Decomposition of the dynamics of sovereign yield spreads in the euro area

B. De Backer

Introduction

Sovereign yield developments in the euro area have attracted considerable attention over the last few years. At the height of the sovereign debt crisis, long-term sovereign yields in some EU Member States had climbed to levels not seen since the beginning of the Economic and Monetary Union (EMU). In 2012, they reached more than 6 % in Italy and Spain, about 14 % in Portugal and as much as 40 % in Greece. The surge of sovereign yields in some of the Member States was all the more remarkable as it occurred within the context of the EMU. Given a single monetary policy in the euro area and the common implied expectations on future policy rates, cross-country differences in sovereign yields reflect country-specific risk premiums. Spreads over the German Bund, a crucial measure of sovereign riskiness, surged from relatively low levels before the crisis (about 15 basis points on average) to several dozens or hundreds of basis points in 2012, depending on the countries. The strong decline in sovereign yields and spreads that followed in the euro area after the first indication of the outright monetary transaction (OMT) programme in July 2012 was equally unprecedented. In the space of about two years, long-term sovereign yields and spreads halved compared with the peak they had reached in 2012. By April 2015, following additional non-conventional monetary policy measures, yields had also fallen to historically low levels. In Italy and Spain for instance, 10-year sovereign yields stood at about 1.3 %. For core countries, short- to medium-term maturity sovereign yields have even dropped to unequalled negative values, reflecting the willingness of investors to pay to lend funds to certain sovereigns (liquidity and safety premium). This contrasts with the high risk compensations demanded in 2012.

The impact of these developments not only concerned sovereign debt markets. Different economic sectors were affected by the sovereign debt crisis. In addition to the public sectors in the respective countries that had to cope in general with rising borrowing costs, banks saw their funding conditions tighten. Adverse bank-State feedback loops emerged in some Member States as (direct or indirect) sovereign assistance to banks increased, raising sovereign credit risk to which banks are exposed (through their holdings of sovereign debt, for instance). Besides, in most Member States, households and non-financial corporations, the so-called "real economy", were confronted with a tightening of (price and non-price) credit conditions, reflected among others in increased margins on new bank loans. The funding conditions in these sectors remain a cause for concern in the euro area since, in early 2015, households and non-financial corporations were still confronted with significant risk premiums. Even though some convergence has been observed since 2014, there is still some cross-country heterogeneity in borrowing costs in the euro area, partly reflecting disparate risk premiums in a context of fragmentation of capital markets inherited from the sovereign crisis. For instance, bank lending rates in Italy and Spain are currently about 4 percentage points over the ECB's main monetary policy rate, while these spreads stood at only about 2 percentage points in 2007.

This article aims at analysing the contributions of different factors to sovereign spreads throughout the crisis, following a macrofinancial approach. Rather than focusing on sovereign yields, the determinants of divergent developments in sovereign spreads in the euro area are analysed. These spreads are still significant for several euro area Member States and, thus, continue to represent

risks priced by markets. Distinguishing the contributions of the various shocks that could influence risk premiums is important in order to understand the dynamics of sovereign spreads and to be able to influence these premiums through monetary or government policy action. Therefore, the interactions between financial markets and key macroeconomic factors should be duly considered. But there are other factors that are more specific to financial markets, such as redenomination risk. Likewise, liquidity risks and changes in global risk aversion could also influence sovereign spread dynamics. In section 1 of the article, developments of sovereign yields and spreads are discussed. The second section focuses on the consequences of the sovereign debt crisis for the borrowing and funding costs of different sectors of the economy, i.e. the government, banks, households and non-financial corporations. Different types of risk in sovereign bond markets are identified and analysed in the third section. These factors are used as inputs in the macrofinancial analysis in section 4, where we decompose sovereign spreads into a fundamental economic component and a non-fundamental component. The impact of the different (unconventional) monetary policy measures on yield spreads is illustrated as well. Finally, the conclusion gives a brief summary of the main findings of the analysis.

1. Developments in euro area sovereign bond markets

From a historical perspective (see chart 1), three phases can be distinguished in euro area sovereign debt market developments since the early 1990s (Cœuré, 2012): a first phase preceding the creation of the EMU in 1999 that was characterised by the trend-wise convergence of sovereign yields and spreads relative to German Bunds, a subsequent phase of stability in euro area sovereign bond markets that started with the establishment of the EMU and continued until the banking crisis, and, finally, a phase marked by the increased volatility and the divergence of yields and spreads during the financial and sovereign debt crises. Most recently, following the announcement and the implementation of different non-conventional monetary policy measures, and in particular the expanded asset purchase programme (APP), euro area bond markets are entering a new regime, characterised by negative yields in many euro area countries and incomplete convergence of yields and spreads.

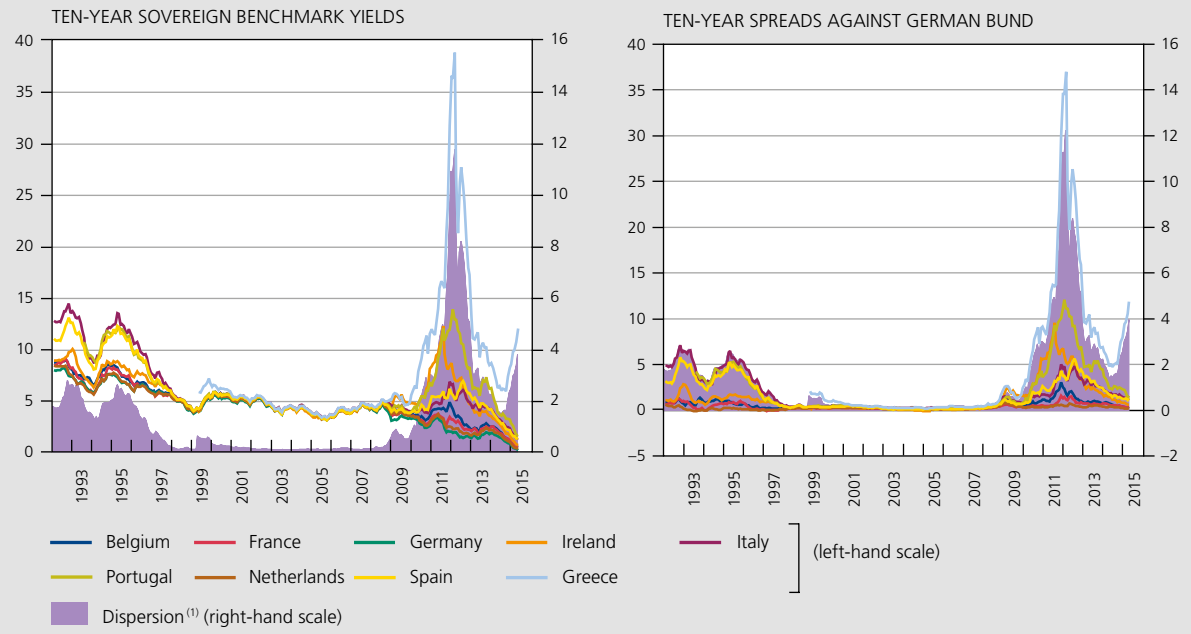
The convergence of yields and spreads (and the general downward tendency of yields) observed during the first phase started after the European Exchange Rate Mechanism (ERM) crisis in 1993 triggered by speculative attacks against European currencies. Following this crisis, many of the ERM members aligned monetary and macroeconomic policies to enhance the credibility of the ERM peg and in a further stage also to meet the convergence criteria stipulated in the Maastricht Treaty. In this phase, the convergence of sovereign yields was driven primarily by the gradual reduction of exchange rate (and sovereign) risks and the gradual convergence of inflation expectations. In Belgium for instance, a strong franc policy *(politique du franc fort)* strictly pegging the Belgian franc to the German mark was introduced at the beginning of the 1990s and the Belgian government gradually stepped up fiscal efforts to meet the entry criteria for the EMU.

In the second phase, sovereign yields were relatively stable and spreads against the German Bund remained low (about 15 basis points on average). However, the low level (and the stability) of the spreads did not reflect the persistent differences in macroeconomic and fiscal fundamentals of some euro area Member States. The discrepancy between the strong convergence in sovereign yields on the one hand and the persistent differences in macroeconomic fundamentals on the other could have been an indication of a certain leniency of financial markets as regards fiscal positions of sovereigns *inter alia* (Bernoth *et al.*, 2012; Cœuré, 2012; ECB, 2014a) or, similarly, of a low degree of risk aversion inherited from a long period of low macroeconomic volatility during the Great Moderation (or the "Goldilocks economy" as described by Alan Greenspan in the 1990s).

The third phase, encompassing the financial and sovereign debt crises, saw initially a strong increase in sovereign yields especially in peripheral Member States to levels exceeding those in force before the EMU. Accordingly, sovereign spreads displayed a high degree of dispersion across Member States reflecting the heterogeneity of sovereign risks and the fragmentation of financial markets in the euro area. These developments were initially observed to some extent in 2008 and 2009 during the financial crisis as a consequence of increasing risk aversion and liquidity risk but then developed fully during the sovereign crisis as a result of a surge in (perceived) sovereign credit risk. However, the sovereign debt crisis was also characterised by contagion risks and, in particular, by a redenomination risk (the risk that a euro asset will be redenominated into another, possibly devalued, legal currency). Since the summer of 2012, the situation has nevertheless improved and sovereign yields in most euro area Member States have dropped, mainly due to the ECB non-conventional monetary policy actions, such as the announcement of the OMT programme and expanded APP, and (recent) low inflation expectations. At the beginning of 2015, following their downward trends – except in Greece –, yields stood at a historically low

CHART 1 DEVELOPMENTS IN EURO AREA SOVEREIGN DEBT MARKETS

(in %, monthly averages, 1992M1-2015M4)



Source: Thomson Reuters Datastream

(1) Standard deviation of the cross section of sovereign yields or spreads for each month.

level and short- to medium-term maturity yields were even negative for several Member States.

2. The relation between sovereign debt market developments and the economy

Sovereign yield developments can exert a strong impact on the real economy through their effects on different economic segments or sectors. This section briefly discusses the different channels through which sovereign yield changes are linked to the "funding costs" of the public sector, the banking sector, households and non-financial corporations.

