THE EFFECTIVENESS OF BANK Bailouts
Value creation or Dilution?
Bachelor Thesis Finance 2012

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1. Introduction

During the past years banks experienced distress as a result of the crisis, resulting into government interventions attempting to restore the financial stability and to prevent worse financial situations. In 2008, the government of the United States transferred 125 billion dollars to banks with the aim to restore confidence to their financial system. In the Netherlands, the government made an amount of 20 billion available to financial institutions. How can these interventions be justified? From an economic perspective, governments should only intervene if the market is not able to perform its task. However, in case of a market failure an intervention should create value and not only lead to a transfer of money from taxpayers to banks (Veronesi and Zingales, 2009). As a result, criticisms make use of this argument and different questions emerge. The president of the federal bank of Minneapolis for example points out that the government should minimize support because it encourages future risk-taking actions by financial institutions. Moreover, some argue that governments should not always intervene and try to minimize the support for failing banks even though the intervention proves to realize a net benefit. This has to do with the fact that government interventions encourage future risk-taking actions by financial institutions and consequently creates distortions (Stern, 2008). Furthermore, a bailout might have a negative effect in the sense that it creates a lack of confidence and eventually deepens a financial crisis (Yiannaki, 2008).

On the other hand, what are the benefits and values created because of bank bailouts? And who are the main beneficiaries? Why is a government intervention important? This thesis will attempt to clarify these issues by examining the literature in the respective field. Methods to be used in order to answer the research questions are the review of relevant literature and conducting an event studies. The importance and the value created due to a government intervention can only be recognized if we fully understand the effectiveness of a bailout. Note that regulations on bailouts and the development of it will not be discussed in this paper. Moreover, contagion in the banking sector that also has a relation with bailouts will not be part of the study as the main focus lies only on the effects of bailouts. Hence, the main question this paper tries to answer is the following.

*To what extent can a government intervention in the form of a bank bailout be considered as effective?*
To be able to fully answer the research question, this paper will proceed as follow. In Chapter 2 insights on the causes of the crisis will be provided that should clarify the emergence of the financial crisis. Regarding the causes of bailouts, credit default swap (CDS) rates play a major role in determining whether a bank is subject to a bank run (Veronesi and Zingales, 2010). Moreover, the reasons that a government considers as important to intervene will be discussed. Lyons (2009) also discusses the necessity of a bailout and why it differs from bailouts from other sectors. Lyons also argues why the competition policy cannot be applied to the banking sector in case of a default.

Chapter 3 will form the basis of the thesis and will consist of an analysis of the effects of the government interventions in 2008 using the papers of King (2009) and Veronesi and Zingales (2010). Accordingly, the value created and distributed as a result of the intervention will become clear. In this section it will be explained how the CDS spread can operate as a method to measure the reaction of bank creditors to the announcement of a rescue plan (King, 2009). In addition to the CDS rate, the bank’s stock will be used as well to determine the reaction of the bank shareholders. Overall it can be concluded that Bank bailouts show that capital injections are positive for creditors and in most cases are negative for shareholders.

An event study will be conducted in chapter 4 that will attempt to prove our findings in chapter 3. The event study should confirm the effects of recent government intervention. Several hypotheses will therefore be tested that are retrieved from the literature that has been used. Finally, the overall findings of the different sections will be summarized and presented in the conclusion.
2. Bailouts and Causes of the Financial Crisis

As discussed in the introduction it is relevant to take a look at the causes and the reasons for why a government considers a bailout as necessary. Crises and bank runs are considered to be main features of the financial landscape that finally can cause bank bailouts (Yorulmazer, 2009). To exemplify, the first bank run in the UK occurred in 2007 where depositors of Northern Rock queued in front of ATM’s in order to withdraw their money. Later on, the government announced a bailout that guaranteed all deposits in Northern Rock. In 2008 banks experienced distress as a result of the financial crisis. Before reviewing the literature with respect to the bailouts it is important to get an understanding of the causes of the subprime crisis that finally led to the banking crisis. According to Reinhardt and Rogoff (2008) a banking crisis occurs when one of the following events are present.

“(1) bank runs that lead to the closure, merging, or takeover by the public sector of one of more financial institutions; and (2) if there are no runs, the closure, merging, takeover, or large scale government assistance of an important financial institution (or group of institutions), that marks the start of a string of similar outcomes for other financial institutions (p. 81, table A2).”

This definition comes close to the definition of a financial crisis. “A financial crisis is a disturbance to financial markets, associated with falling asset prices and insolvency among debtors and intermediaries, which spreads through the financial system, disrupting the market’s capacity to allocate capital within the economy” (Eichengreen en Portes, 1987). Combining the definitions one can conclude that a financial crisis is a distress in the financial market that easily can be spilled over to other financial institutions.

