

Contagion and the European debt crisis

VÍTOR CONSTÂNCIO
Vice-President
European Central Bank

The financial and economic crisis that started in August 2007 is a clear case of the materialisation and propagation of systemic risk. The banking crisis reached a climax in September 2008 with the demise of Lehman Brothers and the subsequent support to the financial system. In spring 2010, it turned into a sovereign debt crisis. Widespread instabilities repeatedly reached new heights since the summer of 2011. This article addresses a phenomenon which is at the very centre of what we are experiencing in the euro area, the phenomenon of contagion. Contagion is one of the mechanisms by which financial instability becomes so widespread that a crisis reaches systemic dimensions. The article argues that contagion phenomena play a crucial role in exacerbating the sovereign debt problems in the euro area. As a consequence, crisis management by all competent authorities should focus on the policy measures that are able to contain and mitigate contagion. Several of the European Central Bank's (ECB) interventions have been motivated by the need to address contagion.

NB: The author would like to thank Philipp Hartmann, Frank Betz, Paola Donati, Carsten Detken, Benjamin Sahel, Gianni Amisano, Oreste Tristani, Tobias Linzert, Roberto de Santis, Bernd Schwaab, and Isabel Vansteenkiste for important contributions to the preparation of this article, as well as Carlos Garcia de Andoain Hidalgo and Vesala Ivanova for research assistance.

The financial and economic crisis that started in August 2007 is a clear case of the materialisation and propagation of systemic risk. The banking crisis reached a climax in September 2008 with the demise of Lehman Brothers and the subsequent support to the financial system. In spring 2010, it turned into a sovereign debt crisis. Widespread instabilities repeatedly reached new heights since the summer of 2011.

In this article, I would like to address a phenomenon which is at the very centre of what we are experiencing in the euro area, the phenomenon of contagion.

Contagion is one of the mechanisms by which financial instability becomes so widespread that a crisis reaches systemic dimensions. The other two mechanisms that constitute sources of systemic risk are the unwinding of financial imbalances and the occurrence of severe macro shocks.¹ Without denying that imprudent fiscal behaviour and lack of effort to maintain the competitiveness of countries are the deep origins of the European sovereign debt crisis, I will argue that contagion phenomena play a crucial role in exacerbating the problems. As a consequence, crisis management by all competent authorities should also focus on policy measures that are able to contain and mitigate contagion. Several of the ECB's interventions have been motivated by the need to address contagion, which impairs our ability to maintain price stability in the euro area. By focusing on contagion in this article, I do not mean to say that other sources of systemic risk are less important for the instabilities we are currently experiencing. Quite the contrary; an important role is also played by the unravelling of widespread financial imbalances, which contaminated fiscal balances, and the lack of structural reforms ensuring countries' competitiveness that I already mentioned above.

The article first looks at contagion conceptually. I will discuss its meaning from a policy maker's perspective against the background of the academic literature. I shall then dwell in some depth on the evidence of contagion phenomena and risks in the euro area government debt crisis. Next, I shall look at some historical episodes where sovereign contagion also played some role and see what we can learn from them. Finally, before concluding I will refer to the ECB's policy responses, and more broadly European policy responses, to contagion.

¹ ECB (2009).

² Coase (1960).

³ For example, Chen (1999) develops a model in which the presence of aggregate shocks makes bank contagion more likely.

1 | THE PHENOMENON OF CONTAGION: FROM RESEARCH TO POLICY

Broadly speaking, financial contagion refers to a situation whereby instability in a specific market or institution is transmitted to one or several other markets or institutions. There are two ideas underlying this definition. First, the wider spreading of instability would usually not happen without the initial shock. Second, the transmission of the initial instability goes beyond what could be expected from the normal relationships between markets or intermediaries, for example in terms of its speed, strength or scope.

Contagion is crucial for policy-making. This is in particular the case because it usually constitutes an externality, in the economic meaning of the term. The actions of economic agent A adversely affect the situation of economic agent B. These effects are external to the economic agent A but the economic agent B cannot make A pay for them. Hence, the price mechanism will not solve the problem. There is a market failure that policy should try to address. In particular in financial markets, where many agents interact at high frequency, it is difficult for economic agents to get together and negotiate a contractual solution to the externality problem, as Nobel Laureate Ronald Coase has suggested in other contexts.² In the heat of a financial crisis this will undoubtedly be impossible.

Contagion, as I have just defined it, is in principle distinct from other forms of systemic instability, notably the unravelling of widespread imbalances and aggregate shocks causing simultaneous failures or crashes. But if imbalances or aggregate shocks already weaken the system, then the different transmission channels can interact and contagion may well become much stronger than in the absence of such additional vulnerabilities.³ This is likely to be relevant in the present context, where many financial intermediaries have not as yet overcome their problems, fiscal deficits and debt levels are relatively high and some countries have lost competitiveness.

It is probably fair to say that an inherent problem in the extant literature is that it is difficult to identify empirically the presence of pure forms of contagion.

This identification problem is not unexpected, as there are so many factors that could also cause the follow-up problems observed and it is so difficult to control for all of them.

Criteria that have been used in the literature to identify contagion include:⁴ (i) the transmission is in excess of what can be explained by economic fundamentals;⁵ (ii) the transmission is different from regular adjustments observed in tranquil times;⁶ (iii) the events constituting contagion are negative extremes;⁷ and (iv) the transmission is sequential, for example in a causal sense. But there is no agreement about which ones of these four criteria are necessary or sufficient to characterise a contagion event.