2.1 The implicit interest rate on government debt

A first, direct, effect of changes in yields (or yield spreads) is that they may impact on the refinancing cost of public debt and possibly in the longer term on the servicing cost and sustainability of public debt. The debt accumulation equation implies that the public debt ratio – as measured by government debt in percentage of GDP – is sustainable if the primary deficit remains limited with respect to GDP and the debt servicing cost is smaller than (or equal to) the nominal growth rate of GDP. The persistence of high debt servicing costs over a prolonged period could thus lead to increased debt accumulation through a "snowball effect" and result in a potentially unsustainable level of indebtedness.

However, sovereign yield developments are not transmitted automatically to public debt servicing costs as public authorities can temporarily mitigate the impact of yields on total funding costs by either postponing/advancing borrowing in financial markets or modifying the maturity structure of their debt. For instance, when long-term yields are rising, governments can lower their funding requirement by postponing some government spending or shorten the maturity structure of their debt by issuing new debt in short maturity buckets. Moreover, the total financing cost of public debt does not just depend on the interest charges on newly issued debt but also on the cost of debt issued previously. This implies that sovereign yield developments are often smoothed out in the cost of servicing debt. Consequently, it is not surprising to observe that implicit interest rates on government debt of

most euro area Member States generally rose only slightly around 2008 and 2011 as a result of the successive financial and sovereign debt crisis (see chart 2). In euro area peripheral states, however, implicit rates reacted more than in core countries to sovereign debt market tensions in 2011. Given the persistence of the sovereign debt crisis, some of these peripheral states (such as Italy, Portugal and Spain) could visibly not avoid refinancing their debt at a high rate in 2011 and probably afterwards. It should also be noted that declining implicit rates on Greek, Irish and Portuguese debt from 2012 onwards do not reflect the sovereign debt tension but rather the efforts consented by the international community to finance these states at low cost (through adapted programmes).

The costs of public debt servicing in the euro area thus reacted to sovereign yield developments during the crisis, although these reactions were relatively limited compared with changes in yields registered in the secondary market. In Italy and Spain for instance, from the beginning of 2011 to mid-2012, 10-year sovereign yields increased by almost 3 percentage points whereas the implicit interest rates on the government debt rose by about half a percentage point. The impact on implicit rates could nevertheless have been more adverse with a longer sovereign debt crisis or in the absence of financial assistance for some states.

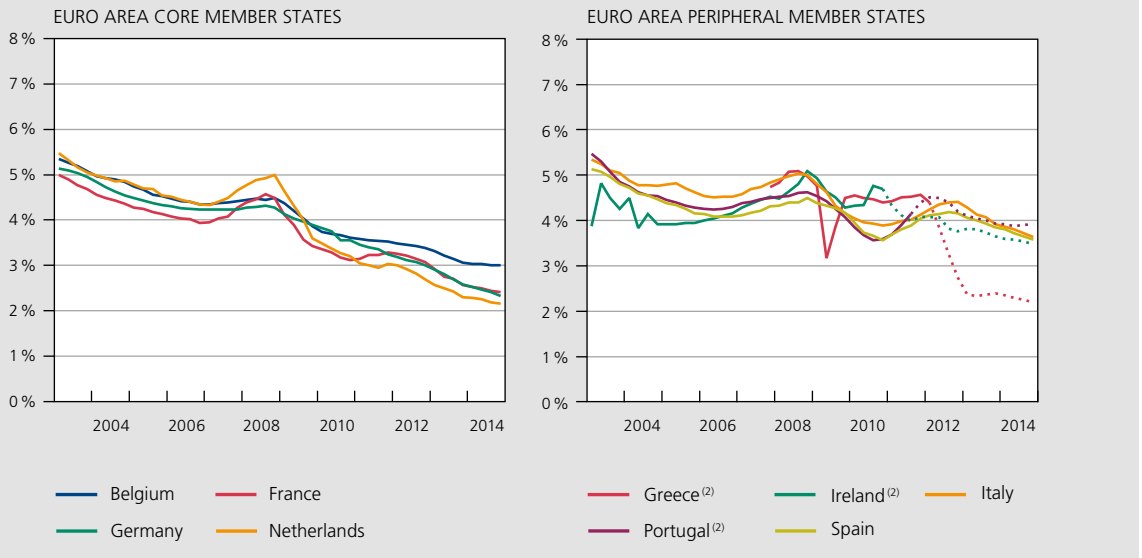
2.2 The link with private sector funding costs through the lens of the bank lending survey

Various channels are at work when considering the transmission of the sovereign debt crisis to banks, households and non-financial corporations. One of them, the bank lending channel, defined here as operating when banks modified their loan supply in response to the sovereign crisis, was particularly important and can be better understood thanks to the euro area bank lending survey (BLS). According to the BLS, two mechanisms were relevant in the debt crisis context: the direct exposure of banks to sovereign debt and the value of banks' sovereign collateral. The first refers to the holding of sovereign debt by banks, which directly exposes their balance sheets to sovereign risk and which could therefore affect their riskiness and in turn their funding costs. In this respect, it should be noted that the average share of euro area sovereign debt in euro area banks' assets amounted to about 8.5 % in the years 2009-2011 (the beginning of the sovereign debt crisis)[1]. The second refers to the impact of the sovereign debt crisis on financing costs through the fall in value of sovereign bonds that banks can use as collateral

(1) The average share over the period 2009-2011 of euro area sovereign debt (loans and securities other than shares) amounted to about 8.5 % of MFIs' assets in Belgium, France, Germany, Greece, Italy, the Netherlands, Portugal and Spain. Balance sheet items figures are taken from the statistical data warehouse of the ECB, MFIs excluding ESCB reporting sector.

CHART 2 IMPLICIT INTEREST RATES ON GOVERNMENT DEBT IN THE EURO AREA[1]

(2003Q1-2014Q4, unless otherwise stated)



Source: EC.

(1) Actual interest payments cumulated over four quarters divided by the initial stock of consolidated sovereign debt. Debt data were linearly interpolated on the basis of end-of-year observations.

(2) Dotted lines represent the implicit rates of states that have been under a financial assistance programme. Data for Greece from 2007Q4-2014Q4.

in liquidity transactions with the ECB or the wholesale market. In addition to these two mechanisms, banks can also be affected by "other effects" of the sovereign debt crisis, such as weaker explicit or implicit government guarantees.

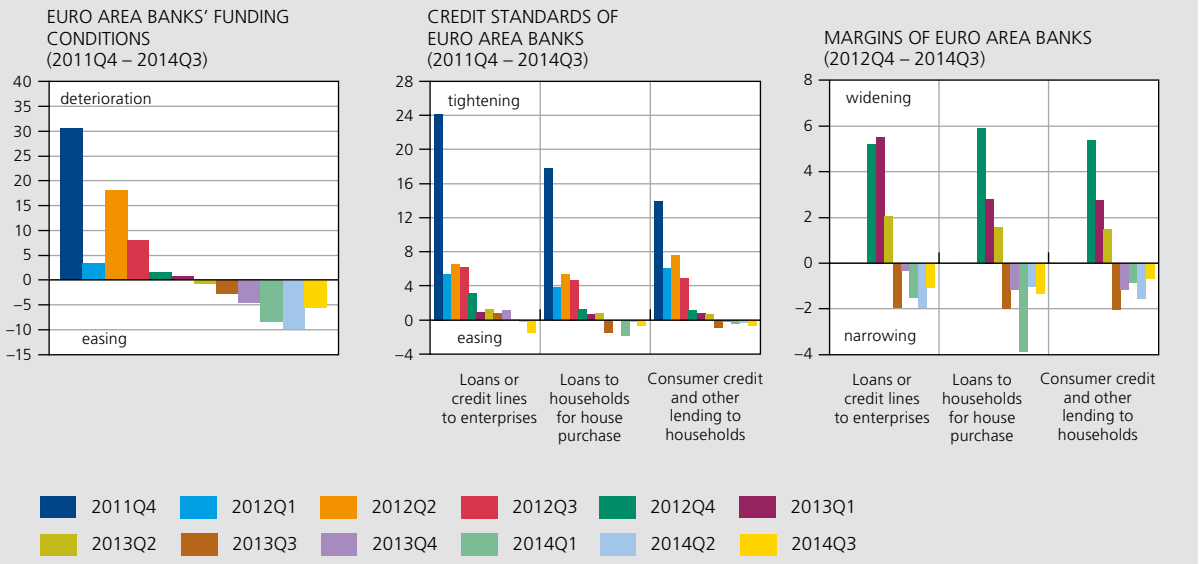
In the BLS, banks were asked to assess the impact of sovereign debt market developments on changes (over the past three months) in their funding conditions, credit standards and margins, and to differentiate the impact according to the mechanisms mentioned above. The results indicate that the majority of euro area banks reported – for the two mechanisms and the other effects – on average a deterioration in their funding conditions at the end of 2011 and throughout 2012 as a consequence of the sovereign debt crisis (see chart 3). The impact of the sovereign debt crisis was probably also sizeable in 2010 and throughout 2011 but the *ad-hoc* question was introduced for the first time in the BLS for the period covering the last quarter of 2011. From the second quarter of 2013 onwards, however, following the easing of the tensions on sovereign debt markets, banks started reporting a more and more pronounced easing of their funding conditions. The survey furthermore indicates that, as a consequence of the sovereign debt crisis, euro area banks significantly tightened credit standards on loans to households and non-financial corporations and widened margins on them. As was the case for banks' funding conditions, the impact of the sovereign debt crisis on credit standards and margins for households and non-financial corporations then slightly eased towards the end of 2013. The BLS also indicates that the direct exposure and collateral mechanisms were more important than the "other effects".

Hence, in addition to affecting sovereigns, the public debt crisis also affected banks, households and non-financial corporations, though the most recent bank lending surveys indicate some easing of the impact. In section 2.3, we show however that the margins of the banking sector on loans to households and non-financial corporations remain at relatively high levels, and we take a new look at them by decomposing them into different risk premiums.