There are several theories that explain the causes of the financial crisis that will be explained without going into detail. The bubble in the housing market is considered as one of the main causes. Households expected the values of their houses to increase in the future and were encouraged to take mortgages with favorable conditions in the short term but not in the future. Lenders who were willing to offer subprime mortgages further fostered this development. According to Bernanke (2007) subprime mortgages are loans made to borrowers with a high credit risk. This is due to their weak credit history and other characteristics that are linked with a high possibility of default. Subprime rates are variable and move in line with the
current interest rate. In the beginning this rate started at a low level, however from 2004 on the interest rate started to rise. As a result borrowers were not able to finance their payments that finally lead to a situation of foreclosures. Moreover the Collateralized Debt obligations (CDOs) also destabilized the financial system. CDO structures enable companies to make transactions with more leverage that finally resulted in a credit crunch (Lim, 2008). To illustrate, CDOs enable the offering of tranches, which makes it possible to issue highly rated bonds and simultaneously junk bonds as part of the same portfolio. Lastly, credit rating companies were too generous in providing ratings. This mainly had to do with the fact that assessing the risk of CDOs for example is extremely difficult. Hence, credit rating agencies were not able to provide rates that reflected the real situation. In addition, once the market collapsed rating agencies worsened the situation by instantly downgrading institutions. Finally, the world is economically linked with each other; the crisis in the US does not stay within the border but spreads easily to the rest of the world.

**Bailouts**

Having briefly considered the causes of the financial crisis, the link between the crisis and bank bailouts can easily be established. The main concern of the government is to prevent spillovers to other banks since spillovers through interbank linkages can cause difficulties to other banks and the financial system in general (Yorulmazer, 2009). As stated earlier, bank runs are the most important feature that might indicate financial crisis. When banks experience liquidity problems, clients get pessimistic and start to withdraw money. Since banks borrow short and lend long, a disruption in customer confidence can result in a self-fulfilling prophecy. Lyons (2009) discusses the necessity of a bailout and why it differs from bailouts from other sectors. According to Lyons (2009) competition policy cannot be applied to the banking sector in case of default. The most important characteristic that distinguishes banking from the competition perspective is the interconnection between banks and the financial system. A collapse of a large bank is contagious in the sense that it contaminates the whole banking system (Lyons, 2009). Since banks lend to each other, bad debts can emerge in case of one bank not being able to repay its duties, which finally influences the solvency of a bank. This can be illustrated by the fall of Lehman Brothers and the depression of the global financial system that followed. In contrast to the banking sector in other competitive markets, when a manufacturer declares bankruptcy, the rivals benefit from this. Therefore, competition policy cannot be applied to the banking sector. Another essential argument is the fact that bank finance is important for the economic system. Borrowing money is necessary for
companies and consumers in order to ensure economic growth. If a bank fails to fulfill this lending function, a fall of demand and finally a recession will follow. All in all, in situations of bank runs, the government has no other choice than to intervene, in order to prevent spillovers to other institutions and a further destabilization of the economy. This leads us to the core of this paper. In the following section the value created due to the government intervention will be examined by using the studies of Veronesi and Zingales (2010). Eventually, this analysis should provide more insights into the effects of the intervention and the value distributed.

Government interventions are considered as important in the sense that they have as objective restoring confidence and stability in banks and the financial system in general and should eventually reduce the probability of bankruptcy. Moreover, bailouts are supposed to oppose the bank run effect and restore household’s confidence (King, 2009). As a result, in 2008, the governments provided financial resources to the financial system in order to support the banking system. The overall amount of the governmental actions in 11 countries was equal to €5 trillion (Panetta et al., 2009). The size of the interventions depends mainly on the size of the banking system in the respective countries. For instance, in the UK and Netherlands the interventions counted for 44.1% and 16.6% of the GDP respectively. This number is lower in countries such as Japan (0.1%) and Italy (0.6%), in which the banking system is more focused on traditional credit activities (King, 2009). Veronesi and Zingales (2010) state that a government intervention should create, not only redistribute value from taxpayers to the banking sector. Therefore, it is interesting to ask whether the intervention by a government does actually create value and if it does, where does this value come from? Is it the taxpayer who bears the full cost? Before answering these questions the role of CDS spreads with respect to bank runs will be discussed.

**A run on short term debt**

Veronesi and Zingales (2010) first use the CDS rates to determine whether banks were subject to a bank run during the financial crisis of 2008. Credit default swaps are basically structured products that act as an insurance against the risk of default. The party that receives the insurance pays a quarterly premium, the CDS spread. In return, the buyer of the CDS will receive a compensation that usually equals the face value of a loan in case of default. It is obvious to assume that CDS rates reflect the probability of default at a given moment, since an increase of the probability of default goes in line with an increase of the rate of a Credit
Default Swap. Hence, a high rate reflects a high probability of default for this year. To determine whether a bank is subject to a bank run the conditional probability of default $P(2)$ for the next year that can be bootstrapped should be compared with the current rate $P(1)$. According to Veronesi and Zingales (2010) $P(2)$ should exceed $P(1)$ in case of bank run, since it is more likely that a default occurs in the short-run rather than in the long term. Therefore, the bank run index can be computed as

$$R = P(1) - P(2)$$

that measures the risk of a run. The figure below retrieved from the article plots the bank run index for the US banks. The vertical dotted line indicates October the 10th, the Friday before the announcement of the bank run. Accordingly, Citigroup, Wachovia, and the three investment banks had a positive bank run index $R$. This indeed confirms that those banks were subject to a bank run. Moreover, Veronesi and Zingales (2010) finally come to the conclusion that banks that were in bad shape gained the most value from the intervention.

**Figure 1: The Bank Run Index**

"The figure plots the difference $R_t = P_t(1) - P_t(2)$, where $P_t(n)$ is the conditional probability of default in year $n$ after $t$, conditional on not defaulting before $n$. These conditional probabilities are inferred from the term structure of CDS rates."

