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How informative are bank stress tests?

- Bank opacity in the European Union

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Abstract

This paper uses standard event study techniques to examine whether the release of the results of the 2010 European bank stress test was informative to the financial markets by reducing the opacity that is inherent in banking stocks. The same methodology is applied to two events of the 2011 EU stress tests: the release of the methodology employed and the clarification by the European Banking Authority concerning capital requirements. For all events, four groups are examined: the stress-tested banks, the next 50 largest banks, and a geographical division into PIIGS banks and non-PIIGS banks. The empirical results indicate that the 2010 results event and the 2011 clarification event were relatively uninformative to the financial markets. However, the 2011 methodology event was found to be highly informative for all groups. These findings indicate that banks are opaque to an intermediate degree. The separation of stress-tested banks into regional portfolios unfortunately yielded no new insights into the issue of bank opacity.

Keywords: Event study, stress tests, bank opacity

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1. Introduction

A banking organization holds capital to guard against uncertainty. Capital reassures depositors and creditors that unexpected losses will not impair its ability to lend to creditworthy borrowers or to protect the savings of its depositors (McArdle, 2011). With the onset of the financial crisis in 2008, market participants hoarded capital and inter-bank lending came to a halt. In order to promote confidence and restart the lending markets, it became even more important for governments to test whether banks had sufficient capital buffers to withstand losses. These so-called stress tests are designed to find weak spots early and to guide preventive actions by bank directors and regulators (Saunders and Allen, 2010).

On 2 December 2009, the Committee of European Banking Supervisors (CEBS) was mandated by the Economic and Financial Affairs Council (ECOFIN) to coordinate a second EU-wide stress testing exercise of the banking system[1]. The overall objective was to assess the resilience of the EU banking system to possible adverse economic developments. On 23 July 2010, the CEBS released the results of the stress test exercise, which saw all but seven of the 91 banks in the exercise pass a 6 percent Tier 1 capital threshold – a measure of financial strength (CEBS, 2010). But their credibility was called into question when two Irish banks that had passed the test had to be bailed out only four months later (Jenkins and Masters, 2011).

On 13 January 2011, the European Banking Authority (EBA) announced a new round of EU-wide stress tests, to take place in the first half of 2011 and to publish results in June 2011. The methodology will build on that used in the 2010 stress test, with the objective to assess the resilience of the EU banking system to hypothetical stress events. The sample of banks involved and the macroeconomic scenarios were published on 18 March 2011 (EBA, 2011b). The EBA provided a clarification of the capital requirements that will be used as thresholds on 8 April 2011. In order to pass the 2011 EU stress test, banks must hold more than 5 percent of Core Tier 1 capital[2]. This is viewed as stricter than the Tier 1 threshold used last year (Jones and Slater, 2011).

[1] The results of the first exercise in 2009 were not made public.
[2] Core Tier 1 capital essentially refers to common equity and retained earnings.

These events give rise to many interesting questions: Was the release of the results in 2010 informative to the financial markets, i.e. was there evidence of abnormal stock returns around that period? Similarly, were the 2011 methodology and clarification events informative to the market? Did the stocks of the stress-tested banks react differently from those banks that were not stress-tested? Are the northern European banks less opaque than their southern counterparts?

There are few empirical studies in this relatively new field. Peristiani et al. (2010) use standard event study techniques to investigate whether the 2009 US stress test produced information demanded by the market. They conclude that the stress test helped quell the financial panic by producing vital information about banks.

On a theoretical level, event studies of bank stress tests ultimately focus on whether banks are opaque or transparent. For opaque banks, the market is unable to accurately assess their true values. Thus, if banks are completely transparent, releasing the results of stress tests should not be informative to the market, but it should if banks are completely opaque (Peristiani et al., 2010). Economists disagree about whether banks are more opaque than other types of firms. Morgan (2002) and Haggard and Howe (2007) find that banks are more opaque than industrial firms, while Flannery et al. (2004) provide evidence that banks are no more opaque. Hopefully, this paper will provide more insights into this debate and the impact of stress tests on banks' stock returns.

1.1 Purpose

The purpose of this paper is to investigate whether the 2011 and 2010 EU-wide stress tests produced new information about banks or whether the market had already incorporated these events in the price of the stocks.

1.2 Research questions

The main questions in our study are: What were the market's perceptions and reactions to the release of the results of the 2010 EU stress test? How did the market react to the subsequent changes in the methodology to be used in the 2011 stress test? Was there a significant reaction to the clarification of the 2011 methodology? Did the stocks of the next 50 largest banks that were not stress-tested react differently from the stress-tested banks to these events? A final question that we examine is whether the equity markets feel that banks from countries collectively known as PIIGS (Portugal, Italy, Ireland, Greece, and Spain) are more opaque than banks from, primarily, the northern countries in the EU.

1.3 Limitations

In this paper, we focus on three key events: the results of the 2010 EU stress test, the release of the methodology of the 2011 EU stress test, and the clarification of the methodology of the 2011 EU stress test. We believe these events were the most significant in terms of market reactions. Since Peristiani et al. (2010) use event study techniques to investigate the market's reaction to the 2009 US stress test, we thought it would be more exciting to extend their analysis to the case of the European Union. Further, we only examine the stock market reaction to the previously mentioned events – not the bond market reaction. This is because of the limited time frame we had at our disposal.

1.4 Disposition

The paper is structured as follows. The second and third sections present the theoretical and regulatory frameworks that form the basis of the paper, including a review of empirical literature. The fourth section describes stress tests in general and provides an overview of the US and EU stress tests. In the fifth section, the event study methodology is presented. The data description is provided in the sixth section. Empirical results are put forward in section seven and discussed in section eight. The paper is concluded in the ninth section, which also includes suggestions for future research.

2. Theoretical framework

This section presents the theoretical framework that is the basis of the analysis, and includes a review of empirical literature.

2.1 Bank opacity

The rationale for the regulation and protection of banks rests on the assumption that banks are opaque, which means that the market is unable to accurately assess the true value of banks. Opacity prevents outside investors from being able to distinguish between sound and unsound institutions. In contrast, for transparent banks, the market is able to accurately assess their true values (Haggard and Howe, 2007).

There are two opposing hypotheses concerning the opacity of banks. At one extreme is the hypothesis that banks are completely opaque to the market – they are black boxes. In this case, we would expect the market to be surprised to learn which banks had capital gaps and the size of the gaps. At the other extreme is the hypothesis that banks are completely transparent to the market – they are open books. In this case, we would expect the market to decipher which banks had capital gaps and the size of the gaps (Peristiani et al., 2010).

2.1.1 Review of empirical literature

The issue whether banks are more opaque than other types of firms is still an open question among economists. Morgan (2002) examines the ratings of new bonds issued by banks and industrial firms. He argues that disagreement between two major rating agencies (Moody's and Standard and Poor's [S&P]) – a so-called split bond rating – is an indication of firm opacity. Morgan shows that banks are more likely to receive such split ratings than industrial firms, and concludes that banks are more opaque than industrial firms.

Similarly, Iannotta (2006) investigates whether banks are relatively more opaque than non-banking firms by analyzing whether Moody's and S&P disagree more often over bank bonds than over non-bank bonds. Iannotta finds that the probability of a split rating is significantly higher when the issuer is a bank, and concludes that banks appear to be among the more opaque industries. He also finds that a higher ratio of capital to total assets increases the likelihood of a split rating. Iannotta concludes that bank opaqueness increases with bank size, capital ratio and financial assets.

Flannery et al. (2004) analyze two proxies for firm opacity: the stock's market microstructure properties and the ability of analysts to forecast firm earnings. If banks were relatively difficult for outsiders to understand, their shares should exhibit distinctive trading characteristics in variables such as their bid-ask spreads, trading volume or return volatility. Moreover, equity analysts should have greater difficulty forecasting a more opaque firm's earnings, ceteris paribus. Thus, greater disagreement across analysts' forecasts implies that the firm is harder to understand. Flannery et al. find that large bank holding companies[3] (BHCs) have very similar trading properties to their matched nonfinancial firms, whereas the smaller BHCs differ quite substantially from their control sample. On the other hand, for the smaller BHCs, equity analysts predict their earnings more accurately than the control sample, whereas analysts forecast large BHCs' earnings about as accurately as the control sample. Therefore, Flannery et al.'s overall conclusion is that banks are no more opaque than industrial firms.

Similarly, Haggard and Howe (2007) test whether various opacity proxies are significantly different between banks and matching firms. They show that banks have less firm-specific information in their equity returns than industrial matching firms, which is consistent with banks being more opaque than industrial firms – in contrast to the conclusions of Flannery et al. (2004).

Jordan et al. (2000) examine the impact on US bank stock returns to announcements of formal supervisory actions. The banks included in the sample were those that supervisors believed required immediate remedial action in order to avoid failure. If banks are completely transparent, there should be no market reaction to the announcement of a supervisory action. However, Jordan et al. find that the release of the supervisory information provided significant new information to financial markets. On average, stock prices declined 5 percent around the announcements, suggesting that banks are opaque.