Against this background, ECB staff has developed and is using a series of state-of-the-art analytical tools to assess contagion risks. But these tools often face the same identification problem as the previous literature. Nevertheless, policy makers should act to stem pure contagion risks if data or analytical tools show sizeable spillover risks and there is no convincing evidence that this is caused primarily by economic fundamentals or common shocks. At the same time, of course, weak fundamentals need to be addressed as well. But their correction will usually take time.

2| EVIDENCE OF CONTAGION FROM THE ONGOING GOVERNMENT DEBT CRISIS

Let me now turn to the evidence from the ongoing debt crisis. I will start by reviewing evidence of contagion across euro area government debt markets and then move to the relationships between sovereign and bank instabilities.

2|1 Sovereign-sovereign contagion

When the sovereign crisis became more severe again and Moody's downgraded Portugal on 5 July 2011, it cited – among other factors – developments in Greece. Moody's believed that contagion from a default of Greece made it more likely that Portugal would require a second round of official financing.⁸

Moreover, referring to Greece as a precedent, Moody's indicated that a second round of official financing would entail private sector participation also in Portugal.⁹

Unfortunately, this was not the end of the story. The downgrade of Portugal and, above all, the continuing fears of a Greek default apparently triggered a sell-off in Spanish and Italian government bonds. There had not been adverse data releases concerning the Spanish and Italian economies or budgetary situations around that time. By 18 July 2011 Italian government bond yields had increased by almost 100 basis points, while Spanish ones had increased by more than 80 basis points.¹⁰

What mechanism triggered these market moves? I believe it is fair to say that contagion played a major role. The initial rises in bond yields can be largely explained by the concerns raised by the scope and possible extent of the “private sector involvement” in Greece, which was set as a condition for a second programme at the euro area summit of 21 July.¹¹ Some investors may find it rational to start shortening sovereign debt and others simply to reduce their exposures to countries in the currency union, since market concerns about government debt sustainability can become self-fulfilling if not tackled. Some other investors may also prefer to withdraw from some market segments in view of high volatility.

4 See Hartmann, Straetmans and de Vries (2006). For a broader survey of the contagion literature and discussions of particular channels through which financial contagion emerges, see De Bandt and Hartmann (2000), Pritsker (2001), ECB (2005) or ECB (2009).

5 See Eichengreen, Rose and Wyplosz (1996) or Bekaert, Harvey and Ng (2005).

6 Forbes and Rigobon (2002) capture this through increased correlations during times of stress.

7 See, for example, Longin and Solnik (2001) or Hartmann, Straetmans and de Vries (2004).

8 According to Moody's, “the growing risk that Portugal will require a second round of official financing before it can return to the private market, particularly if the country were to suffer contagion from a disorderly Greek default, or merely from the growing likelihood of a default. Such contagion would meaningfully change the risks for investors that currently hold Portuguese bonds given the increasing possibility that private sector creditor participation will be required as a prerequisite for any further finance”.

9 Moody's noted that “European policymakers have grown increasingly concerned about the shifting of Greek debt held by private investors onto the balance sheets of the official sector. Should a Greek restructuring become necessary at some future date, a shift from private to public financing would imply that an increasingly large share of the cost would need to be borne by public sector creditors. To offset this risk, some policymakers have proposed that private sector participation should be a precondition for additional rounds of official lending to Greece.”

10 Negative news regarding developments within the Italian government surfaced on 7 July and could have contributed to the narrowing of the yield gap between Italy and Spain, but they could not have triggered the joint sell-off.

11 Chen's model, op.cit., explains in a banking context how a combination of information and payment externalities can trigger contagious runs.

Reduced demand leads to falling prices, which in turn reduces the value of bonds held by other investors. Investors may prefer to reduce exposures while their positions are still in positive territory, or to take small losses early, so as not to be exposed to potentially large losses or high volatility later. Markets may then also become illiquid, which can further increase the downward pressure on bond prices. Falling bond prices translate into higher yields, which worsens debt sustainability prospects for those governments which have significant funding needs, thus validating investors' expectations.¹²

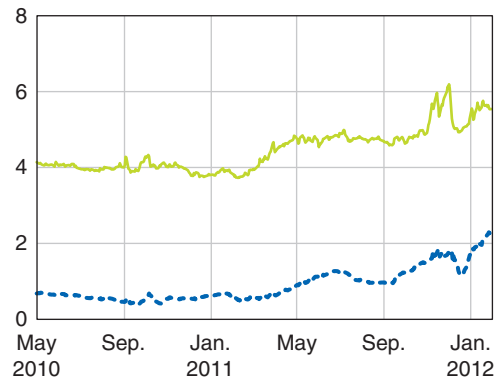
This is merely anecdotal evidence of contagion. I therefore would like to consider next some elements of the ECB staff's analytical toolkit in order to take a more systematic look at the data. Broadly speaking each of the tools estimate to which extent measures of the sovereign risk of a given euro area country affects the sovereign risk of other euro area countries, controlling for different features of the data that do not constitute contagion. Of course, a particular point of attention is whether countries in severe difficulties to finance their public budget deficits, for example one of the three countries with a stabilisation programme supported by the European Union and the International Monetary Fund – Greece, Ireland and Portugal –, contaminate countries that do not have as large public deficits. Since each result and its interpretation may be dependent on the specific model used, let me consider three different approaches that have found their way in the ECB's developing toolkit in this area.