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3. Effects of Bailouts

Evaluating Paulson’s Gift

Veronesi and Zingales (2010) use the US government plan of 2008 to estimate the costs and benefits of the respective intervention. The government plan consists of three parts. First of all, the government injected an amount of $125 billion in equity into the 10 largest US banks. In return it would receive preferred stock with a nominal value equal to the amount of investment. Additionally, the government would receive a 5% dividend for the first five years and 9% thereafter and a warrant equal to 15 percent of the value of preferred stock with a strike price equal to the average stock price 20 working days before the money is invested. Secondly, the plan involved a three-year guarantee for the Federal Deposit Insurance Corporation for all new issues of unsecured debt until June 2009. Attached to this part of the plan was an insurance coverage against all non-interest bearing deposits.

The method used to determine the effect of the intervention is to look at the changes in the value of a bank’s financial claims as well as the final cost to the taxpayer. This basically entails an event study that evaluates the changes in the markets value of equity, debt and derivative liabilities before and after the announcement. The increasing trade of CDSs enabled Veronesi and Zingales (2010) to provide a reliable measure of the changes in the value of debt and the underlying bonds, which is important since the debt holders are expected to gain most from the rescue plan. They came to the conclusion that the value of bonds of the 10 US banks increased to an amount of $124 billion.

With respect to the effects on equity, it can be concluded that equity holders lost $2.8 billion. The event study analyzes the return of stocks of each bank between October the 10th and October the 14th after taking into account the equity betas of the stocks. JP Morgan Chase’s shareholders lost $34 billion while shareholders of Morgan Stanley gained $11 billion. Citigroup and Goldman Sachs gained approximately $8 billion each. Accordingly, the effects of the plan on preferred equity were determined as well. Preferred equity showed an increase of $6.7 billion due to the intervention of the government. Derivative liabilities showed at first insight an increase of $26 billion but after taking into account collateralization the value increases modestly by $5.3 billion. To clarify, collateralization entails that derivative contracts are traded between security dealers.
Overall, Paulson’s plan increased the total value of the bank’s financial claims by $128 billion, as mentioned before; debt holders gained the most of the plan. However, the increase of value cannot be considered as the total value added of the plan, since the government spent lots of money at the cost of the taxpayer in order to implement the plan. Therefore, to assess the net effect of the plan, it is essential to compute the cost for the taxpayers.

In order to determine the costs for the taxpayers the benefits of the plan should be subtracted from the $125 billion infusion, since the intervention provides claims on the underlying companies. Therefore, the intervention amount should be considered as an investment and not as a cost. Hence, the actual cost for the taxpayer equals the difference between the $125 billion invested and the value of the underlying claims. The government claims consist of preferred equity and warrants that benefited the government with an amount between $89bn and $112bn. Consequently, the intervention cost taxpayers between $13 and $36bn., which means that the taxpayers did not benefit. However the intervention has prevented a bank run. Finally, the net benefit of the plan can be determined by adding up the gains of the financial claims of the bank ($124bn) and the cost of the taxpayer ($13-$36bn), resulting in a net benefit of between $88 and $111 billion.

Veronesi and Zingales (2010) finally state that banks will tend to take more risks in the long run since banks know that the government will not let them fail. Therefore, he highlights the importance of preventing futures crises by finding the most effective way to curb incentives of banks to perform risky actions.

**Market reactions to rescue packages in other countries**

In the next section rescue packages in other countries will be reviewed by using King’s (2009) working paper. Analyzing these rescue packages and comparing it with the results of Veronesi and Zingales (2010) should provide more insight into the effects of the interventions and eventually should lead to a reliable conclusion. The study contributes to the existing literature in three different ways. First of all, it empirically assesses the market response to the rescue packages. Secondly, the wealth transfer between creditors and shareholders will be examined. Finally, the paper contributes to literature on the field of CDS spreads.
Similar to Veronesi and Zingales (2010), King evaluates the impact on creditors and shareholders by analyzing the CDS rates and movements in stock prices in six countries. He analyzes market reactions due to the announcement through an event study of the 52 largest banks in the following countries, United States, United Kingdom, France, Germany, Netherlands and Switzerland. The event study methodology suffers from limitations since it is hard to measure the real effects due to the fact that every bank has its own rescue package (King, 2009). Taking this into account, the effects of the interventions are measured through the use of a statistical exercise based on qualifying assumptions. Keeping the objective of the rescue packages in mind, i.e. to diminish the probability of default and to restore confidence in the financial system, data has been analyzed 50 trading days before and after the government announcement in each particular country. The announcement of interventions (Table 1) provides funding to banks in order to prevent dramatic events. It can be seen that pressure to intervene increased at the time that Lehman brothers declared bankruptcy. Due to this, the Troubled Asset Relief Program was announced by Paulson and approved by the Congress on 29 September. Following the example of the US, European governments intervened to rescue their institutions, starting with Fortis in the Benelux (29 September) and ending with Switzerland on 16 October. A more detailed timeline that provides an overview of all the intervention dates can be found in the appendix.

