

## The Fiscal Costs of Banking Intervention in the Eurozone

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**Abstract:** *This study aimed to reveal the fiscal cost of banking interventions in the Eurozone. To this end, firstly, the theoretical underpinnings of a banking crisis and its management policies are explained, then the policies used in the Eurozone and their costs are analyzed in detail. For analysis of banking interventions on budgets, Multidimensional Scaling (MDS) Analysis was used to see similarities and dissimilarities between countries. Two important conclusions emerged. First; countries that have faced a systemic banking crisis (Germany, the Netherlands and Ireland) were dissimilar from the group as a whole from the beginning of the financial crisis. After a sovereign debt crisis, the indebted countries were also affected and disintegrated (Greece and Spain). The second was that the net budgetary impact of these measures was found to be smaller than anticipated but the rise in gross debt was considerable in some countries. Furthermore, in those countries, contingent liabilities posed a threat for future public finances. In order to minimize the fiscal cost of a banking crisis, union-wide crisis management and institutions should be established. This calls for the completion of The Banking Union.*

**Keywords:** Banking crisis, banking crisis management, fiscal cost of banking crisis, MDS Analysis.

**JEL Classification:** G01, G21, H12

### 1. Introduction

Since the early 1970s, through financial and capital account liberalization, banking crises have tended to occur frequently. The subprime mortgage market crisis, which began in August 2007, was rooted in the real estate market bubble, mainly fuelled by foreign capital as a result of capital account liberalization. As Bernanke famously stated, “a global savings glut” inflated this bubble. The savings of China, Japan and Germany flew to the deficit countries, especially to the US. Furthermore, those savings were invested in complex structured assets which were the result of financial engineering, another form of financial liberalization.

After the 1970s, an efficient market paradigm dominated the intellectual discussions. According to this paradigm, financial markets efficiently allocate resources to the most productive investment projects and maximize welfare. Two important outcomes of this paradigm are that bubbles cannot occur because asset values reflect fundamentals and as markets are efficient, they can regulate themselves. Self-regulation of the markets eventually led to a deregulation process with lobbying of bankers from US and Europe. However, with the help of financial innovation, new financial products were created. These new structured products allowed banks to secure loans and repackage them under the name of asset-backed securities (ABS). With a lack of prudent regulation and the optimism of the efficient market

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paradigm, it was thought that these products would spread and reduce inherent risk (De Grauwe (2008), Krugman (2009)).

However, that was not the case. When the bubble burst as a result of contractionary monetary policy in the US, the pricing of these structured assets became problematic. Fire sales began and asset prices collapsed accordingly. This also led to a rapid deterioration in bank balance sheets. Major investment and deposit banks needed the help of authorities to survive. In September 2008, the US authorities allowed Lehman Brothers, the fourth largest investment bank in the US with \$600 billion assets, to go bankrupt. This shocked the markets and transformed the subprime mortgage market crisis into a fully-fledged global crisis<sup>1</sup>.

After the Lehman Brothers collapse, confidence in the credit-worthiness of banks, financial institutions and even firms fell significantly. Then the crisis began to spill over to the real economy (Allen et al., 2009: 3).

The crisis also revealed the serious solvency problems of several major European Banks as these banks played a significant role in structured product demand (Leaven & Valencia, 2008a: 26). Belgium, Luxemburg, Ireland, Germany, Austria and the Netherlands faced a systemic crisis. The severity of the crisis in those countries was related to the size of their financial system and financial links with US banks.

The authorities in the US and Europe intervened in the financial markets to lessen the systemic consequences. Prior to September 2008, they intervened in financial institutions on an ad hoc basis. In this phase, they injected liquidity into the banks and forced them to merge with other banks<sup>2</sup>. After Lehman's default, it became evident that individual solutions would not be enough. Counterparty risk began to emerge and more comprehensive strategies evolved.

These intervention policies have enormous costs. First, these policies have direct fiscal costs in terms of taxpayers' money. The direct fiscal costs can be followed from budget balances and debt ratios. Second, these policies have indirect fiscal costs related to the misallocation of capital and the moral hazard of distorting incentives (Calomiris et al., 2003: 71). Third, a banking crisis is usually followed by a recession, so output loss can also be seen in the aftermath of a financial crisis.

This study is focused only on the direct fiscal costs as a result of banking interventions in 12 Eurozone countries which experienced a banking crisis<sup>3</sup>. The impact of interventions on budget and general government gross debt was analyzed. These interventions have an impact on both revenue and expenditure items of the budget. To analyze the similarities and dissimilarities between the budgetary items of different countries, Multidimensional Scaling Analysis (MDS) was applied. Then the net impact on the budget balance and government liabilities was considered in the light of MDS results.

Sections 2 and 3 of the paper present the theoretical background of a banking crisis and management techniques. In section 4, the details of policies used in the Eurozone are explained. In section 5, the budgetary impact of these intervention policies is analyzed empirically and descriptively. After consideration of the net budgetary cost, the impact on gross government debt is examined and conclusions are drawn in the final section.

## 2. Systemic Banking Crisis

Banks as deposit-taking institutions are inherently vulnerable. They borrow in the form of savings and demand deposits and finance long-term investment projects. This maturity mismatch exposes banks to bank-runs. In normal times, short-term borrowing and long-term lending may not cause any problems, but any triggering factor that induces a loss of confidence in bank solvency can lead to deposit withdrawals (Reinhart & Rogoff, 2011: 9). Diamond & Dybvig (1983) showed that a typical bank-run may be self-fulfilling. A loss of confidence in bank solvency leads to deposit withdrawals. If depositors believe that other depositors will withdraw, then they also feel justified in withdrawing their deposits. Costly liquidation of bank assets is then necessary to satisfy these demands, which leads to a sound bank becoming insolvent. There are two equilibriums here. One is that without a bank-run, depositors withdraw according to their consumption needs. The other is that a bank-run may end with a bank default following liquidation.

A run on an individual bank may not threaten the entire system. However, in the case of inaccurate information, depositors in other banks expect solvency problems to spread to their banks and withdraw accordingly. This bank-run becomes a banking panic (Demirgüç-Kunt & Detragiache, 1998).

After the bank-runs of the 1930s, safety nets such as deposit insurances were established to prevent banking panics. Modern banking systems have averted such types of runs, although a banking run today involves drying up liquidity in interbank markets which is known as a wholesale run (Allen et al., 2009: 4). Lenders of last resort facilities have been extensively used to avoid this type of run.

In recent decades, a banking crisis has been more related with the asset side of the bank balance sheets than the liability side. An exogenous shock, such as a downward pressure on financial assets may start a debt deflation process and fire sales afterwards (Honohan & Leaven, 2005: 8). This deteriorates the balance sheet of the bank. Furthermore, assets are important as collateral. Kiyotaki & Moore (1997) showed that an exogenous shock that causes a drop in asset prices leads to a decrease in the value of collateral. Then borrowers' credit limits decline, so the credit used in the economy also declines. This leads to a further decrease in asset prices causing an eventual downward spiral. Non-performing loans as a consequence of an exogenous shock also hamper the asset side of the balance sheet. This would also trigger the liquidation of assets and poses a threat to solvency.

To sum up, a banking crisis occurs when a considerable numbers of banks in the banking system default or are prevented from defaulting with the help of government intervention, because of a typical bank-run, asset side disturbances or a recognition of regulatory bank failure/s (e.g. fraud, mismanagement or corruption) (Honohan & Leaven, 2005: 6)<sup>4</sup>. If the crisis in the banking system threatens the payments system and has a significant impact on the real economy, this is called a systemic banking crisis. In a systemic banking crisis, situations changed quickly, real information about the banking system is scarce and is usually outdated. A severe recession is the consequence of a drop in credit demand and supply (Hoelscher & Quintyn, 2003: 1).

Leaven & Valencia (2012) created a banking crisis database and determined 147 banking crises between 1970 and 2011. In that study, the crisis countries were divided into two groups: systemic banking crisis countries and borderline banking crisis countries. If a

country experienced significant stress in the banking system such as bank-runs or bank-defaults and used at least three type of intervention policy, which are explained in the following section and are presented in Table 1, it was named as a significant banking crisis. In some countries, no bank default or bank-run was evident, but the government used considerable intervention policies. In this case, those countries were classified as borderline banking crisis countries. In the Eurozone, Austria, Belgium, Germany, Greece, Ireland, Latvia, Luxemburg, the Netherlands and Spain experienced a systemic banking crisis, while France, Italy, Portugal and Slovenia were classified as borderline banking crisis countries.

### **3. Managing a Systemic Banking Crisis**

Management of a systemic banking crisis involves two phases: containment and resolution. In the containment phase, authorities try to re-establish the confidence lost during the crisis and lessen the repercussions to the real economy. This acute phase of crisis is important as a poor response may hamper the resolution phase. In the resolution phase, the government tries to refine the capital positions of banks and resolve bad assets.

#### **3.1. Containment Phase**

In the containment phase of the crisis, it is important to stabilize bank liabilities, thereby stopping depositor and creditor runs. In order to ensure confidence in the system, central banks act in a speedy manner and provide sufficient liquidity into the payment system. This gives the authorities time to understand the real causes of the crisis and choose the policies to target the deficiencies.