Calomiris and Mason (1997) compare the attributes of banks that failed during the Chicago banking panic of June 1932 to those banks that survived the period. They conclude that the special attributes of failing banks were distinguishable months before the panic and were reflected in stock prices, failure probabilities, debt composition and interest rates. This finding indicates that banks are relatively transparent.

[3] Any company that has control over a bank. It is the bank holding company that issues the stock (Jordan et al., 2000).

Table 1 below presents an overview of these studies as well as the main results.

Table 1. *Overview of studies on bank opacity.*

Author	Sample	Sample period	Method	Conclusion
Calomiris and Mason (1997)	123 Chicago banks	1931-1932 (Chicago banking panic)	Univariate tests, logistic regression and survival model.	Banks are transparent.
Jordan et al. (2000)	35 US BHCs	1989-1994	Event study using a standard market model and two-factor models.	Banks are opaque.
Morgan (2002)	7,862 bond issues (of which 848 were issued by banks)	1983-1993	Univariate tests and probit regressions.	Banks are more opaque than industrial firms.
Flannery et al. (2004)	320 US BHCs	1990-1997	Mann-Whitney sign rank test (earnings forecast) and a non-parametric test called proportional difference (microstructure properties).	Banks are no more opaque than industrial firms.
Iannotta (2006)	2,473 bond issues (of which 2,051 were issued by banks)	1993-2003	Univariate tests and multivariate analysis.	Banks belong to the more opaque industries.
Haggard and Howe (2007)	243 US BHCs	1993-2002	Univariate tests and multivariate analysis.	Banks are more opaque than industrial firms.

3. Regulatory framework

In this section, the regulatory framework behind stress tests is presented.

3.1 Basel I

With the collapse of the German bank Herstatt in 1974, the major industrial nations formed a committee with the goal of harmonizing banking standards and regulations amongst their nations' financial systems. The results of the committee meetings were known as the Basel Accords and became part of the regulatory framework upon which the current stress tests are based (Balin, 2008).

The 1988 Basel Capital Accord, most commonly referred to as Basel I, attempted to develop a single capital requirement for credit risk amongst the major banking countries of the world. Basel I was divided into four parts, known as pillars (Balin, 2008):

- Pillar 1 (The constituents of capital): This defines what types of bank-held capital are to be counted as reserves. It also determines how much of each type of capital reserve a bank can hold. Capital reserves are then divided into two categories, known as Tier 1 and Tier 2. Tier 1 capital is composed of two items: stated cash reserves and capital generated by the sale of equity. Tier 2 capital is loosely defined and can be comprised of reserves held for potential losses, subordinated debt holdings, debt/equity hybrid structures or potential gains on trading assets financed with bank equity.

- Pillar 2 (Risk weighting). A set of guidelines were created for assigning risk weights to assets in the banks' loan book. The weightings were divided into five categories: riskless, low risk, moderate, high risk, and a catch-all category labeled "variable".

- Pillar 3 (A target standard ratio). This set a universal standard where 8 percent of a bank's risk-weighted assets must be covered by Tier 1 and Tier 2 capital, with the stipulation that Tier 1 capital must cover 4 percent of the firms' risk-weighted assets.

- Pillar 4 (Implementation). Each member country of the accords was asked to create strong oversight and enforcement entities to maintain compliance with the Basel Accords.

The main criticism of Basel I is that its focus on an 8 percent reserve treated all loans equally. The greater amount of assets held in reserve meant less profit for the regulated banks. In an effort to boost profits, banks began what is referred to as "regulatory arbitrage". Banks would sell off the least risky portion of their loan book and keep the most lucrative but risky portion in house. In addition, since Basel I places more risk on longer-duration assets than short-term assets, banks began swapping their long-term holdings for a string of short-term holdings. These efforts to subvert the reserve requirements led to the unintended consequence of bank portfolios deteriorating in terms of credit quality (Saunders and Allen, 2010).

3.2 Basel II

In response to the above-mentioned criticism, the Basel Committee decided upon a more comprehensive and updated capital sufficiency accord, known informally as Basel II. This accord consists of three pillars (Basel Committee on Banking Supervision, 2004):

1. Minimum capital requirements
2. Supervisory review process
3. Market discipline

The first pillar is where the greatest amount of change takes place. Here, Basel II takes a more sensitive measure of a bank's risk-weighted assets and attempts to close the loopholes that promoted regulatory arbitrage. First, the definition of a bank is expanded to include the assets of the holding company of an international bank. Banks could no longer move risk between subsidiaries. Second, regulatory capital would be evaluated in terms of three types of risk: credit risk, operational risk and market risk (Basel Committee on Banking Supervision, 2004).

Credit risk can be evaluated by the banks' use of one of three methods. The first is the standardized approach. This is based on external credit ratings assigned by independent rating agencies. The second is the internal ratings-based (IRB) foundation approach. In this approach, banks, with approval, develop probability of default models that give in-house risk-weightings of the banks' book. The third is the internal ratings-based advanced approach. This is the same as the foundation IRB except that the banks – not the regulators – determine the assumptions of proprietary credit default models (Saunders and Allen, 2010).

Operational risk reserves are calculated to guard against failures in internal bank processes, poor individual decision-making, and other external events. Market risk is defined as the risk of loss due to fluctuations in asset prices. Here, Basel II separates fixed income products from other products such as equity, commodity and foreign exchange products. Market risk is further decomposed into interest rate risk and volatility risk (Balin, 2008).

The second pillar deals with regulatory and supervisory issues. It states that bank regulators are expected to evaluate how well banks are assessing their capital needs relative to their risk. Forward-looking stress tests are part of this process (Basel Committee on Banking Supervision, 2004).

The third pillar is concerned with improving market discipline within a country's banking sector. In addition to these changes, the designation of capital was expanded into three tiers. Total capital is defined as the sum of Tier 1 and Tier 2 minus Tier 3, and must equal or exceed 8 percent of risk-weighted assets (Saunders and Allen, 2010):

Tier 1 (Core capital): The minimum requirement is that it must equal or exceed 4 percent of risk-weighted assets. Included assets are mainly common shareholders' equity with some allowance for preferred stock and minority interests.

Tier 2 (Supplementary capital): The total amount of Tier 2 is limited to 100 percent of Tier 1. Included assets are allowances for loan and lease losses, non-qualifying perpetual preferred stock, hybrid capital, subordinated debt and revaluation reserves.

Tier 3 (Deductions). These include investments in unconsolidated subsidiaries, reciprocal holdings of banks' capital securities and subsidiaries or joint ventures.

4. Stress tests

This section describes stress tests in general and provides an overview of the 2009 US stress test and the 2010 and 2011 EU stress tests. It also includes an event study of the US stress test by Peristiani et al. (2010).

4.1 Stress test background

Stress tests have been part of risk management for financial firms since the early 1990s. With the financial crisis that started in 2008, stress tests also became an essential tool in which the central banks of the United States and the European Union evaluate the risks of capital shortfalls by the banks that hold the majority of assets within their respective financial systems. In general, stress tests are a set of scenarios put forward, such as what happens to a firm's balance sheet if GDP drops by three percent the following year or if the stock market indexes suffer a 15 percent drop over a certain time period. Stress tests are used to complement a bank's internal risk models, and are also part of the supervisory review process in the second pillar of the Basel II accords (Sorge and Virolainen, 2006).

4.2 Stress tests on the macroeconomic level

Macro stress-testing, or macroprudential supervision, refers to a variety of techniques used to assess the vulnerability of a financial system to "exceptional but plausible" macroeconomic shocks (Sorge and Virolainen, 2006). It looks to the overall health of firms within the financial system and evaluates them with stress tests and scenario analysis to determine the sensitivity of the financial system to economic shocks. By contrast, microprudential supervision and regulation evaluate each firm independently in isolation, largely without regard to spillover and feedback effects (Warwick Commission on International Financial Reform, 2009). Hirtle et al. (2009) argue that the 2009 US stress tests were a successful blending of macro- and microprudential supervision.

According to Sorge and Virolainen (2006), macro stress-testing can be broken down into several steps. The first step is to define the scope of the tests with regard to the financial institutions and portfolios included. Second, the macroeconomic stress scenario needs to be defined. Third, quantify the direct impact of the stress scenarios on the solvency of the financial sector. The quantification of financial distress is simulated by one of two models: the balance sheet model or the Value at Risk (VaR) model. Balance sheet models look at the link

between the firms' accounting measures of risk, such as non-performing loans and loan loss provisions, and the business cycle. The VaR model is a system to measure risks across different trading positions and firm-wide risks, and then aggregate them into a single risk measure. Fourth, use the results to determine the overall risk-bearing capacity of the financial system. The final step is about accounting for potential feedback effects within the financial system and any spillover into the real economy (Sorge and Virolainen, 2006).

4.3 Overview of the 2009 US bank stress test

From February to May 2009, US federal banking supervisors conducted stress tests on the 19 largest US bank holding companies as of year-end 2008. These banks held assets of roughly 10 trillion US dollars and represented close to two thirds of US bank assets. Any BHC identified as needing additional capital would be required to raise more capital, either in public markets or by issuing mandatory convertible preferred shares via the US Treasury's Capital Assistance Program (CAP). The purpose of the stress test – the so-called Supervisory Capital Assessment Program (SCAP) – was to assess the size of these capital needs (Board of Governors of the Federal Reserve System, 2009a).