<table>
<thead>
<tr>
<th>Measure</th>
<th>United Kingdom</th>
<th>Netherlands</th>
<th>Germany</th>
<th>France</th>
<th>United States</th>
<th>Switzerland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset insurance</td>
<td>19 Jan</td>
<td>26 Jan</td>
<td></td>
<td></td>
<td>24 Nov</td>
<td></td>
</tr>
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<td>Asset purchases</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 Oct²</td>
<td>18 Oct</td>
</tr>
<tr>
<td>Other measures:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central bank liquidity operations</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Short selling restrictions</td>
<td>18 Sep</td>
<td>21 Sep</td>
<td>21 Sep</td>
<td>21 Sep</td>
<td>18 Sep</td>
<td>21 Sep</td>
</tr>
<tr>
<td>Deposit insurance</td>
<td>3 Oct</td>
<td>10 Oct</td>
<td>6 Oct</td>
<td></td>
<td>3 Oct</td>
<td>5 Nov</td>
</tr>
<tr>
<td>Ad hoc bank support actions</td>
<td>28 Sep</td>
<td>29 Sep</td>
<td>6 Oct</td>
<td>30 Sep</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Overview of comprehensive rescue plans, (King, 2009) as in BIS (2009)
Governments used different comprehensive rescue packages to recapitalize and to increase the solvency of banks by increasing the amount of equity and reducing the amount of leverage. Examples of these are the injections of capital in the form of common and preferred shares, subordinated debt, and convertible notes. The other two categories of measures are debt guarantees and asset purchase/insurance. As explained in Panetta et al. (2009), a debt guarantee basically entails that the government provides guarantees against default on bank debt and other liabilities in return for an annual fee paid by the issuer. Debt guarantees ought to reduce liquidity risk and lower overall borrowing costs and help facilitating banks to maintain access to funding. Under asset purchases or guarantees the government assumes part or all of the risk of a distressed asset portfolio, which limits the potential loss from risky assets and moreover improves bank liquidity (Panetta et al. 2009).

Abnormal return on stock prices and CDS spreads

As mentioned, the use of an event study should assess the response of bank CDS spreads and stock returns to the announcement of these measures. King calculated the daily abnormal return by using a standard event study methodology (MacKinley 1997). Figure 2 displays the abnormal returns in each country.

Figure 2  Cumulative average abnormal stock returns by country

Retrieved from King (2009)
To assess the response of creditors’ reactions, the CDS spreads around the announcement of government intervention had to be analyzed. King determined the abnormal changes in CDS spreads by using both a market adjusted change method, and a multifactor model since CDS rates are sensitive to risk-free rates and equity market volatility as stated in Alexander and Kaeck (2008). Therefore, the multi-factor model is: 

\[ R_{CDSt} = \alpha_i + \beta_1 R_{mt}^i + \beta_2 R_{rt} + \beta_3 R_{vt}^i + \epsilon_{it} \]

Accordingly, King found the following CDS spread changes of each country (figure 3).

Figure 3  Cumulative average abnormal changes in CDS spreads by country

![Graph showing cumulative average abnormal changes in CDS spreads by country](image)

Retrieved from King (2009)

From this point, the narrowing of CDS spreads around the government announcement confirms that creditors took confidence and benefited from the government intervention at the expense of the shareholders. Moreover, the result that comes out from the CDS methodology is consistent across all countries. However, the bailouts did not result into an increase of stock

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1 where \( R_{CDSt} \) is the period \( t \) change in the level of the CDS spread for bank \( i \), \( R_{mt} \) is the change in the CDS market index, \( R_{rt} \) is the period \( t \) return on a country’s 10-year government bond, and \( R_{vt} \) is the change in implied volatility of a country’s national stock market index. The abnormal change in a bank’s CDS is the difference between the actual change and the predicted change based on the multi-factor model.
prices, in contrary, stock prices continued to underperform in all countries except for the US. This mainly has to do with the fact that the rescue package in the US contained favorable conditions that resulted into a decline in the probability of distress that outweighed the potential dilution of shareholders. Moreover, it becomes clear that injected banks perform worse than banks not receiving any form of capital. This entails, that shareholders consider an intervention as a negative signal. Hence, this result confirms Yiannaki’s (2008) statement that bailouts might have a negative effect in the sense that it creates lack of confidence. However, there is no evidence that an intervention eventually deepens financial crisis.

In summary, it can be concluded that in general capital injections are positive for creditors and negative for shareholders. Nevertheless, this assumption does not always prevail, since the intervention effect depends on the type of rescue package and the circumstances of a bank. Which consequently explains the different effects of the rescue packages across the US and Europe. Regarding the US, the capital injection was perceived as positive for both the creditors and the shareholders. This is due to the fact that the preferred shares offered little dilution of existing shareholders and did not impose constraints on bank management (King, 2009). By contrast, bank shareholders in Europe and the UK in particular received the intervention as negative since it diluted their equity and restricted the payment of dividends.

A suggestion as a result of the underperforming stocks in Europe is that capital injections did not succeed in restoring market confidence. This is not surprising, since rescue packages are not meant to protect shareholders but are meant to reduce the risk of default across all banks. Taking this into account, one can assume and conclude that the rescue packages were successful since only a few banks were eventually nationalized.
4. Event Study on recent bank bailouts

In this section the effects of some recent government interventions will be analyzed through the use of an event study. Likewise, by determining the change in CDS spread and the return on stocks, the effects of the respective bailouts can be assessed. Moreover, it will become clear whether the results of King (2009) and Veronesi and Zingales (2010) are consistent with our findings.