How to intervene in the containment phase is related with the roots of the crisis. If the triggering factor is a deposit run, blanket guarantees, liquidity provisions or a bank holiday can be used in order to stabilize the banking system. However, if the problem is related to an insolvent bank, then administrative intervention is needed. The most challenging problem occurs when the crisis originates from macroeconomic turbulence. In this case, bankers are also innocent victims. Regulatory forbearance may be used to address this problem (IMF, 2008: 151).

Regulatory forbearance is mostly used in the containment phase to provide time for recapitalizing by delaying recognition of loan losses or capital shortfall. This is a market-based and decentralized approach that leaves restructuring to the market participants (Calomiris et al., 2003: 8). However, this policy also allows undercapitalized banks to survive and leads to a decline in their net worth. This would increase future bailout costs accordingly (Honohan & Klingebiel, 2000: 6).

Another common tool used in this phase is liquidity support, which is provided by central banks to resume the functioning of the payments system, although according to critics, this support delays the recognition of solvent and insolvent institutions (Honohan & Klingebiel, 2000: 5).

Blanket guarantees are used to avoid bank-runs. Leaven & Valencia (2008a) showed that blanket guarantees and bank closures are negatively related. The government tries to avoid closing banks by extending guarantees, but these guarantees also decrease creditor incentives on monitoring. Therefore, banks with insufficient creditor monitoring take on more risk and try to “gamble to resurrect” (Leaven & Valencia, 2008b: 5).

In cases of severe bank-runs, some administrative measures such as bank holidays or deposit freezes are used. If confidence cannot be re-established, these measures only delay withdrawals.

To avoid debt overhang, a general debt relief can be a useful tool. This approach is based on writing off a portion of the debt. This is simple and speedy but can cause incentive problems. It does not impose costs on borrowers or shareholders, but can create a “culture of no repayment” (IMF, 2008: 151).

The measures used in this phase of the crisis have an irreversible impact on the allocation of losses. Moreover, these will also lead to moral hazard problems. If authorities use poorly chosen policies, these will undermine the success of resolution policies (Honohan & Leaven, 2005: 13).

### **3.2. Resolution Phase**

When confidence has been re-established and markets return to normal functioning, which means the crisis is contained, over-indebtedness and undercapitalization of financial corporations should be resolved. Resolution policies address the solvency problem of banks and help to create a sound banking system. The effectiveness of these policies is related to the existing legal and governmental infrastructure (Honohan & Leaven, 2005: 12).

It is important to distinguish banks according to viability and solvency in this phase. Insolvent and nonviable banks are resolved as soon as possible. Banks that are viable but undercapitalized require intervention<sup>5</sup>. To identify these banks, comprehensive supervisory data is needed. Supervisory authorities ascertain which banks are viable by examining their medium-term business plans and cash-flow projections based on realistic macro-economic assumptions. In these plans and projections, banks present how they can become a profitable institution. When the authorities decide on recapitalization, public funds are injected as a common share, preferred stock or subordinated debt (Hoelscher & Quintyn, 2003:7).

Bank restructuring often has to be done with corporate debt restructuring in order to accelerate the process. To deal with debt restructuring nonperforming assets need to be removed from balance sheets. There is an ongoing debate on this issue. There are two approaches to dealing with non-performing assets. In the first, banks do the debt restructuring themselves as a decentralized approach. In the second, non-performing assets are transferred to a publicly owned asset management company (AMC). In a decentralized approach, the banks have better knowledge of their borrowers but there is a risk of transferring these assets above the market value as not all losses are taken at the bank level. In the publicly owned asset management companies, centralization of skills and resources leads to more effective management. However, in the case of non-performing assets, a large portion of banking system assets is transferred and the AMC may be under political pressure, which could undermine the effectiveness of the AMC (Caprio & Klingebiel (1996) and Klingebiel (2000)).

In the resolution phase, some cases such as bank fraud or corruption also need operational restructuring. Changing the management may help to restore confidence. Nationalization of the bank may be an extreme option in dealing with this type of crisis. Reductions in staff and wages, sales of some assets (e.g. a reduction in subsidiaries) may help to increase profitability and cash flow (Classens et al., 2002: 13).

On the other hand, the interventions of governments are constrained by fiscal capacity. When injecting capital, governments should consider their ability to raise taxes and make spending cuts. Therefore, governments often try to use inflationary solutions or currency devaluations. This is similar to general debt relief. The burden of intervention policies falls on the money holders and other nominal creditors. Banks and nonbank creditors receive relief but this may strain future macro-economic stability (Honohan & Leaven, 2005: 10).

There is no consensus on which policy is superior. To be able to manage a systemic banking crisis, countries have tried various measures. Leaven & Valencia (2008a), Calomiris et al. (2003), Classens et al. (2002) and Honohan & Leaven (2005) all stress the role of institutional factors, and the legal and governmental framework in this decision. In countries with weak institutional structures, a market-based approach may fail. Therefore, in these countries, policies that are less dependent on the political, legal and economic institutions should be used. General debt relief or inflationary solutions may put on the agenda. However, developed countries that have a strong institutional framework should use market-based and decentralized approaches considering competitive incentives.

#### 4. The Management of the Banking Crisis in the Eurozone

It is clear that the European Union was not ready to manage a financial crisis. Neither the ECB nor any European-wide institution was suitably authorized. Management of the crisis was left to national authorities<sup>6</sup>. At the beginning of the 1990s, financial integration was low and there were few cross-border institutions. As a consequence of the prosperity of The Single Market, cross-border institutions emerged and contagion of the crisis became an important fact. Then managing the crisis evolved into a union-wide issue (Freixas, 2003: 6).

A “Declaration on a Concerted European Action Plan of the Euro Area Countries” was endorsed by all EU countries on 15-16 October 2008. It simply stressed the liquidity provision by the ECB, public recapitalization of undercapitalized banks, public guarantees and cooperation among nations<sup>7</sup>. After this declaration, the Commission issued three important documents; the Banking Communication on 13 October 2008, the Recapitalization Communication on 5 December 2008 and the Impaired Asset Communication on 25 February 2009. The commission only determined the outlines of crisis management, and nations were to decide which tools were to be used<sup>8</sup>.

Leaven & Valencia (2010, 2012) classified the policies that addressed the banking crisis into four broad categories. First is *liquidity support*. In the Eurozone, the central bank functions were devoted to the ECB, but the ECB was not formally assigned as a lender of last resort by the Maastricht Treaty (Pisani-Ferry & Sapir, 2009). In the global crisis, the ECB acted swiftly and provided liquidity to revive the interbank market. According to Gionne et al. (2011), the ECB became the “intermediation of last resort”. The aim of the ECB, was to provide liquidity to this market and prevent the credit crunch.

The second policy category is *guarantees on liabilities*. Deposit insurance schemes were already in place. In 1994, EU adopted Directive 94/19/EC which harmonized the minimum level of deposit guarantee as €20 000. However, this directive set the minimum level. After the crisis, the UK was the first EU country to raise the coverage of the deposit guarantee (Singh & LaBrosse, 2011:14). When a country raises its deposit guarantee coverage, it gains a competitive advantage. Funds flew to EU countries with high deposit insurance coverage, thanks to capital liberalization, as a consequence of flight to quality.

Other countries, either inside or outside the Eurozone, followed. Therefore, the Commission made an amendment in the Directive and increased the coverage level to €100 000 (IP/10/918).

The third broad category is *asset purchases*. To relieve the balance sheets of banks, treasuries responded. While purchasing assets, some countries used “bad banks”, to which bad assets had been transferred such as Germany, and some countries established Asset Management Companies (AMC) such as Ireland, Spain, and Belgium (IMF, 2013: 31).

The fourth category is *restructuring*. In order to strengthen the capital ratios of viable but undercapitalized institutions, governments inject liquidity to banks in the form of preferred or common stock and subordinated debt. Before providing public funds, a bank should present a viability test and restructuring plan. The extreme version of restructuring is *nationalizations*. Some systemically important banks nationalized and sold especially in the first phase of the crisis.

In Table 1, the banking crisis management policies pursued in the Eurozone are apparent. Ireland used extensive measures as they experienced severe banking problems. It is important to note the size of the financial sector was also very large in Ireland, so the government intervened heavily to minimize repercussions to the real economy.

**Table 1.** Intervention Policies

| Country                          | Extensive liquidity support | Significant guarantees on liabilities | Significant restructuring costs | Significant asset purchases | Significant nationalizations |
|----------------------------------|-----------------------------|---------------------------------------|---------------------------------|-----------------------------|------------------------------|
| <b>Systemic Banking Crisis</b>   |                             |                                       |                                 |                             |                              |
| Austria                          | ✓                           | ✓                                     | ✓                               |                             | ✓                            |
| Belgium                          | ✓                           | ✓                                     | ✓                               |                             | ✓                            |
| Germany                          | ✓                           | ✓                                     |                                 |                             | ✓                            |
| Greece                           | ✓                           | ✓                                     | ✓                               |                             |                              |
| Ireland                          | ✓                           | ✓                                     | ✓                               | ✓                           | ✓                            |
| Luxemburg                        | ✓                           | ✓                                     | ✓                               |                             | ✓                            |
| Netherlands                      | ✓                           | ✓                                     | ✓                               |                             | ✓                            |
| Spain                            | ✓                           | ✓                                     | ✓                               |                             |                              |
| <b>Borderline Banking Crisis</b> |                             |                                       |                                 |                             |                              |
| France                           | ✓                           | ✓                                     |                                 |                             |                              |
| Italy                            | ✓                           | ✓                                     |                                 |                             |                              |
| Portugal                         | ✓                           | ✓                                     |                                 |                             |                              |
| Slovenia                         | ✓                           | ✓                                     |                                 |                             |                              |

Source: Leaven & Valencia (2012)

Furthermore, from Table 2, the details of these policy responses can be followed. In a systemic crisis most countries nationalized financial institutions. Almost all countries guaranteed assets (except Greece and Spain). Deposit insurance coverage limit was also increased in all countries and in some cases above the threshold level of €100 000. Germany and Ireland relied heavily on asset purchases. Ireland also injected a huge amount of capital to save the banks.