The stress test included two macroeconomic scenarios: an expected "baseline" scenario and a "more adverse" scenario. In the first stage of the test, the banks estimated losses, profits and loan reserves two years ahead under both scenarios. Indicative loss ranges were supplied by the regulators, and coordinated by the Federal Reserve. In the baseline case, the scenario chosen reflected consensus expectations for the economy as of February 2009. In the adverse case, the economic scenario assumed that GDP would fall by 3.3 percent in 2009, housing prices would drop 22 percent, and unemployment would increase to 8.9 percent (Board of Governors of the Federal Reserve System, 2009a).

The banks submitted their projections under both scenarios to regulatory authorities. These projections were then extensively reviewed, and adjusted by the regulators. With this data, the regulators developed independent estimates of profits and losses for the participating banks. The final projections were used to calculate each banks pro forma capital position as of year-end 2010 under the adverse scenario. The capital positions were then compared to benchmarks intended to assess both the amount and composition of capital required[4]. Of the 19

[4] The thresholds were 6 percent Tier 1 capital and 4 percent Tier 1 Common capital.

participating BHCs, 10 required additional capital, while nine had no additional capital needs. In total, the final capital shortfall was estimated at $75 billion. The participating banks were then obligated to file a plan for recapitalization with the supervisors and outline how the capital shortfall would be raised. As of November 2009, $77 billion in new capital had been raised for the 10 BHCs with a capital need (Board of Governors of the Federal Reserve System, 2009b; Hirtle et al., 2009).

4.4 Event study of US stress test

Peristiani et al. (2010) investigate whether the 2009 US stress test produced information demanded by the market, using standard event study techniques. They study how stock prices of the 19 stress-tested banks reacted to four key events:

- 10 February 2009: Federal bank regulatory agencies released a seven-page fact sheet announcing a Financial Stability Plan, including the stress test and Capital Assistance Program (CAP).

- 23 February 2009: The US government supplied details about CAP, for example that it would supply capital under the CAP via mandatorily convertible preferred shares. Also, the Chairman of the Federal Reserve, Ben Bernanke, indicated to Congress that the stress test results would not be used as a basis for nationalizing banks.

- 24 April 2009: The Federal Reserve Board released a 20-page white paper detailing the stress test methodology.

- 7 May 2009: The results of the stress test were released.

Peristiani et al. (2010) find that the stress test was in fact informative. Of the four events, the clarification and the release of the results were highly informative, whereas the methodology event was relatively uninformative and the announcement was a non-event with regards to the stock market response. The authors interpret these findings that the market had largely deciphered on its own which banks would have capital gaps before the results of the stress test were announced. On the other hand, the market was informed by the size of the gap. Peristiani et al. conclude that the stress test helped quell the financial panic by producing vital information about banks. In addition, their findings suggest that banks are neither black boxes nor open books, but rather opaque to some intermediate degree.

4.5 Overview of the 2010 EU bank stress test

On 23 July 2010, the CEBS released the results of an EU-wide stress-testing exercise, in close cooperation with the European Central Bank (ECB) and national supervisory authorities. The stated purpose of the 2010 exercise was to "provide policy information for assessing the resilience of the EU banking system to possible adverse economic developments and to assess the ability of banks in the exercise to absorb possible shocks on credit and market risks, including sovereign risks" (CEBS, 2010, p.1).

The exercise included 91 European banks, representing 65 percent of the European market in terms of total assets. In each EU member state, the sample was built by including banks in descending order of size, so as to cover at least 50 percent of the national banking sector, in terms of total assets. The stress test was conducted with a two-year time horizon, ending in 2011. As with the US stress test, banks were evaluated under a benchmark scenario and a severe scenario (CEBS, 2010).

The benchmark scenario is mainly based on forecasts by the European Commission. It assumes a mild recovery from the severe downturn of 2008-2009, with GDP increasing by 1.0 percent in 2010 and 1.7 percent in 2011 in the EU. Unemployment is expected to remain high and consumer price inflation is assumed to be contained and stable overall (CEBS, 2010).

Under the severe scenario, a shock causes a modest "double dip" recession. There is an upward shift in the yield curve and a widening of spreads related to the EU sovereign debt crisis, applied for the average 5-year duration bond rates. This shock of 145 basis points (bp) consists of two components: a 75bp upward move in the yield curve common to all EU countries due to the sovereign crisis, and an additional effect for individual countries (e.g. 685bp for Greece and 268bp for Portugal) that aggregate to a further 70bp. Probability of default (PD) and loss given default (LGD) were calculated for 5 portfolios (financial institutions, sovereign, corporate, consumer credit/retail, and retail real estate) using regression model elasticities linked to the macro variables, national supervisory inputs, the ECB Monetary and Financial Institutions database, and Moody's KMV database (Blundell-Wignall and Slovik, 2010).

Sovereign bond haircuts were applied to the trading book holdings only, since there is an assumption that in the banking book there can be no sovereign defaults – so bonds held to maturity will receive 100 cents to the Euro. All government support packages are assumed to stay in place beyond the time horizon of the exercise and a zero growth assumption is used for bank credit and market risk exposures (Blundell-Wignall and Slovik, 2010).

The trading book of a bank consists of financial assets held at fair value through profit or loss and are marked to market. The assets in general are: the banks for profit proprietary trading positions, for profit trading positions of clients, market making books, and hedges to protect the overall composition of the trading book. All other financial assets are considered part of a firm's banking book (Blundell-Wignall and Slovik, 2010).

The banking book is primarily composed of assets of longer maturity and is divided into sub-categories based on the risk exposure of the asset. These categories are: sovereign debt, retail instruments[5], equity, and "other" exposures[6]. Assets in the banking book are held to maturity and may be carried at values that differ from their mark-to-market value in the trading book. Sovereign debt is valued, under the premise of no defaults or debt restructurings, at the amount to be received at maturity (Blundell-Wignall and Slovik, 2010).

The assumption of no default or restructuring is seen as unrealistic, given the current state of Greek and Portuguese sovereign debt costs, by many analysts. With the increasing probability of sovereign debt default in the Eurozone, the EBA's decision to only test the trading book exposure to a sovereign debt default is viewed as unrealistic by many financial and market analysts (Clark and Finch, 2010).

As a result of the 2010 exercise, under the adverse scenario after a sovereign shock, 7 banks had Tier 1 capital ratios below 6 percent, which was used as a benchmark. The threshold of 6 percent should not be interpreted as a regulatory minimum though. According to the Capital Requirements Directive, the regulatory minimum for the Tier 1 capital ratio is set to 4 percent. The seven banks that failed the stress test were Hypo Real Estate (Germany), ATE Bank (Greece), plus five Spanish institutions: Diada, Espiga, Banca Civica, Unnim and CajaSur.

[5] In general, these assets are mortgages and revolving consumer credit lines.
[6] This category is mainly comprised of corporate exposures, such as loans to small and medium-sized businesses and also special purpose entities.

These banks were then subject to closer supervisory scrutiny. Details of the follow-up actions were provided at national level by the supervisory authorities, including any need for recapitalization (CEBS, 2010).

On the next trading day, Monday 26 July, the market reactions were mixed. None of the failed banks came as a surprise to the market and the stress test in general was viewed, according to the Economist, as only a "partial stress reliever" (The Economist Online, 2010). The short-term rate for interbank borrowing (EURIBOR) increased, which was viewed as a signal of continued nervousness of bankers with regard to lending to other banks in the EU system. On the other hand, CDS spreads on European banks fell, demonstrating that investors felt more at ease owning bank debt (Clark and Finch, 2010).

Upon further inspection, markets came to realize that in addition to the 7 banks that failed, 17 came within 1 percentage point of failing. Of these 17 banks, which were later labeled "near-fail banks", two in particular, The Bank of Ireland Plc, Ireland's largest lender, and Allied Irish Banks Plc, Ireland's second biggest, were told to raise cash after Ireland agreed to a 67.5 billion Euro aid package. These reasons and others served to undermine confidence in the stress tests and in the CEBS (Jenkins and Masters, 2011).

4.6 Overview of the 2011 EU bank stress test

The European Banking Authority (EBA) was established on 1 January 2011, taking over all existing and ongoing tasks and responsibilities from the CEBS, including safeguarding the stability of EU's financial system. Given this systemic stability mandate, the EBA announced a new round of EU-wide stress tests to take place in the first half of 2011 and to publish results in June 2011. The objective is to assess the resilience of the EU banking system to hypothetical stress events under certain restrictive conditions (EBA, 2011a).

4.6.1 Methodology event

On 18 March 2011, the EBA published details of its stress test scenarios and methodology. The approach builds on that used in the 2010 stress test, focusing primarily on assessing credit and market risks in hypothetical adverse economic conditions. Consistent with the 2010 exercise, the baseline and adverse scenarios will be applied over a two-year period – 2011 and

2012. However, this time the capital threshold will be focused on a definition of Core Tier 1 capital, which is more restrictive than the Tier 1 threshold used in 2010[7] (EBA, 2011b).