The following hypotheses discussed in the previous chapters and used by King (2009) will therefore be tested.

\[ H1: \text{Capital injections will in general cause a decline in bank stock prices, except in situations where the probability of default decreases and outweighs the potential dilution of existing shareholders.} \]

\[ H2: \text{The announcement of government interventions will be associated with a narrowing of bank CDS spreads} \]

Specification of the event study

Before discussing the methodology that will be used, the banks that will be included into the event study should be identified. To highlight, only banks that were not included in King’s event study will be incorporated. The following banks that were subject to a government intervention will be part of the event study. Some additional data about the bank will be given as well.

**Dexia**

On the 20\(^{th}\) of October of 2011, the Belgium government nationalized Dexia in order to prevent bankruptcy. Details of the plan were announced in an official press release on the 10\(^{th}\) of October. Belgian government bought the bank's division in Belgium for 4bn Euros. Moreover, Dexia also secured state guarantees of up to 90bn euro’s to secure borrowing over the next 10 years. Belgium will provide 60.5% of these guarantees, France 36.5% and Luxembourg 3%. For Dexia, 2011 was a difficult year, mainly due to the problems of Greece and the drying up of interbank liquidity. As a result, Dexia’s share lost 88.5% from €2.5 at the end of 2010 to €0.297 at 30 December 2011. The associated market indices reflected similar drops. The BEL20 fell with 19.2%. Some additional data is presented in table 3.
Table 3 Stock Data Dexia Bank

<table>
<thead>
<tr>
<th></th>
<th>31/12/10</th>
<th>31/12/11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share price (in EUR)</td>
<td>2,600</td>
<td>0.297</td>
</tr>
<tr>
<td>Market capitalisation (in millions of EUR)</td>
<td>4,801</td>
<td>0.579</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest/lowest price (in EUR)</td>
<td>4,868/2,540</td>
<td>3,571/0,220</td>
</tr>
<tr>
<td>Average daily volume of transactions (in millions of EUR)</td>
<td>13,379</td>
<td>8,533</td>
</tr>
<tr>
<td>Daily number of securities exchanged (in thousand shares)</td>
<td>3,802</td>
<td>5,543</td>
</tr>
</tbody>
</table>

Retrieved from Dexia’s annual report (2011)

**National Bank of Greece SA**

On 17 February 2009, the government of Greece offered a debt guarantee worth 500m Euro to the national bank of Greece. In addition, the National bank sold the government preferred shares worth 350 million euro’s. This intervention was part of the rescue package offered by the government which included capital injections through preferred shares, guarantees on debt issuance by banks and liquidity support via special government bonds. At the end of 2009 shareholders’ equity was equal to an amount of €8.5 billion. The stock price fluctuated remarkably, with an annual stock volatility of 4.0%. The NBG share price declined in the first quarter, due to the crisis. However, the share price picked up and increased in the up following quarters. Furthermore, NBG’s market capitalization at 31 December 2009 was €11 bn, an increase of 4.4 bn compared to the beginning year. The weighted index of NBG’s increased even at higher level. NBG’s share of the total market capitalization of the Greek banking sector reached 35%, indicating that NBG performed better than other banks.

**Piraeus bank**

Another bank that will be used for analyzing the effects of the intervention is Piraeus Bank. On the 23rd of January 2009, the bank witnessed an increase of share capital equal to 370 million euro through the banks issue of preferred stock to the government. In 2009, the stock market movement of the Bank’s share price was mainly due to the negative international and Greek macroeconomic developments. As a result, the stock price represented great volatility. The share price followed the Athex market index and dropped until March 2009, but eventually closed with a 29% increase at €8.09. Regarding the market capitalization, Piraeus Bank ranked ninth among the Athex listed companies. In 2009, the total market capitalization increased by €15.3 billion ending at €83.4bn.
Methodology

Now the method that has to be used to determine the effects of the capital injections will be explained. King used two methods to measure effects of the government announcement. First King calculates the abnormal return of stock prices and the abnormal changes in CDS spreads by using the multi factor model as explained in MacKinley’s (1977) event study methodology.

$R_{CDSi} = \alpha_i + \beta_1 R_{mi} + \beta_2 R_{nt} + \beta_3 R_{nt} + \varepsilon_{it}$

Another method that King used is the Market-adjusted change in CDS spreads and stock prices. Both methods will be explained below and will be used in our event study.

Abnormal return in stock prices

The abnormal return in stock prices will be computed by using MacKinley’s (1977) standard event study methodology, which is explained by King (2009) as follow;

$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$

$R_{it}$ and $R_{mt}$ are the daily returns of the stock price for bank $i$ and the national stock market index $m$, respectively, and $\varepsilon_{it}$ is a zero-mean error term with constant variance. Both the beta and the alpha are retrieved from historical data. The ARs for bank $i$ and event date $t$ can be calculated as the difference between the actual returns and the predicted returns over the based on the estimated coefficient from the equation displayed above.

Market-adjusted changes in CDS spreads and stock prices

The method of cumulative market-adjusted change will also be used in our event study to capture the response of bank CDS spreads and stock prices. Basically the market-adjusted returns (MARs) can be calculated as the daily change in the relevant market index deducted from the daily change in a bank’s security, i.e.

$MAR_{ir} = R_{ir} - R_{mr}$

This method can be considered the same as the abnormal return method with an interception equal to zero and a beta on the market equal to 1. A beta of 1 implies that changes in equity follow the market index one-to-one. The advantage of this method is because of its convenience and simplicity. There is no need to incorporate other factors than the market index. Moreover King confirms that his previous results of the market-adjusted method are
similar to the results calculated using the multi-factor method. Therefore, we can assume that
the results of the market-adjusted method will be robust as well.