2.3 Decomposition of banks' margins on loans to households and non-financial corporations

The impact of the sovereign debt crisis on households' and non-financial corporations' bank retail rates was felt not only through the banking sector's funding costs but also through substitution effects. Sovereign yield developments in general influence other types of interest

CHART 3 BANK LENDING SURVEY: IMPACT OF THE SOVEREIGN DEBT CRISIS ON BANKS' FUNDING CONDITIONS, CREDIT STANDARDS AND MARGINS FOR BANK LOANS TO HOUSEHOLDS AND NON-FINANCIAL CORPORATIONS[1]



Source: ECB (bank lending survey).

(1) *Ad-hoc* question on the impact of the sovereign debt crisis on banks' funding conditions. The question was first included in the survey in 2012. Net percentages defined as the difference between the sum of the answers "contributed considerably/somewhat to a deterioration/tightening/widening" and the sum of the answers "contributed considerably/somewhat to an easing/narrowing". Averages of the three possible channels: direct exposure, value of sovereign collateral, other effects.

rates, including bank lending rates. For instance, banks can decide to reduce their credit supply to households and non-financial corporations in order to invest more in sovereign bonds when sovereign yields increase relative to retail lending rates. This portfolio rebalancing should then push up bank lending rates as well, implying that they could be influenced by sovereign yields. However, bank lending rates in the euro area do not necessarily move in line with euro area sovereign yields and generally tend to be higher than sovereign yields. This imperfect correlation and average positive discrepancy point to the presence of specific risk premiums in bank lending rates (in addition to the risk premiums already included in sovereign yields). In this section, we make a (rough) approximation of banks' margins – defined as the difference between bank lending rates and the ECB's main refinancing operations (MRO) rate –, which makes it possible to highlight the roles played by different risk channels.

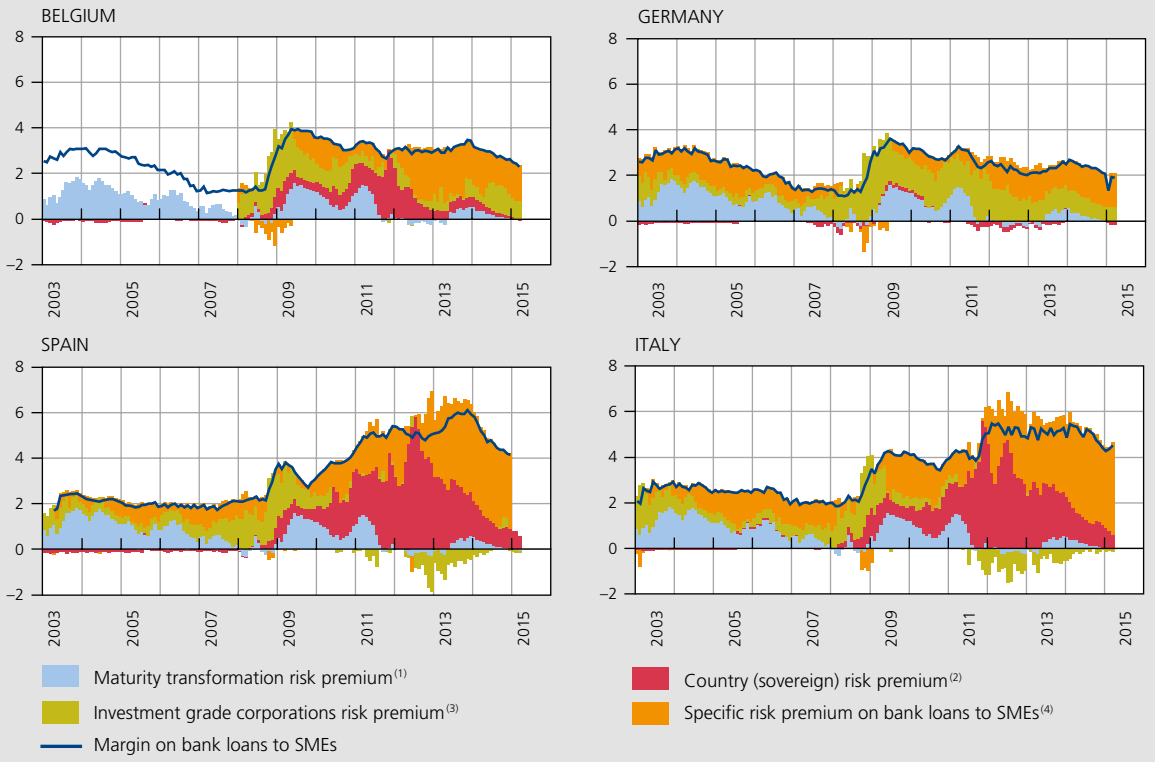
Focusing on non-financial corporations, margins between bank lending rates on loans granted to (small and medium-sized) enterprises, measured as the rates on small long-term loans[1], and the monetary policy rate can be decomposed into four spreads that we interpret here as risk premiums (see Box 1): a maturity transformation premium, a sovereign (or "country") premium, a premium on loans to investment grade (IG) non-financial corporations (rated Baa or better) and finally a premium on loans to all (not necessarily IG) non-financial (small and medium-sized) corporations.

Four countries are considered in this article as representative of either core euro area Member States (Germany and to a lesser extent Belgium) or peripheral states (Italy and

(1) A specific bank interest rate for SMEs is not available as such. Therefore, we approximate it by taking the rate on small (up to € 1 million) long-term (initial rate fixation period of more than 5 years) new business loans granted to non-financial corporations. These loans are the most susceptible to be granted to SMEs. We use MIR (MFI interest rate) data.

CHART 4 DECOMPOSITION OF BANK LENDING SPREADS ON LOANS GRANTED TO SMEs

(in %, 2003M1 – 2015M3)



Sources: Barclays Capital, Thomson Reuters Datastream, ECB.

(1) Difference between five-year swap rates for Euribor six-month (before Aug. 2005) or five-year OIS rates (since Aug. 2005) and MRO rates of the ECB.

(2) Difference between five-year sovereign yields and five-year swap rates.

(3) Difference between yields on IG corporations of about five years (average for maturities between four and six years) and five-year sovereign yields. Data missing for Belgium before 2008. The observations in February 2015 were used as first estimates for March 2015.

(4) Difference between new business MIR rates on loans up to € 1 million and with initial rate fixation period over five years (approximation of SME bank loan rates) and yields on IG corporations of about five years. Spanish data were smoothed using a moving average over seven months.

Spain). Changes in bank lending margins and the decomposition into the four above-mentioned spreads are illustrated in chart 4. At the end of 2008 and at the beginning of 2009, margins widened in all four countries considered due to a rise in the maturity transformation risk premiums as well as in risk premiums of IG corporations. The former occurred as short-term rates fell following the ECB's cuts in the MRO rate while longer-term market rates remained relatively constant, at least initially. The latter reflected the general re-pricing of corporate credit risk and the flight-to-safety phenomenon in the context of the financial crisis which diverted investment away from corporate bonds towards safer assets.

From the end of 2008 and until mid-2012, premiums associated with sovereign risk (or country risk premiums) increased in Italy and Spain, leading to a further widening of margins and fragmentation of euro area financial markets. Clearly, the increase in country risk premiums reflected the difficulties that the Italian and Spanish governments faced during the sovereign debt crisis. In these two countries, the spread between yields on IG corporate and sovereign bonds could even be slightly negative as markets regarded corporate bonds as "safer" than government bonds. In Belgium, the country risk premium increased between the beginning of 2009 and the end of 2011 but the bank loan margin nevertheless fell slightly (due to diminishing risk premiums of IG corporations following a search-for-yield phenomenon). In Germany, the country premium remained very small throughout the crisis.

Considering the statistical analysis presented in Box 1, the link between margins on bank loans and country premiums can be estimated by means of standard econometric regressions. According to a counterfactual analysis on the basis of these regressions, it appears that bank lending margins would have been significantly smaller if the sovereign premiums had remained low (with no sovereign debt crisis), except in Germany where they would have been unaffected given the low country risk premiums.

Country risk premiums for Belgium, Italy and Spain started to decline in 2012 amid the easing sovereign debt market tensions and the spread between yields on IG corporate and sovereign bonds remained small, implying that the cost of issuing debt through IG corporate bonds had come down as well. However, bank lending margins remained relatively high, partly reflecting the lack of any viable alternative funding sources, such as corporate bonds, for a substantial fraction of euro area non-financial corporations. Margins on bank loans were supported by the widening spread between bank lending rates to all non-financial corporations and corporate bond yields. Besides, non-financial corporations' bank borrowing costs are nowadays still significantly higher than yields on sovereign or corporate bonds, something which does not facilitate the flow of credit towards the real economy. In order to tackle this issue, the ECB started targeted longer-term refinancing operations (TLTROs) at the end of 2014 to encourage banks to lend more to corporations (and households). Furthermore, at the beginning of 2015, it announced plans to launch the expanded APP which is expected to influence credit flows to the real economy (and thus bring inflation back below, but closer to, 2 %) mainly through a portfolio rebalancing channel. Since the announcement and implementation of these measures, margins on bank loans to non-financial corporations seem to have fallen further in the four countries considered; a more in-depth analysis on a larger dataset is nevertheless required before being able to make an assessment of the final impact of these measures.

Box 1 – Decomposition of the margins on bank loans to SMEs and the role of sovereign risk

We decompose bank loan margins into four spreads, in line with Illes and Lombardi (2013). More precisely, the decomposition takes the following form:

$$R_{lending} - R_{MRO} = [R_{OIS} - R_{MRO}] + [R_{sov} - R_{OIS}] + [R_{Baa} - R_{sov}] + [R_{lending} - R_{Baa}].$$

On the left-hand side of the equation, we measure the bank lending margin $[R_{lending} - R_{MRO}]$ by the difference between the interest rate on bank loans granted to (small and medium-sized) enterprises – as approximated by the rate on small long-term loans – or households ($R_{lending}$) and the ECB's main refinancing operations rate (R_{MRO}). We interpret the spreads on the right-hand side as risk premiums. The first component $[R_{OIS} - R_{MRO}]$ is

understood to be a maturity transformation risk premium measured as the difference between the long-term overnight index swap rate, R_{OIS} (a 5-year interbank market rate), and the MRO rate (typically associated with a 1-week maturity)[1]. The second component $[R_{sov} - R_{OIS}]$ is the country risk premium measured as the difference between the sovereign yield (R_{sov}) and the interbank market rate, both with five-year maturities. The third component $[R_{Baa} - R_{sov}]$ refers to the IG risk premium, which is measured as the difference between yields on IG (Baa rated or better) non-financial corporations bonds (R_{Baa}) and the sovereign yield, both with five-year maturities[2]. It represents the additional risk premium obtained on an investment in the (IG) corporate sector relative to an investment in sovereign bonds. The last component $[R_{lending} - R_{Baa}]$ is a bank loan risk premium, measured as the difference between the bank lending rate on small (up to € 1 million) long-term (more than 5 years) loans to non-financial corporations and the yields on IG non-financial corporation bonds. It represents the additional premium charged by banks for lending to firms not necessarily well-rated, the lack of alternatives to bank credit for small and medium-sized enterprises and the bank monitoring costs for these enterprises[3].