In addition, the adverse scenario, designed by the ECB, is more severe than the 2010 exercise in terms of deviation from the baseline forecast and probability that it materializes. It includes a marked deterioration in the main macroeconomic variables, such as GDP, unemployment and house prices. The tests will for example review how banks handle a 0.4 percent decline in EU's real GDP in 2011. Stock prices are assumed to fall by 15 percent on average in the Euro area. A new feature is that country-specific bond yield shocks have been introduced for the EU member states, accounting for differentiated fiscal situations and market perceptions. On average, long-term interest rates are assumed to increase by 75 basis points for the Euro area. Short-term inter-bank interest rates are assumed to rise by 125 basis points, reflecting renewed tensions in European money markets. As in the 2010 stress test, sovereign bond haircuts only apply to bonds held in the trading portfolio. Bonds held in the held-to-maturity category are excluded (EBA, 2011b).

In contrast to the 2010 exercise, the new round of stress tests assumes static balance sheets, i.e. freezes banks' balance sheets as of end 2010. This is done in order to ensure consistency and prevent banks from claiming they would change their business model or sell off risky assets to mitigate the risk (EBA, 2011b).

4.6.2 Clarification event

On 8 April 2011, the EBA announced the benchmark to be used in the stress test as well as the sample of banks included. All of the banks tested in 2010 will be reexamined, with the exception of those banks that were merged with others or ceased to exist. In addition, five banks were added to the list of those examined in 2010. Ireland's Irish Life and Permanent Plc's, Norway's DnB NOR Bank ASA, Nykredit Bank from Denmark, Slovenia's Nova Kreditna Banka Maribor and Oesterreichische Volksbank AG from Austria. In total, the sample contains 90 banks. As in the 2010 stress test, the sample continues to represent more than 65 percent of banking assets in the EU and more than 50 percent of the banking assets in all individual EU countries (EBA, 2011c).

[7] In 2010, the European Commission was in the process of harmonizing the definition of Core Tier 1. Use of this measure at that time would not have facilitated direct comparison of results across countries. Accordingly, the Tier 1 ratio was used as benchmark in the 2010 stress test (CEBS, 2010).

The 2011 stress test will use a stricter benchmark of Core Tier 1 capital than the Tier 1 threshold used in 2010. The EBA's definition of Core Tier 1 capital is 5 percent of risk-weighted assets and essentially refers to common equity and retained earnings. This is lower than the 7 percent Core Tier 1 capital requirement proposed under the new Basel III accords. The EBA chose not to adopt the Basel III definition of Common Equity Tier 1 because this definition will not be implemented until 2013 (EBA, 2011c).

However, the EBA's exclusion of some types of non-voting capital, known as silent participations, may increase the probability of some banks failing the test. Silent participations are a form of non-voting equity capital with both debt and equity characteristics and are used primarily within the German banking system (Moshinsky, 2011).

5. Methodology

This section presents the research methodology and discusses possible biases related to it.

5.1 Event study

The event study methodology is the standard method of measuring security price reaction to some announcement or event. It was introduced in a seminal paper by Fama et al. (1969). They studied whether stock prices behave differently around stock splits than in normal periods. In this paper, we follow the outline of an event study as suggested by Campbell et al. (1997). They identify five main steps in conducting an event study: event definition, selection criteria, normal and abnormal returns, estimation procedure and testing procedure.

1. Event definition. The initial task of conducting an event study is to define the event of interest and identify the period over which the security prices of the firms involved will be examined. This period is known as the event window. For our study, we have selected the following three events:

- 2010 Results
- 2011 Methodology
- 2011 Clarification

As for the event window, we follow Peristiani et al. (2010) who use a three-day window, where the announcement day is the event day. Although the results, methodology and clarification events were arguably one-day events, the event window is expanded for two main reasons. First, including the day after the event day is done in order to capture price effects that occur after the stock market closes on the announcement day. Second, including the day prior to the event day allows for news leakages. Indeed, there is evidence that some details of the 2011 methodology were leaked to the German newspaper Handelsblatt before the actual announcement (Jenkins et al., 2011). Since all three events occurred on a Friday, we include the Thursday, Friday and next Monday (the next trading day) in the event window.

2. Selection criteria. The banks included in our study were selected according to several criteria. For a detailed description of the selection process, see the data section.

3. Normal and abnormal returns. The normal return is defined as the return that would be expected if the event did not take place. There are two common choices by academics for

modeling the normal return: the constant-mean-return model and the market model. The former model assumes that the mean return of a given security is constant through time, while the latter assumes a stable linear relation between the market return and the security return.

To compute stock returns we take the logarithm according to:

$$R_{it} = ln\left(\frac{P_{i,t}}{P_{i,t-1}}\right)$$

where R_{it} is the log-return for firm *i* at time t, $P_{i,t}$ is the current closing price and $P_{i,t-1}$ is last day's closing price.

Continuously compounded returns are used in order to avoid issues with nonstationarity in the data. The econometric consequences of nonstationarity can be quite severe, leading to test statistics and predictors that are unreliable. There is widespread empirical evidence that stock returns become stationary when they are integrated of order 1, i.e. after taking the first ln-differential (Gujarati, 2003, pp. 798-810).

In the next step, we follow Peristiani et al. (2010) and estimate a market model by regressing the daily stock return for each individual bank, R_{it}, on the market return, R_{mt}, proxied by the return on the MSCI World Index:

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

where ε_{it} is the zero mean disturbance term.

When we have the normal return, the abnormal return can be calculated. The abnormal return is the actual ex post return of the security over the event window minus the normal return. Mathematically, the relation can be expressed

$$AR_{it} = R_{it} - E(R_{it}|X_t)$$

where AR_{it} and $E(R_{it})$ are the abnormal and the normal return, respectively, for time period t. X_t is the conditioning information for the normal model.

In order to study stock price changes around events, each firm's return data could be analyzed separately. However, this is not very informative because stock price movements are also caused by information unrelated to the event. By averaging over a number of firms, the

analysis becomes more informative; since the abnormal returns are centered around a particular event, the average should reflect the effect of that event. All other information, unrelated to the event, should cancel out on average (de Jong, 2007). Typically, the unweighted cross-sectional average of abnormal returns in period t, AAR_t, is considered:

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it}$$

4. Estimation procedure. In order to estimate the normal returns, the parameters of the market model, α_i and β_i, must be estimated over the so-called estimation window. Scholars usually use the period prior to the event window for the estimation window. However, there is no consensus of the length of the estimation window. Brown and Warner (1980) use a 35-month period that ends 10 months before the event. Fama et al. (1969) decided arbitrarily to use an estimation window of 24 months. Both of these studies use monthly data. According to Campbell et al. (1997), the parameters of the normal return model could be estimated over the 120 days prior to the event, if daily data is used. Peristiani et al. (2010) use a year of daily data for their estimation window.

We follow the latter study and estimate the parameters of the market model via ordinary least squares using daily data from 21 July 2009 to 21 July 2010. Thus, the estimation window ends just before the first event – the 2010 results. Generally, the event period itself is not included in the estimation window. Otherwise, both the normal and the abnormal returns would reflect the impact of the event. This would be problematic since the methodology is built around the assumption that the event impact is captured by the abnormal returns (Campbell et al., 1997).

5. Testing procedure. In event studies, statistical tests are designed to answer the question whether the calculated abnormal returns are significantly different from zero at a certain significance level. The null hypothesis to be tested is of the form

$$H_0: E(AAR_t) = 0$$

against the two-sided alternative hypothesis

$$H_1: E(AAR_t) \neq 0.$$

The most common test of the null hypothesis of no abnormal returns is a simple t-test. In order to introduce this test, the abnormal returns AR_{it}, which together determine the average

abnormal return AAR_t, are assumed to be IID (independently and identically distributed). Moreover, they are assumed to follow a normal distribution with mean zero and variance σ^2. Since σ^2 is unknown, an estimator of σ can be obtained from the cross-sectional variance of the abnormal returns in period t:

$$s_t = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(AR_{it} - AAR_t)^2}$$

This yields the following test statistic for the average abnormal return:

$$G = \sqrt{N}\frac{AAR_t}{s_t} \sim t_{N-1}$$

which follows a student-t distribution with $N-1$ degrees of freedom. However, there is strong evidence that stock returns do not satisfy the normality assumption imposed to derive the distribution of the *G* test statistic. If we maintain the assumptions that the abnormal returns are independent and have the same mean and variance, it can be shown that in large samples[8], *G* approximately follows a standard normal distribution. This is a result of the so-called central limit theorem (de Jong, 2007). Hence, we have:

$$G = \sqrt{N}\frac{AAR_t}{s_t} \approx N(0,1)$$

In order to study performance over longer periods surrounding the event, the usual way is to calculate the cumulative abnormal returns. Define $CAR_i(\tau_1, \tau_2)$ as the cumulative abnormal return for security *i* from τ_1 to τ_2 where $T_1 < \tau_1 \leq \tau_2 \leq T_2$. The time line below provides an illustration:

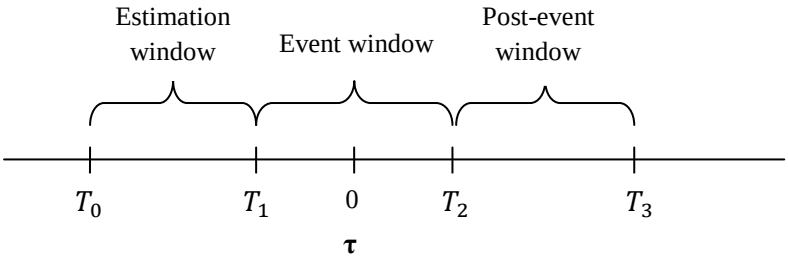

Figure 1. *Time line for an event study*

[8] In event studies, N > 30 is typically considered large enough.