The cumulative average market-adjusted changes can be obtained by determining the daily
MARs across banks in a given country and summing it over the window [-50, 50] where t=0
will be represented as the announcement days; Dexia 10th of October 2011, National bank of

Data

Data will be obtained from Datastream and Bloomberg in order to measure the effects on
CDS rates and stock return. Moreover, stock changes and CDS rates will be measured in
different event windows starting and ending 50 days before and after the event [-50, 50]. Note
that due to unavailability of CDS data in DataStream, only part of the analysis can be
performed. For your information, CDS spreads of Piraeus bank are not available. Moreover,
we should take into account that the banks used are included in the national market indices
and are hence correlated. This should reduce the size of the market-adjusted change in the
event study performed, as movements of the bank stock are incorporated in the market index.
The results of the correlation analysis are not surprising; most banks show a positive
correlation between the banks stock change and its accompanying market index. The results
are shown in table 4. Lastly, a significance test will be performed to test the robustness of the
results.

Table 4 Correlations

<table>
<thead>
<tr>
<th>Bank</th>
<th>Accompanying Market Index</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dexia</td>
<td>Belgium20</td>
<td>0,53455</td>
</tr>
<tr>
<td>National Bank of Greece</td>
<td>Athex Composite</td>
<td>0,915337656</td>
</tr>
<tr>
<td>Piraeus</td>
<td>Athex Composite</td>
<td>-0,751761856</td>
</tr>
</tbody>
</table>
Findings

Reaction on stock returns

AR Method

The abnormal change of the stock return is calculated following the described method. Table 5 shows the reaction of the stock around the announcement days. Overall, the stock decreased on the event day [0, 1], which entails that the government intervention is perceived as negative for all bank shareholders. Moreover, the event window [0,10] indicates that the stock price behaved negatively over a larger window.

<table>
<thead>
<tr>
<th></th>
<th>[-10, -5]</th>
<th>[-5, -1]</th>
<th>[0,1]</th>
<th>[1,5]</th>
<th>[5,10]</th>
<th>[-10,1]</th>
<th>[0,10]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dexia</strong></td>
<td>-3.18%</td>
<td>-47.88%</td>
<td>-4.79%</td>
<td>-28.38%</td>
<td>-6.23%</td>
<td>-48.62%</td>
<td>-27.40%</td>
</tr>
<tr>
<td><strong>NBG</strong></td>
<td>1.60%</td>
<td>2.90%</td>
<td>-4.61%</td>
<td>-9.75%</td>
<td>-1.08%</td>
<td>-1.18%</td>
<td>-13.13%</td>
</tr>
<tr>
<td><strong>Piraeus</strong></td>
<td>1.38%</td>
<td>-1.29%</td>
<td>-5.04%</td>
<td>-11.35%</td>
<td>-3.37%</td>
<td>-4.58%</td>
<td>-13.70%</td>
</tr>
</tbody>
</table>

Testing for significance

To get an indication of the reliability of our findings presented above we have to test whether the abnormal changes are statistically different from zero. In order to test whether the abnormal returns are statistically different from zero we have to compute a test statistic. Following Serra (2002), the test can be performed as follow.

$$ t = \frac{AR_0}{S(AR_0)} $$

Where $AR_0$ is the abnormal return on the event day and $S(AR_0)$ the abnormal return standard deviation estimated on the non event window [-365, -90]. The standard deviation is calculated over a non-event window in order to obtain reliable data and minimize manipulation. To achieve this, data one year before the non-event window is used to calculate the predicted values and hence the non-event window abnormal changes. The results for stocks are shown in table 6. In our case it turns out that on the event day itself, the stock behaved negatively for all banks, which indicates that stockholders perceived the intervention as negative. Hence, according to these results H1 can be accepted.
Table 6 Abnormal stock returns

<table>
<thead>
<tr>
<th></th>
<th>[-1]</th>
<th>[0]</th>
<th>[1]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dexia</td>
<td>0.00275114</td>
<td>-0.0177254</td>
<td>0.005157</td>
</tr>
<tr>
<td>National Bank of Greece</td>
<td>0.00438639</td>
<td>-0.0120399</td>
<td>-0.0112841</td>
</tr>
<tr>
<td>Piraeus</td>
<td>-0.005631</td>
<td>-0.012613</td>
<td>-0.0161912</td>
</tr>
</tbody>
</table>

Market Adjusted Change method

Next, the cumulative market-adjusted returns can be computed as the difference between the change in a bank’s stock and the accompanying change of the market index. The market index used for Dexia is the BEL20. While for the banks in Greece, the Athens Stock Index (ASE) is the relevant market index. By summing the market-adjusted change over a particular event window, the results in Table 7 can be presented. To provide a broader picture of the results, different event windows will be used for the market-adjusted method. As explained before, the results are calculated the same way as the abnormal return method assuming a beta equal to 1 and an interception of zero. A beta of 1 simply implies that a security will move with the market.