Although the four risk premiums add up to the margin on the bank lending rate (see chart 4), the movements of specific risk premiums do not always correspond to changes in the total margin. For instance, the country risk premiums started to come down in 2012 while the margins remained broadly stable in Belgium, Italy and Spain. Often, in order to estimate the link between bank margins and the country risk premiums in a more structural way, the literature resorts to a simple but standard regression analysis (Cordemans and de Sola Perea, 2011, ECB, 2013, Gambacorta *et al.*, 2014, Neri, 2013, Arnold and van Ewijk, 2013). The regressions we use for margins on bank lending rates for loans to non-financial corporations or households take the following form:

$$R_{lending} - R_{MRO} = \alpha + \beta[R_{OIS} - R_{MRO}] + \gamma[R_{sov} - R_{OIS}] + \delta\, \Delta ln[GDP].$$

This model explains the margin on bank lending rates by a constant (α), the maturity transformation risk premium, the country (sovereign) risk premium and the year-on-year growth rate of real GDP which serves as a business cycle indicator, proxying for different types of credit risk among non-financial corporations and/or households. The parameters β and γ measure the pass-through of the retained premiums (respectively the maturity transformation and the sovereign risk premium) to bank lending margins, while the coefficient δ measures the impact of changes in GDP growth on the bank lending spread.

According to the estimation results presented below, the two risk premiums considered are only imperfectly passed on by banks to interest rate margins to households and non-financial corporations (the coefficients β and γ are smaller than one). It nevertheless appears that, on the basis of the significant and positive values of the parameters, margins would react significantly to changes in country risk premiums. One exception here is Germany in the case of non-financial corporations where the parameter does not seem to be significant; the German coefficient of the country risk premium γ is also less significant for households. The economic effects of the sovereign risk premiums seem to be important: in Belgium for instance, the estimation results imply that, *ceteris paribus*, a rise of 1 percentage point in the country premium would raise the margin on the bank lending rate to non-financial corporations and households by respectively 60 and 55 basis points on average. The results for the other countries are similar (with the exception of Germany). Besides, the GDP growth rate coefficients in the four countries under consideration are negative and significant, which suggests that margins on bank loans are higher during downturns in the business cycle (possibly because of greater credit risk). Moreover, the R-squared figures indicate an acceptable precision. Depending on the country and the sector, between 40 % and 76 % of the variation of the margins is explained.

(1) The difference also reflects a marginal credit risk of prime banks which is often neglected. See the article in the ECB Monthly Bulletin on the measurement of risk-free rates in the euro area (ECB, 2014b).

(2) Five-year maturity bond yields on corporate bonds are not available as such from the Barclays Capital database that we use. We thus take the mean of rates on bonds whose maturity is, on the one hand, from four to five years and, on the other, from five to six years.

(3) Given that long-term bank lending rates cover maturities above five years while we consider only five-year IG corporate bonds, a marginal maturity transformation premium cannot be avoided.

REGRESSION ANALYSIS OF THE BANK LENDING RATES

(estimation by ordinary least squares, data in %, 2003M1-2014M12)

	α	β	γ	δ	R^2
	Results for non-financial corporations[1][3]				
Belgium	2.18***	0.75***	0.60***	–0.17***	56 %
Germany	2.14***	0.60***	0.61	–0.07***	53 %
Italy	2.44***	0.40***	0.74***	–0.09***	67 %
Spain	2.74***	0.04	0.68***	–0.13***	76 %
	Results for households[2][3]				
Belgium	2.07***	0.59***	0.55***	–0.19***	40 %
Germany	2.07***	0.60***	0.97**	–0.07***	47 %
Italy	2.19***	0.69***	0.47***	–0.09***	58 %
Spain	3.15***	0.18	0.58***	–0.18***	68 %

Sources: Barclays Capital, Thomson Reuters Datastream, ECB, own computations.
(1) Spanish data were smoothed using a moving average over seven months.
(2) MFI new business rates on household loans for house purchases with maturity over five years, weighted with new business volumes.
(3) Significant at 1 %: ***; 5 %: **; 10 %: *.

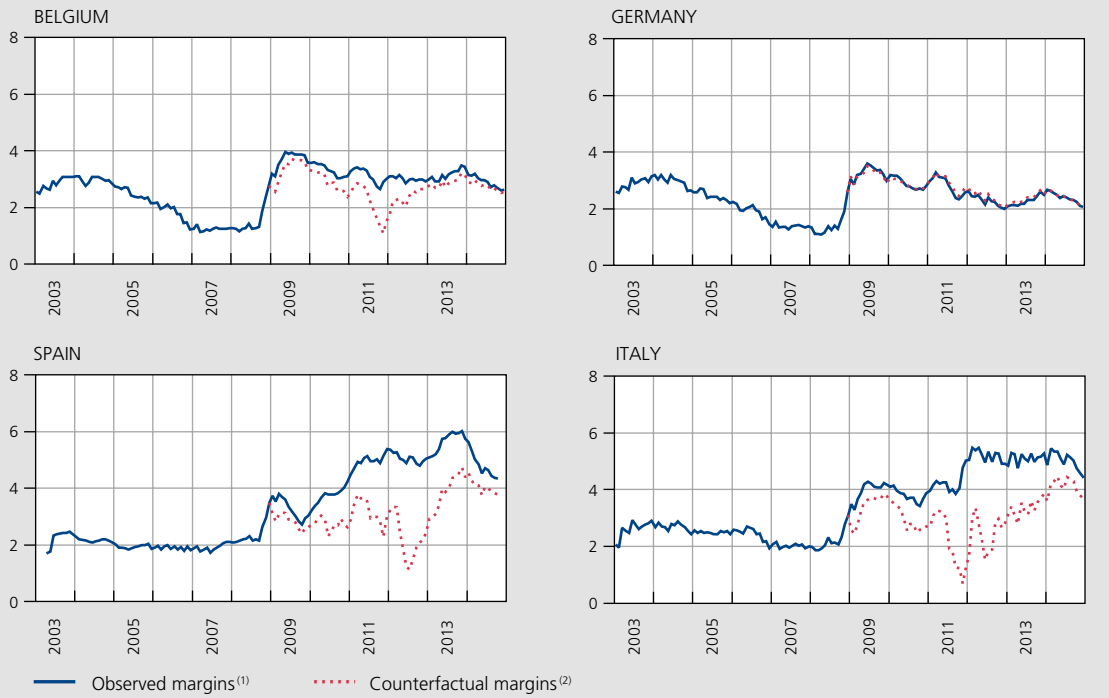
Using this model, one can carry out a counterfactual analysis to estimate the impact of the sovereign debt crisis on the margins. More specifically, we compute risk premiums that would have been observed in the absence of a sovereign debt crisis (counterfactuals). This situation is simulated by setting country risk premiums to zero from 2009 onwards. It should however be noted that this exercise suffers from limitations owing to the simplicity of the model. For instance, the lack of feedback effects from the sovereign crisis to the GDP growth rate is not captured. This kind of exercise can nevertheless serve as a first approximation to illustrate the (direct) impact of the sovereign crisis on bank lending margins.

Focusing on non-financial corporations, it seems that the margins would have been significantly smaller under the scenario where sovereign risk premiums remained nil after 2009. The differences between the observed values and the counterfactuals are the greatest in 2011 and 2012. In Belgium in particular, this difference reached a maximum in November 2011 as a consequence of the government crisis. According to the simulations on the basis of this simple model, the Belgian margin on bank lending rates would have been almost two percentage points lower in November 2011 if we had disregarded the country risk premium. By contrast, there would hardly have been any difference for Germany between the observed values and the counterfactuals given the small country risk premium.

It should also be noted that counterfactuals for the margins on bank loans started to increase as from the beginning of 2012 (Belgium), or mid-2012 (Italy and Spain) and got closer to the observed values. This suggests that the margins on bank lending rates observed today are no longer primarily due to country risk premiums but rather to corporations/credit premiums (as is also indicated by the decomposition of margins presented in the main text).

COUNTERFACTUAL ANALYSIS OF SME LOAN BANK MARGINS, EXCLUDING COUNTRY RISK PREMIUMS AFTER 2009

(in %, 2003M1 – 2014M12)



Sources: Thomson Reuters Datastream, ECB, own computations.

(1) Difference between new business MFI rates on loans up to € 1 million and with initial rate fixation period over five years (approximation of SME bank loan rates) and the MRO rates of the ECB. Spanish data were smoothed using a moving average over seven months.

(2) Margins that would have been observed in the absence of a sovereign debt crisis, estimated according to the regressions in the box by setting country risk premiums to zero from 2009 onwards.