The first approach is a state-space model performing, in real time, multivariate frequency decompositions.¹³ In a first step the movements in daily government bond yields of specific countries are ascribed to high-frequency shocks (or disturbances), whose effects wane in few days, medium-frequency shocks whose effects last for a few weeks, and long-lasting shocks whose effects describe the trends in the yields. In a second step, the shocks extracted from the frequency decomposition of one or several countries' government bond yields are used as additional explanatory variables in otherwise the same model as in step 1 for one or several other countries' yields. If the inclusion of these cross-country terms leads to a statistically significant

Chart 1
Frequency decomposition approach:
Contagion and spillover effects from Greece,
Ireland and Portugal to Italy and Spain

(percentage points)

a) Italy



b) Spain



— 10-year government bond yields
 - - - Estimated spillover effects from Greece, Ireland, Portugal

Note: The two panels show the 10-year government bond yields of Italy and Spain (green line) and the estimated joint spillover effects from Greek, Irish and Portuguese 10-year government bond yields on them (blue dashed lines). The model is estimated with daily data from May 2010 to early February 2012.

Source: Donati (unpublished).

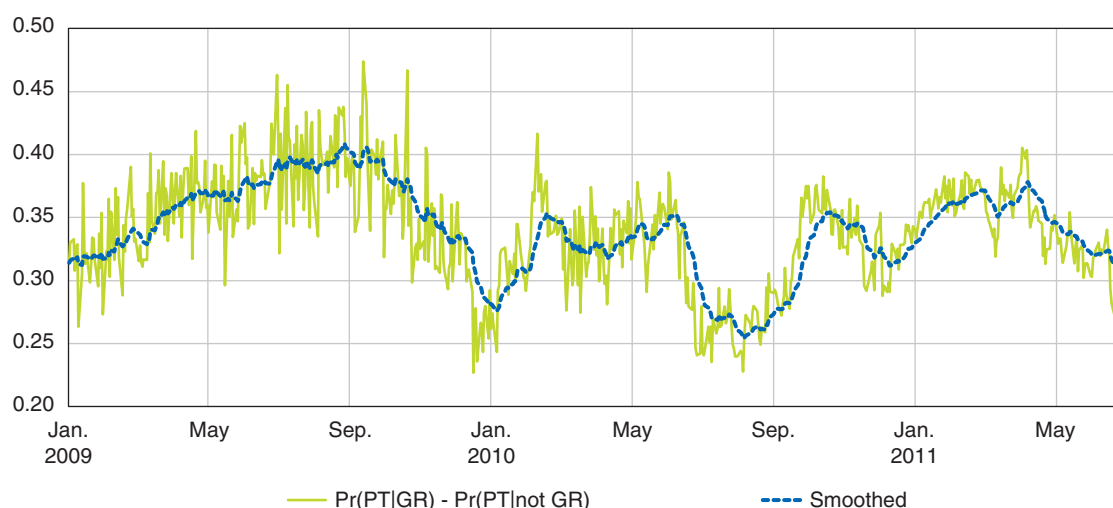
improvement in the forecast accuracy for yields over a 100-day horizon, I will regard this as evidence of spillover or contagion effects.

In the two panels of Chart 1 I display the results for the joint contagion or spillover effects from the 10-year government bond yields of Greece, Ireland and Portugal to those of Italy and Spain, respectively. According to this approach, contagion from Greece, Ireland and Portugal (blue dashed lines) explains

¹² Calvo (1988).

¹³ Donati (unpublished). Originally such methodologies were developed in the engineering literature on automatic controls. This literature shares similarities with the unobserved components approach proposed in the economics literature by Harvey (1985), Clark (1987) and, more recently, Creal, Koopman and Zivot (2010).

Chart 2
Credit risk approach: Contagion and spillover effects from Greece to Portugal



Note: The Chart shows the estimated probability over a year that Portugal experiences a credit event on its government bonds given that Greece experiences a credit event on its government bonds. The probabilities are derived from daily data on credit default swaps insuring government debt for all maturities over a 5-year horizon. Only the incremental effect of a Greek credit event is measured, because the conditional probability of a Portuguese credit event, given no Greek credit event, is deducted from the above conditional probability. The blue line shows the increments in the conditional probability, whereas the pink line is smoothed using an exponentially weighted moving average. The model is estimated with data from September 2008 to June 2011.

Source: Zhang, Schwaab and Lucas (2011).

a significant share of Italian (panel a) and Spanish (panel b) government bond yields (green lines). In 2011, for example, these effects accounted on average for about 38% of the variability of Italian sovereign yields and around 33% for Spanish sovereign yields. As of July 2011, the time of the worsening of the sovereign debt crisis, the contagion or spillovers measured trended upwards, suggesting long-lasting effects.¹⁴ The situation improved by the end of 2011, although contagion from the three programme countries remained significant by January 2012.

The second approach builds on recent advances in credit risk modelling. The model at hand estimates the effect of an increased probability of a credit event (e.g. a default) for one country on the likelihood of a credit event for other countries.¹⁵ The probabilities are estimated from premiums of sovereign credit default swaps (CDS) traded in the market, irrespective of whether the probabilities priced-in by the market are in line with the assessment made by official institutions. The multivariate conditional

probabilities are derived taking into account the fat-tailed and skewed distributions of CDS premiums and controlling for the time-varying nature of relationships between CDS premiums of different sovereigns as well as volatility clustering.

