

## **Stefan Gerlach: Housing markets and financial stability**

Speech by Mr Stefan Gerlach, Deputy Governor of the Central Bank of Ireland, at the National University of Ireland, Galway, 20 April 2012.

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### **Introduction**

It is an honour for me to participate in this conference on “Contemporary Housing Issues in a Changing Europe.”<sup>1</sup> This is my first trip in Ireland away from Dublin and I am very pleased to be here.

As you all well know, there are many aspects of housing that influence, and are the objective of, public policy. Policy makers in Ireland and abroad thus worry about the cost and availability of housing, the role of planning procedures in housing development, and the rights of tenants and distressed mortgage borrowers, to mention but just a few a topics.

It will therefore come as no surprise to you that central banks and financial regulators also worry a great deal about the housing market and the banks and households that are its key actors. To fit with the broad theme of the conference, I have decided to talk this afternoon on the topic of “Housing Markets and Financial Stability.” The main focus of my talk is to explain why central banks are concerned about housing market developments. One reason is the risk of housing bubbles that can have far-reaching implications for financial stability. I will therefore also discuss what policies can be adopted to mitigate the likelihood that a bubble occurs and the consequences if it does. Following the financial crisis, central banks across the world will attach even greater weight to housing market developments, so this is a timely topic.

### **Central banks and the housing market**

It is useful to start by asking why central banks and financial regulators worry about the housing market.<sup>2</sup> They do so for three reasons: for monetary policy purposes; for financial regulatory reasons and because of financial stability concerns.

First, the housing market is a key link in the chain of events through which monetary policy impacts on the economy. Since housing is typically constructed or purchased using borrowed funds, the cost of borrowing is a major part of the overall cost of housing. A tightening of monetary policy increases these costs and therefore moderates the demand for housing, which reduces property prices and leads to a fall in construction activity.

The decline in property prices also decreases collateral values and banks’ willingness and ability to lend to firms and households. Furthermore, it also reduces households’ wealth perceptions. The overall effect is to lower the demand for goods and services in the economy, economic activity and inflation pressures.

But while crucially important, the role of housing in the monetary transmission mechanism is well known and in the interest of brevity I will not focus on it here.

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<sup>1</sup> Address given at the conference on “Contemporary Housing Issues in a Changing Europe,” National University of Ireland, Galway, April 20, 2012. I am grateful to Rebecca Stuart for her help in preparing this speech.

<sup>2</sup> The Central Bank of Ireland is both a central bank and a financial regulator. In what follows I will not make a distinction between central banks and financial regulators.

The second reason central banks worry about the housing market arises from the fact that mortgages are the single biggest financial transaction most households undertake. Property lending is a major component of households' liabilities and an important exposure of mortgage lenders. Central Banks that have responsibility for micro-prudential supervision and regulation and for customer protection, as the Central Bank of Ireland does, will wish to ensure that individual banks make sound lending decisions in order to protect their balance sheets and that they deal fairly with customers.

Given the developments in Irish housing markets in recent years, my colleagues at the Central Bank have given a number of speeches on mortgage markets and mortgages arrears in the recent past.<sup>3</sup> I will therefore not discuss this aspect of housing markets today.

The third reason central banks are concerned by housing markets is, as we have seen in Ireland, that large declines in property prices can trigger an episode of financial instability. The borrowing capacity and credit demand of households and firms are affected by changes in the prices of properties. Since they are often used as collateral for bank lending, rising property prices are typically associated with rapid credit expansion. Developments in the property market therefore affect banks' capital positions and their lending capacity, both directly through changes in the valuation of their holdings of real estate assets and, if property prices fall, indirectly via changes in non-performing loans.

A sharp fall in property prices can lead to financial instability in many ways. A decline in prices tends to be associated with economic weakness as housing construction grinds to a halt, triggering financial strains and defaults among property developers, construction companies and real estate firms. Rising unemployment also leads to mortgage arrears and defaults among households. The overall effect can be a sharp worsening of banks' balance sheets.

It is this link between housing prices and financial stability that I wish to focus on this afternoon.

## **Property bubbles**

Next I will review how the property bubble developed here in Ireland and put it into an international context. My main point is that housing bubbles are not only highly adverse events, but they are common and similar. Nevertheless, too few policy makers have learned too little from the historical experience.

Figure 1 shows annual property price indices in nominal terms from the BIS website for 10 countries, indexed so that 1999 equals 100. The figure tells a familiar story: property prices rose sharply across the world in the decade before the financial crisis started in 2007. The diversity of the price changes between 1999 and 2007 is staggering, ranging from -6% in Germany to over 160% in Spain, which corresponds to an average annual increase of between -0.85 and 12%. These large differences between countries in the extent of the price increases are interesting. It is particularly notable that the price increases in the US - 75% in this period or 7% annually - were rather modest from an international perspective.

Figure 2 shows credit expansion in the same economies, using data from the IMF. As can be seen, the run-up in property prices was associated with large increases also in credit, which varied between 23% in Germany to in excess of 400% in Ireland.

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<sup>3</sup> See, for instance, Governor Honohan's address to the University of Limerick Law Society on "Household Indebtedness: Context, Consequence & Correction" on 14 March, 2012, and Deputy Governor Matthew Elderfield's address to the Harvard Business School Alumni Club of Ireland on "Mortgage Arrears Resolution: Where Next?" on 2 March, 2012.

The fact that credit and housing prices rose together can be interpreted in several ways. Many believe that it reflects changes in banks' willingness and ability to lend – arising, for instance, from excessively expansionary monetary policy, securitisation and reduced risk perceptions – that triggered property price bubbles across the world.

But it is also possible that rapid economic growth led households to revise up their expectations of future income and raise their demand for housing. Indeed, the macroeconomic environment before the start of a property bubble is typically highly favourable. This was certainly the case in Ireland, where real GDP grew at an average rate of 6% per year in the period 2000 to 2006.

Specifically, asset prices were rising, labour market participation rates and nominal wage growth were high and unemployment was low. With the housing stock essentially given at any point in time, greater demand for housing leads to sharp and sustained increases in property prices. Such advantageous conditions can lead households to expect additional capital gains that typically exceed the cost of borrowing, triggering further increases in property demand.

