higher yield spreads were driven mainly by a widening of the liquidity spread, while higher yield spreads during the European sovereign debt crisis may also be attributed to a wider credit spread. The factors with the greatest impacts on the individual countries' yield spreads vary. In the countries hardest hit by the sovereign debt crisis, credit spread widening has played the largest role, while liquidity spreads have been relatively more important in countries with low yield spreads.

Patterns in Denmark have been different, however, since the Danish long-term yield spread to Germany has, at times, been negative during

DECOMPOSITION OF YIELD SPREADS TO GERMANY – COUNTRIES SEVERLY AFFECTED BY THE SOVEREIGN DEBT CRISIS

Chart 4



Note: 5-year yield spreads. Credit and liquidity spreads have been estimated based on a regression model, the explanatory variables of which are a credit factor (the yield spread between French and German government-guaranteed bonds) and a liquidity factor (the yield spread between German government-guaranteed bonds and German government bonds). The decomposition does not sum up to the actual yield spread, since the estimation has unexplained residuals.

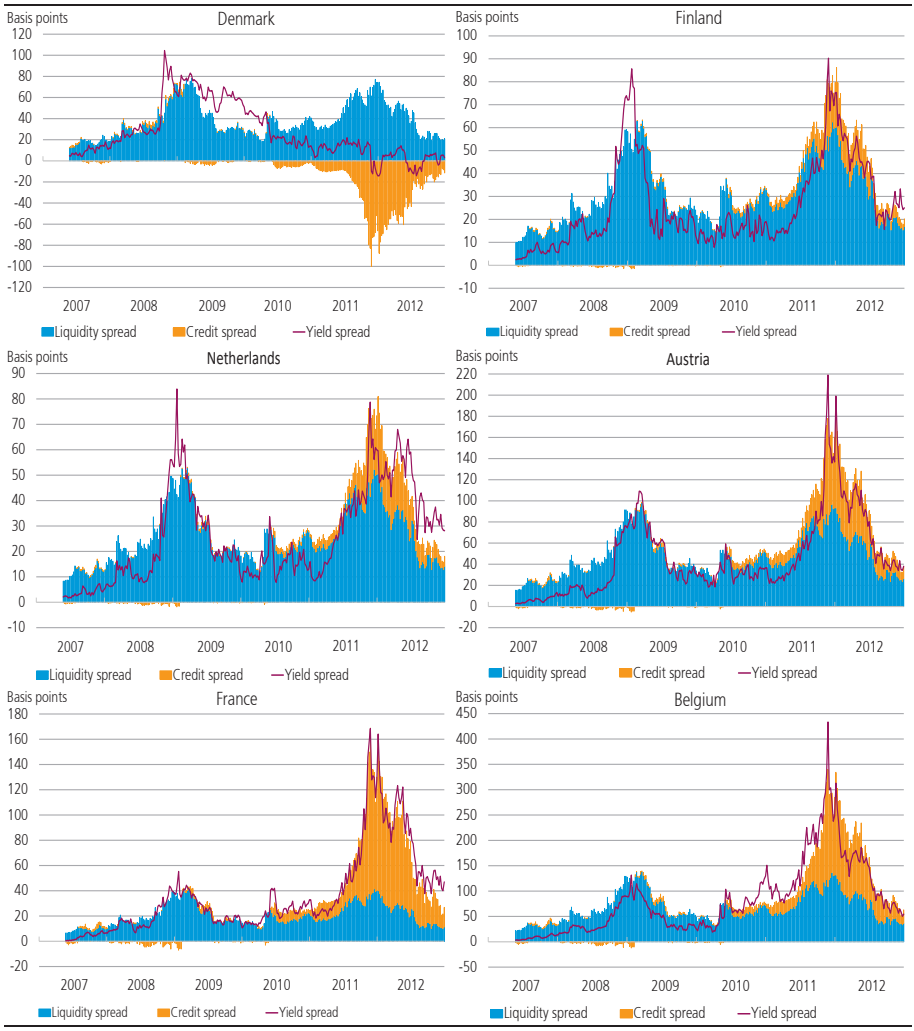
Source: Christensen and Ejsing (2013).

the debt crisis. A possible reason may be that increased uncertainty about euro area developments and the costs of resolving the debt crisis has led to increased demand for non-euro denominated government securities with a high credit rating. Danish government securities have the highest credit rating and, therefore, have been attractive to investors ("safe haven"), which explains the negative contribution of the credit spread to the Danish yield spread in Chart 5, resulting in lower Danish yields and lower government borrowing costs.

MARKET STRUCTURE, INVESTOR BEHAVIOUR AND CONTAGION EFFECTS

Although government yield spreads across countries reflect economic fundamentals, market-related factors such as market structure and investor behaviour may also contribute to narrowing or widening yield spreads. Altenhofen and Lohff (2013) discuss in more detail how market-related factors have influenced yield spreads between selected government bonds during the sovereign debt crisis in recent years.

DECOMPOSITION OF YIELD SPREADS TO GERMANY – OTHER COUNTRIES Chart 5



Note: 5-year yield spreads. Credit and liquidity spreads have been estimated based on a regression model, the explanatory variables of which are a credit factor (the yield spread between French and German government-guaranteed bonds) and a liquidity factor (the yield spread between German government-guaranteed bonds and German government bonds). The decomposition does not sum up to the actual yield spread, since the estimation has unexplained residuals.