Table 7 Reaction of stock around announcement of rescue packages

<table>
<thead>
<tr>
<th></th>
<th>Cumulative market-adjusted stock returns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[-50, -26]</td>
</tr>
<tr>
<td>Dexia</td>
<td>-7.00%</td>
</tr>
<tr>
<td>Bank of Piraeus</td>
<td>-29.32</td>
</tr>
<tr>
<td>National Bank of Greece</td>
<td>0.50%</td>
</tr>
</tbody>
</table>

Similar to the results of the abnormal change method one in general can conclude that on the days after the announcement the stock price has decreased remarkably for all three banks. For Dexia, the stock decreased modestly with 5.1% after the announcement day. On a cumulative event window of respectively 25 and 50 days after the event day, the stock price performed even worse, i.e. by -63.75% and -68.29%. This result is not surprising, since bailouts are meant to lower the probability of default and is not meant to protect shareholder value. However, the days prior the intervention shows a decrease as well, this might indicate that either a default or a government intervention was anticipated beforehand.

Considering Piraeus bank, the stock price decreased one day after the announcement day as well. However, summing up the 50 days after the event day, it can be concluded that the stock behaved moderately but still negatively. This can be explained by taking the type of rescue
package into account. The modest movement has to do with the fact that the government only injected capital through the banks issue of preferred shares. As a matter of fact, the issue of preferred share does offer little dilution of existing shareholders (King, 2009).

Finally, the results of the National bank of Greece can be interpreted as follow; similar to the other two banks the stock price of NBG decreased immediately after the event day with 6.77%. To illustrate, the graph below displays the market-adjusted change for NBG for each day.

Figure 4 Market Adjusted Change of National bank of Greece

However, the stock prices showed in general a positive cumulative change in each particular window. The explanation for this result is simple; the National Bank of Greece received the largest part of the government rescue package that consisted of an issue of 500m in debt and the issue of preferred shares equal to an amount of 350m. Taking this considerable amount into account and the positive reactions of shareholders, it can be concluded that shareholders took confidence assuming the probability of default had decreased. In addition, the issue of preferred shares does only offer little dilution to shareholders. Hence, it can be concluded that our findings are consistent with the results of Veronesi and Zingales (2010) who argue that conditions of the rescue packages might outweigh the potential dilution of shareholders. This brings us back to the hypothesis addressed at the beginning of this chapter.

H1: Capital injections will in general cause a decline in bank stock prices, except for situations where the probability of default decreases and outweighs the potential dilution of existing shareholders.

All in all, the results generally illustrate a decrease of stock returns due to the government announcement. Hence, it can be confirmed that the hypothesis tested can be accepted and is consistent with our findings.
Reaction on CDS spread

To compute the cumulative market-adjusted change we subtract the change of the market CDS spread of the accompanying bank from the change of each individual bank CDS spread. Similar to King (2009) we used the CMA European iTRAXX index as a market index for the National Bank of Greece. As for Dexia we used the Kingdom of Belgium CDS 5-year as the market index. The results are presented in table 8.

<table>
<thead>
<tr>
<th></th>
<th>Cumulative market-adjusted changes in CDS Spreads</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[-50,-26]</td>
</tr>
<tr>
<td>National Bank of Greece</td>
<td>9.29%</td>
</tr>
<tr>
<td>Dexia</td>
<td>17.07%</td>
</tr>
</tbody>
</table>

Before interpreting the results, the hypothesis below and the role of the CDS will be highlighted again. CDS rates reveal the probability of default at a given moment, since an increase of the probability of default goes in line with an increase of the rate of a Credit Default Swap. Hence, a high rate reflects a high probability of default for that particular period.

H2: The announcement of government interventions will be associated with a narrowing of bank CDS spreads

Over the event windows prior the announcement day one can conclude that for both Dexia and the National Bank of Greece, the CDS spread moved upwards, which indicates an increase of the CDS rate. Regarding the results of the national bank of Greece it can be seen that on the day after the event the CDS spread decreases with 7.59%. Overall, the CDS spread decreased following the days after the event [0, 50] while before the event day the CDS spread increased. As for Dexia, on the day after the announcement the CDS spread reacted negatively as well. At event day one the CDS spread dropped significantly with 11.1%. These results are unsurprising, since a narrowing of CDS spreads implies that the bailout was perceived as positive for creditors. This has to do with the fact that a narrowing in CDS spread reflects a decline of the probability of default at a given moment (Veronesi and Zingales, 2010). Therefore, the results confirm the second hypothesis presented above.
5. Conclusion

This paper analyzed the effects of government interventions by evaluating the changes in stock and CDS spreads around the announcement day. Before having analyzed the effects on bank’s equity and CDS spread, causes and the importance of bank bailouts were examined.

In the first section the relation between financial distress and bailouts became clear. It can be concluded that crises and bank runs are considered as a main feature of the financial landscape, that finally leads to a bank bailout (Yorulmazer, 2009). According to Lyons (2009) bank bailouts are important in the sense that competition policy cannot be applied to the banking sector in case of a default, since banks are interconnected with each other and the financial system. Hence, it is important for the government to intervene in order to prevent spillovers and a further destabilization of the whole financial system. A suggestion that can be given to prevent further bailouts is to create more transparency and enhance monitoring by the government (Yianakki, 2008). By doing this, situations of moral hazard will occur in a less extend. This will stabilize the financial transactions within and across banks and in the end result in fewer bailouts.