As we now know, the global property market boom was followed by a collapse in prices that has cumulatively been very large. Among the countries in Figure 1 which have experienced price declines over the period, falls have been between 46% in Ireland and 3% in New Zealand between 2007 and 2011.<sup>4</sup> The left-hand panel of Figure 3 shows that the size of fall mirrored the increase before the crisis.

However, the sheer size of a rise in property prices is not the most important factor in determining how severe the bust will be. Rather, what matters is whether the asset price boom is funded by credit. If so, the evidence suggests that the cost of a bust is much greater.<sup>5</sup>

The right-hand panel of Figure 3 shows that house price falls following the crisis are negatively related to the extent of credit expansion before the crisis. Overall, these data show that the rapid increases in property prices and credit are typically followed by large price falls.

Thus, the IMF (2011a) studies a number of emerging market and advanced economies and finds that faster growth in mortgage credit during booms was accompanied by stronger house price growth at the time, and greater house price declines and larger increases in non-performing loans during busts. Furthermore, IMF (2012) finds that housing busts and recessions associated with higher leverage in the boom phase tend to be longer and more severe, while Jorda, Schularick and Taylor (2011) find that recessions preceded by greater private-sector leverage<sup>6</sup> are associated with worse outcomes in terms of economic growth, investment spending, and credit growth than those associated with less leverage. These effects are amplified if the recession coincided with a financial crisis.<sup>7</sup> Overall, the international evidence shows that mortgage credit growth and the state of the economy

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<sup>4</sup> The Irish decline is based on CSO data for end-2011.

<sup>5</sup> For instance, the dot-com bubble was not primarily funded by the banking sector and was followed by a relatively mild recession. For a discussion on this, see Crowe et al. (2011a).

<sup>6</sup> Measured as domestic bank credit as a proportion of GDP.

<sup>7</sup> Mian and Sufi (2011) show that US counties which were more highly leveraged before the crisis had greater declines in employment growth, residential investment growth and consumption growth following the crisis. Dynan (2012) finds that the reduction in spending of highly leveraged households is greater than would be predicted by the impact of house price declines alone. This may be because highly leveraged households reduce spending to pay down debt, and because highly leveraged households may no longer be able to access credit, thus reducing consumption.

during the boom explain most of the subsequent differences in house prices and bank loan losses.<sup>8</sup>

The recent financial crisis was started in much the same way as many other crises, that is, by a huge property price bubble that was financed by massive credit expansion by banks.<sup>9</sup> Such dramatic falls in house prices as were experienced during the crisis were followed by widespread fragility in the financial sector as borrowers' balance sheets became stressed. Once the falls became large enough and a sufficiently large number of borrowers were affected, a full-blown financial crisis ensued.

### **House prices, financial crises and fiscal stability**

Unfortunately, the Irish housing bubble was not an atypical event. It is therefore of interest to look more generally at property price booms and financial stability to see what the consequences of the bursting of a housing bubble are. In this section I look first at the consequences for the broader economy before looking at their impact on governments' fiscal positions.

### **Macroeconomic effects of housing bubbles**

Financial crises associated with speculative boom-bust episodes have been traced back as far as the Holy Roman Empire in the 17th century.<sup>10</sup> Not all of these, of course, relate to property bubbles, although many do. Indeed, there is ample historical evidence of house price boom-bust cycles and their economic effects.

Work by the IMF<sup>11</sup> found that approximately 40 per cent of house price booms were followed by busts,<sup>12</sup> resulting in, on average, 30 per cent house price declines, and lasting for approximately four years. Reinhart and Rogoff (2009a) find that the cumulative decline in real house prices, from peak to trough, is in excess of 35 per cent over an average period of 6 years, although declines of 50 and 60 per cent have also been recorded (Figure 4).<sup>13</sup>

So house price booms frequently end in a bust. But how frequently do they end in a financial crisis? Reinhart and Rogoff (2009a) in their celebrated study of financial bubbles show that house price increases are indeed common prior to banking crises (Figure 5). Bordo and Jeanne (2002) find that financial crises are generally triggered when house prices have peaked, or immediately after they have started falling. Of 15 advanced economies over the period 1970–2002, they identified 20 episodes of housing booms, of which 11 were followed by a bust. Of these 11 boom-bust cycles, 6 involved banking crises.<sup>14</sup> Crowe et al. (2011a)

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<sup>8</sup> See IMF (2011a).

<sup>9</sup> Kindleberger and Aliber (2011) state that “Bubbles result from the growth of credit that proves too high to be sustainable; when the credit growth slows, some asset prices begin to decline”.

<sup>10</sup> See Kindleberger and Aliber (2011) for a history of bubbles and crashes.

<sup>11</sup> IMF (2003). The analysis is carried out on 14 countries.

<sup>12</sup> ECB (2003) finds that 55 per cent of booms in real house prices in EU countries were followed by busts.

<sup>13</sup> Japan experienced a long decline in house prices following the 1992 crisis. However, excluding Japan from the sample still leaves the average duration of house prices declines following financial crises in excess of 5 years. Claessens et al. (2008b) find that house prices decline for an extended period, “typically much more than three years”.

<sup>14</sup> In a study of 14 OECD countries, Barrell et al. (2010) find that a single percentage point rise in real house price growth is sufficient to raise the probability of a crisis in the range of 0.07% (in the US) to 0.74% (in France). The unweighted average marginal effect of the 14 individual country effects is 0.31%. Reinhart and Rogoff (2009a) find that real house prices are one of the best indicators of banking crises.

show that, of 23 countries that experienced booms in both real estate and credit before the crisis, 21 experienced either a financial crisis or a significant drop in GDP growth, while of the seven countries that experienced a boom in real estate only, just two had a systemic financial crisis.<sup>15</sup>

The evidence regarding the impact on the real economy is similarly stark. Recessions that coincide with housing busts are, on average, longer and more pronounced than others.<sup>16</sup> The macroeconomic effects of the bursting of a bubble are studied in Claessens et al. (2008b).<sup>17</sup> They find that the prolonged nature of house price declines following busts has a significant impact on a range of real economy indicators (Figure 6). Specifically, they find that output, investment and credit begin to decline once house prices have peaked, while consumption is slowing. Inflation typically increases for a number of quarters after the house price peak, before declining sharply. The unemployment response is even more lagged, remaining steady for almost 2 years before increasing. It is therefore no surprise that almost five years after housing prices started to fall, the recovery in Ireland is still very weak.