The cumulative abnormal return is given by:

$$CAR_i(\tau_1, \tau_2) = AR_{i,t_1} + \cdots + AR_{i,t_2} = \sum_{t=t_1}^{t_2} AR_{it}$$

The cumulative average abnormal return, $CAAR(\tau_1, \tau_2)$, is then calculated as follows:

$$CAAR(\tau_1, \tau_2) = \frac{1}{N}\sum_{i=1}^{N} CAR_i(\tau_1, \tau_2)$$

The null hypothesis to be tested is

$$H_0: CAAR(\tau_1, \tau_2) = 0$$

against the two-sided alternative hypothesis

$$H_1: CAAR(\tau_1, \tau_2) \neq 0.$$

The variance of the cumulative average abnormal return is given by:

$$Var\big(CAAR(\tau_1, \tau_2)\big) = \bar{\sigma}^2(\tau_1, \tau_2) = \frac{1}{N^2}\sum_{i=1}^{N} \sigma_i^2(\tau_1, \tau_2)$$

The null hypothesis is tested using the t-statistic (J_1) obtained from:

$$J_1 = \frac{CAAR(\tau_1, \tau_2)}{\sqrt{\widehat{Var}\big(CAAR(\tau_1, \tau_2)\big)}} \approx N(0,1)$$

5.1.1 Possible biases

Event studies are subject to a number of possible biases. Nonsynchronous trading or non-trading can introduce a bias. The nontrading effect arises when asset prices are taken to be recorded at time intervals of one length when in fact they are recorded at time intervals of other, possibly irregular, lengths. This nontrading effect induces potentially serious biases in the moments and co-moments of asset returns, such as their means, variances, betas and auto-correlation coefficients. In event studies, the influence of the nontrading effect feeds into a bias for the market-model beta (Campbell et al., 1997, p. 177). In our study, most of the stress-tested banks had actively traded securities, but for the next 50 largest banks, several banks had infrequently traded stock. However, Jain (1986) concludes that in general, adjusting for thin trading is not important.

Another possible source of bias is the assumptions behind the statistical analysis of the event study. Asset returns are assumed to be jointly normal and temporally IID. Departures from this assumption can lead to biases. Without assuming normality, all results would be asymptotic. However, this is generally not a problem for event studies since the test statistics converge to their asymptotic distributions rather quickly (Campbell et al., 1997, p. 177).

In analyzing aggregated abnormal returns, it is assumed that the abnormal returns of individual securities are uncorrelated in the cross-section. Generally, this will be a reasonable assumption unless the event windows of the securities overlap in calendar time. When the event windows overlap, the covariances between the abnormal returns may differ from zero, and the distributional results for the aggregated abnormal returns are not applicable. Campbell et al. (1997, p. 167) discuss different ways to handle this so-called clustering problem. In our case, using a 21-day event window, with 10 pre-event days and 10 post-event days, would cause a clustering problem for the 2011 events; the event windows would overlap. Therefore, we use an 11-day event window, with 5 pre-event days and 5 post-event days, for the methodology and clarification events.

6. Data

This section presents the data used for the analysis and the selection process for including a certain bank in the event study.

6.1 Data description

The stress-tested banks included in our study were selected according to three criteria. First, only the banks subject to both the 2010 and the 2011 EU stress tests were included. Thus, the banks that ceased to exist as a separate banking entity were not included. Second, only those banks that had daily traded stock between 2009-07-21 and 2011-04-22 available in Thomson Reuters Datastream were included. Third, only the banks that passed the 2010 EU stress test were included in our analysis. Of the seven banks that failed, only two had traded stock (Hypo Real Estate and ATEbank). The other five were regional Spanish banks known as cajas. We cannot follow Peristiani et al. (2010), who compare the nine banks that passed the 2009 US stress test with the ten banks that failed it, since we only have two banks in the fail category with traded stock. Our final sample therefore consists of exactly 50 banks. All banks that were stress-tested and our final sample of 50 banks are listed in Tables 11 and 12 in the appendix.

Following Peristiani et al. (2010), we examined the abnormal returns of the next 50 largest bank stocks that were not included in either the 2010 or the 2011 stress tests. These next 50 banks were ranked according to market capitalization and were selected from the countries that are under the supervision of the EBA. We felt market capitalization, instead of asset size, was more reflective of the true value and relative importance within the European banking system. This assumption was based on several reasons. First, the determination of an asset's value on a bank's balance sheet allows for discretion on the part of the individual banks. Second, there is the issue of the true value of sovereign debt holdings and the assumption of zero default when valuing them on the banking book. Third, not all of the banks selected had detailed information in Datastream regarding the value of their assets.

Once the banks were ranked according to market capitalization, those banks that were found to be owned by one of the banks included in the stress tests were eliminated. Downes and Goodman (2007) define controlling interest as ownership of more than 50 percent of a corporation's voting shares. However, a much smaller percentage, owned individually or by a group in combination, can be controlling if the other shares are widely dispersed and not actively voted. In our study, those banks eliminated were owned by a parent bank that owned

over 50 percent of both common and voting equity. From the remaining stocks, we then took those not valued in Euros and converted from their local currency into Euros as of 18 April 2011. All share and currency information was obtained through Datastream. The next 50 largest banks, ranked by market capitalization, can be found in Table 10 in the appendix.

The 50 stress-tested banks were then separated into two portfolios which we titled PIIGS and non-PIIGS. The term PIGS, in bond trading circles, has long been used to refer to the southern Eurozone nations: Portugal, Italy, Greece and Spain. This acronym was not only used as a geographical reference but also an economic one. Crudely stated, the growth of these countries was stuck in the mud, as opposed to the northern members of the Eurozone (von Reppert-Bismark, 2008). The acronym was expanded to include Ireland due to its recent bailout by the EU. In addition, we included three banks from Malta and Cyprus in this group, making both the PIIGS and the non-PIIGS categories consist of 25 banks. They are listed in Tables 13 and 14 in the appendix.

Currently, three of the five PIIGS have received bailouts and there is speculation that the bailout package provided to Greece may have to be restructured and Spain may also need financial assistance. In addition, on 22 May 2011, S&P downgraded Italy's long-term credit rating from stable to negative, causing a minor sell-off in European stocks (Neil, 2011). We feel this is a logical point in which to separate the stress-tested banks into portfolios for comparative purposes. With this separation, we wish to explore the question of whether financial markets see banks from southern Europe as more opaque than their northern counterparts.

In the market model regressions, the returns on the MSCI World Index were used as the market proxy. The daily returns were obtained through Datastream. The MSCI World Index is a stock market index composed of 1500 global stocks and is often used as a benchmark for world or global stock funds. It is a market-capitalization weighted index comprised of stocks representative of the market structure of 23 developed countries in North America, Europe, and the Asia-Pacific region. The market proxy, theoretically, is meant to represent the value-weighted portfolio of all assets, whether traded or untraded, and human capital. However, this "true" market portfolio is unobservable, so a proxy is needed. The two most common proxies used are the S&P 500 and the MSCI World Index, which are highly correlated. Since we are examining the European banking sector, we chose the index with a more global perspective (Koller et al., 2010, pp. 252-253).

7. Empirical results

In this section, the results of the event studies of the 2010 and 2011 events are presented for four groups: the stress-tested banks, the next 50 largest banks, the PIIGS and the non-PIIGS banks.

Tables 2-5 present the average abnormal returns (AAR), cumulative average abnormal returns (CAAR), and their associated t-statistics (G and J_1) for the three events and for the four groups. The length of the event window is three days, where day 0 is the event day. The other days are relative to the event day.