One example from the results of this multivariate approach is displayed in isolation in Chart 2. It shows how the difference between the estimated probability that Portugal experiences a credit event given Greece would experience such an event and the estimated unconditional probability that Portugal would experience a credit event evolved during the two preceding years. It turns out that the “contagion effects” from a Greek credit event (say a default) to Portugal ranges – according to this model – between 25 and 45 percentage points. The impact of Greece on Ireland is of a similar magnitude but not reported in this article.

In order to further broaden the basis for identifying sovereign contagion in the euro area, let us now move from more statistically oriented approaches

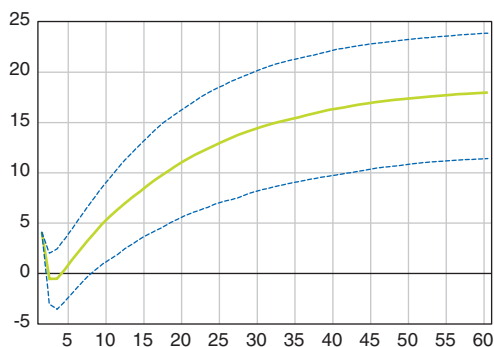
¹⁴ The fact that the spillovers have a trend – as opposed to fluctuate around a zero mean – indicates that they are of a persistent, long-lasting, nature and that their effect is likely to dissipate only slowly, even in the presence of favourable developments. When the spillover effects move in parallel with the yields of the affected country, in the logic of the model, it means that contagion from the three peripheral countries has contributed to drive the underlying trend of the yields, as for example in the case of Italy – and to a lesser extent of Spain – from early August 2011 (in the wake of the first announcement of private sector involvement in the Greek public debt negotiations) to end December 2011. Certainly, Italian and Spanish yields responded to several additional factors, whose effects may have enhanced or offset those stemming from Greek, Irish and Portuguese 10-year government bond yields.

¹⁵ Zhang, Schwaab and Lucas (2011). Other approaches measuring spillovers among banks based on conditional default probabilities are in Huang, Zhou and Zhu (2009) or Segoviano and Goodhart (2009). Ground work in a portfolio risk management context was done by CreditMetrics (2007).

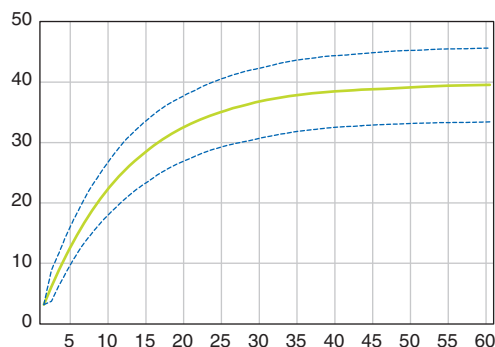
Chart 3
Structural vector error correction approach: Contagion from Greece to six euro area countries

(basis points)

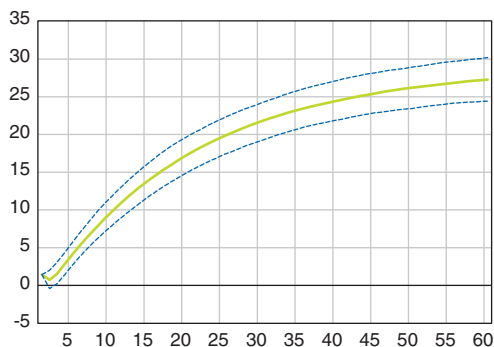
a) Ireland
 10-year IE-DE sovereign spreads



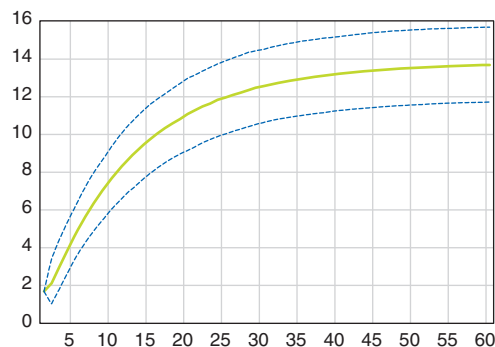
b) Portugal
 10-year PT-DE sovereign spreads



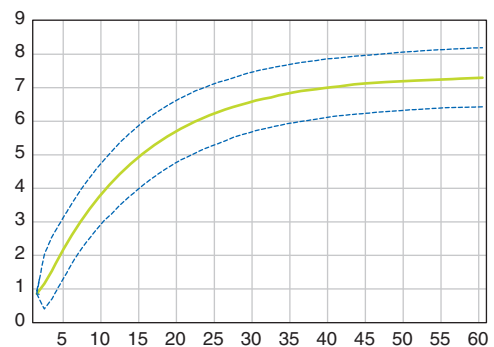
c) Spain
 10-year ES-DE sovereign spreads



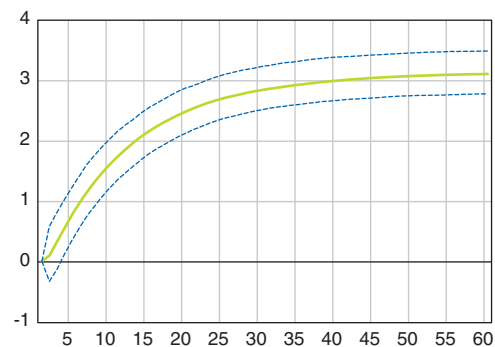
d) Italy
 10-year IT-DE sovereign spreads



e) Belgium
 10-year BE-DE sovereign spreads



f) France
 10-year FR-DE sovereign spreads



Note: The six panels show the accumulated impulse response functions (green lines) of a one-notch rating downgrade shock for Greece on the 10-year government bond spreads over Germany for Ireland, Portugal, Spain, Italy, Belgium and France, respectively. The blue dashed lines are 68% confidence intervals. The horizontal axes are counting days over which the adjustments take place. The model is estimated with data from September 2008 to August 2011.
 Source: De Santis (2012, Figure 9).