The left-hand panel of Figure 7 shows the evolution of house prices, from their peak, through the crisis period for a sample of the “Big Five” crisis countries identified by Reinhart and Rogoff (2009a), Korea and Ireland.<sup>18</sup> Clearly, Ireland has experienced a comparatively severe house price drop. The right-hand panel of Figure 7 shows the falls in GDP in the same economies. Ireland has also experienced one of the greatest falls in real GDP and one of the slowest recoveries.

It is interesting to note the difference in the time frame for recovery between house prices and GDP. While GDP in this sample of countries typically recovered to peak levels within 6 years, the recovery in house prices was much delayed. In the Nordic countries, the recovery took between 10 and 22 years, while house prices have not yet recovered to pre-crisis levels in Korea and continue to decline in Japan.

Overall, these graphs suggests that economic activity in Ireland will recover only gradually and that it may take a long time before house prices return to their level in 2007.

### **Public debt and deficits**

Another, related consequence of a financial crisis is a sharp deterioration of government finances. Nowhere have the consequences for public finances of the financial crisis that started in 2007 been more apparent than in Ireland. However, the Irish experience was not an outlier. Reinhart and Rogoff (2009a) find that public debt rises, on average, over 85 per cent following a financial crisis.<sup>19</sup>

There are three reasons why public finances deteriorate so much after a financial crisis. First, the economic slowdown reduces tax collections. The resulting loss of revenue was particularly dramatic in Ireland where during the boom years the government relied increasingly on taxes that were dependent on the state of the business cycle, and on activity in the housing market in particular. When the crisis struck, tax revenue collapsed

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<sup>15</sup> See Crowe et al. (2011a).

<sup>16</sup> See Claessens et al. (2008a).

<sup>17</sup> See also IMF (2003), which finds that house price busts following booms resulted in an average output loss of 8% of GDP, and Reinhart and Rogoff (2009a) who find declines in real GDP around severe banking crises average 9.3 per cent, and that, on average, the unemployment rate rises for almost 5 years, increasing around 7 percentage points during this time.

<sup>18</sup> The “Big five” crises are Japan (1992), Norway (1987), Sweden (1991), Finland (1991) and Spain (1977).

<sup>19</sup> This figure is reported as an increase in the stock, rather than as a percentage of GDP, as declines in GDP can make this ratio difficult to compare across countries.

(see Figure 8). Second, weaker economic growth translates into greater need for government expenditure on unemployment support and social welfare (see Figure 9). Third, if banks incur sufficiently large losses, the government may be forced to inject capital in the banking system, potentially leading to large increases in public debt.

Ireland's current fiscal problems largely result from the effect of the housing bubble on the public debt. As Figure 10 shows, following the onset of the crisis in 2007, Ireland has experienced very large public deficits and a rise in the ratio of public debt to GDP from 25% in 2007 to 105% in 2011. This increase in public debt was so large that investors grew concerned about the Government's ability to service the debt, impairing the Government's access to financial markets in 2010 and requiring outside financial assistance.

This large public debt makes it very difficult for the Government to support economic recovery through any sort of expansionary fiscal policy. Indeed, the sheer size of the debt requires the Government to pursue tight fiscal policies. It also has to be borne in mind that, should banks' loan losses rise further than currently expected, further upward pressure would be put on an already high debt ratio.

### **Macro-prudential policy**

Given the devastating consequences housing bubbles can have, policy makers have good reasons to attempt to prevent them. But, while some housing bubbles are followed by a crisis, not all are. Unfortunately, it is impossible to know in advance which bubbles are followed by a crisis.<sup>20</sup> This uncertainty can bias policy makers in favour of inaction. One particular problem is that the boom phase is associated with rapid growth of real income, falling unemployment, rising tax revenues, increasing asset prices and high bank profitability. With households, government and banks all doing well, there is little political support for policies intended to prevent the bubble from growing further, even when policy makers believe them necessary. To avoid such a scenario, the policy makers responsible for the overall health of the financial system – the macro prudential authority – must have a clear mandate and be independent.

Following the crisis, there has been much work on the development of macro-prudential tools that reduce the likelihood of property-driven financial crises, and that reduce or limit their consequences if they do occur. As the Central Bank is the macro-prudential authority in Ireland,<sup>21</sup> the bank is following this debate closely.

What are macro-prudential tools? The IMF (2011c) proposes two criteria. First, they explicitly and specifically target the build-up of risk across the financial system – systemic risk – as the bubble grows. Second, they are controlled by the macro-prudential authority.<sup>22</sup> However, few macro-prudential tools have been used systematically and there is little practical experience for policy makers to rely on.<sup>23</sup> Nonetheless, several tools that target real estate lending have

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<sup>20</sup> Costly property bubbles could potentially be identified by early warning systems. For a discussion, see Barrell et al. (2010).

<sup>21</sup> This mandate is provided in Article 6A(2(a)) of the Central Bank Reform Act 2010. Available here: <http://www.irishstatutebook.ie/2010/en/act/pub/0023/index.html>.

<sup>22</sup> Many public policies (such as micro prudential, monetary or tax policy) impact on the property market but do not constitute macro prudential policy.

<sup>23</sup> For instance, Crowe et al. (2011b) note that of a sample of 36 countries, as at September 2010 only 3 reported "actively" implementing Loan-to-value, or Loan-to-Income, limits to address property market developments.

been adopted in a small number of economies.<sup>24</sup> They can be grouped in three broad categories.<sup>25</sup>

The first category relates to capital requirements on property lending. For instance, capital requirements for mortgages for buy-to-let properties could be increased relative to those for primary dwellings. This would tend to reduce this type of lending, which appears to be associated with greater credit risk, and ensure that banks' resilience is bolstered by the additional capital buffer.<sup>26</sup>

Second, dynamic provisioning requires banks to hold provisions against expected losses due to credit risks. This tool has been implemented in Spain, where banks are required to build up buffers against performing loans in an upturn, which can then be drawn down in a recession.<sup>27</sup> This naturally slows bank lending in the boom phase and leaves banks in a better position to withstand loan losses in a crash.