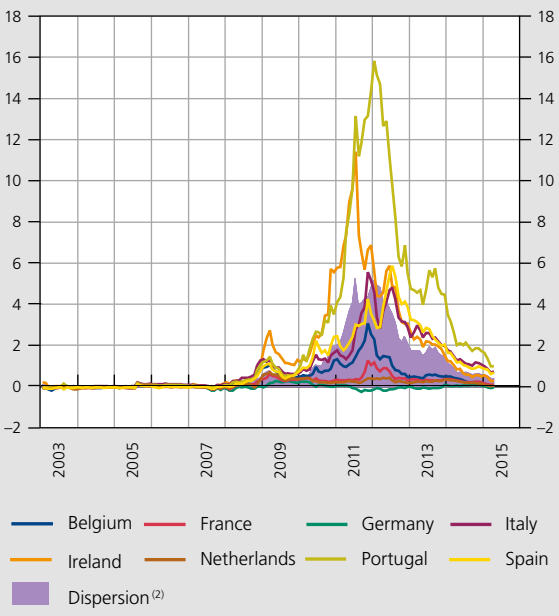
3. Risk indicators and developments in euro area sovereign spreads

In order to understand the transmission of sovereign debt tensions to the real economy, the driving factors of the country (sovereign) risk premiums are analysed. In this section, we focus on the identification of some indicators representative of these factors. As in the previous section, country premiums are defined as the spreads between sovereign yields and the virtually risk-free overnight index swap (OIS) rate on the interbank market of the same (5-year) maturity.

In the initial phase of the crisis in 2008-2009, corresponding to a global financial crisis, country risk premiums (or sovereign spreads) in the euro area were mainly affected by liquidity risk and risk aversion. A premium for liquidity risk is present in sovereign bond yields since investors are generally more inclined to invest in deeper bond markets and charge premiums for the risk of having to reduce the price of a security to sell at a given moment. Besides, market risk aversion determines the price of different risks and so modulates the importance of risk premiums (including liquidity risk). This liquidity risk can be better understood by several indicators, including the spread between the Euribor and OIS rates (or the difference between non-guaranteed and guaranteed interbank market rates) which widened sharply after the collapse of Lehman Brothers. Additionally, it can also be illustrated by the difference in yields on different types of government-guaranteed bonds, by definition entailing similar credit risk but potentially different liquidity risks (such as the difference between bond yields on the government-owned bank Kreditanstalt für Wiederaufbau (KfW) and yields on German Bunds; see Monfort and Renne, 2014). The global rise in risk aversion is reflected among other things

CHART 5 RECENT DEVELOPMENTS IN EURO AREA SOVEREIGN SPREADS[1]

(in %, monthly averages, 2003M1-2015M4)



Source: Thomson Reuters Datastream.

(1) Difference between five-year sovereign yields and five-year swap rates for Euribor six-month (before Aug. 2005) or five-year OIS rates (since Aug. 2005).

(2) Standard deviation of the cross section of sovereign spreads for each month.

by the rise in implied volatility indicators on the financial markets, such as the VIX index based on the implied volatility of the S&P 500 index.

We focus on the period 2010-2012 of the sovereign debt crisis since spreads reached much higher levels than during the financial crisis (chart 5). We illustrate the importance of fundamental economic variables for sovereign credit risk and show that sovereign spreads were also affected by redenomination risk, although risk aversion and liquidity risk continued to be present as well.

3.1 Credit risks during the sovereign debt crisis

Over the period 2010-2012, sovereign credit default swap (CDS) spreads – a broad measure of sovereign default risk – increased considerably. This re-pricing of sovereign credit risk could be due to the slowdown of the economy and the worsening of the fiscal position of sovereigns and was concomitant with the large burden imposed on public finances by the bank bail-outs and/or the reinforced debt guarantees.

Fundamental economic variables are prime indicators of sovereign credit risk since they testify to the robustness of an economy in general and to public debt sustainability more particularly. As such, one of the representative variables of sovereign credit risk is sovereign debt as a percentage of (annual) GDP. For the four countries shown in chart 6, the correlation between debt ratios and sovereign spreads is positive over the period 2008Q1-2014Q4, this being the case especially in Belgium, Italy and Spain, whereas the correlation is also positive but less pronounced in Germany. Therefore, the rise in public debt ratios seems to have affected sovereign spreads since 2008 and should thus be taken into account in a more comprehensive assessment of the determinants of sovereign spreads.

However, correlations do not imply a direct causal relationship and should be supplemented with additional analysis. Consequently, in order to estimate the fundamental component of spreads (in section 4 below), we focus on the crisis period and consider a series of economic variables, including the public debt ratio as well as other fundamental variables such as GDP growth.

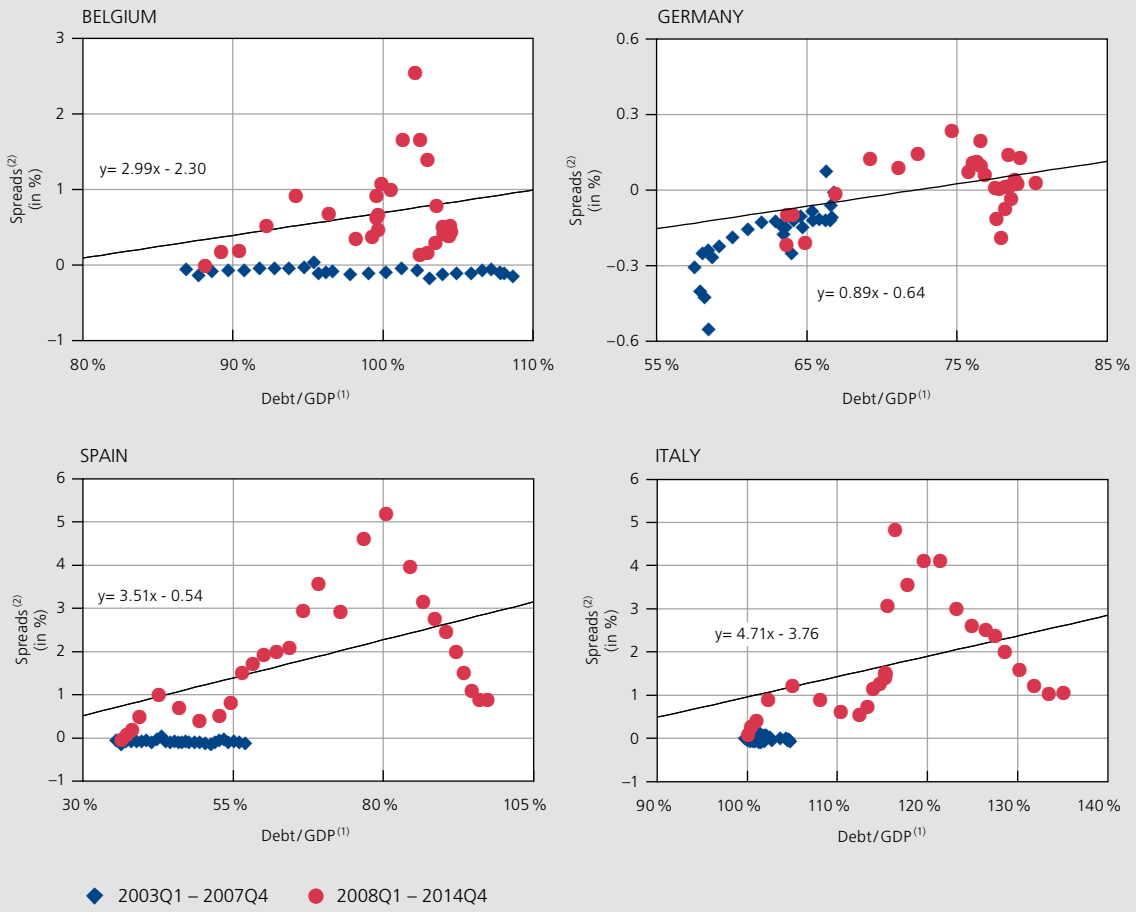
3.2 Contribution of redenomination risk to contagion in the euro area

During the sovereign debt crisis, the dynamics of sovereign spreads in the euro area were also seriously affected by the emergence of the contagion phenomenon in the sovereign debt markets. This can be seen by the especially strong positive correlations over the period 2010-2012 between sovereign yields of the different euro area peripheral Member States[1]. On the contrary, negative correlations could be observed over the same period between on the one hand a certain number of core Member States (typically Germany) and on the other the periphery (Italy, Spain) or even Belgium. This contagion phenomenon was primarily supported by the "redenomination risk", which refers to the risk that euro assets could be redenominated into another (possibly devalued) legal currency, i.e. the risk of a country leaving the monetary union. This risk became relevant for the first time at the end of 2011 when Greece had to deal with serious financial troubles. The situation largely contributed to speculation about a possible "Grexit", or even a possible break-up of the euro area itself.

Intra-euro-area redenomination risk is hard to measure. Various attempts have resorted to surveys, the pricing of fictitious securities betting on a Member State leaving the

(1) See Boeckx and Dewachter (2012).

CHART 6 GOVERNMENT DEBT OVER GDP AND CORRELATION WITH SOVEREIGN SPREADS
(2003Q1-2014Q4)



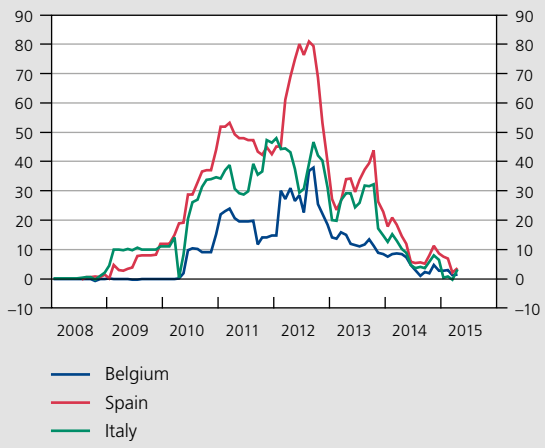
Sources: Thomson Reuters Datastream, ECB.
(1) End-of-year data for the debt/GDP series, linearly interpolated.
(2) Difference between five-year sovereign yields and five-year swap rates for Euribor six-month (before Aug. 2005) or five-year OIS rates (since Aug. 2005).

euro area before a certain date or indicators based on the number of Google searches for key words like "euro break-up". Another, more reliable, approach to measure redenomination risk is based on modelling the dynamics of sovereign interest rates and will be used in the next section. Besides, there is a simple and accurate (since it is based on actually exchanged assets) indicator comparing CDS spreads on sovereign bonds for contracts denominated in euros and in US dollars. Intuitively, the holder of a euro-denominated CDS just after default assumes an additional risk since the euro could be scrapped and replaced by a national currency that is immediately devalued. If this risk is considered real by markets, spreads on CDS contracts denominated in euros tend to be lower than those on CDS contracts denominated in dollars. During the sovereign debt crisis, the difference, called "quanto CDS spreads" (De Santis, 2015), seemed greater for euro area peripheral Member States than for Germany, for instance, since the redenomination risk concerned the periphery more. In order to obtain a measure of the intra-euro-area redenomination risk (and not a measure of redenomination risk with respect to the dollar), we consider the difference in quanto CDS spreads of various countries with Germany.