At the beginning of the sovereign debt crisis, indebted countries found themselves in a vicious circle. On one hand, rising government debt caused soaring sovereign bond spreads, while on the other hand, soaring sovereign bond spread caused banking distress as a consequence of a curtailment in credit ratings. To relieve banking pressure and break the vicious circle between sovereigns and banks, Greece and Spain had to undertake further interventions into the banking system in 2012<sup>9</sup>.

Table 2. Details of Intervention Policies Between 2007-2012

| Country                                    | Liquidity Support<br>(Percentage points increase in central bank claims on financial inst. Over deposits and foreign liabilities) | Gross Restructuring Costs (%GDP) | Asset Purchases (%GDP funded by Treasury and Central Bank) | Asset Guarantees (%GDP) | Deposit Insurance Limit (in €) | Other Guarantees on Liabilities   | Nationalisations  |
|--|---|----------------------------------|--|-------------------------|--------------------------------|---|---|
| <b>Systemic Banking Crisis Countries</b>   |   |                                  |  |                         |                                |   |   |
| Austria                                    | 8.0   | 4.9                              | -  | 0.6                     | Unlimited                      | Bank and nonbank bond issues  | Hypo Group(2009)  |
| Belgium                                    | 14.1  | 6.0                              | -  | 7.7                     | €100 000                       | Interbank and short term debts and guarantees on Dexia                                | Fortis (2008), Dexia Bank Belgium (2011)  |
| Germany                                    | 3.5   | 1.8                              | 11.1   | 6.1                     | €100 000                       | Interbank loans and bank debt (€400000)   | Hypo Real Estate(2008)  |
| Greece                                     | 42.3  | 25.4                             | -  | -                       | €100 000                       | Funding guarantees up to €15 bn   |   |
| Ireland                                    | 16.3  | 40.7                             | 20.3   | 19.1                    | Unlimited                      | Unlimited guarantees to most liabilities to 10 banks                                  | Anglo Irish Bank(2009), EBS Limited and Irish Nationwide Build. Society(2010) Irish Life and Perm. (2011) |
| Luxembourg                                 | 4.1   | 7.7                              | -  | -                       | €100 000                       | €4.5 bn guarantee on Dexia's debt   | Fortis and Dexia(2008)  |
| Netherlands                                | 3.7   | 6.6                              | -  | 3.3                     | €100 000                       | Interbank loans of solvent banks Fortis Bond(€5 bn) and ING bonds(€10 bn)             | ABN-AMRO/ Fortis(2008)  |
| Spain                                      | 3.5   | 3.8                              | 1.8  | -                       | €100 000                       | Guarantees on debts of financial inst. (up to €200 bn)                                |   |
| <b>Borderline Banking Crisis Countries</b> |   |                                  |  |                         |                                |   |   |
| France                                     | 7.4   | 1.0                              | -  | 0.3                     | €100 000                       | €350 bn in guarantees for refinancing credit inst. Guarantee on 55 bn of Dexia's debt |   |
| Italy                                      | 5.7   | 0.3                              | -  | -                       | €103 000                       | State guarantee for new bank liabilities  |   |
| Portugal                                   | 16.7  | 0                                | -  | -                       | €100 000                       | Debt securities issued by credit inst. (%20 of GDP)                                   |   |
| Slovenia                                   | 9.6   | 0.8                              | -  | -                       | Unlimited                      | New debt issued by financial inst. Until end-2010                                     |   |

Source: Leaven & Valencia (2012), Stolz & Wedow (2010) and own calculations



## 5. The Fiscal Costs of Banking Intervention

The government tries to minimize the costs of a banking crisis on the real economy by supporting financial institutions, especially banks. In the Eurozone, saving banks was important as non-financial corporations provide approximately 70% of their funds from banks<sup>10</sup> (Gioanne et al., 2011: 13). However, saving banks imposed a fiscal cost.

Fiscal costs are directly related with three factors. First, initial macro-economic, institutional and financial conditions play a role. In the Asian crisis, as a consequence of financial and corporate sector weaknesses, asset values declined enormously and capital flow reversals were evident. Institutional quality weaknesses led to insufficient policy responses. It is clear that if there is a lack of clear and well communicated strategy costs will be greater (Hoelscker & Quintyn, 2003: 4).

Second, intervention policies that are used by authorities are also related to fiscal costs. According to Honohan & Klingebiel (2000), the costliest policy measure is liquidity support. They also stress that countries that are using deposit insurance and regulatory forbearance and avoid liquidity support, could decrease the fiscal cost by two thirds.

Third, the degree of success in recovering asset values is also important in the fiscal cost of a banking crisis. For example in Sweden, in the banking crisis of 1991-93, the fiscal cost of the banking crisis was 4.4% of GDP, but all of the loss was recovered. However, in the case of Ecuador between 1998 and 2001, there was no recovery (Hoelscker & Quintyn, 2003: 34).

Honohan & Klingebiel (2000) identified 112 systemic banking crises in 93 countries between 1970 and 1999. They found that the median fiscal cost of banking intervention policies was 10% of GDP, Caprio & Klingebiel (1996), studied 86 systemic banking crises starting from the 1970s, and found a cost of 13.6% of GDP. Lindgren, Garcia & Saal (1996) also determined 149 systemic banking crises and calculated the cost as 7.2% of GDP.

Leaven & Valencia (2010) studied banking crises -between 1970 and 2006- and found a median direct budgetary cost of 10% of GDP and a median increase in public debt of 16.3 percentage points. Reinhart & Rogoff (2011) argued strongly that an average rise in public debt over a 3-year period is 86 percentage points.

Direct fiscal costs have particular importance in the case of the Eurozone. The Maastricht Treaty has budget deficit and debt thresholds. Therefore, Eurostat, following a decision of 15 July 2009 gathered supplementary data on public interventions to support financial institutions (EC, 2013). Eurostat delivered these data in the form of tables for each EU country<sup>11</sup>. The aim of these tables was to show a complete picture of the actual and potential impact on government deficit and debt due to government interventions directly related to support for financial institutions (EC, 2014: 2). In this section; we will also analyze the direct fiscal cost of a banking crisis by focusing on the impact on the government budget and government gross debt.

### 5.1. The Budgetary Impact of Interventions

Government interventions to financial institutions have an impact on both sides of the budget. In Table 3 the details of these interventions on government revenue and expenditure

can be seen. These interventions have repercussions on the expenditure side of the balance sheet as expected. First; the government issue debt instruments for financing those interventions. Accrued interest payable arising from government interventions is the first item of government expenditure. Secondly, the granting of funds in the form of capital injections above the market price is also recorded as a capital transfer and an expenditure item. Third, the amounts of payments arising from government guarantees granted to financial institutions that have been called by the beneficiary are also recorded as an expenditure item. However, these interventions also provide revenue for the government. As a remuneration for guarantees granted to financial institutions on the value of their impaired assets or for the repayment of their liabilities, governments receive fees. Moreover, governments receive interest on loans granted. Finally, they receive dividends on equity subscribed by governments in financial institutions. The amounts relating to any transactions not falling under the most common types explained above, are reported under the residual “other” lines for both revenue and expenditure (EC, 2014: 13)<sup>12</sup>.

**Table 3.** Net Revenue/Expenditure for General Government

|          |  |          |
|----------|--|----------|
| <b>A</b> | <b>Revenue (a+b+c+d)</b>   | <b>x</b> |
| a        | Guarantee fees receivable  | x        |
| b        | Interest receivable  | x        |
| c        | Dividends receivable   | x        |
| d        | Other  | x        |
| <b>B</b> | <b>Expenditure (e+f+g+h)</b>   | <b>x</b> |
| e        | Interest payable   | x        |
| f        | Capital injections recorded as deficit-increasing (Capital transfer) | x        |
| g        | Calls on guarantees  | x        |
| h        | Other  | x        |
| <b>C</b> | <b>Net Revenue/ expenditure for government</b>                       | <b>x</b> |

Source: EC (2014)

In the Appendix, the details of Table 3 for each country -between 2008 and 2013- are presented in Table A1. Based on Table A1, the similarities and dissimilarities in budgetary items were analyzed. For both revenue and expenditure items, Multidimensional Scaling (MDS) analysis was applied.

### 5.1.1 Multidimensional Scaling (MDS) Analysis

MDS analysis is a multivariate analysis which visualizes the items (unit, individual or observation) based on their distances in multidimensional space. In MDS analysis, items are represented as points in a multidimensional space in such a way that the points corresponding to similar items are located together, while those corresponding to dissimilar items are located far apart (Mochado et al., 2011: 614).