Next, this paper identified the factors that can be used to measure the effects of a bailout. CDS spread and the changes in stock return are described as measures to the reaction of announcement of a rescue plan. As explained, credit default swaps are structured products that act as an insurance against the risk of default. Moreover, the paper of Veronesi and Zingales (2010) has been used to estimate the costs and benefits of the US intervention plan of 2008 by looking at the changes in the value of a bank’s financial claims as well as the final cost of the taxpayer. It can be concluded that only part of the total rescue amount eventually comes at the cost of the taxpayer. The $125bn government injection resulted in a net benefit of between $88 and $111billion and a cost to the American taxpayer of $13-$36bn.

In the same section King’s paper (2009) was used to analyze rescue packages in other countries through the empirical assessment of market responses. According to King a government intervention will be associated with a reduction of a banks CDS spread. This consequently entails that creditors took confidence and the probability of default had decreased. Next to the CDS rate, the bank’s stock can be used as a measure to determine the reaction of the banks shareholders. King argues that capital injections should create
shareholder value in case the benefits of lower leverage and a lower probability of financial distress offset the dilution of existing shareholders.

The event study performed is meant to prove Kings (2009) hypotheses and to finalize the answer on our research question that addressed the effectiveness of Bank Bailouts. All in all, it can be concluded that bank Bailouts are in general effective since bailouts restore confidence and stability in banks and the financial system and eventually reduce the probability of bankruptcy. Moreover, bailouts are supposed to oppose the bank run effect and restore household’s confidence (King, 2009). The results of the event study prove the robustness of the hypothesis tested. The analyses show that both the results of the market adjusted change method as well as for the abnormal change method are consistent with the literature explained previously. Therefore, it can be concluded that capital injections indeed cause a decline in stock price and a narrowing of a banks CDS spread. This implies that capital injections are positive for creditors and in general negative for shareholders. This is not surprising, since rescue packages are not meant to protect shareholders but are meant to reduce the risk of default across all banks. Taking this into account, one can assume and conclude that the rescue packages were effective since the government interventions restored creditor’s confidence and reduced the probability of default, which is in the end, the main goal of the bailout.
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### Appendix A

#### Timeline of key rescue efforts

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 September</td>
<td>US Treasury makes public plans to purchase illiquid assets from banks under Troubled Asset Relief Program (TARP).</td>
</tr>
<tr>
<td>29 September</td>
<td>Fortis receives a $16 billion in capital from the Dutch, Belgian and Luxembourg governments, representing 49% of capital. Bradford &amp; Bingley is nationalised by the UK government. US Congress votes down the TARP.</td>
</tr>
<tr>
<td>30 September</td>
<td>France and Luxembourg inject €6 billion of capital into Dexia.</td>
</tr>
<tr>
<td>3 October</td>
<td>US Congress approves the revised $700 billion TARP. Dutch assets of Fortis are nationalised.</td>
</tr>
<tr>
<td>6 October</td>
<td>German government provides €50 billion emergency credit facility to Hypo Real Estate Group.</td>
</tr>
<tr>
<td>8 October</td>
<td>UK government announces recapitalisations and debt guarantees for banks.</td>
</tr>
<tr>
<td>9 October</td>
<td>Dutch government announces plan to recapitalise banks. Dexia receives debt guarantees totalling €150 billion from Belgium, France and Luxembourg.</td>
</tr>
<tr>
<td>13 October</td>
<td>French and German governments announce system-wide bank recapitalisations and guarantees for new bank debt. Germany also announces fund to purchase bank assets. UK announces capital injections in three banks.</td>
</tr>
<tr>
<td>14 October</td>
<td>US government announces that up to $250 billion of previously approved TARP funds are to be used to recapitalise banks. US also announces programme to offer guarantees on new debt (Temporary Liquidity Guarantee Program). US Treasury purchases preferred shares in nine banks. Dutch government announces debt guarantee scheme.</td>
</tr>
<tr>
<td>16 October</td>
<td>Swiss government announces bank recapitalisation and asset purchase plan. UBS transfers $31 billion of illiquid assets and receives CHF 6 billion in equity.</td>
</tr>
<tr>
<td>20 October</td>
<td>Dutch government buys €10 billion in preferred shares in ING. French government announces plans to buy subordinated debt of six banks, including BNP Paribas, Crédit Agricole, and Société Générale.</td>
</tr>
<tr>
<td>3 November</td>
<td>Germany government buys €8.2 billion of preferred shares in Commerzbank.</td>
</tr>
<tr>
<td>5 November</td>
<td>Swiss government announces debt guarantee scheme.</td>
</tr>
<tr>
<td>13 November</td>
<td>Dutch government buys €750 million in preferred shares in SNS Reaal.</td>
</tr>
<tr>
<td>24 November</td>
<td>US Treasury provides Citigroup protection against losses on an asset pool of USD 306 billion, and buys another USD 20 billion in preferred shares.</td>
</tr>
<tr>
<td>8 January</td>
<td>Germany government buys another €10 billion of preferred shares in Commerzbank.</td>
</tr>
<tr>
<td>16 January</td>
<td>US Treasury provides Bank of America protection against losses on asset pool of USD 118 billion, and buys another USD 20 billion in preferred shares.</td>
</tr>
<tr>
<td>19 January</td>
<td>UK announces asset protection plan and converts its preferred shares in RBS into ordinary.</td>
</tr>
<tr>
<td>28 January</td>
<td>Dutch government creates €35.1 billion back-up facility for ING's Alt-A mortgage securities.</td>
</tr>
</tbody>
</table>

Sources: national websites, bank’s websites.

Retrieved from King (2009)