to an approach that controls for additional economic factors. It estimates a panel of sovereign yield spreads over German yields for many euro area countries using a structural vector error correction model.¹⁶ The model controls for aggregate factors affecting all country yield spreads together (such as changes in global risk aversion), country-specific factors (in particular individual country default risk (as measured by credit ratings) and for persistence in yields through the error correction mechanism. Contagion is identified with the impulse response function of the yield spread of each country to an unanticipated shock in the Greek credit rating.

The results confirm that besides general risk aversion and own credit risk also the Greek credit rating affected other euro area countries' bond spreads in a statistically significant way over the period September 2008 to August 2011. These contagion effects are economically small for some countries, such as France, and large for other countries such as Ireland, Spain, Italy or Portugal (see impulse response functions in Chart 3). Contagion is more pronounced for countries with comparatively weak economic fundamentals. The findings are also consistent with the observation that CDS spreads of each euro area country have recently been higher, in some cases markedly, than the CDS spreads of other countries with the same ratings.¹⁷

2|2 Sovereign-bank contagion

Let me now turn to the evidence on contagion between government debt markets and banks. In July 2011 sovereign tensions spread not only to Italy and Spain, but also to banks exposed to the sovereign debt of these countries.

The sovereign crisis has clearly affected funding availability and funding costs for individual banks in the euro area. The coincidence of the sovereign debt problems and banks' funding problems constitutes only anecdotal evidence. Additional evidence can be obtained by applying the frequency decomposition

model, the first one of the three models I described earlier, to bank CDS spreads. This shows that from the beginning of April 2011 onwards developments in the CDS spreads of Greece, Ireland, Portugal, Italy and France explain an increasing share of the variability in the CDS spreads of, for example, Société Générale and Crédit Agricole, whose CDS spreads doubled from early July up to mid-August. However, the two banks' exposures to Greece or any other of the programme countries did not increase during these months. In other words, contagion effects from government debt markets to banks, as defined in the model, have become more important in the euro area during the second half of 2011.¹⁸

Overall, there seems to be significant evidence of actual contagion effects during the European sovereign debt crisis,¹⁹ despite the policies aimed at containing the spreading of instability. Note, however, that there may also be latent contagion risks that have not yet materialised. It is quite likely that if the various crisis management measures had not been taken, contagion would be much more severe than presently observed.

3| LOOKING BACK IN HISTORY

Before turning to the ongoing European policy responses to contagion I would like to look back and consider what one can learn from history.

3|1 Fiscal stability in successful monetary unions

A first step is to consider the relationship between fiscal developments across countries in monetary unions when accompanied by political integration, although differences to the present European situation are still large. Michael Bordo and co-authors observe a common pattern in the experiences of the United States, Canada, Germany, Argentina and Brazil during the 19th and 20th centuries.²⁰ Successful fiscal federalism seems to have been associated with "explicit or implicit

¹⁶ De Santis (2012). The methodology is similar to Sims' (1980) standard vector autoregression approach, except that the structural vector error correction model imposes an additional long-run restriction.

¹⁷ The ECB has more than these three approaches under development for assessing sovereign contagion risk. Amisano and Tristani (2011), for example, not only control for economic fundamentals but also introduce nonlinearities in the contagion analysis. But the preliminary results could not be reported in this article.

¹⁸ Acharya, Drechsler and Schnabl (2011) as well as Alter and Schüler (2011) provide further discussions of the links between banking instabilities and sovereign debt problems.

¹⁹ Using again different methodologies, staff of the International Monetary Fund has found related evidence; see Caceres, Guzzo and Segoviano (2010) or Arezeki, Candelona and Sy (2011).

²⁰ Bordo, Jonung and Markiewicz (2011).

no-bail-out clauses, constitutional restrictions and through discipline exercised by financial markets for government debt".²¹ In the cases of the United States and Canada, the adoption of fiscal federalism entailed a shift of state debt onto federal hands. For the United States this was achieved in the aftermath of the Revolutionary War through a plan developed and executed by Alexander Hamilton. Hamilton's plan transferred state debts accumulated during the Revolutionary War to the federal budget. In addition, it also converted state debts into bonds and established a "sinking fund", in which revenues were collected to finance bond purchases on the open market. In this way the United States created an efficient mechanism to smooth fiscal revenues over time and managed to tap into the bond market at reasonable rates.

Another interesting experience, albeit again different in terms of environment, is the Italian unification in 1861, when the Kingdom of Sardinia integrated various previously independent states. One of the first decisions of the newly constituted Finance Ministry of the Italian Kingdom was to underwrite all the outstanding debt of the integrated states.

The insight that may be gained from these historical examples is that a well functioning monetary union requires strong and innovative approaches to deal with regional fiscal problems. This includes appropriate incentives for keeping public deficits under control, also in a low-interest rate environment, and effective means for dissipating contagious sovereign solvency concerns.