Third, limits on loan-to-value (LTV) and loan-to-income (LTI) ratios target the creditworthiness of borrowers more explicitly. While LTV limits help ensure that the underlying collateral – the property – is sufficient to cover the loan, were the borrower to default, LTI limits enhance the creditworthiness of borrowers by limiting their repayment burden. Tightening these ratios in the as the boom gets underway raises the ability of the financial system to cope if the bubble bursts. Their potential use in Ireland warrants further reflection.<sup>28</sup>

It is sometimes argued that tighter monetary policy – higher interest rates – is the appropriate way to deal with property bubbles. However, monetary policy is a blunt tool that affects all lending, risky and less risky. In contrast, macro prudential tools can be targeted narrowly on the most risky borrowers. Such a sharp focus may lower the overall cost of preventive action.

However, the narrow focus may enable borrowers and lenders to seek to circumvent the restrictions. For instance, Crowe et al. (2011a) report that, in Korea lower LTV limits were implemented for loans of less than 3 years substantially increasing the popularity of loans of three years and one day. Furthermore, LTV limits have been circumvented by taking out a personal loan to cover a portion of the house price. Moreover, measures aimed at limiting credit provision by banks risk pushing lending into other, less regulated, sectors. To overcome these problems, policy makers will likely employ several macro prudential tools at the same time. While this may reduce the risk of avoidance, it may be difficult to calibrate the setting of the different policy instruments since they are likely to interact. It is to be expected that re-calibration of instruments will take place regularly as experience with macro prudential policy is gathered.

In addition, using macro-prudential policy requires detailed micro and macro data in order to determine whether and which tools are needed. Moreover, there is a need for expert judgement, which will be a scarce commodity at the outset.<sup>29</sup> There are also requirements in terms of the legal framework in countries in enabling the imposition of macro-prudential

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<sup>24</sup> For a discussion of policy practices internationally, see, for example, Honohan and Laeven (2005). Honohan (2010) discusses policy actions undertaken and available in Ireland before the current crisis.

<sup>25</sup> See Crowe et al. (2011a).

<sup>26</sup> Risk weights on certain types of riskier property lending were introduced in Ireland in 2006–7. Honohan (2010) concludes had such a surcharge been implemented earlier, it might have been more effective.

<sup>27</sup> For a discussion of dynamic provisioning in Spain, see Saurina (2009).

<sup>28</sup> A similar process is underway in the UK where the Financial Policy Committee (FPC) is considering potential macro prudential tools, including LTV and LTI limits. See: <http://www.bankofengland.co.uk/publications/Documents/records/fpc/pdf/2012/record1203.pdf>

<sup>29</sup> See BIS (2010), which finds that of 22 countries surveyed, all relied exclusively on judgement in setting macro prudential policy.

instruments. Macro prudential instruments are often forward looking and preventive in nature and it may be difficult, if the legal framework places the burden of proof on the macro prudential authority, to justify a tightening of macro prudential policy, particularly in a situation in which financial tensions are not clearly evident to outside observers.

Nonetheless, there is evidence that such policies can be successful. In terms of the impact on housing market activity, Ahuja and Nabar (2011) using data on 49 emerging and advanced economies find that LTV limits slow property price growth. In a case study of Hong Kong SAR, they find that tightening LTV limits reduced both transaction volumes and price growth, albeit with a lag.<sup>30</sup> Wong et al. (2011), using data on Hong Kong, Singapore and Korea, find that the impact of LTV limits on property market activities is inconclusive, but that there is strong evidence that they restrict household leverage.<sup>31</sup>

In terms of the impact on the banking sector, Lim et al. (2011) based on IMF survey data<sup>32</sup> of countries' experiences find that LTV and LTI limits and dynamic provisioning, among other instruments, may be effective in reducing credit growth. Ahuja and Nabar (2011) find that LTV and LTI limits slow property lending and that LTV limits lower non-performing loans over the longer term, while Wong et al. (2011) find that LTV limits had a significant positive impact on banking stability in Hong Kong SAR.

## Conclusions

The financial crisis has once again highlighted the risk property market developments can pose for financial stability. This is an important reason why central banks pay great attention to the developments in the housing area, including to the evolution of house prices, the rate of credit expansion, the cost and availability of mortgages and so on.

There is now great attention being focussed by policy makers across the world on how to best avoid a repetition of the crisis. Unfortunately, the property bubble in Ireland was particularly large, the resulting financial crisis was particularly severe, and the impact on the Irish economy is likely to be felt for many years to come. It is therefore important that we in the Central Bank think particularly carefully about housing developments and whether they pose risks to financial stability.

To do so, we need to think about what macro prudential policy framework is suitable to us.<sup>33</sup> In particular, we need to explore whether macro prudential tools such as those I have discussed may play a useful role in Ireland. There is much work – which is highly technical and will involve regulators, economists, statisticians and lawyers working together – to be done.

Thank you for your attention.

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<sup>30</sup> The lag is 1 year for transaction volumes, 2 years for price growth.

<sup>31</sup> See also Igan and Kang (2011), who find that LTV and LTI limits in Korea were related to declines in house price growth and transactions, and Benito (2006), who finds that higher loan-to-value ratios were associated with greater house price volatility in response to income shocks.