For different types of MDS, as reflected as different types of relationships between the items in multidimensional space, there are different measurement procedures. In this respect MDS can be classified into metric<sup>13</sup> and non-metric MDS (Kruskal & Wish, 1991: 22)<sup>14</sup>. In order to assess the goodness-of-fit, stress values can be used as follows;

$$Stress = \left[ \frac{\sum_{i < k} \sum_{j < k} (d_{ij} - \hat{d}_{ij})^2}{\sum_{i < k} \sum_{j < k} (\hat{d}_{ij})^2} \right]^{1/2} \quad (Eq.1)$$

$d_{ij}$  refers to the distances between the points in the configuration and disparities are obtained as  $\hat{d}_{ij}$  by regressing  $d_{ij}$  on observed distances,  $\delta_{ij}$ . These stress statistics are usually referred to as the Standard Residual Sum of Squares. When the stress statistic is equal to 0, it means that there is a perfect fit between configuration and observed distances (Kruskal & Wish, 1991: 25). In order to assess the goodness-of-fit, the reference stress values for comparison can be seen in Table 4.

**Table 4.** Stress Values

| Minimum Stress | Goodness of Fit |
|----------------|-----------------|
| 0.20           | Poor            |
| 0.1            | Fair            |
| 0.05           | Good            |
| 0.025          | Excellent       |
| 0              | Perfect         |

Source: Timm (2002)

In this study, MDS analysis was applied to see the similarities and dissimilarities of the budgetary impact of interventions in 12 Eurozone countries that experienced a banking crisis. Both expenditure and revenue items were examined as in some cases banking intervention leads to important revenue gain. Furthermore, this analysis was applied for each year between 2008 and 2013, to obtain a general view of the similarities and dissimilarities evolving over time. While MDS can create a geometric embedding of any dimension, it is favorable to restrict the problem in two dimensions. The stress values calculated for both revenue and expenditure items are summarized in Table 5.

**Table 5.** Calculated Stress Values

|             | 2008   | 2009   | 2010   | 2011   | 2012   | 2013   |
|-------------|--------|--------|--------|--------|--------|--------|
| Revenue     | 0.0480 | 0.0320 | 0.0210 | 0.0400 | 0.0103 | 0.0410 |
| Expenditure | 0.0005 | 0.0009 | 0.0019 | 0.0200 | 0.1677 | 0.0012 |

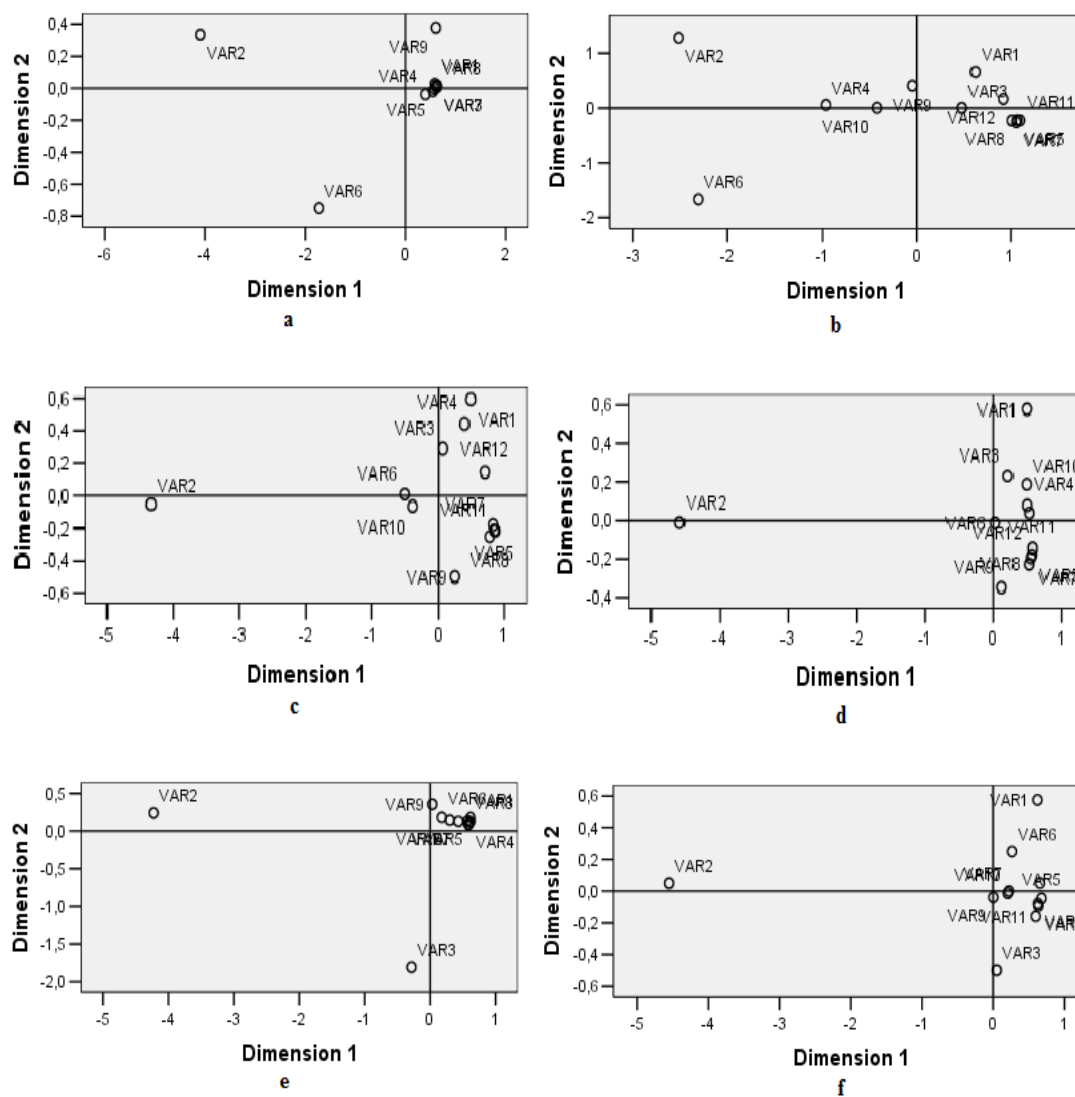
By comparing Table 4 and Table 5, it can be said that in MDS analysis of revenue items the goodness-of-fit was good for 2008 and 2012, excellent for 2009, 2011 and 2013 and perfect for 2010. In MDS analysis of expenditure items, the goodness-of-fit was poor in 2012, but in the other years the goodness of fit was perfect. The goodness of a MDS solution can be visualized in a scatter plot diagrams, that shows scatter plot of the data versus corresponding distances in MDS space. In almost all of the MDS analysis; the scatter plots and observed distances are linearly related. This means differences in the configuration are similar to the observed distances. These diagrams have not been reported not to increase the volume of the paper. The results of the analysis are interpreted in the next section<sup>15</sup>.

### 5.1.2 The Impact of Banking Interventions on Revenue and Expenditure Items

Figure 1 shows the results of MDS applied on revenue and Figure 2 on expenditure items. In Panel a of Figure 1 and Figure 2, which reflects 2008, all countries demonstrate similar patterns but Germany, the Netherlands and Ireland show differences. From Table A1, it can be seen that particularly in Germany, interest on the loans granted are very high. The

Netherlands is also the same. This was mainly caused by close financial ties with the US. According to Bloomberg, 7% of the subprime mortgage market loss belonged to German Banks. Germany funded financial institutions individually until September 2008, after which time more comprehensive strategies evolved (OECD, 2010: 88). As Germany funded financial institutions, a capital transfer can be seen as a capital injection on the expenditure side. In Ireland as the housing bubble burst, financial institutions suffered problems and then in September 2008, the government announced a general guarantee scheme (see Table 2). From Table A1, it can be seen that main contribution to revenue was fees from these guarantees in Ireland. This can also be followed from Table 2. Ireland provided unlimited guarantees to most liabilities of the 10 largest banks. In 2008 the liabilities under guarantee constituted €365 billion (OECD, 2009: 33).

**Figure 1.** Euclidean Distance Model for the 2008-2013 Revenue Items  
*(Var1: Belgium, Var2: Germany, Var3: Greece, Var4: France, Var5: Luxembourg, Var6: Netherlands, Var7: Portugal, Var8: Slovenia, Var9: Ireland, Var10: Spain, Var11: Italy, Var12: Austria)*



In 2009, there was a greater dispersal in the revenue items (Panel b of Figure 1) among countries compared with 2008. This was because after the collapse of Lehman Brothers in September 2008, governments started financial rescue programs conditional to their exposure to financial crisis. There was no co-ordinated response between Eurozone members, so the content of the program differed. From Table A1 it can be seen that in all countries except Italy, revenues occur as a result of these interventions. However, Germany and the Netherlands showed differences. France, Spain and Ireland can be grouped together. They also granted loans and received interest accordingly. In the expenditure items (Panel b of Figure 2), Germany and the Netherlands were again different from the whole group. Ireland also injected capital and differed from the sample.