Table 2. *Abnormal returns for the three event studies of the stress-tested banks.*

Stress-tested banks						
	2010 Results		2011 Methodology		2011 Clarification	
Day	AAR	G	AAR	G	AAR	G
-1	0.00318	1.35779	-0.00945	-5.10626**	0.01410	4.49408**
0	-0.01242	-5.81590**	-0.00455	-1.77015	-0.00663	-2.82282**
1	0.01329	3.73966**	-0.00914	-5.76919**	-0.00562	-1.46230
	CAAR	J_1	CAAR	J_1	CAAR	J_1
	0.00405	0.90126	-0.02313	-6.19913**	0.00184	0.29979

** Significant at the 1 percent level

Table 3. *Abnormal returns for the three event studies of the next 50 largest banks.*

Next 50						
	2010 Results		2011 Methodology		2011 Clarification	
Day	AAR	G	AAR	G	AAR	G
-1	-0.00689	-3.66719**	-0.00365	-1.52190	0.00256	1.17291
0	-0.00568	-3.24397**	0.00068	0.26917	-0.00141	-0.70102
1	-0.00140	-0.72090	-0.00467	-2.52756*	0.00015	0.07246
	CAAR	J_1	CAAR	J_1	CAAR	J_1
	-0.01397	-5.73561**	-0.00764	-2.06993*	0.00129	0.41551

* Significant at the 5 percent level

** Significant at the 1 percent level

Table 4. *Abnormal returns for the three event studies of the PIIGS banks.*

PIIGS						
	2010 Results		2011 Methodology		2011 Clarification	
Day	AAR	G	AAR	G	AAR	G
-1	0.00820	2.29781*	-0.01015	-3.56133**	0.02269	4.78498**
0	-0.01289	-4.01215**	-0.01009	-2.69468**	-0.01320	-3.79363**
1	0.01765	2.90230**	-0.00897	-4.03849**	-0.01656	-2.45007*
	CAAR	J_1	CAAR	J_1	CAAR	J_1
	0.01296	1.86172	-0.02921	-5.05149**	-0.00707	-0.68150

* Significant at the 5 percent level

** Significant at the 1 percent level

Table 5. *Abnormal returns for the three event studies of the non-PIIGS banks.*

Non-PIIGS						
	2010 Results		2011 Methodology		2011 Clarification	
Day	AAR	G	AAR	G	AAR	G
-1	-0.00184	-0.66985	-0.00875	-3.62666**	0.00550	1.62024
0	-0.01194	-4.15307**	0.00099	0.30902	-0.00006	-0.02325
1	0.00893	2.47650*	-0.00931	-4.03901**	0.00532	2.46677*
	CAAR	J_1	CAAR	J_1	CAAR	J_1
	-0.00485	-0.94765	-0.01706	-3.88102**	0.01076	1.76255

* Significant at the 5 percent level

** Significant at the 1 percent level

In order to investigate the possibility that the market acquired information about the results prior to the actual announcement or that the market reaction was delayed further, we decided to expand the event window. We chose to expand it to a 21-day event window, comprised of 10 pre-event days, the event day, and 10 post-event days. The results can be found in Tables 6-9 in the appendix.

8. Discussion

In this section, the empirical results are interpreted and analyzed. The section is divided in the three events: 2010 results, 2011 methodology and 2011 clarification. For each event, we analyze four groups: the stress-tested banks, the next 50, the PIIGS and the non-PIIGS.

8.1 Event 1: 2010 Results

The results of the event study involving the 2010 stress test were revealing. On the day prior to the release of the results, the average abnormal returns were positive but insignificant at the 5 percent level. The returns on the day of the release were significantly negative, but the trading day after the release, the returns were positive and significant at the 5 percent level. For the whole three-day event window, the value of J_1 is 0.90, so the null hypothesis that the event has no impact cannot be rejected.

The release of the results of the 2010 test were made on a Friday evening after the markets in Europe and Asia had closed for the day and the next trading day was not until the following Monday. The negative abnormal returns on the day of the release could be attributed to market uncertainty over the results of the test. Furthermore, we find the significant positive results on the following trading day to be a positive reaction by the market to the information released in the stress tests. This suggests that initially the 2010 stress test helped reduce uncertainty regarding banks within the European banking system.

We next examine the impact of the 2010 stress test upon the returns of the next 50 largest banks within the European banking system, i.e. those that were not included in the stress test. Here, the AAR for the day prior to and the day of the release were both significantly negative. The post-release day returns were also negative but insignificant. The CAAR results for the three-day event window were negative and significant.

With regard to the non-PIIGS group, the results show that the negative average abnormal returns were not significant at the 5 percent level for the trading day prior to the release of the results. However, on the day of the release, the abnormal returns were significantly negative, perhaps reflecting market unease prior to the results. The next trading day, AAR was positive and significant. For the three-day event window, the value of J_1 is -0.95, so the null hypothesis cannot be rejected.

The empirical results for the PIIGS group were also mixed. The AAR for the day prior to the event was positive and significant, the event day was significantly negative, and finally the post-event market day was positive and significant. However, the CAAR for the three-day event window was found to be positive but insignificant.

All in all, the empirical results suggest that the event as a whole was not very informative to the market. But we decided to expand the event window to examine this further. Figure 2 below plots the cumulative abnormal returns for the four groups with a 21-day event window, based on Tables 6-9. The plots display a similar pattern for all groups, but differ in terms of magnitude. Banks in the PIIGS category have the highest CARs, while the next 50 banks show the smallest reaction. There is no clear trend for the groups leading up to the event; the CARs for the PIIGS gradually drift up but they drift down for the non-PIIGS. On the 23 July, the CARs fell for all groups, only to increase significantly the first two trading days after the event. From that point, the CARs gradually declined. The reason why the next 50 banks show the smallest reaction could be that the event was a non-event for them – they were not included in the stress test and were not affected by the outcome to the same extent as the stress-tested banks. Another explanation could be that many of the next 50 banks had infrequently traded stock and did not react to the event for this reason.

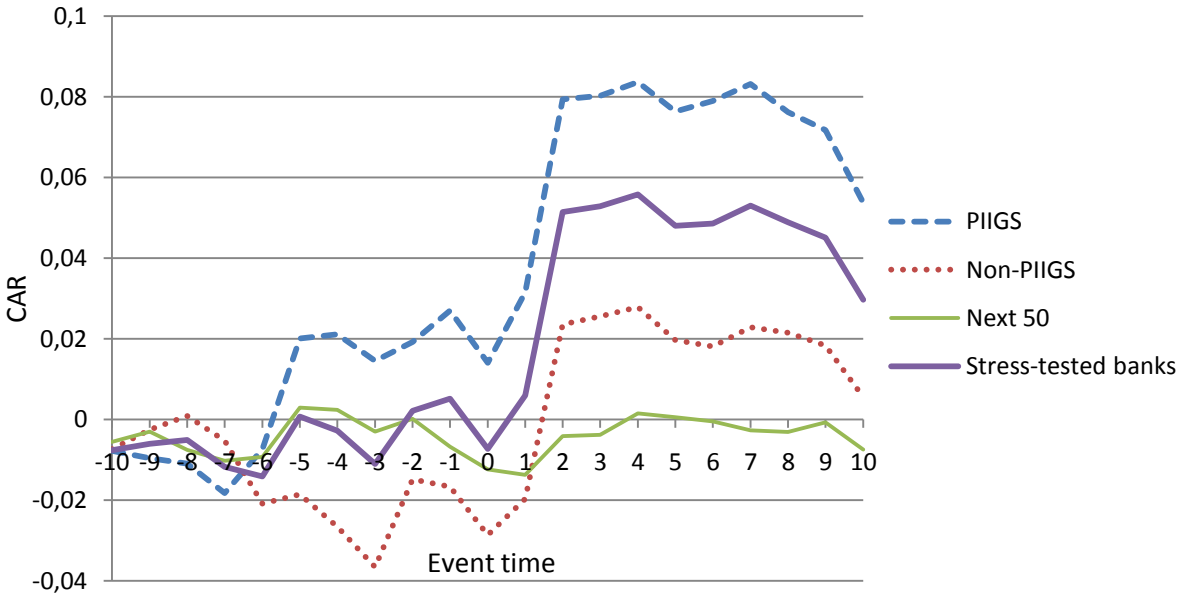

Figure 2. *Plot of the cumulative abnormal returns for the 2010 results event*

8.2 Event 2: 2011 Methodology

The second event focuses on the release by the EBA of the methodology to be used in the up-coming 2011 stress test. Starting with the portfolio of all 50 banks included in the stress test, we found that on the day prior to and the day after the release of the methodology, the average abnormal returns were significantly negative. On the release date, the returns were negative but not significant. For the whole three-day event window, the value of J_1 is -6.20, so the null hypothesis that the event has no impact is strongly rejected.

These significant negative returns could be attributed to the market's general displeasure with the structure of the stress test not being more stringent. In particular, market analysts view the EBA's decision to only stress-test sovereign bond positions held in the banks' trading book and not test the positions in the banking book as unrealistic given the worsening conditions in Greece and Portugal (Slater and Laurent, 2011).

The abnormal returns of the next 50 banks on the day prior to and the day of the event were negative and positive, respectively, but insignificant. However, the post-event day AAR was negative and significant. In addition, the CAAR for the three-day event window was significantly negative. This may also be attributable to the market's belief that the stress test methodology is not stringent enough.

The empirical results regarding the non-PIIGS group were similar to the results for the stress-tested banks and the next 50 banks. Here, the pre-event and post-event day abnormal returns were negative and significant. The event day returns were positive but insignificant. For the whole three-day event window, the CAAR was negative and significant (J_1 = -3.88). Again, this may reflect negative market sentiment regarding the methodology.