<sup>32</sup> See IMF (2011d) for a discussion of the survey

<sup>33</sup> In fact, the European Systemic Risk Board has recently asked its member countries to clarify and strengthen the macro prudential mandates of responsible national authorities where necessary: [http://www.esrb.europa.eu/pub/pdf/recommendations/2011/ESRB\\_2011\\_3.en.pdf?9697eb49d4116f8ed269b4d95326217b](http://www.esrb.europa.eu/pub/pdf/recommendations/2011/ESRB_2011_3.en.pdf?9697eb49d4116f8ed269b4d95326217b)



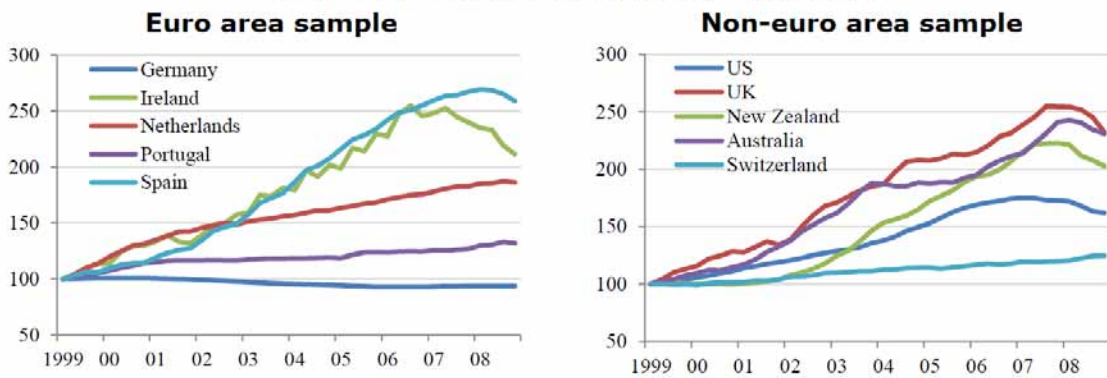
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**FIGURES**

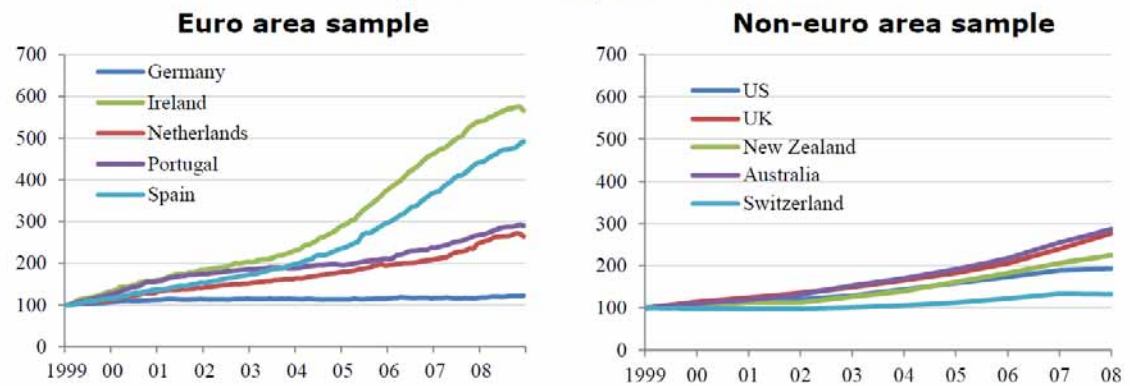
**Figure 1: Nominal house prices, 1999-2008**



Source: BIS, CBI calculations.

Notes: Data are indexed to 1999 = 100. Data are property price per dwelling for all dwellings, where possible. Data for Germany, Spain and Portugal are per square metre. Data for the Australia, Germany, Ireland and the Netherlands are for existing dwellings. Data for US are for 1-family existing dwellings. Data for Switzerland are for all 1-family dwellings.

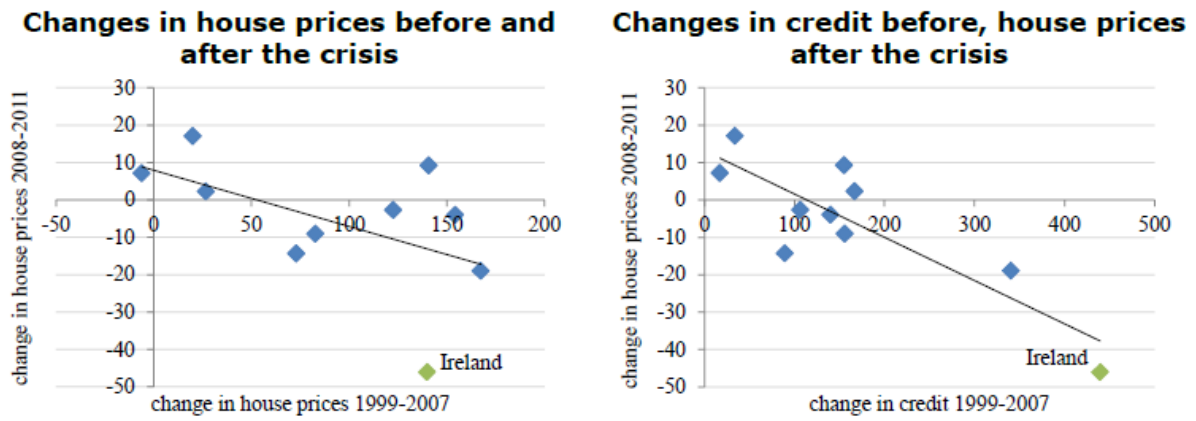
**Figure 2: Credit, 1999-2008**



Source: IMF, CBI calculations.

Notes: Data are indexed to 1999 = 100. Data are claims on private sector.