But also a word of caution is needed. All of the historical cases I have just mentioned are ones in which the political union was in place at the time of the monetary union. This implies that changes to the fiscal framework were more straightforward in these cases.

3|2 Central banks' role in containing the spreading of instability

Another relevant historical episode of significant contagion risks is the Russian sovereign debt default of August 1998. This event started a dramatic chain reaction, which included the subsequent failure of the hedge fund Long-Term Capital Management (LTCM). As Russia defaulted and its currency collapsed so did

its domestic banking system. The stress spread across the globe, and a number of international investors, in particular financial institutions, made large losses. Stock prices dropped sharply across emerging markets and the developed world. As security prices fell, the capital of investors and financial firms was eroded, liquidity withdrew from markets, volatility increased, and credit spreads for sovereign debt widened globally, abruptly and simultaneously.

The Russian crisis did not lead to a financial meltdown. First, central banks around the world provided ample liquidity to market participants, in various ways. Second, central banks helped in coordinating the actions of market participants, such as the eventual bailout of LTCM by the private sector. Arguably, central banks' action in the fall 1998 prevented the worst.²²

4| KEY EURO AREA POLICY RESPONSES TO CONTAGION RISKS

I now turn more specifically to policy actions in the euro area addressing the sources and propagation of the debt crisis. I start with the ECB and then move to the responsibilities of other public authorities.

4|1 ECB policies

In order to secure the working of the monetary policy transmission mechanism, which is essential for the ability of the European Central Bank to maintain price stability over the medium term, the ECB drew on a number of non-standard monetary policy measures introduced over the course of the financial crisis that had started in the summer of 2007. The measures taken have overall contributed to stabilising financing conditions and the flow of credit to the economy, all with the view to maintaining price stability.

Following the outbreak of the crisis in August 2007 and its dramatic worsening in September 2008, the ECB provided liquidity in more varied ways and at longer terms in order to address dysfunctions in the money market. It also cooperated with other central banks to contribute to an international response to an international money market problem.

²¹ Bordo et al., *op.cit.*, p. 26.

²² For more discussion on this and other contagion episodes, see for example Kaminsky, Reinhart and Vegh (2003) or Dungey, Fry, González-Hermosillo and Martin (2002).

The joint provision of US dollar liquidity by initially three central banks, including the ECB, and later by many more central banks, was labelled by some observers as the Plaza Accord for money markets.

In the aftermath of the failure of Lehman Brothers, the ECB launched its policy of “enhanced credit support”, a series of measures to enhance the flow of credit above and beyond what could be achieved through policy interest rate reductions alone. These measures include the unlimited provision of liquidity through “fixed rate tenders with full allotment”; the provision of liquidity at lengthened maturities of up to one year; and the provision of more liquidity in foreign currencies to euro area banks and of euro liquidity to other central banks for them to provide to their local banks; and a programme of purchases of covered bonds. As banks can only make use of the ECB liquidity-providing facilities if they have sufficient collateral, the ECB also extended the list of assets it accepts as collateral. As it had been the case in the years before the crisis, we also adjusted collateral eligibility criteria in view of market developments in order to remedy evolving inconsistencies and avoid possible abuses.

The total value of eligible marketable collateral is very large. It equals about EUR 13.5 trillion, which amounts to about 150 percent of euro area GDP. From this total, the euro area banks have in their balance sheets EUR 2.1 trillion already approved for utilisation (including also non-marketable collateral). It creates the necessary room for manoeuvre in our liquidity provision that amounts to about EUR 900 billion.

Facing the repercussions of the euro area government debt crisis, the ECB established in May 2010 the Securities Markets Programme (SMP). Under the SMP, which is in full compliance with the prohibition of monetary financing, the Eurosystem buys securities in dysfunctional debt market segments in order to safeguard the transmission of monetary policy to all parts of the monetary union. Sovereign contagion is one of the mechanisms by which the transmission of monetary policy through interest rates can be disabled. In this sense SMP interventions also lean against sovereign contagion.

Particularly as of the summer of 2011 the European debt crisis reached new heights. The ECB reacted to the disorderly conditions in euro area debt securities markets by resuming on 8 August 2011 the active implementation of the SMP. The relative

size of the programme, representing just 2.3% of the euro area GDP against the 13.7% of GDP that has been bought by the Bank of England or the 11.4% purchased by the Federal Reserve, makes it easier to sterilise its liquidity impact.

At the Governing Council meeting of 6 October 2011 the ECB took a further series of decisions in response to market stresses: to conduct two further one-year longer term refinancing operations; to continue to apply fixed rate full allotment procedures in all monetary policy liquidity-providing operations for as long as needed and at least till the middle of 2012; and to engage in a second Covered Bond Purchase Programme (CBPP2) with an intended purchase amount of EUR 40 billion over a period of one year starting in November 2011.

On 30 November the Bank of Canada, the Bank of England, the Bank of Japan, the Federal Reserve, the Swiss National Bank and the ECB undertook coordinated action to ease US dollar funding strains. In particular, the price of the existing US dollar liquidity swap arrangements was lowered by 50 basis points. Moreover, temporary bilateral liquidity swap arrangements have been established, which enable each central bank to provide liquidity in the currencies of the other participants.

On 8 December 2011 the ECB has decided to conduct two very long-term refinancing operations with a maturity of three years. These operations intend to ease the pressures banks are currently facing when they seek funding at longer-term maturities. They help banks avoid rebalancing the maturities of assets and liabilities by scaling down lending to the real economy. The first operation attracted unprecedented demand of EUR 489.2 billion, which in itself underlines the usefulness of this measure. Its effectiveness is also illustrated by a downward shift of euro area bond yields across the maturity spectrum.