According to this approach, redenomination risks in Belgium, Italy and Spain seemed to be weak, or even insignificant, before 2010 (see chart 7). They nevertheless appeared to increase significantly during the sovereign debt crisis to reach a peak in mid-2012, just before the official announcement of the OMT programme in September. Nowadays, redenomination risks seem to have come back down to much lower levels for all three considered states, in spite of the troubles at the beginning of 2015 over Greece's difficulty in repaying its debt.

CHART 7 REDENOMINATION RISK INDICATORS: QUANTO CDS SPREADS AGAINST GERMANY [1]

(basis points, monthly averages, 2008M1-2015M4)



Source: Thomson Reuters Datastream.
(1) Difference between five-year CDS spreads on senior bonds between contracts denominated in dollars and in euros, and difference with Germany.

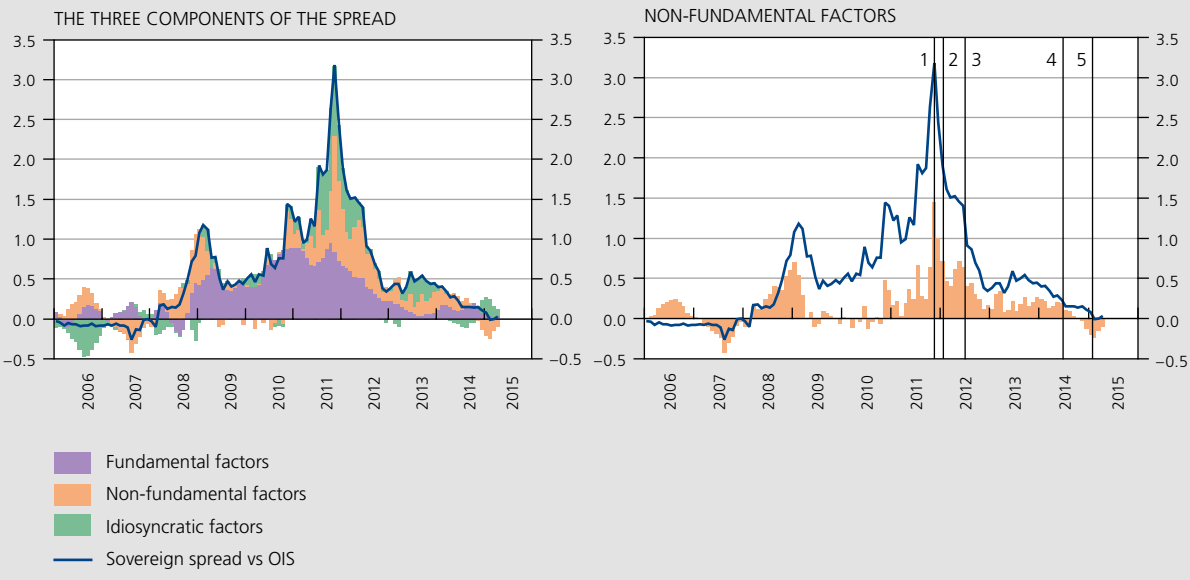
Considering the different factors that have influenced the dynamics of sovereign spreads throughout the crisis, the next section aims at estimating their quantitative impact on spreads by considering three types of factors: fundamental economic factors (such as debt over GDP and GDP), non-fundamental factors (such as redenomination risk), and idiosyncratic, country-specific factors.

4. Decomposition of sovereign spreads: the role of fundamental and non-fundamental factors and the effects of monetary policy

In this section, we decompose the dynamics of euro area sovereign spreads since the beginning of the financial crisis using an econometric macrofinancial modelling approach and briefly discuss the effects of some monetary policy measures. The spreads considered here are taken relative to the market rate (OIS rate) of the same maturity and therefore correspond to the country risk premiums discussed in section 2. As a consequence, we obtain spreads for each of the euro area countries, including for Germany. The model used in the analysis is a standard multi-country

CHART 8 HISTORICAL DECOMPOSITION OF SOVEREIGN SPREADS: BELGIUM *

(in %, 2006M1-2015M4)



Sources: Bloomberg, IMF, Thomson Reuters Datastream, own computations.
* Historical decomposition of five-year sovereign spreads (with respect to OIS rates). See Dewachter *et al.* (2014).
(1) 11/2011: Resignation of Italian and Greek Prime Ministers, Greek referendum, Belgian political crisis.
(2) 12/2011 & 02/2012: VLTROs.
(3) 09/2012: Announcement of OMT programme.
(4) 06/2014: Announcement of TLTROs (with other measures).
(5) 01/2015: Announcement of expanded APP.

macrofinance affine yield curve model. Specifically, it includes both macroeconomic and financial variables and, in line with the empirical literature and financial theory, allows these variables to endogenously interact and influence sovereign spreads while precluding arbitrage opportunities in sovereign bond markets (see Box 2).

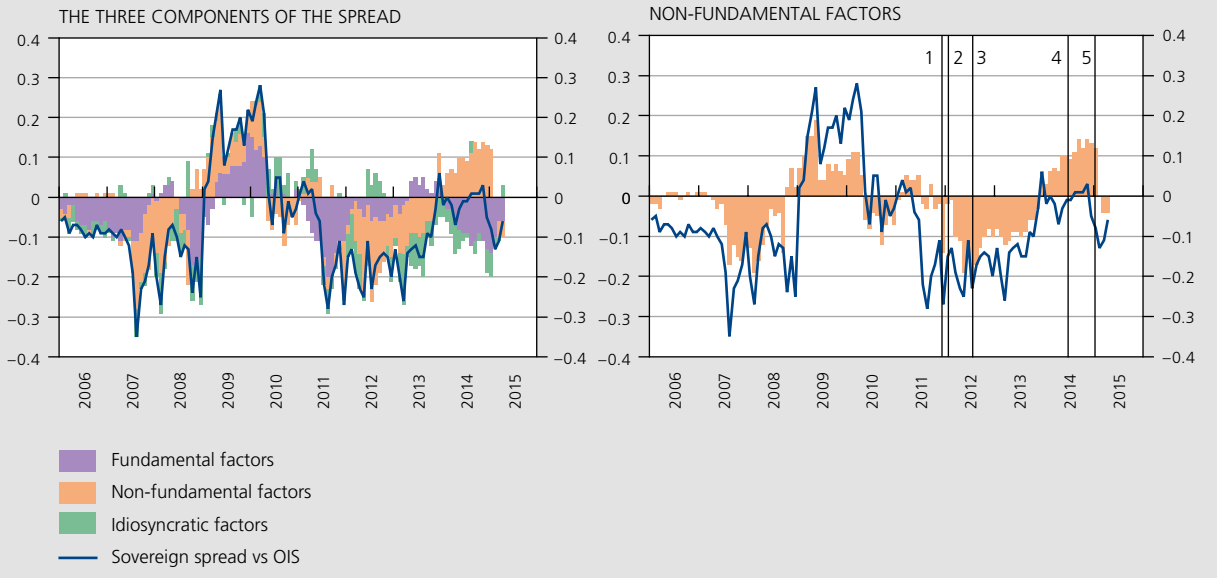
On the basis of the affine term structure model, historical decompositions can be used to analyse the contributions of the different macroeconomic or financial shocks to the dynamics of the sovereign yield spreads over time. As mentioned above, in order to perform this decomposition, we divide the explanatory factors into three categories: (a) fundamental economic factors (such as GDP or public debt over GDP); (b) non-fundamental factors (mainly redenomination risk); and (c) country idiosyncratic factors not related to the two previous categories (domestic political uncertainty for instance).

According to the decompositions of 5-year sovereign spreads in Belgium (chart 8), Germany (chart 9), Italy (chart 10) and Spain (chart 11), both the fundamental and non-fundamental shocks appear to have generally been driving sovereign spreads in the four countries throughout the crisis. According to the model, even if the fundamental component seems to have been overall more important for all countries (it seems to have explained more than 50 % of sovereign spreads on average in each country), not only macroeconomic and fiscal variables but also other, non-fundamental, factors would appear to have played a significant role in the dynamics of sovereign spreads. As a result, non-fundamental risks could have increased sovereign risk premiums and thus hampered the smooth transmission of monetary policy to households and non-financial corporations through the mechanisms presented in section 2. Besides, the contributions of idiosyncratic shocks seem to have been significant only at times. In Belgium for instance, the impact of idiosyncratic shocks on the spreads would have been especially large in the second half of 2011, at the height of the government crisis, but would have rapidly disappeared following the formation of a government at the beginning of December 2011.

The relative importance of fundamental and non-fundamental shocks in the sovereign yield spreads nevertheless varied across countries and over time. From 2008 and up till broadly the end of 2011, mainly fundamental

CHART 9 HISTORICAL DECOMPOSITION OF SOVEREIGN SPREADS: GERMANY *

(in %, 2006M1-2015M4)



Sources: Bloomberg, IMF, Thomson Reuters Datastream, own computations.

* Historical decomposition of five-year sovereign spreads (with respect to OIS rates). See Dewachter *et al.* (2014).

(1) 11/2011: Resignation of Italian and Greek Prime Ministers, Greek referendum, Belgian political crisis.

(2) 12/2011 & 02/2012: VLTROs.