The most conclusive results were found when the abnormal returns of the PIIGS were examined. Here, the AARs for all three event days were significantly negative. In addition, the CAAR was negative and significant, with J_1 equaling -5.05, so the null hypothesis is strongly rejected. These results, as with the others, may be attributable to market sentiment but we cannot dismiss the suggestion that they were due to the fiscal and debt problems affecting, in particular, Portugal and Greece.

Since the event windows of the methodology and clarification events overlap if the event window is expanded to 21 days, we decided to expand it to 5 pre-event days and 5 post-event days for both events. Figure 3 below plots the cumulative average abnormal returns for the four groups. As with the 2010 event, the plots display similar patterns, with the PIIGS banks showing the largest reaction and the next 50 showing the smallest reaction. Initially, the CAARs increase significantly, but start decreasing three days before the event. Perhaps this reflects that some details of the methodology actually leaked out to the market in advance.

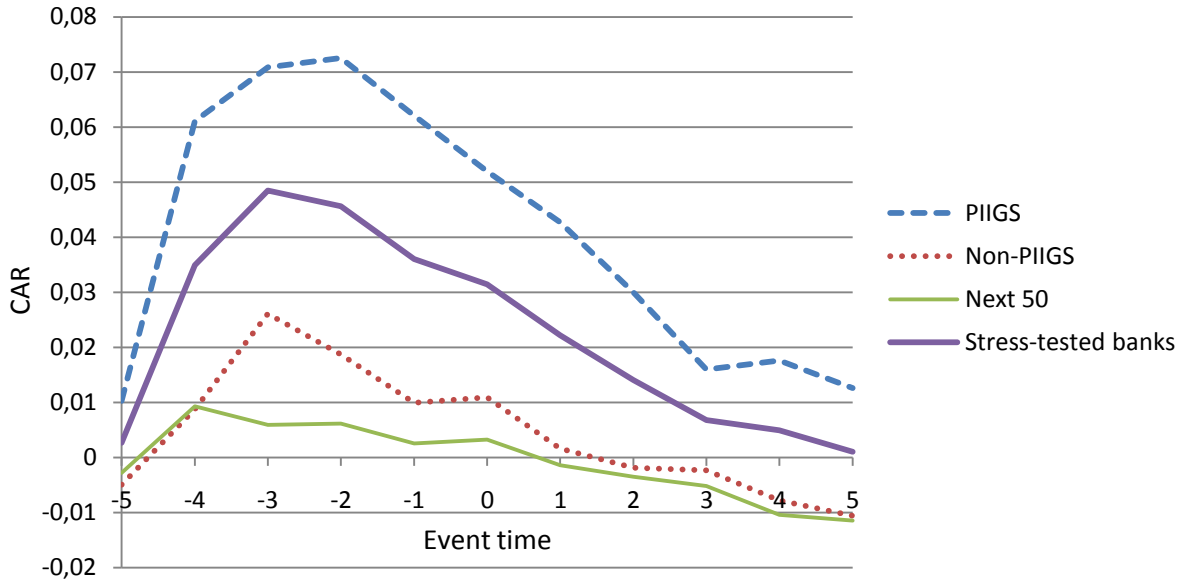

Figure 3. *Plot of the cumulative abnormal returns for the 2011 methodology event*

8.3 Event 3: 2011 Clarification

We next examine the results of the clarification where the EBA dealt with the issue of silent participations. The empirical results of this event study were inconclusive. When evaluating the portfolio stress-tested banks, the AAR for the day prior to the event date was positive and significant. On the event day, the return was negative and significant. The post-day return was negative but insignificant. The CAAR for the three-day event window was found to be insignificant, with J_1 equaling 0.30.

The returns for the portfolio of the next 50 banks were insignificant for all three individual event days and the CAAR was also insignificant. Similarly, for the non-PIIGS group, both the day prior to and the day of the event were insignificant. However, the AAR for the post-event day was positive and significant. Overall, the CAAR for the three-day event window was positive but insignificant.

The results for the PIIGS were more conclusive. The pre-day AAR was significantly positive, while the event day and post-event day AAR's were both negative and significant. For the whole event window, the value of J_1 is -0.68, so the null hypothesis cannot be rejected.

To sum up, the CAARs were insignificant for all four groups, which suggest that the clarification event was not very informative to the market. Perhaps it was the release of the methodology that provided guidance to the market and the specifics of the clarification were considered irrelevant or in line with expectations.

In addition, it was surprising that there was little market reaction with regard to the issue of silent participations. Perhaps, since that issue primarily deals with the German banking sector, the issue was ignored by the markets. There was also significant speculation prior to the release of the clarification that silent participations may not be counted as Tier 1 capital in the upcoming stress test (Taylor, 2011).

Figure 4 below plots the cumulative abnormal returns for the four groups. Again, the plots display similar patterns, with the PIIGS banks showing the largest reaction and the next 50 showing the smallest reaction. The plots support the finding that the clarification event was not very informative to the market.

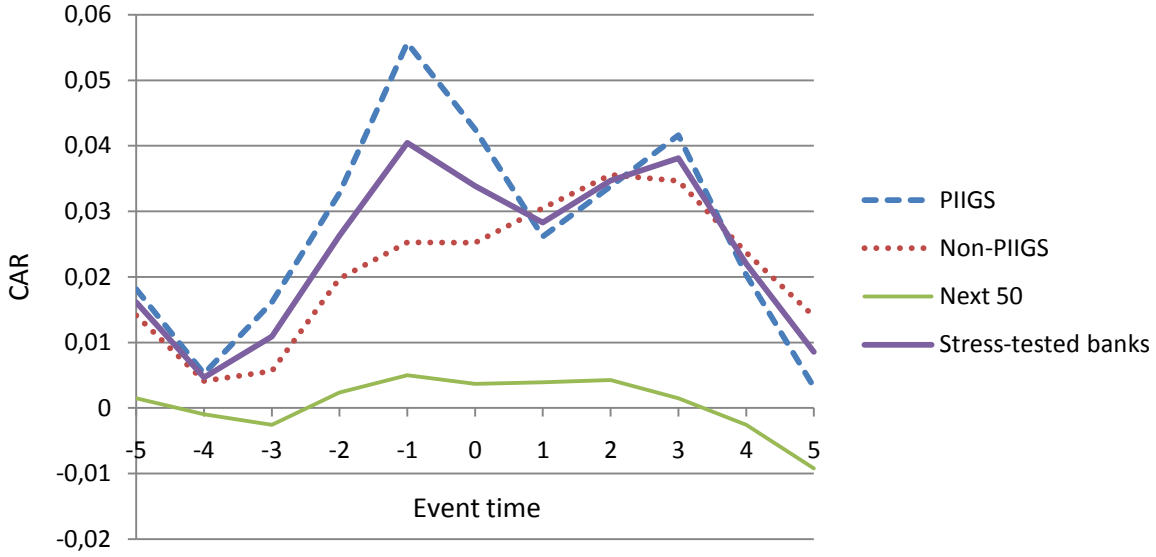

Figure 4. *Plot of the cumulative abnormal returns for the 2011 clarification event*

9. Conclusion

Using standard event study techniques, this paper has examined the impact of European banks' stock returns to the following three events: the results of the 2010 EU stress test, the release of the methodology of the 2011 EU stress test, and the clarification by the EBA defining key capital requirements and the sample of banks to be tested in the 2011 exercise. Four groups were examined: the stress-tested banks, the next 50 largest banks, and a separation of the stress-tested banks into two regional portfolios: PIIGS and non-PIIGS banks.

The empirical results show that the 2010 stress test generated inconclusive returns. On the one hand, the average abnormal returns were significantly negative on the day of the event but significantly positive on the post-event day for all groups except the next 50. On the other hand, the cumulative average abnormal returns were insignificant for all groups, except the next 50, suggesting that the event as a whole was not very informative to the financial markets.

The CAARs for the clarification event were insignificant for all groups, suggesting that this was a non-event. The market probably anticipated beforehand which capital requirements would be used and which banks would be tested. In contrast, the methodology event was highly informative for all groups; the CAARs were significantly negative, reflecting negative market sentiment regarding the methodology.

A general feature of all three events was that the next 50 largest banks showed small reactions over all of the event windows. A reason could be that they were not included in the stress tests, and were therefore not affected by the outcome to the same extent as the stress-tested banks. Another explanation could be that many of the next 50 banks had infrequently traded stock and did not react to the events for that reason.

In terms of the bank opacity hypothesis, our results lead us to reject both the complete opacity (black box) hypothesis and the complete transparency (open book) hypothesis, supporting the findings of Peristiani et al. (2010). Rather, banks seem to be opaque to an intermediate degree. The separation of stress-tested banks into regional portfolios unfortunately yielded no new insights into the issue of bank opacity. Both the PIIGS and non-PIIGS portfolios had similar returns for both the results and methodology events. However, unlike the non-PIIGS banks,

the PIIGS portfolio did produce significant AARs for all three days of the clarification, but the CAAR for the event as a whole was insignificant.