The three year refinancing operations was complemented with increasing the pool of eligible collateral. Though on average the pool of eligible collateral is very large, individual banks may have insufficient collateral to cover their funding needs, for example when the credit assessments of asset-backed securities deteriorate. First, the ratings threshold for certain asset-backed securities was reduced. Second, national central banks were allowed to temporarily accept performing credit claims as

collateral. Moreover, the minimum reserve ratio was halved from two percent to one percent, which increases liquidity provision to the banking sector by an additional EUR 100 billion.

All of these actions had clear positive impacts in line with their objectives. If we look at the past experience, the ECB's measures have enabled the monetary policy transmission mechanism to continue operating relatively well at the level of the euro area, containing also contagion, although it should be recognised that the transmission mechanism remains severely disrupted in some euro area countries.

4|2 Policies by other European and national authorities

ECB action was fast, targeted and decisive. But we cannot shoulder the burden of solving the problems alone. The euro area governments have to live up to their responsibilities, which entails action at both the level of the member states and the euro area. It is of paramount importance that member states continue implementing policies that put their public finances on a sustainable path. At the same they need to engage in structural reforms that raise the growth potential of their respective economies. Moreover, obviously, EU/IMF programme countries need to stick particularly closely to the commitments made. Only in this way can the fundamental factors and imbalances at the origin of the crisis be removed.

At the European level, the ECB very much welcomes the progress made in re-designing fiscal governance. On 9 December 2011 EU Heads of State or Government agreed on a new fiscal compact that limits structural deficits to 0.5 percent of nominal GDP. Contrary to the rules of the Stability and Growth Pact, this balanced budget rule will be enshrined in primary legislation. Importantly, this rule foresees automatic corrections in case it is violated. Its transposition into national law is subject to verification by the European Court of Justice. Taken together, these measures significantly strengthen the preventive arm of the European fiscal governance framework and thereby limit the ground for sovereign contagion in the future.

As effective crisis prevention cannot cover for all eventualities, it is important to have a credible firewall in place that limits contagion risks between different sovereign debt markets. Following the intensification of the euro area government debt crisis in May 2010, the euro area member states decided to create the European Financial Stability Facility (EFSF). The EFSF enables financing of euro area member states in difficulty, where financing is subject to conditions negotiated with the troika, consisting of the EU Commission, the IMF, and the ECB. The adjustment programme over time improves economic fundamentals and thus dissipates solvency concerns, which in turn enables the country to return to the markets.

The ECB welcomes the decisions recently taken by the euro area Heads of State or Government that strengthen the EFSF and its successor, the European Stability Mechanism (ESM). First, euro area leaders have committed to review the size of the backstops facilities by March. Second, the ESM will enter into force by July 2012, earlier than originally foreseen. Third, as regarding private sector involvement the euro area will adhere to established IMF practice, which will help reassuring investors. Finally, an emergency voting procedure will be introduced into the rules of the ESM, which facilitates effective decision making especially in crisis situations. Nevertheless it is crucial that the EFSF will be made operational as soon as possible. In view of this objective, we have decided that the ECB – jointly with some national central banks – will act as an agent for the EFSF in its market operations.

Finally, it is essential that the affected governments do not see the implementation of the new stabilisation tools as incentives to weaken their efforts of strengthening their financial positions. Rather it is crucial that all support measures – be it in the form of loans or security purchases – are subject to strict conditionality regarding fiscal budget measures and structural reforms to increase the economic growth rate that is so essential to stabilise the debt ratio. Imbalances in the fiscal, real and financial sectors should not be allowed to emerge again.

5| CONCLUDING REMARKS

I conclude by reiterating a few main messages that I wanted to convey in this article.

First, long historical experience suggests that central banks have an important role to play in contributing to financial stability, including containing contagion risks. They can do so by providing an anchor for stability through delivering on their primary objective of price stability, by providing as much liquidity as quickly and widely as needed in a crisis situation, and by providing analysis and coordination to other policy makers and market participants.

Second, in the context of its systemic risk surveillance the ECB spends significant resources, not only for identifying imbalances and weak fundamentals early, but also for identifying and assessing contagion risks. No matter how difficult it is to collect all the relevant information and to design the appropriate analytical tools, most pieces of evidence point to the existence of very significant financial and sovereign contagion risks in the euro area over the time of the ongoing crisis.

Third, containing such contagion is of great importance for overcoming the ongoing European

debt crisis. There would be enormous economic and social damage if the ECB and other competent authorities do not respond appropriately and decisively within their respective mandates.

Fourth, whilst the ECB's action has been decisive and effective this alone is not enough. All parties need to live up to their responsibilities. It is of utmost importance that the agreements of the Heads of State or Governments of the euro area and EU institutions of 21 July and 9 December 2011 are honoured and rigorously implemented. This concerns particularly the swift implementation of the operational strengthening of the EFSF agreed and an early implementation of the ESM. Moreover, all countries should meet their fiscal targets and introduce structural reforms that restore competitiveness and growth potential where they have been lost over the last decade. Widespread imbalances and weak fundamentals should not be allowed to emerge again.

If all parties honour their commitments, then the combination of preventive governance and ex post support mechanisms will contain contagion and Europe will successfully weather these difficult times.