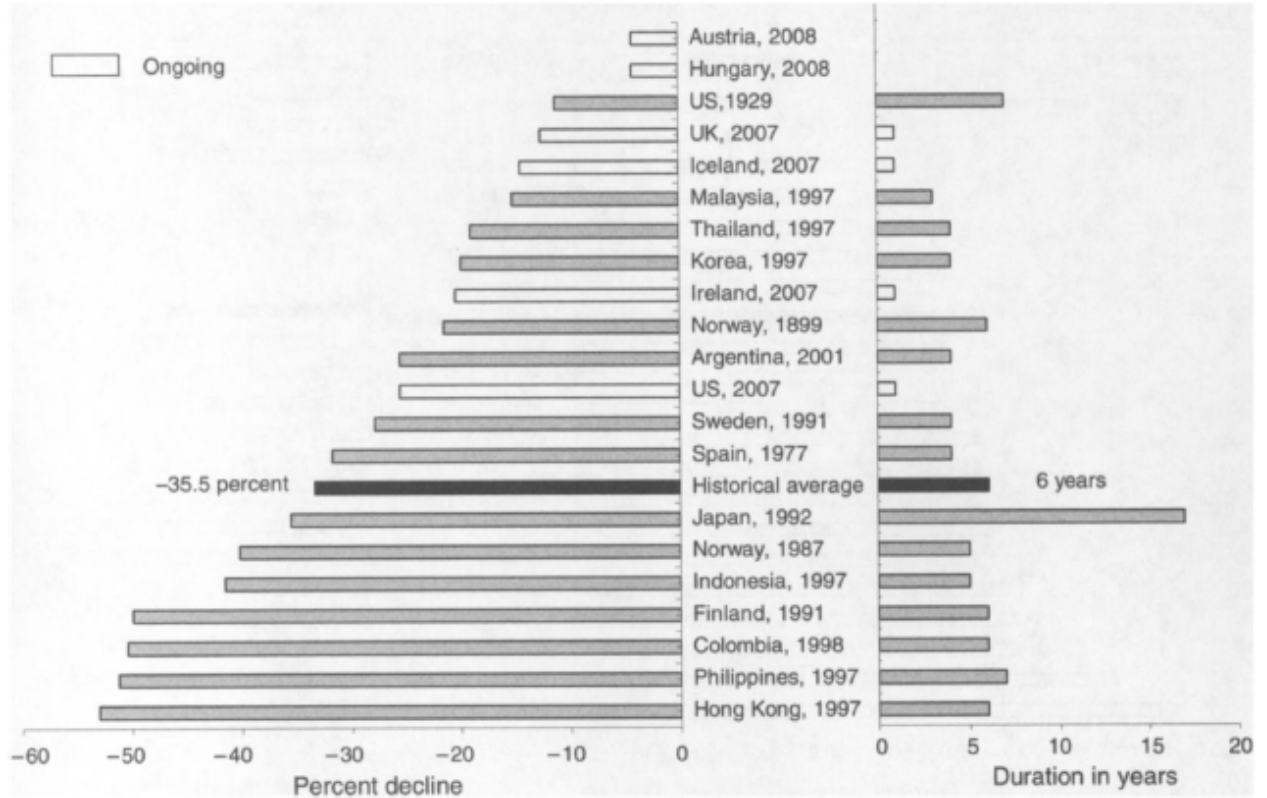
**Figure 3: House prices and credit**



Source: BIS, IMF, CSO and CBI calculations.

Notes: See notes to Figures 1 and 2. House price data for US, UK, New Zealand, Australia and Switzerland for 2011 are at Q3.

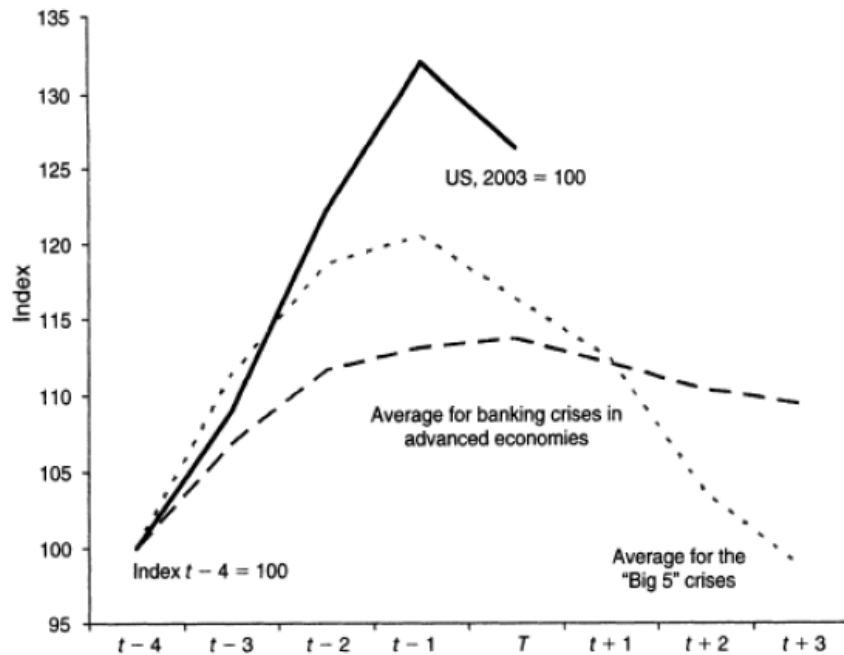
**Figure 4: Past and ongoing real housing price cycles and banking crises: peak- to-trough declines (left panel) and years duration of downturn (right panel)**



Source: Reinhart and Rogoff (2009b)

Notes: Each banking crisis episode is identified by country and the beginning year of the crisis. Only major (systemic) banking crisis episodes are included, subject to data limitations. The historical average reported does not include ongoing crisis episodes. For the ongoing episodes, the calculations are based on data through the following periods: October 2008, monthly, for Iceland and Ireland; 2007, annually, for Hungary; and 2008:111, quarterly, for all others. Consumer price indices are used to deflate nominal house prices.