In 2010, the revenues attained from the interventions rose in all countries in line with financial rescue programs (Panel c of Figure 1). But Germany again differed from the other countries as a significant amount of interest was acquired. The Netherlands and Spain can be grouped together as they both received interest revenue and fees from guarantees. Ireland also differed from the sample because the main source of revenue was fees from guarantees. Looking at the expenditure side (Panel c of Figure 2), it can be seen that Germany, the Netherlands and Ireland are different from the sample. Again Ireland injected a huge amount of capital into the financial system. From Table 2, the gross restructuring cost is seen to be 40.7 for Ireland.

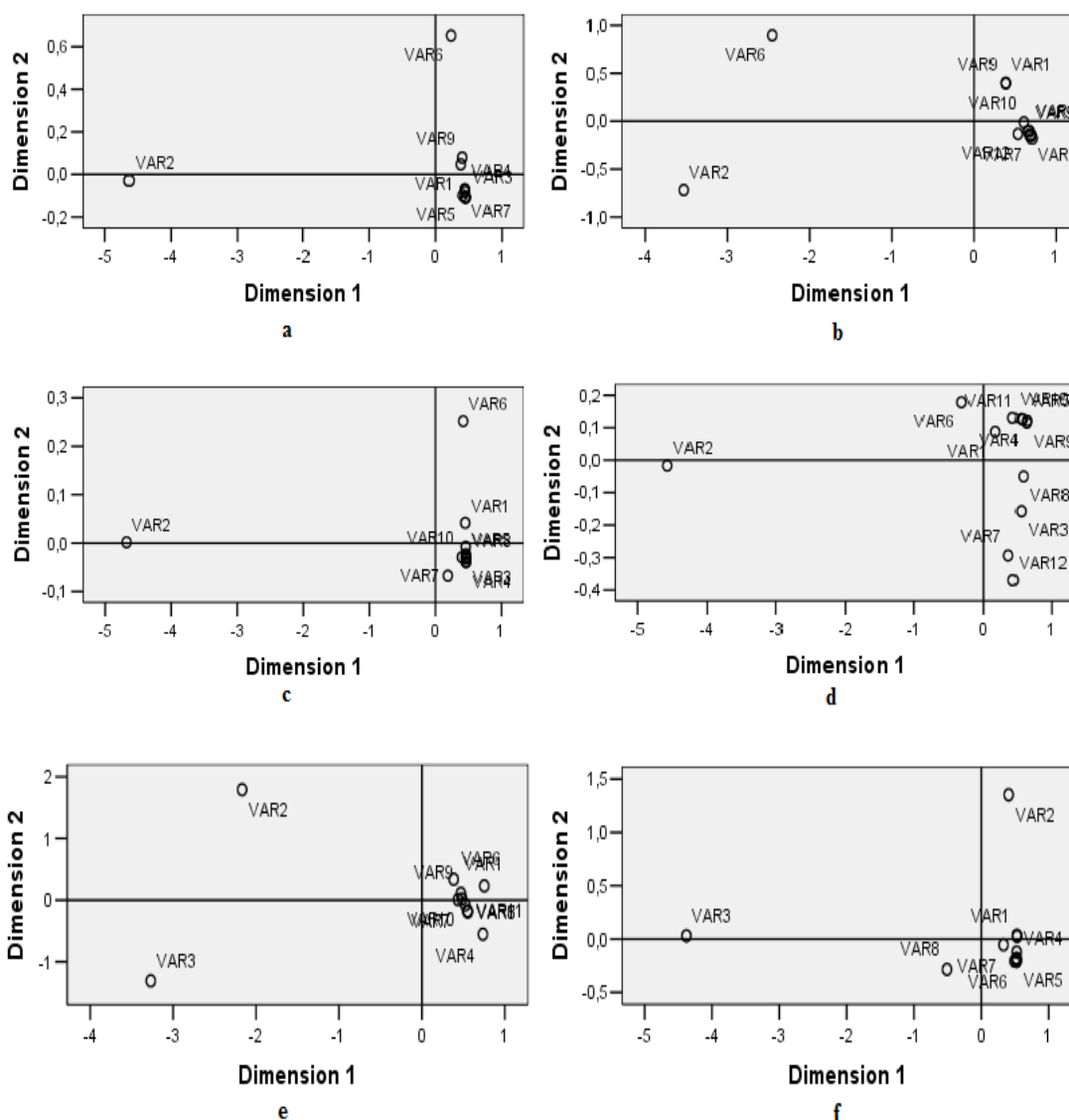
The distances between countries narrowed in 2011 especially in revenue items (Panel d of Figure 1). However, Germany is very different from the whole sample in both revenue and expenditure items. Belgium and Ireland acquired fees from guarantees, but revenues in Spain were rooted in interest receivables. In expenditure items (Panel d of Figure 2), Greece, Austria, Portugal and Slovenia can be grouped together, but they had smaller expenditure compared to the whole group. In Ireland and Spain capital injections were important sources of expenditure (see Table A1).

In 2012, all countries had similar patterns. The distances are very narrow except for Germany and Greece (Panel e of the Figure 1 and Figure 2). In Germany revenue resulted from interest receivables and expenditure resulted from the interest payable. However, in Greece, the revenue and expenditure was related with the commission fees that are reflected in the "other" items. These revenues and capital injections stemmed from the resolution of ATE Bank and cooperative banks and from the recapitalization of Proton Bank (EC, 2013:3).

In 2013, countries were more dispersed compared with 2012 both in revenue and expenditure items. Germany again showed a different pattern. Belgium and the Netherlands can be grouped together in respect of revenue items (Panel e of Figure 1). Greece and Ireland can also be grouped together. Revenues and expenditures in Greece (Panel e of Figure 2) occur as a result of recapitalization that was not reflected for transparency reasons. In Ireland, the revenue resulted from dividends accrued from capital injections in previous years. The expenditure also stemmed from the call on generous guarantees that had been provided in the first years of the financial crisis. Slovenia also injected capital into its ailing banks.

**Figure 2.** Euclidean Distance Model for the 2008-2013 Expenditure Items

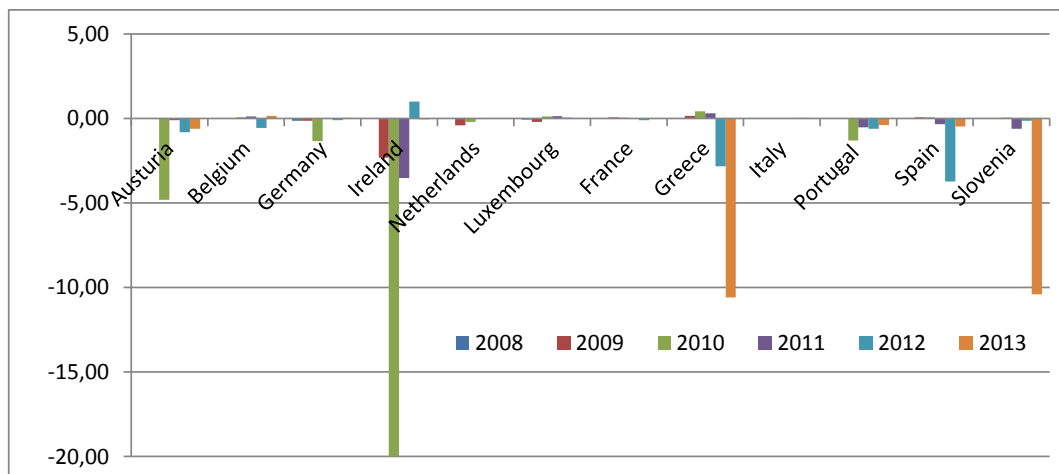
(Var1: Belgium, Var2: Germany, Var3: Greece, Var4: France, Var5: Luxembourg, Var6: Netherlands, Var7: Portugal, Var8: Slovenia, Var9: Ireland, Var10: Spain, Var11: Italy, Var12: Austria)



To sum up, Germany and the Netherlands were dissimilar to the whole group, especially in the first years of the financial crisis. This was due to close financial ties with the US and that they were strongly affected by the turbulence therein, so they used extensive measures to alleviate the financial stress. When the housing bubble burst in Ireland and Spain, they also came under financial stress. Ireland in particular, had provided blanket guarantees to the financial system and as the financial system was very large (678% of GDP), the budgetary cost in Ireland was high. Greece also showed a different pattern in 2012 and 2013 due to restructuring of the banks. It is important to note that in March 2012, sovereign debt restructuring was handled by *troika*<sup>16</sup>. Sovereign bonds were exposed to a haircut of about 53.5% from the face value (Lane, 2012: 59). This hampered solvency for the banks and recapitalization was needed.

The net budgetary impact of interventions can be followed from Figure 3. Between 2008 and 2013, the average impact on budget deficit was 5.7%. The highest impact was in Ireland at 27%. The net budgetary cost in Eurozone countries, except in Ireland, Greece and Spain, was smaller than the deficit ratios suggested by Honohan & Klingebiel (2000), Caprio & Klingebiel (1996) and Leaven & Valencia (2010). Three important reasons may be suggested to explain this. First, as analyzed above, these measures have an impact on both revenue and expenditure items. In some countries, such as France and Italy, revenue impact surpassed the expenditure impact. The second is that asset purchases and capital injections are financial transactions and do not have a budgetary impact. These are categorized as “below the line transactions”. However, in the case of asset or stock purchases above the market price, this difference should be recorded as a capital transfer. Lastly, asset and liability guarantees have no budgetary impact. If a guaranteed bank defaulted, the payments to beneficiaries were reflected as an expenditure item. In the banking crisis of the Eurozone, countries used extensive guarantees, asset purchases and capital injections, the impact of which cannot be seen in budgetary items. Thus, general government debt is analyzed.