REFERENCES

Acharya (V.), Drechsler (I.) and Schnabl (P.) (2011)

"A Pyrrhic victory? – Bank bailouts and sovereign credit risk", *NBER Working Paper*, 17,136, June.

Alter (A.) and Schüler (Y.) (2011)

"Credit spread interdependencies of European states and banks during the financial crisis", mimeo., University of Konstanz, June.

Amisano (G.) and Tristani (O.) (2011)

"The euro area sovereign crisis: Monitoring spillovers and contagion", *ECB Research Bulletin*, 14, Autumn, pp. 2-4.

Arezki (R.), Candelona (R.) and Sy (N.) (2011)

"Sovereign rating news and financial markets spillovers: Evidence from the European debt crisis", *IMF Working Paper*, WP/11/68, March.

Bandt (O. de) and Hartmann (P.) (2000)

"Systemic risk: A survey", *ECB Working Paper Series*, 35, November.

Bekaert (G.), Harvey (C.) and Ng (A.) (2005)

"Market integration and contagion", *Journal of Business*, 78, pp.39-70.

Bordo (M.), Jonung (L.) and Markiewicz (A.) (2011)

"A fiscal union for the euro: Some lessons from history", *NBER Working Paper*, 17,380, September.

Caceres (C.), Guzzo (V.) and Segoviano (M.) (2010)

"Sovereign spreads: Global risk aversion, contagion or fundamentals", *IMF Working Paper*, WP/10/120, May.

Calvo (G.) (1988)

"Servicing the public debt: The role of expectations", *American Economic Review*, 78, pp. 647-661.

Chen (Y.) (1999)

"Banking panics: The role of the first-come, first-served rule and information externalities", *Journal of Political Economy*, 107, pp. 946-968.

Clark (P.) (1987)

"The cyclical component of US economic activity", *Quarterly Journal of Economics*, 102, pp. 797-814.

Coase (R.) (1960)

"The problem of social cost", *Journal of Law and Economics*, 3, pp.1-44.

Creal (D. D.), Koopman (S. J.) and Zivot (E.) (2010)

"Extracting a robust US business cycle using a time-varying multivariate model-based bandpass filter", *Journal of Applied Econometrics*, 25, pp. 695-719.

CreditMetrics (2007)

"CreditMetrics (TM) - Technical document", RiskMetrics Group, www.riskmetrics.com/pdf/dnldtechdoc/CMTD1.pdf.

De Santis (R. A.) (2012)

"The euro area sovereign debt crisis: Save haven, credit rating agencies and the spread of the fever from Greece, Ireland and Portugal", *ECB Working Paper*, 1419, February.

Donati (P.) (unpublished)

"Modelling spillovers and measuring their impact and persistence: Application to CDS spreads during the euro area sovereign crisis", internal ECB's unpublished manuscript.

Dungey (M.), Fry (R.), González-Hermosillo (B.) and Martin (V.) (2002)

"Contagion in international bond markets during the Russian and the LTCM crises", *Journal of Financial Stability*, 2, pp.1-27

Eichengreen (B.), Rose (A.) and Wyplosz (C.) (1996)

"Contagious currency crisis: First tests", *Scandinavian Journal of Economics*, 98, pp. 463-484.

European Central Bank (2005)

"Financial market contagion", *Financial Stability review*, December, pp. 142-149.

European Central Bank (2009)

"The concept of systemic risk", *Financial Stability Review*, December, pp.134-142.

European Central Bank (2010)

Annual Report.

Forbes (K.) and Rigobon (R.) (2002)

"No contagion, only interdependence: Measuring stock market comovements", *Journal of Finance*, 43, pp. 2223-2261.

Hartmann (P.), Staetmans (S.) and de Vries (C. G.) (2004)

"Asset market linkages in crisis periods", *Review of Economics and Statistics*, 86, pp. 313-326.

Hartmann (P.), Straetmans (S.) and de Vries (C. G.) (2006)

"Banking system stability: a cross-Atlantic perspective", in M. Carey and R. Stulz (eds.), *The Risks of Financial Institutions*, National Bureau of Economic Research and Chicago University Press, pp. 133-188.

Harvey (A.) (1985)

"Trends and cycles in macroeconomic time series", *Journal of Business and Economics Statistics*, 3, pp. 216-27.

Huang (X.), Zhou (H.) and Zhu (H.) (2009)

"A framework for assessing the systemic risk of major financial institutions", *Journal of Banking and Finance*, 33, pp. 2036-2049.

Kaminsky (G.L.), Reinhart (C.M.) and Vegh (C.A.) (2003)

"The unholy trinity of financial contagion", *Journal of Economic Perspectives*, 17, pp. 51-74.

Longin (F.) and Solnik (B.) (2001)

"Extreme correlation of international equity markets", *Journal of Finance*, 56, pp. 649-676.

Pritsker (M.) (2001)

"The channels for financial contagion", in S. Claessens and K. Forbes (eds.), *International Financial Contagion*, Kluwer Academic Publishers.

Segoviano (M. A.) and Goodhart (C. A. E.) (2009)

"Banking stability measures", *IMF Working Paper*, WP/09/4, January.

Sims (C. A.) (1980)

"Macroeconomics and reality", *Econometrica*, 48, pp. 1-48.

Zhang (X.), Schwaab (B.) and Lucas (A.) (2011)

"Conditional probabilities and contagion measures for euro area sovereign default risk", *Duisenberg school of finance – Tinbergen Institute Discussion Paper*, TI 11-176/2/DSF29, December.