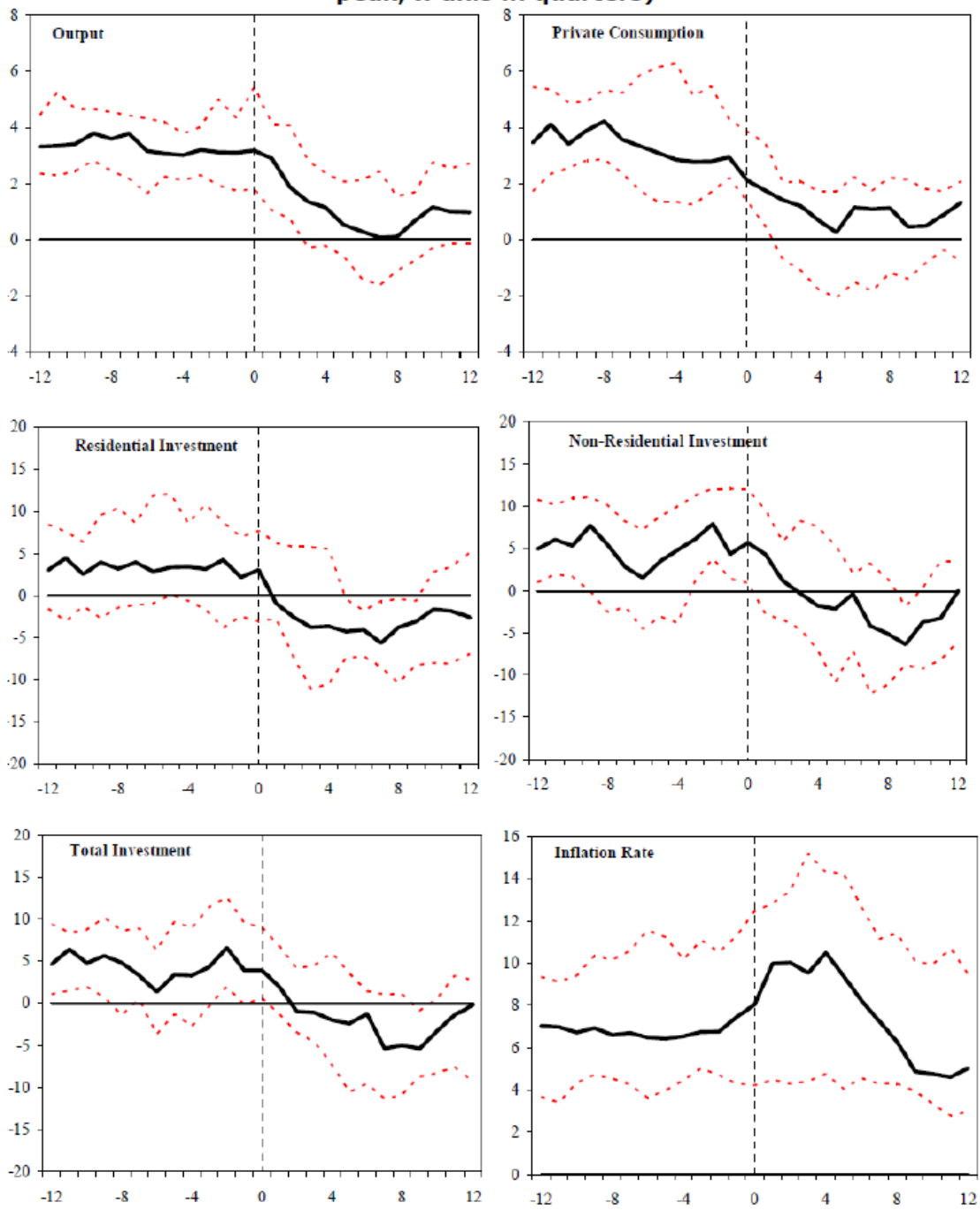
**Figure 5: Real housing prices and banking crises**

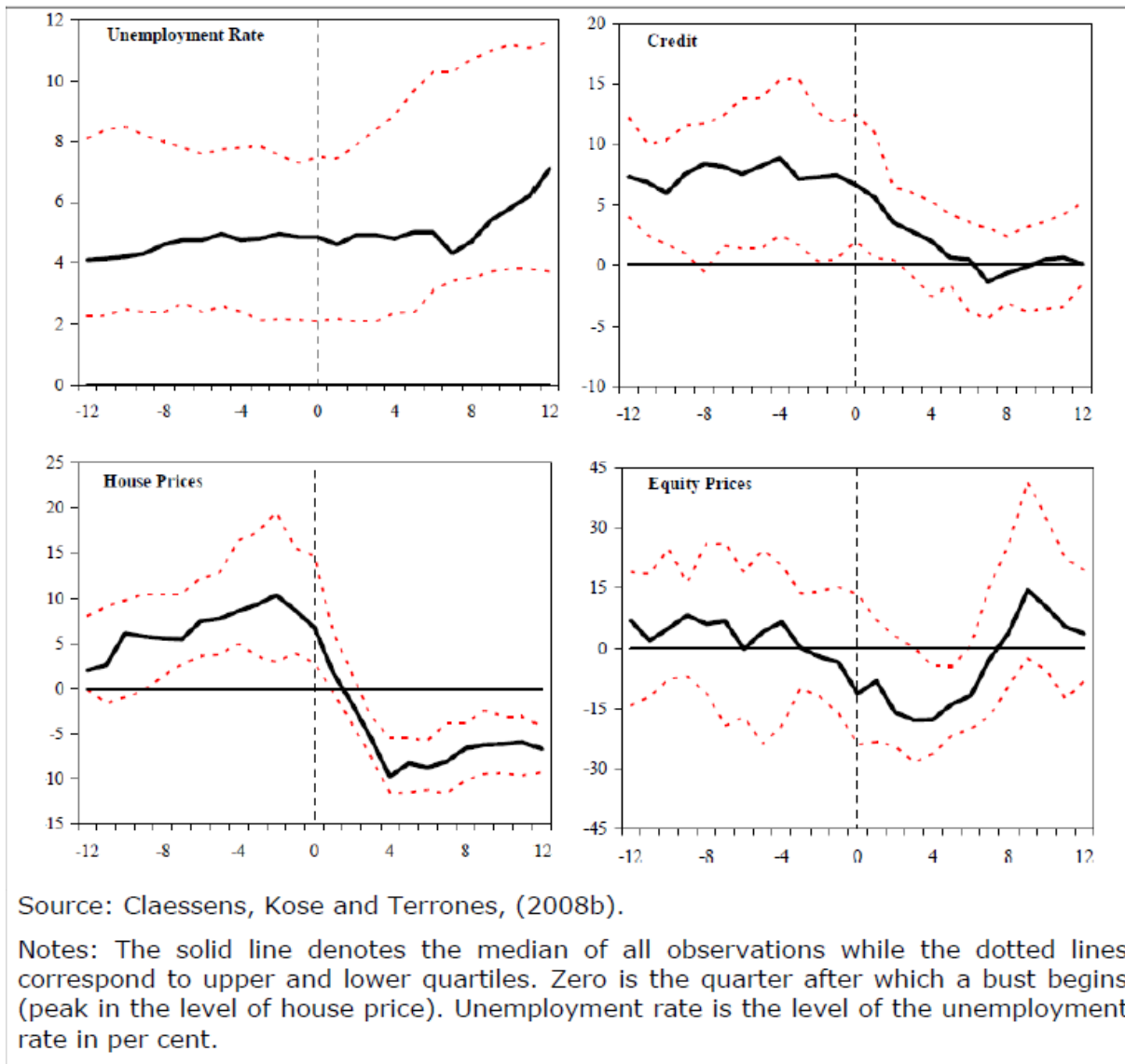


Source: Reinhart and Rogoff (2008).