**Figure 3.** Net Budgetary Impact of Interventions in Eurozone (%GDP)

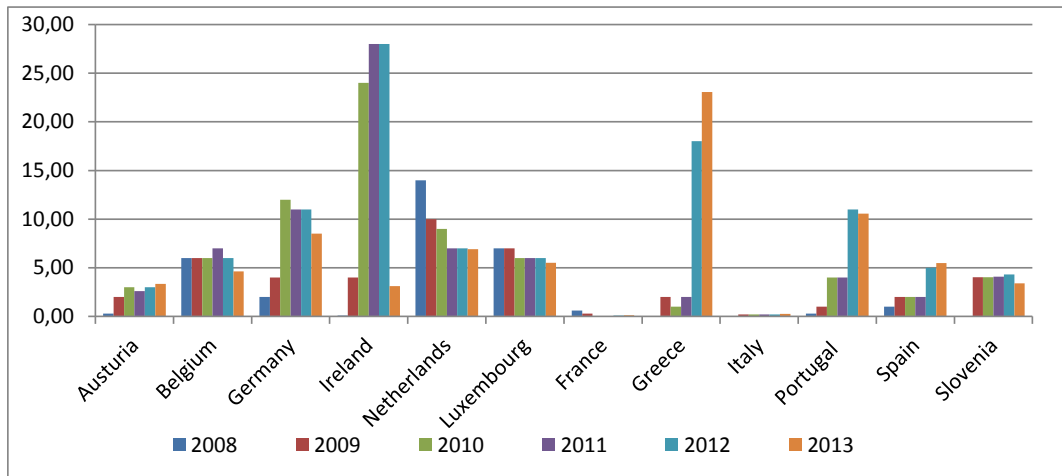


Source: Eurostat

## 5.2. Impact of Interventions on Government Liabilities

Some of these intervention policies do not have any budgetary impact but do affect gross debt. When governments issue debt to finance asset purchases and capital injections; gross debt increases<sup>17</sup>. From Figure 4 it is evident that in the countries which experienced systemic crisis, gross debt also rose accordingly. Between 2008 and 2013, the cumulative increase in general government liabilities /GDP ratio due to interventions was approximately 87 pp in Ireland, 54 pp in the Netherlands and 48 pp in Germany. After the sovereign debt crisis and additional intervention in Greece and Spain, there was a rise in gross debt ratios. In 2012, gross debt ratio increased 23 pp in Greece and 6 pp in Spain. The average impact of interventions on gross debt was 33 pp. This is approximately twice that suggested by Leaven & Valencia (2010).

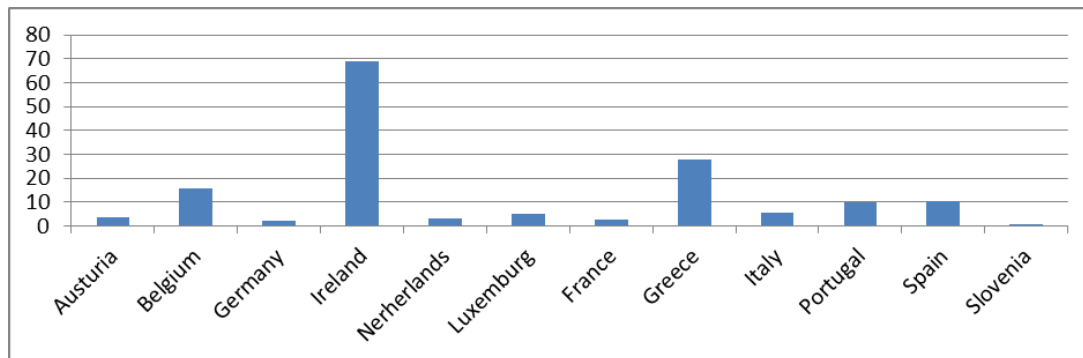
**Figure 4.** Impact of Interventions on Government Liabilities (%GDP)



Source: Eurostat

Guarantees on assets and liabilities do not affect budget balance and gross debt but they increase contingent liabilities. When the guarantee is called and the liability has to be taken over by the government, both deficit and debt will increase (EC, 2014: 8). In Figure 5, contingent liabilities of Eurozone countries are shown. In Ireland, Belgium and Greece, ratios are very high.

**Figure 5.** Contingent Liabilities (%GDP)



Source: Eurostat

It is important to note that these guarantees included a significant amount of assets. Past crises have suggested that the recovery of these assets has been lower than expected<sup>18</sup>. This means that those guarantees may impose a further impact on budget deficit and debt.

## 6. Conclusion

The turbulence first erupted in the subprime mortgage market crisis in August 2007. After the collapse of Lehman Brothers, a crisis in one market affected the entire financial system, spread to other economies and hampered the real sector worldwide.

European banks were also greatly affected as a consequence of financial links with the US. As banks are the most important financial intermediary in the Eurozone, governments used extensive ad hoc and programmed policies to address these problems. Germany, Ireland



and the Netherlands used extensive measures from the beginning of the crisis. This can be followed from MDS Analysis. These countries are dissimilar from their counterparts till the beginning of the crisis. After the sovereign debt crisis, interventions of recapitalizing banks were made in Greece and Spain and they also differed from the entire group. Direct budgetary costs were not as great as suggested for the previous crisis, except in Ireland and Greece. In some countries, such as France and Italy, these measures provided revenue for governments. These revenues were rooted in fees from guarantees and interest receivables.

On the other hand, the gross debt rose enormously, except in France and Italy. This increase was much more than the literature suggested. Furthermore, contingent liabilities in Ireland, Spain, Greece and Belgium posed a threat to future public finances. This was related to the banking crisis management policies used. In this crisis, governments designed their programs based on guarantees and capital injections that had no direct impact on budget.

It is important to note that rising government debt due to these interventions was a triggering factor of the sovereign debt crisis. This also reflects the design failures of European Economic and Monetary Union (EMU). There is no European-wide institution authorized to deal with crisis management, governments were alone. In the case of Ireland, this diminished public finances and Ireland suffered a sovereign debt crisis after Greece. This also threatened the survival of the Euro. After European Debt Crisis, it has been realized that European-wide crisis management institutions are needed, especially to deal with banking problems. With this aim Head of EU States, agreed to establish Banking Union on June 2012. Banking Union rests on three pillars: Single Supervisory Mechanism (SSM), Single Resolution Mechanism (SRM) and Supranational Deposit Insurance. SSM and SRM are established and SSM has come into force. In the context of SRM, Single Resolution Fund (SRF) was formed. This fund mutualizes the banking interventions and financed by levies imposed on banks. So restructuring banks would not impose costs to government finances. But there is no agreement on Supranational Deposit Insurance. It is clear now, a monetary union without banking union is incomplete and prone to crisis. Therefore, especially for the survival of the Euro, completion of banking union is of vital importance.

## End Notes

1. *According to some analysts, if the US authorities had bailed out Lehman Brothers, the crisis would not have become a global financial crisis. Mishkin (2011) rejects this and points out moral hazard issues. This would probably have created a moral hazard and created risk-taking incentives in the banking system. This would have increased the future costs of bailouts accordingly.*
2. *Germany provided liquidity to IKB and Sachsen LB in August 2007 and sold at the beginning of 2008. The UK nationalized Northern Rock and Bradford and Bingley and sold Bradford and Bingley to Abbey (Santander). The US also intervened in Bear Stearns and sold it to JP Morgan Chase (Stolz & Wedow, 2010)*
3. *These countries are Austria, Belgium, Germany, the Netherlands, Ireland, Luxembourg, France, Greece, Italy, Portugal, Spain and Slovenia. Only the countries that experienced a banking crisis were examined in this paper. In order to decide which countries experienced a banking crisis, the criteria of Leaven and Valencia (2012) were applied, which is explained in the text.*
4. *For a detailed survey about the causes of banking crisis see Allen & Gale (2007) and Allen, Babus & Carletti (2009).*