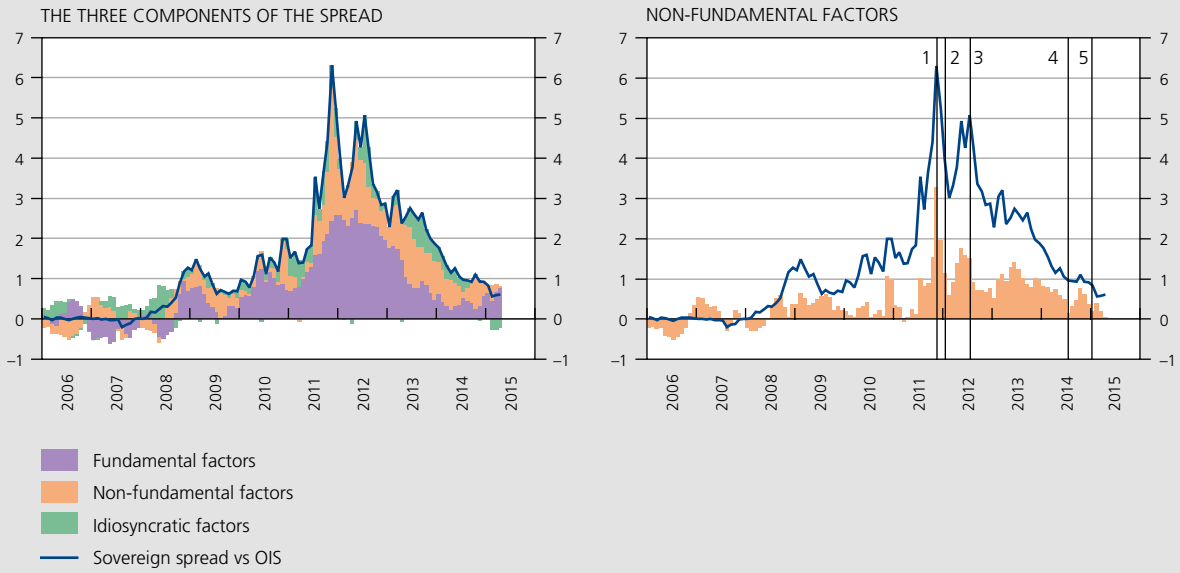
(3) 09/2012: Announcement of OMT programme.

(4) 06/2014: Announcement of TLTROs (with other measures).

(5) 01/2015: Announcement of expanded APP.

CHART 10 HISTORICAL DECOMPOSITION OF SOVEREIGN SPREADS: ITALY*

(in %, 2006M1-2015M4)



Sources: Bloomberg, IMF, Thomson Reuters Datastream, own computations.
* Historical decomposition of five-year sovereign spreads (with respect to OIS rates). See Dewachter *et al.* (2014).
(1) 11/2011: Resignation of Italian and Greek Prime Ministers, Greek referendum, Belgian political crisis.
(2) 12/2011 & 02/2012: VLTROs.
(3) 09/2012: Announcement of OMT programme.
(4) 06/2014: Announcement of TLTROs (with other measures).
(5) 01/2015: Announcement of expanded APP.

economic shocks seem to have contributed to the increase of sovereign spreads in Belgium, Italy and Spain. In the latter two countries, fundamental components at the end of 2011 accounted for up to slightly less than 3 percentage points of sovereign spreads which were (largely) fluctuating at about 4 percentage points. Over this period, sovereign bond markets seem thus to have reflected the deteriorating economic situations in the three countries. Concurrently, with the non-fundamental components of sovereign spreads remaining relatively muted (at least until November 2011), the monetary policy of the ECB was mainly focusing on liquidity provisions to the financial sector, which it addressed with both standard and non-standard monetary policy measures, such as cuts in its key interest rates and two very long-term refinancing operations (VLTROs) conducted in December 2011 and February 2012.

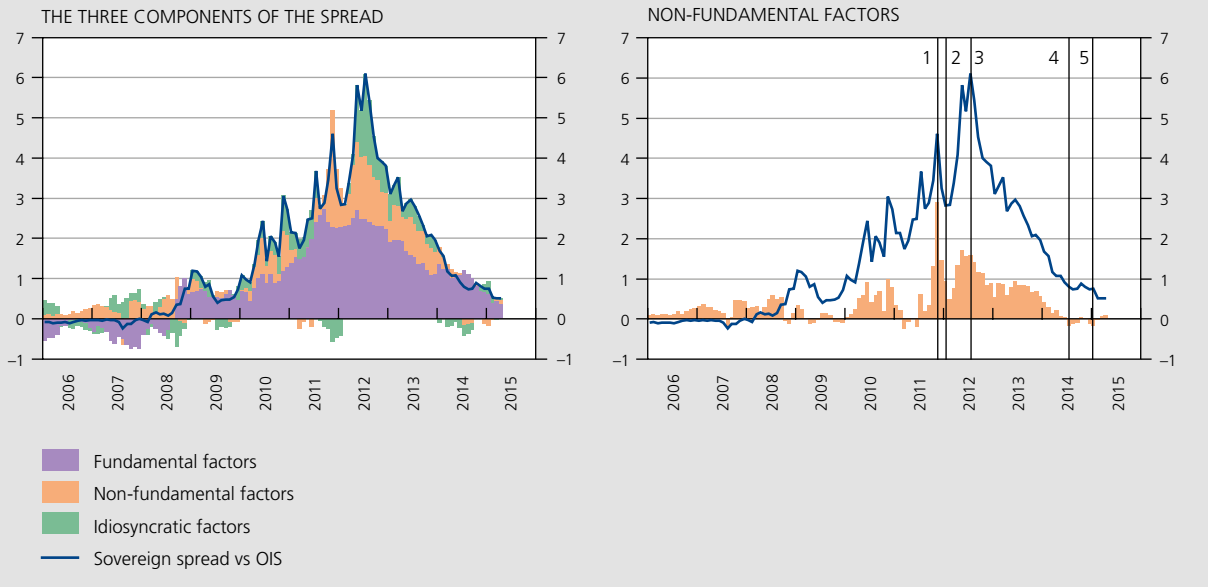
From the end of 2011, however, non-fundamental shocks in general, and redenomination risk in particular, appear to have contributed substantially to developments in sovereign spreads. Their contributions seem to have reached two peaks which show up more or less clearly on the charts depending on the countries: November 2011 and the summer of 2012. The first peak of non-fundamental risks, noticeable in Belgium, Italy and Spain – where these risks explained respectively 46 %, 52 % and 63 % of sovereign spreads –, is concomitant with extreme tensions related to a possible Greek referendum (to approve the Troika's conditions for a loan agreement) and the resignation of the Greek and Italian Prime Ministers. The second estimated peak of the non-fundamental components reached in the summer of 2012, particularly visible in the case of Italy and Spain (more than for Belgium), was mainly due to a sharp rise in redenomination risk. It also coincides with the high quanto CDS spreads observed at the time (see section 3.2). The summer of 2012 was marked by the difficulties in Greece to form a government after the elections in May, contributing to fears about a possible Grexit and, by contagion, a possible euro area break-up. More specifically, non-fundamental factors seem to have accounted for about 150 basis points in Italy and Spain in the summer of 2012 out of about respectively 500 and 600 basis points for the total sovereign spreads (and for about 60 out of 150 basis points in Belgium). Not surprisingly, the German sovereign spreads and their non-fundamental component were negative in 2012 as

a result of the flight to safety of investors. Given the importance of non-fundamental (redenomination) risks, the ECB announced its intention to tackle redenomination risk in July 2012 (Draghi, 2012) and, in September 2012, it set up the OMT programme. On the basis of this programme, the ECB is ready to intervene and address severe distortions in government bond markets by buying (possibly unlimited amounts of) sovereign bonds in secondary markets from euro area Member States requesting financial assistance through the European Stability Mechanism and respecting the imposed adjustment programme. As it considerably helped reduce redenomination risk, the effects of the OMT announcement corresponded to a decline in the estimated non-fundamental components of about 60 basis points in Spain and around 30 basis points in Belgium and Italy between September and November 2012. On the contrary, the German non-fundamental component became less negative (and increased by 9 basis points over the same period).

By mid-2014, sovereign spreads had narrowed considerably and their non-fundamental components seemed to have dissipated in Belgium, Italy and Spain. The smaller spreads appeared to be mainly supported by fundamental economic factors. Nevertheless, the transmission of ECB monetary policy to households and non-financial corporations still had to be fully restored, as can for instance be assessed by the then relatively high margins on bank loans (analysed in section 2) or the low credit flows to the real economy. Consequently, the ECB announced in June 2014 that it would conduct TLTROs starting in September 2014 aiming at encouraging banks to lend to non-financial corporations and households (excluding loans for house purchases). Moreover, in January 2015, the ECB regrouped and supplemented its securities purchase programmes with purchases of sovereign bonds under the so-called expanded APP the goal of which is to bring inflation back on a path consistent with achieving rates below, but close to, 2 % over the medium term. We observe that since the announcement and implementation of these non-standard measures, sovereign spreads continued to fall in Belgium, Italy and Spain. The non-fundamental component in Italy also continued to decrease, while it remained essentially close to zero in Spain and reached negative figures in Belgium. In April 2015, the non-fundamental components were estimated to be very small for each of the countries analysed.

CHART 11 HISTORICAL DECOMPOSITION OF SOVEREIGN SPREADS: SPAIN *

(in %, 2006M1-2015M4)



Sources: Bloomberg, IMF, Thomson Reuters Datastream, own computations.

* Historical decomposition of five-year sovereign spreads (with respect to OIS rates). See Dewachter *et al.* (2014).

(1) 11/2011: Resignation of Italian and Greek Prime Ministers, Greek referendum, Belgian political crisis.

(2) 12/2011 & 02/2012: VLTROs.

(3) 09/2012: Announcement of OMT programme.

(4) 06/2014: Announcement of TLTROs (with other measures).

(5) 01/2015: Announcement of expanded APP.

Box 2 – Affine yield curve model used for the decomposition of sovereign spreads

The econometric modelling approach used to decompose sovereign spreads into fundamental, non-fundamental and idiosyncratic components belongs to the class of "macrofinancial" affine yield curve models. This class of models has become the benchmark model to study the yield curve dynamics in the context of no-arbitrage restrictions. In this class of models, both macroeconomic variables and financial factors are taken into account to the extent that they affect the yield curve. Macroeconomic and financial variables affect the yield curve either because (1) they have an impact on the expectations of future short-term (monetary policy) interest rates or because (2) they affect the risk premium. Against this background, several macroeconomic variables are included in the model consistently with the conjecture that certain macroeconomic variables, e.g. output and inflation, can affect monetary policy (and future short-term policy rates), while others are believed to affect the risk premiums, e.g. debt ratios.