Notes: The Big Five Crises are: Spain (1977), Norway (1987), Finland (1991), Sweden (1991) and Japan (1992). Other Banking and Financial Crises are: Australia (1989), Canada (1983), Denmark (1987), France (1994), Germany (1977), Greece (1991), Iceland (1985), and Italy (1990), and New Zealand (1987), United Kingdom (1973, 1991, 1995), and United States (1984).

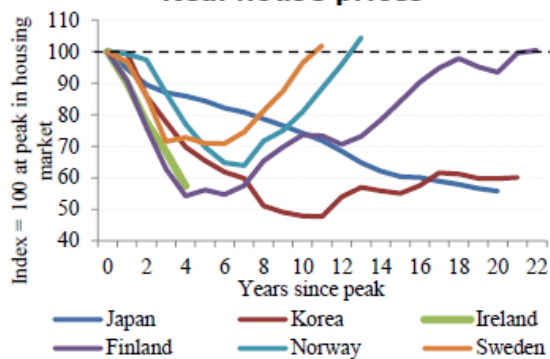
**Figure 6: House price busts in OECD countries**  
 (Per cent change from a year earlier unless otherwise noted; zero denotes peak; x-axis in quarters)







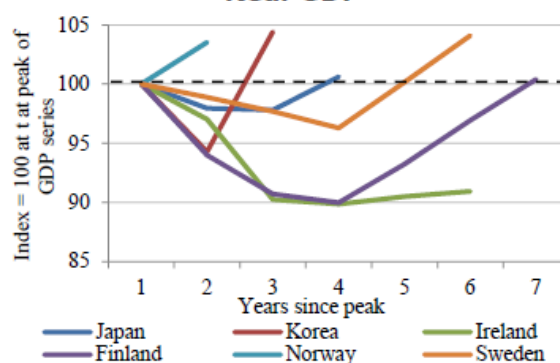
**Figure 7: Real economy peak-to-trough and time to recovery**  
**Real house prices**



Source: O'Connell and Woods (2012).

Notes: Yearly average constructed using quarterly data. Peaks in the housing occurred at different times from historical dating of crisis.

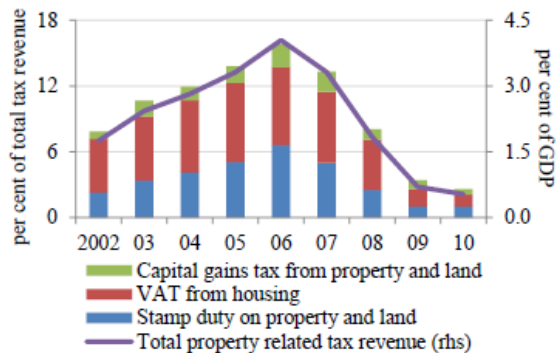
**Real GDP**



Source: O'Connell and Woods (2012).

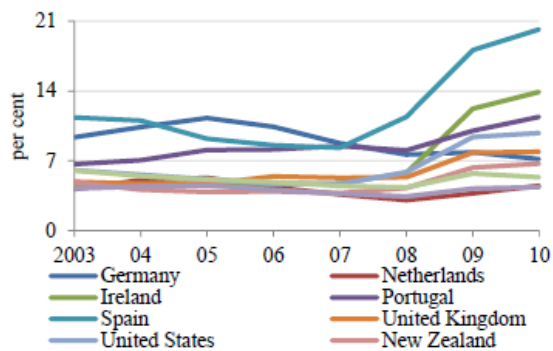
Notes: Irish data are for 2007 to 2013, with CBI QB 1 2012 forecasts used for 2012 and 2013. Peaks in the GDP occurred at different times from historical dating of crisis.

**Figure 8: Cyclically sensitive tax revenues  
Ireland**



Source: European Commission estimates

**Figure 9: Unemployment rates  
International comparison**

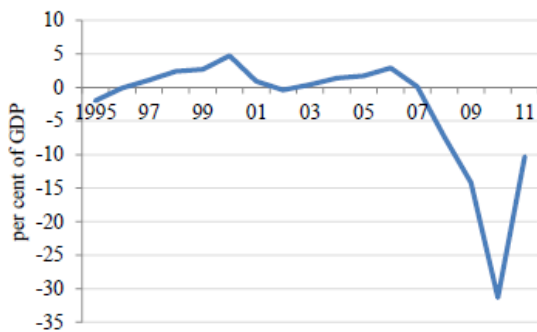


Source: OECD

Note: Unemployment rates are not harmonised

**Figure 10: Fiscal impact of the crisis in Ireland**

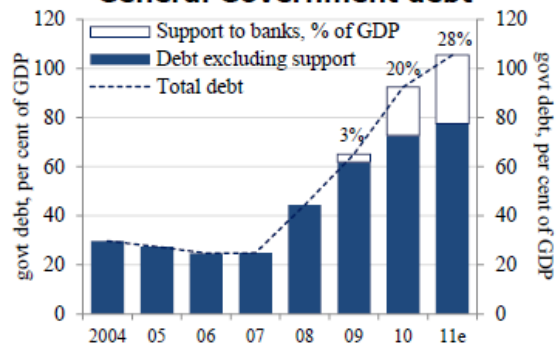
**General Government deficit**



Source: Eurostat and European Commission

Notes: As per European Commission excessive deficit procedure (EDP) definition of the deficit.

**General Government debt**



Source: CBI Macro-Financial Review, March 2012.

Notes: Support includes capital injections (including promissory notes, ordinary shares and preference shares) and associated interest payments.