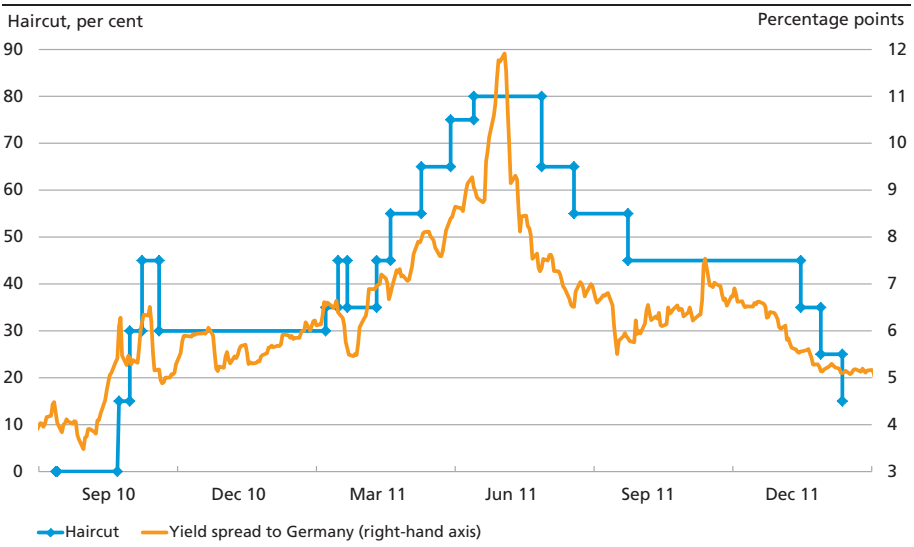
Source: Christensen and Ejsing (2013).

The value of a bond depends *inter alia* on the extent to which the bond can be used as collateral for loans. The difference between a bond's market value and its value as collateral is referred to as the haircut. Haircuts are used both by central banks and private market participants and are to contribute to protecting the lender from losses.

For example, during the recent debt crisis close correlation has been observed between the collateral value of Irish government bonds for loans among private market participants and the Irish government yield

ADDITIONAL HAIRCUT ON IRISH GOVERNMENT SECURITIES AND 10-YEAR YIELD SPREAD TO GERMANY

Chart 6



Note: Haircut as per cent of the amount of trading in Irish government bonds with LCH relative to an AAA-rated bond benchmark.

Source: London Clearing House, LCH, and Bloomberg. LCH is a central counterparty, acting as intermediary between borrower and lender.

spread to Germany, cf. Chart 6. The same trend applied to Spanish government securities.

In response to the financial crisis, international standards for payment and settlement systems (financial infrastructures) have been tightened, cf. BIS (2012). The new standards specify e.g. that stable and conservative haircuts should be established that are calibrated to include periods of stressed market conditions. This may help to ensure e.g. that increased haircuts resulting from interest rate rises do not impose further upward pressure on yields ("procyclicality").

The price of a bond also depends on whether the bond series can be traded in large volumes without significant costs and loss of value. Other things being equal, investors are willing to pay higher prices for bonds traded with narrow bid-ask spreads. During the recent sovereign debt crisis, the bid-ask spread in the countries hit hardest by the crisis widened considerably. As a result, markets' ability to absorb large buying and selling orders from customers weakened, which may have contributed to a wider cross-country yield spread.

In addition, the analysis indicates that there may have been contagion effects and closer correlation between bond yields across the debt-ridden euro area member states during the recent debt crisis. This has reduced the investors' opportunities to obtain diversification gains in their bond portfolios.

POLICY INITIATIVES AND CREDIT RATINGS

Hansen et al. (2013) examine how the announcement of a number of selected initiatives and events in the wake of the financial crisis and the debt crisis have influenced the 10-year government bond yield spreads to Germany for Denmark and selected euro area member states. The article examines the total effect on the date of announcement and the next day.

The analysis shows, among other things, that announcement of expansions of the credit lines and mandates of the European financial firewalls, the EFSF and the ESM, narrowed Spanish and Italian yield spreads to Germany. Announcements concerning the ECB's purchase of government bonds also resulted in the intended narrowing of yield spreads for Spain and Italy.

Moreover, the article finds that negative announcements about credit ratings have tended to widen yield spreads. This indicates that the announcements were not fully incorporated in prices in the government securities markets beforehand.

Danmarks Nationalbank's liquidity measures in the form of additional credit facilities and expansions of the collateral basis for loans from Danmarks Nationalbank were primarily aimed at the banks' liquidity and the functionality of the money market. The analysis shows a clear tendency for Danmarks Nationalbank's liquidity measures to reduce the spread between unsecured and secured money-market interest rates in Denmark.

The first Danish bank rescue package (Bank Rescue Package 1), which increased the government's commitments in the form of general guarantees to the banks, led to a widening of the Danish 10-year yield spread to Germany. Bank Rescue Package 1 was introduced in a period of market turmoil when yield spreads may have been affected by several factors. But the result is in line with the findings of studies of the effects of bank rescue packages in the euro area member states.

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