Under financial theory, the model is also presented as being "arbitrage-free", implying that it generates yield curves that do not contain arbitrage opportunities between sovereign bonds of different maturities.

Formally, the model can be represented as follows:

$$S_{i,t} = A + B\ Y_t + \varepsilon_t,$$

$$Y_t = \mu + \Phi\ Y_{t-1} + \vartheta_t,$$

where $S_{i,t}$ is a vector containing sovereign yields or yields spreads of different maturities for country i at time t, Y is a vector describing the economic state (state vector), containing the economic and financial variables described below, ε is a measurement error term and ϑ contains the residuals of the second system of equations of the model. The dynamics of the state vector, which implicitly also models expectations in the economy, are assumed to follow a vector autoregressive (VAR) model and the structural macroeconomic and financial shocks hitting the economy are identified on the basis of a Choleski decomposition. Given the macrofinancial dynamics of the state vector, the model imposes a no-arbitrage rule by restricting the loadings A and B in the yield equations such that the final yield curve representation is consistent with the absence of arbitrage opportunities. The model is explained in more detail in Dewachter *et al*. (2014).

The specific model in this section contains thirteen variables (stacked in the vector Y), divided into three categories, i.e. the fundamental, non-fundamental and idiosyncratic components of sovereign spreads, discussed in section 4. The variables included in each component are as follows:

- Fundamental economic factors: these are the observed economic variables that should normally contribute most to sovereign spread movements (Afonso *et al*., 2012; Borgy *et al*., 2012; Caggiano and Greco, 2012; Maltriz, 2012; von Hagen *et al*., 2011). Some variables are conjectured to affect yields through monetary policy and expectations on future short-term policy rates, namely:
  - the year-on-year growth of a general indicator of economic perspectives (economic sentiment indicator measured at European level);
  - the year-on-year growth of real GDP (national);
  - year-on-year Inflation (national);
  - two factors accounting for the monetary policy stance. These factors (level and slope) are extracted from a principal component analysis of the OIS term structure.

  Besides these variables, the model also includes public debt in percentage of GDP which is believed to be linked to the credit risk premium. Lastly, risk aversion is represented by the VIX index (Bekaert *et al*., 2013) which approximates the expected volatility in financial markets (in the next 30 days).

- Non-fundamental factors : these factors affect sovereign spreads in the euro area but are not directly linked to observed economic variables. These factors thus represent contagion and/or redenomination risk. More specifically, we single out three of them :
  - redenomination risk : the risk that a euro asset could be converted into another (possibly devalued) legal currency. In other words, it represents the risk that a euro area Member State leaves the monetary union. We include it in the model via two variables. Given that redenomination risk is reflected in common movements of euro area spreads (and contributes to the contagion phenomenon), these two variables are based on a principal component analysis. In the current model, the first two factors of the euro area spreads are used as redenomination variables [(1)] ;
  - residual liquidity risk (flight to safety) : we consider the difference between yields on KfW bonds guaranteed by the German government and yields on German Bunds. Since the credit risk is the same in both cases, the observed differences in yields between these bonds mainly stem from differences in liquidity between the two markets and hence reflect liquidity risk ;
  - political risk measured at the European level : the fraction of sovereign spreads explained by this factor represents common movements of spreads that are due to a European-wide political risk. More specifically, the index is based on the number of newspaper articles regarding policy uncertainty (see Baker *et al.*, 2015).

- Idiosyncratic factors : the contributions of these factors to spreads are specific to each country and not linked to the fundamental or non-fundamental factors. For instance, idiosyncratic factors could refer to domestic political developments or troubles caused by strikes or social tension. They are included in the model as two factors extracted with the help of a principal component analysis based on the sovereign spreads of a given country.

(1) These two principal factors explain 83 % of the total variation in the euro area sovereign spreads and an interpretation of their meaning is possible. The first corresponds to the general level of sovereign spreads in the euro area. The second makes it possible to distinguish movements in spreads in the euro area core Member States from movements in the periphery. The first is thus high when spreads are high everywhere in the euro area and the second is high when the difference between spreads in core countries and those in the periphery is high.

Conclusion

In this article, we have analysed recent developments in sovereign yields and spreads in the euro area. Specifically, we have illustrated that the unprecedented sovereign yield and spread movements in the euro area during the (sovereign debt) crisis may have had implications for different sectors of the economy. In particular, the sovereign debt crisis pushed up implicit interest rates on government debt especially in (peripheral) countries that faced strong tensions on their sovereign bond markets, tightened banks' funding conditions and increased the costs of bank loans to households and non-financial corporations. Regarding the private sector more precisely, movements in country (sovereign) risk premiums were concomitant with an increase in banks' margins on loans to households and non-financial corporations especially over the period 2011-2013 in Italy and Spain, and to a lesser extent in Belgium.

Subsequently, a macrofinancial affine term structure model was used to gain a better understanding of the relative contributions of different shocks to these country (sovereign) yield spreads. Given that a modelling approach is required to be able to quantify these contributions, the estimation results must be interpreted cautiously and should be corroborated by additional robustness checks. The model nevertheless estimates that sovereign yield spreads in Belgium, Germany, Italy and Spain were to a large extent influenced by their fundamental component. Therefore, shocks to fundamental factors such as GDP growth or public debt in percentage of GDP remain the most important drivers of sovereign spreads. Additionally, during the sovereign debt crisis, the redenomination risk became important and, consequently, the importance of non-fundamental components increased, which is consistent with the indications of an independent measure of redenomination risk (quanto CDS spreads). This non-fundamental risk component was strong in the summer of 2012 when fears about a possible Grexit or euro area break-up were running high. Since 2012, however, the non-fundamental components of sovereign spreads seem to have declined

in Belgium, Italy and Spain, following the announcement of the ECB's OMT programme. Nonetheless, in order to enhance the functioning of the monetary policy transmission mechanism, the ECB launched, respectively in June 2014 and in January 2015, a TLTRO programme and an expanded APP. These measures helped reduce the non-fundamental components of sovereign spreads and, in a context of low inflation, short- to medium-term nominal sovereign yields reached negative figures in some euro area Member States.

In contrast with non-fundamental risks, fundamental economic risks seem to remain important for the yield spreads. Considering developments in Italy and Spain for instance, the model indicates that the largest share of the sovereign spreads observed in April 2015 is explained by the fundamental components. As a result, sovereign spreads could still narrow if fundamental economic factors were to improve structurally with possibly derived effects on borrowing costs of households and non-financial corporations.

Bibliography

Afonso A., M. G. Arghyrou and A. Kontikas (2012), *The determinants of sovereign bond yield spreads in the EMU*, Technical University of Lisbon, Working Paper 36.

Arnold I. J. M. and S. E. van Ewijk (2014), *The impact of sovereign and credit risk on interest rate convergence in the euro area*, De Nederlandsche Bank, Working Paper 425.

Baker S. R., N. Bloom and S. J. Davis (2015), *Measuring Economic Policy Uncertainty*, Institut d'Economie Industrielle, Université Toulouse 1 Capitole, Working Paper.

Bekaert G., M. Hoerova and M. Lo Duca (2013), "Risk, uncertainty and monetary policy", *Journal of Monetary Economics*, (60), 771–788.

Bernoth K., J. von Hagen and L. Schuknecht (2012), "Sovereign risk premiums in the European government bond market", *Journal of International Money and Finance*, (31), 975–995.

Boeckx J. and H. Dewachter (2012), "Contagion in euro area sovereign bond markets", *Bank- en Financiewezen*,. (2012/4), 224–235.

Borgy V., T. Laubach, J.-S. Mésonnier and J.-P. Renne (2012), *Fiscal sustainability, default risk and euro area sovereign bond spread*, Banque de France, Document de Travail 350.

Caggiano G.and L. Greco (2012), "Fiscal and financial determinants of Eurozone sovereign spreads", *Economics Letters*, (117), 774–776.

Cœuré B. (2012), *The euro area sovereign debt market: lessons from the crisis*, speech at the 12th IMF Annual Forum on Managing Sovereign Risk and Public Debt, Rio de Janeiro, 28-29 June.

Cordemans N. and M. de Sola Perea (2011), "Central bank rates, market rates and retail bank rates in the euro area in the context of the recent crisis", *NBB, Economic Review*, 27–52, June.

De Santis R. A. (2015), *A measure of redenomination risk*, presented at the Second International Conference on Sovereign Bond Markets, ECB, 10-11 March.

Dewachter H., L. Iania, M. Lyrio and M. de Sola Perea (2014), "A macro-financial analysis of the euro area sovereign bond market", *Journal of Banking & Finance*, (50), 308–325.

Draghi M. (2012), speech at the Global Investment Conference in London, 26 July.

ECB (2013), "Assessing the retail bank interest rate pass-through in the euro area at times of financial fragmentation", *Monthly Bulletin*, 75–91, August.

ECB (2014a), "The determinants of euro area sovereign bond yield spreads during the crisis", *Monthly Bulletin*, 67–83, May.

ECB (2014b), "Euro area risk-free interest rates: measurement issues, recent developments and relevance to monetary policy", *Monthly Bulletin*, 63–77, July.

Gambacorta L., A. Illes and M. Lombardi (2014), *Has the transmission of policy rates to lending rates been impaired by the Global Financial Crisis?*, BIS, Working Paper 477, December.

Illes A. and M. Lombardi (2013), "Interest rate pass-through since the financial crisis", *BIS, Quarterly Review*, 57–66, September.

Maltriz D. (2012), "Determinants of sovereign yield spreads in the Eurozone: a Bayesian approach", *Journal of International Money and Finance*, (31), 657–672.

Monfort A. and J.-P. Renne (2014), "Decomposing euro-area sovereign spreads: credit and liquidity risks", *Review of Finance*, (18), 2103–2151.

Neri S. (2013), *The impact of the sovereign debt crisis on bank lending rates in the euro area*, Banca d'Italia, Questioni di Economia e Finanza 170.

von Hagen J., L. Schuknecht and G. Wolswijk (2011), "Government bond risk premiums in the EU revisited: the impact of the financial crisis", *European Journal of Political Economy*, 27(1), 36–43.