5. *To determine solvency, the most widely-used indicator is capital adequacy ratio (car). However, this may be difficult to calculate at the time of the crisis as loan valuation is problematic. Gearing ratio or banks' reliance on central bank credit may also be used (Hoelscher & Quintyn, 2003).*
6. *According to Niento & Schinasi (2007), management of the crisis had three principles: it was decentralized to national authorities, segmented across sectors and depended on cooperation of supervisory bodies of nations.*
7. *See for details: [http://ec.europa.eu/economy\\_finance/publications/publication13260\\_en.pdf](http://ec.europa.eu/economy_finance/publications/publication13260_en.pdf)*
8. *They also have to bear in mind the state-aid rules, not to distort competition.*
9. *Greece intervened in ATE bank and recapitalized Proton Bank. Spain recapitalized BFA-Bankia, Catalonia-Caixa, NCG Banco and Banco de Valencia (EC, 2013).*
10. *In the US this ratio is approximately 38%.*
11. *There were no reportable interventions in Bulgaria, The Czech Republic, Estonia, Croatia, Malta, Poland and Romania. In Finland there were only interventions related to contingent liabilities.*
12. *Expenditure on commission fees, relating to special entities or revenue fees on securities issued under the special liquidity schemes are recorded as 'other items'. Governments, for reasons of transparency, may report large capital transfers under this item.*
13. *Metric MDS is also known as Principal Coordinate Analysis.*
14. *For details see Johnson & Wichern (1998).*
15. *These can be reported upon request.*
16. *Troika is composed of IMF, EC and ECB.*
17. *If governments reduce the stocks of other financial assets, the deposits in the Central Bank or commercial banks or securities held by government-owned reserve funds, rather than issuing new debt gross debt would not increase (EC, 2009).*
18. *Leaven & Valencia (2008) calculated the recovery rate in Sweden(1991) as 94.4%, in Norway(1991) as 77.8%, in Finland(1991) as 13.3% and in Japan it was only 0.7%. In Japan this increased further and reached 54% in 2008.*

## References;

- Allen, F. & Gale, D.M. (2007), "An Introduction to Financial Crises", Wharton Financial Institutions Center Working Paper, No. 07-20.
- Allen, F., Babus, A. & Carletti, E. (2009) "Financial Crises: Theory and Evidence" Annual Review of Financial Economics, Vol. 1: 97-116.
- Calomiris, C.W., Klingebiel, D. & Leaven, L. (2003), "A Taxonomy of Financial Crisis Resolution Mechanisms: Cross-country Experience", World Bank Policy Research Paper, No: 3379.
- Caprio, J. & Klingebiel, D. (1996), "Bank Insolvencies: Cross-Country Experience", World Bank Policy Research Working Paper, No. 1620.
- Claessens, C. A. , Klingebiel, D. & Laeven, L.(2002) "Resolving Systemic Financial Crisis : Policies and Institutions," World Bank Policy Research Working Paper Series, No. 3377.

- Claessens, S., Pazarbasioglu C., Laeven L., Dobler, M., Valencia, F., Nedelescu, O., Seal, K. (2011) "Crisis Management and Resolution: Early Lessons from the Financial Crisis," IMF Staff Discussion Note No. 11/05.
- De Grauwe, P. (2008) "The Banking Crisis: Causes, Consequences and Remedies" CEPS Policy Brief No.178.
- Demirgüç-Kunt, A. & Detragiache, E. (1998), "The Determinants of Banking Crises in Developing and Developed Countries" IMF Staff Papers, Vol.45, No.1.
- Diamond D.W. & Dybvig P.H. (1983), "Bank Runs, Deposit Insurance, and Liquidity". Journal of Political Economy, 91 (3): 401–419.
- EC (2009), Public Finances in EMU, Economic and Financial Affairs, Luxembourg.
- EC(2013),"Eurostat Supplementary Tables for Financial Crisis: Background Note" (April 2013) [http://epp.eurostat.ec.europa.eu/portal/page/portal/government\\_finance\\_statistics/documents/Background\\_note\\_fin\\_crisis\\_Apr\\_2013\\_final.pdf](http://epp.eurostat.ec.europa.eu/portal/page/portal/government_finance_statistics/documents/Background_note_fin_crisis_Apr_2013_final.pdf) (Retrieved in 13/12/2013).
- EC(2014),"Eurostat Supplementary Tables for Financial Crisis: Background Note" (April 2014) [http://epp.eurostat.ec.europa.eu/portal/page/portal/government\\_finance\\_statistics/documents/Background\\_note\\_fin\\_crisis\\_Apr\\_2014\\_final.pdf](http://epp.eurostat.ec.europa.eu/portal/page/portal/government_finance_statistics/documents/Background_note_fin_crisis_Apr_2014_final.pdf) (Retrieved in 10/06/2014).
- Freixas, X. (2003), "Crisis Management in Europe", in Financial Supervision in Europe ed. Kremers, J.M, Schoenmaker, D. & Wierds, K., Edward Elgar Publishing, UK.
- Frydal, E. (1999), "The Length and Cost of Banking Crisis", IMF Working Paper, No. 99/30.
- Giannone, D.,Lenza, M., Pill, H. & Reichlin, L. (2011), "Non-Standard Monetary Policy Measures and Monetary Developments", ECB Working Paper Series, No.1290
- Hoelscher, D.S. & Quintyn, M. (2003), "Managing Systemic Banking Crisis", IMF Occasional Paper, No.224
- Honohan, P. & Klingebiel, D. (2000). "Controlling the fiscal costs of banking crises," Policy Research Working Paper Series No.2441, The World Bank.
- Honohan, P. & Leaven, L. (2005), "Introduction and Overview" in Systemic Financial Crises: Containment and Resolution ed. Honohan, P. & Leaven, L, Cambridge University Press, New York.
- IMF (2008), "Sound Policies to Resolve Financial System Stress and Restore Sound Financial Intermediation" in World Economic Outlook October 2008: Financial Stress, Downturns, and Recoveries, Washington.
- IMF (2013), "Assessment of Financial Stability in Europe: Much Achieved to Address the Crisis but Vulnerabilities Remain and Intensified Efforts Needed" IMF Country Report, No.13/68.
- Johnson R. A. & Wichern D. W. (1998), Applied Multivariate Statistical Analysis, Prentice Hall, United States of America.
- Kiyotaki, N. & Moore, J. (1997), "Credit Cycles", Journal of Political Economy, Vo.105 No.2, pp. 211–248.

- Klingebiel, D. (2000), "The Use of Asset Management Companies In The Resolution Of Banking Crises Cross-Country Experiences", World Bank Policy Research Working Paper No. 2284.
- Krugman, P. (2009), *The Return of Depression Economics and The Crisis of 2008*. W.W. Norton & Company, Inc. New York.
- Kruskal J. B. & Wish M. (1991), *Multidimensional Scaling*, Sage Publications, United States of America.
- Leaven, L. & Valencia, F. (2008a), "Systemic Banking Crisis: A New Database" IMF Working Paper, No: WP/08/224.
- Leaven, L. & Valencia, F. (2008b), "The Use of Blanket Guarantees in Banking Crises", IMF Working Paper, No. 08/250.
- Leaven, L. & Valencia, F. (2010) "Resolution of Banking Crises: The Good, the Bad, and the Ugly," IMF Working Paper , No. 10/44.
- Leaven, L. & Valencia, F.(2012), "Systemic Banking Crises Database: An Update" IMF Working Paper, No. 12/163.
- Lane, P. (2012). "The European Sovereign Debt Crisis", *Journal of Economic Perspectives*, 26 (3), 49-68.
- Lindgren, C., Garcia, G. & Saal, M.I., (1996), *Bank Soundness and Macroeconomic Policy*, IMF Books, Washington.
- Mishkin, F.S. (2011), "Monetary Policy Strategy: Lessons from the Crisis" IMF Working Paper, No: 16755.
- Machado, J.T, Guarte, D.M & Duarte, F.B., (2011), "Identifying Economic Periods and Crisis with Multidimensional Scaling" *Nonlinear Dynamics*, No: 63, p.611-622.
- Nieto, M.J. & Schinasi, G. J. (2007), "EU Framework for Safeguarding Financial Stability: Towards an Analytical Benchmark for Assessing its Effectiveness", IMF Working Paper No.07/260.
- OECD (2011), *Economic Survey of Ireland*. [www.oecd.org/eco/surveys/ireland](http://www.oecd.org/eco/surveys/ireland).
- Pisani-Ferry, J. & Sapir, A.(2009), "Banking Crisis Management in the EU: An Interim Assessment," *Economics Papers from University Paris Dauphine* No. 12380.
- Reinhart, C. & Rogoff, K. (2011), *This Time is Different: Eight Centuries of Financial Folly*, Princeton University Press.
- Singh, D. & La Brosse, J.R. (2011), "Developing a Framework for Effective Financial Crisis Management", *OECD Journal: Financial Market Trends*, Vol.2011, Iss.2.
- Stolz, S.M. & Wedow, M. (2010), "Extraordinary Measures in Extraordinary Times – Public Measures in Support of the Financial Sector in the EU and the United States" , ECB Occasional Paper Series, No:117.
- Timm N. H. (2002), *Applied Multivariate Analysis*, Springer-Verlag, New York.

## Appendix

Table A1. Net Budgetary Impact of Interventions

|             | Revenue                   |                     |                      |       | Expenditure          |                  |                     |       | Net revenue/cost |
|-------------|---------------------------|---------------------|----------------------|-------|----------------------|------------------|---------------------|-------|------------------|
|             | Guarantee fees receivable | Interest receivable | Dividends receivable | Other | Interest payable (2) | capital transfer | Calls on guarantees | Other |                  |
| <b>2008</b> |                           |                     |                      |       |                      |                  |                     |       |                  |
| BELGIUM     | 21.7                      | 8.9                 | 52.9                 | 0     | 95.6                 | 0                | 0                   | 18.6  | -30.7            |
| GERMANY     | 59                        | 880                 | 0                    | 371   | 805                  | 1100             | 0                   | 2561  | -3156            |
| GREECE      | x                         | x                   | x                    | x     | x                    | x                | x                   | x     | x                |
| FRANCE      | 23                        | 47                  | 0                    | 0     | 22                   | 0                | 0                   | 0     | 48               |
| LUXEMBOURG  | 0.6                       | 15.9                | 0.0                  | 0.0   | 11.6                 | 0.0              | 0.0                 | 25.2  | -20.4            |
| NETHERLANDS | 30                        | 502                 | 0                    | 0     | 450                  | 0                | 0                   | 9     | 73               |
| PORTUGAL    | 0                         | 0                   | 17                   | 0     | 15                   | 0                | 0                   | 0     | 2                |
| SLOVENIA    | x                         | x                   | x                    | x     | x                    | x                | x                   | x     | x                |
| IRELAND     | 110                       | M                   | M                    | M     | 110                  | M                | M                   | M     | 0                |
| SPAIN       | 0                         | 9                   | 0                    | 0     | 21                   | 0                | 0                   | 0     | -12              |
| ITALY       | x                         | x                   | x                    | x     | x                    | x                | x                   | x     | x                |
| AUSTRIA     | 3                         | 0                   | 0                    | 0     | 0                    | 0                | 0                   | 0     | 2                |
| <b>2009</b> |                           |                     |                      |       |                      |                  |                     |       |                  |
| BELGIUM     | 507.5                     | 12.1                | 121.2                | 0     | 654.9                | 0                | 0                   | 18.9  | -33              |
| GERMANY     | 1128                      | 1326                | 2                    | 95    | 1532                 | 3817             | 0                   | 196   | -2992            |
| GREECE      | 176                       | 231                 | 0                    | 29    | 63                   | x                | x                   | x     | 373              |
| FRANCE      | 475                       | 777                 | 204                  | 0     | 100                  | 0                | 0                   | 0     | 1356             |
| LUXEMBOURG  | 12.5                      | 4.9                 | 13.6                 | 0.0   | 99.7                 | 0.0              | 0.0                 | 0.0   | -68.7            |
| NETHERLANDS | 112                       | 1416                | 849                  | 0     | 2391                 | 2160             | 0                   | 86    | -2260            |
| PORTUGAL    | 14                        | 0                   | 47                   | 0     | 52                   | 0                | 0                   | 0     | 9                |
| SLOVENIA    | 7.8                       | 41.7                | x                    | x     | 45.8                 | x                | x                   | x     | 3.7              |
| IRELAND     | 437                       | 387                 | M                    | 60    | 651                  | 4.000            | M                   | M     | -3.767           |
| SPAIN       | 268                       | 633                 | 0                    | 0     | 202                  | 0                | 0                   | 3     | 696              |
| ITALY       | x                         | x                   | x                    | x     | 16.5                 | x                | x                   | x     | -16.5            |
| AUSTRIA     | 217                       | 0                   | 0                    | 0     | 135                  | 120              | 0                   | 2     | -40              |
| <b>2010</b> |                           |                     |                      |       |                      |                  |                     |       |                  |
| BELGIUM     | 687.3                     | 0                   | 191.6                | 0     | 622                  | 0                | 0                   | 7.1   | 249.8            |
| GERMANY     | 1754                      | 3557                | 39                   | 136   | 4106                 | 1400             | 0                   | 33216 | -33237           |
| GREECE      | 625                       | 377                 | 0                    | 47    | 89                   | 0                | 0                   | 0     | 960              |
| FRANCE      | 602                       | 121                 | 289                  | 0     | 17                   | 0                | 0                   | 0     | 995              |
| LUXEMBOURG  | 14.2                      | 2.3                 | 135.0                | 0.0   | 99.8                 | 0.0              | 0.0                 | 0.0   | 51.8             |
| NETHERLANDS | 598                       | 871                 | 56                   | 0     | 1700                 | 928              | 0                   | 52    | -1155            |
| PORTUGAL    | 50                        | 0                   | 59                   | 0     | 84                   | 0                | 450                 | 1800  | -2225            |
| SLOVENIA    | 20.4                      | 55.6                | x                    | x     | 62.6                 | x                | x                   | x     | 13.5             |
| IRELAND     | 1.074                     | 508                 | 211                  | 130   | 1.893                | 31.575           | M                   | M     | -31.545          |
| SPAIN       | 512                       | 805                 | 0                    | 0     | 148                  | 0                | 0                   | 397   | 772              |
| ITALY       | x                         | x                   | 227                  | x     | 139                  | x                | x                   | x     | 88               |
| AUSTRIA     | 301                       | 0                   | 263                  | 2     | 253                  | 1.706            | 0                   | 2     | -1.395           |

The Fiscal Costs of Banking Intervention in the Eurozone

| 2011        |       |       |       |      |       |        |       |      |         |
|-------------|-------|-------|-------|------|-------|--------|-------|------|---------|
| BELGIUM     | 728.9 | 0     | 960.5 | 0    | 661.4 | 121    | 450   | 6.8  | 450.2   |
| GERMANY     | 1548  | 6752  | 45    | 605  | 6868  | 500    | 42    | 2178 | -638    |
| GREECE      | 732   | 346   | 0     | 59   | 109   | 395    | 0     | 0    | 633     |
| FRANCE      | 463   | 19    | 124   | 0    | 5     | x      | x     | x    | 601     |
| LUXEMBOURG  | 11.4  | 5.7   | 141.7 | 0.0  | 99.6  | 0.0    | 0.0   | 0.0  | 59.3    |
| NETHERLANDS | 387   | 678   | 200   | 0    | 1362  | 0      | 0     | 40   | -137    |
| PORTUGAL    | 67    | 16    | 0     | 0    | 364   | 600    | 0     | 0    | -882    |
| SLOVENIA    | 19.3  | 59.3  | x     | x    | 72.2  | 243.4  |       | x    | -236.9  |
| IRELAND     | 1.236 | 598   | 582   | 399  | 1.392 | 7.121  | M     | 34   | -5.732  |
| SPAIN       | 599   | 1.328 | 0     | 0    | 297   | 5.137  | 0     | 9    | -3.516  |
| ITALY       | 10    | x     | 307   | x    | 130   | x      | x     | x    | 188     |
| AUSTRIA     | 332   | 0     | 289   | 4    | 264   | 700    | 0     | 2    | -341    |
| 2012        |       |       |       |      |       |        |       |      |         |
| BELGIUM     | 748.9 | 0     | 800.8 | 0    | 746.9 | 2915   | 0     | 4.4  | -2116.6 |
| GERMANY     | 773   | 6687  | 46    | 878  | 6277  | 0      | 15    | 4512 | -2419   |
| GREECE      | 694   | 780   | 0     | 2907 | 278   | 265    | 0     | 9105 | -5267   |
| FRANCE      | 387   | 0     | 0     | x    | 0     | 2585   | x     | x    | -2198   |
| LUXEMBOURG  | 24.4  | 2.3   | 102.2 | 0.0  | 99.6  | 0.0    | 0.0   | 0.0  | 29.3    |
| NETHERLANDS | 256   | 588   | 155   | 0    | 1136  | 0      | 0     | 34   | -171    |
| PORTUGAL    | 234   | 237   | 0     | 5    | 579   | 750    | 0     | 151  | -1004   |
| SLOVENIA    | 10.2  | 71.5  | x     | x    | 81.5  | 61.0   | x     | x    | -60.8   |
| IRELAND     | 957   | 768   | 849   | L    | 691   | 280    | 0     | L    | 1.603   |
| SPAIN       | 910   | 385   | 0     | 0    | 489   | 39.068 | 0     | 27   | -38.289 |
| ITALY       | 693   | x     | 17    | x    | 103   | x      | x     | x    | 606     |
| AUSTRIA     | 204   | 0     | 289   | 4    | 298   | 2.768  | 0     | 3    | -2.573  |
| 2013        |       |       |       |      |       |        |       |      |         |
| BELGIUM     | 541.7 | 0     | 870.7 | 0    | 790.3 | 0      | 0     | 5.8  | 616.3   |
| GERMANY     | 954   | 5124  | 243   | 861  | 4864  | 0      | 0     | 1370 | 947     |
| GREECE      | 621   | 429   | 3     | 784  | 161   | 14383  | 0     | 6565 | -19272  |
| FRANCE      | 414.6 | x     | x     | x    | 69    | 0      | x     | x    | 345.6   |
| LUXEMBOURG  | 5.5   | 1.4   | 85.3  | 0.0  | 94.1  | 0.0    | 0.0   | 0.0  | -1.9    |
| NETHERLANDS | 191   | 413   | 519   | 0    | 1.113 | 86     | 0     | 43   | -119    |
| PORTUGAL    | 197   | 453   | 1     | 3    | 589   | 700    | 0     | 0    | -635    |
| SLOVENIA    | 7.8   | 54.9  | x     | x    | 97.8  | 3633.0 | x     | x    | -3668.1 |
| IRELAND     | 421   | 664   | 1.038 | L    | 1.785 | 0      | 1.086 | L    | -748    |
| SPAIN       | 533   | 429   | 0     | 0    | 815   | 4.822  | 0     | 19   | -4.694  |
| ITALY       | 716   | x     | x     | x    | 0     | x      | x     | x    | 716     |
| AUSTRIA     | 170   | 0     | 289   | 4    | 290   | 2.066  | 0     | 3    | -1.896  |