Although an examination of bank opacity as a function of geography was not the primary goal of this paper, we believe that it is an area worthy of further analysis. Since the results of the 2011 stress test will not be released until mid-June 2011, we also think this is a subject for further research. If more banks fail the 2011 stress test than the 2010 exercise, it would be interesting to compare the pass versus fail banks, and investigate whether the market had deciphered which banks would have capital gaps. Another suggestion for future research would be to examine the reaction of the bond market to the stress test events. In particular, does the credit default swap market react to the results and processes of the stress tests differently than the equity market? Due to time and informational constraints, these subjects were not explored in this paper but will hopefully be examined in detail in the future.

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11. Appendix

Table 6. *Abnormal returns for the three event studies of the stress-tested banks with a 21-day event window.*

Stress-tested banks						
	2010 Results		2011 Methodology		2011 Clarification	
Day	AAR	G	AAR	G	AAR	G
-10	-0.00762	-3.06050**	-0.00112	-0.66447	-0.00389	-2.19622*
-9	0.00155	0.81122	0.00539	2.91509**	0.00328	1.54393
-8	0.00099	0.51123	-0.00476	-1.30450	-0.02232	-6.58072**
-7	-0.00669	-3.45370**	0.00400	1.86868	-0.01957	-5.92051**
-6	-0.00239	-0.39332	0.02008	9.25543**	-0.01430	-7.12277**
-5	0.01489	4.81419**	0.00267	1.00186	0.01614	2.28798*
-4	-0.00352	-1.34056	0.03223	6.28114**	-0.01147	-2.99962**
-3	-0.00828	-3.09512**	0.01355	5.20450**	0.00621	0.81785
-2	0.01323	5.96383**	-0.00286	-0.94482	0.01539	4.34257**
-1	0.00298	1.27095	-0.00959	-5.13641**	0.01420	4.51057**
0	-0.01244	-5.83148**	-0.00456	-1.77209	-0.00663	-2.82400**
1	0.01321	3.70304**	-0.00928	-5.79722**	-0.00553	-1.44944
2	0.04553	10.67212**	-0.00814	-3.59687**	0.00638	1.97930*
3	0.00144	0.60481	-0.00723	-3.19879**	0.00342	1.08945
4	0.00288	1.23767	-0.00191	-0.78231	-0.01612	-7.49537**
5	-0.00774	-3.37723**	-0.00389	-2.19622*	-0.01343	-7.21046**
6	0.00051	0.18143	0.00328	1.54393	-0.00758	-3.59508**
7	0.00448	1.94014	-0.02232	-6.58072**	-0.00866	-4.63519**
8	-0.00414	-2.21486*	-0.01957	-5.92051**	-0.03359	-7.50672**
9	-0.00382	-1.82273	-0.01430	-7.12277**	-0.00170	-0.86547
10	-0.01540	-8.02419**	0.01614	2.28798*	0.00052	2.46520*

* Significant at the 5 percent level

** Significant at the 1 percent level

Table 7. *Abnormal returns for the three event studies of the next 50 largest banks with a 21-day event window.*

Next 50						
	2010 Results		2011 Methodology		2011 Clarification	
Day	AAR	G	AAR	G	AAR	G
-10	-0.00554	-2.51000*	0.00136	0.70950	-0.00101	-0.68944
-9	0.00248	1.51103	0.00072	0.44096	0.00248	0.72774
-8	-0.00452	-2.88847**	-0.00330	-1.44162	-0.01031	-3.57554**
-7	-0.00271	-1.27439	-0.00130	-0.69648	0.00158	0.77516
-6	0.00096	0.28768	0.01019	4.88363**	-0.00391	-1.66951
-5	0.01226	5.42290**	-0.00279	-1.12609	0.00147	0.61365
-4	-0.00054	-0.16635	0.01208	3.69313**	-0.00245	-1.49766
-3	-0.00540	-3.19414**	-0.00341	-0.99550	-0.00161	-1.01812

-2	0.00313	1.09766	0.00026	0.12247	0.00493	2.32900*
-1	-0.00689	-3.62781**	-0.00363	-1.52675	0.00267	1.21952
0	-0.00562	-3.24559**	0.00074	0.29594	-0.00134	-0.66757
1	-0.00136	-0.68996	-0.00465	-2.48608*	0.00025	0.12420
2	0.00961	3.55660**	-0.00209	-1.30000	0.00034	0.20036
3	0.00034	0.21030	-0.00174	-1.05675	-0.00280	-1.43174
4	0.00531	3.23759**	-0.00522	-2.07477*	-0.00401	-1.50660
5	-0.00093	-0.40635	-0.00101	-0.68944	-0.00668	-3.37126**
6	-0.00107	-0.40589	0.00248	0.72774	-0.00285	-1.28925
7	-0.00222	-1.15018	-0.01031	-3.57554**	-0.00577	-2.45132*
8	-0.00041	-0.21972	0.00158	0.77516	-0.00959	-2.54126*
9	0.00236	1.36950	-0.00391	-1.66951	-0.00435	-2.74680**
10	-0.00669	-3.63066**	0.00147	0.61365	0,000005	0.03670

* Significant at the 5 percent level

** Significant at the 1 percent level

Table 8. *Abnormal returns for the three event studies of the PIIGS banks with a 21-day event window.*

PIGS						
	2010 Results		2011 Methodology		2011 Clarification	
Day	AAR	G	AAR	G	AAR	G
-10	-0.00783	-1.87347	-0.00025	-0.10554	-0.00502	-2.24988*
-9	-0.00177	-0.55115	0.00830	2.76177**	-0.00047	-0.13043
-8	-0.00141	-0.54702	-0.01191	-1.77666	-0.03405	-6.17517**
-7	-0,00730	-2.53262*	0.01076	3.27241**	-0.02129	-3.61858**
-6	0.01088	0.96769	0.01890	5.84952**	-0.01559	-5.02009**
-5	0.02750	5.63895**	0.01029	2.33595*	0.01816	1.29388
-4	0.00099	0.22842	0.05079	6.34352**	-0.01291	-1.74927
-3	-0.00659	-1.38436	0.00978	2.25381*	0.01088	0.71817
-2	0.00469	1.98288*	0.00166	0.32132	0.01665	2.54243*
-1	0.00780	2.17213*	-0.01043	-3.62514**	0.02290	4.81135**
0	-0.01294	-4.02834**	-0.01011	-2.69043**	-0.01319	-3.79031**
1	0.01749	2.86524**	-0.00926	-4.09923**	-0.01637	-2.44071*
2	0.04781	7.10674**	-0.01276	-3.47008**	0.00769	1.24894
3	0.00091	0.30724	-0.01399	-3.69375**	0.00780	1.42514
4	0.00343	0.91152	0.00164	0.51906	-0.02133	-5.95531**
5	-0.00730	-2.13211*	-0.00502	-2.24988*	-0.01712	-6.01769**
6	0.00261	0.54430	-0.00047	-0.13043	-0.01128	-3.08617**
7	0.00418	1.38195	-0.03405	-6.17517**	-0.00970	-3.08229**
8	-0.00694	-2.65504**	-0.02129	-3.61858**	-0.04791	-6.33334**
9	-0.00444	-1.64684	-0.01559	-5.02009**	0.00294	0.89788
10	-0.01805	-7.41321**	0.01816	1.29388	0.00138	5.86087**

* Significant at the 5 percent level

** Significant at the 1 percent level

Table 9. *Abnormal returns for the three event studies of the non-PIIGS banks with a 21-day event window.*

Non-PIGS						
	2010 Results		2011 Methodology		2011 Clarification	
Day	AAR	G	AAR	G	AAR	G
-10	-0.00741	-2.45211*	-0.00199	-0.81785	-0.00276	-0.99302
-9	0.00487	1.24082	0.00247	1.20637	0.00703	3.36257**
-8	0.00339	1.09478	0.00239	1.05850	-0.01060	-4.68103**
-7	-0.00608	-0.58410	-0.00277	-1.37454	-0.01786	-5.71133**
-6	-0.01567	-3.28019**	0.02126	7.22261**	-0.01300	-5.03632**
-5	0.00228	1.60290	-0.00494	-2.24489*	0.01413	5.78961**
-4	-0.00803	-2.91920**	0.01367	3.56367**	-0.01003	-4.45713**
-3	-0.00998	-3.27520**	0.01733	6.24930**	0.00155	0.74322
-2	0.02176	4.81365**	-0.00738	-2.48523*	0.01412	4.92046**
-1	-0.00184	-0.66256	-0.00874	-3.60346**	0.00549	1.62090
0	-0.01194	-3.53134**	0.00099	0.30808	-0.00007	-0.02523
1	0.00893	1.55989	-0.00931	-4.01692**	0.00531	2.46463*
2	0.04326	4.18953**	-0.00352	-1.48578	0.00507	2.42917*
3	0.00197	0.51674	-0.00048	-0.28861	-0.00095	-0.32015
4	0.00234	0.81558	-0.00546	-1.50393	-0.01091	-5.59654**
5	-0.00818	-2.31410*	-0.00276	-0.99302	-0.00974	-4.38398**
6	-0.00159	-0.53276	0.00703	3.36257**	-0.00388	-2.03058*
7	0.00478	1.29763	-0.01060	-4.68103**	-0.00763	-3.68982**
8	-0.00135	-0.51328	-0.01786	-5.71133**	-0.01927	-7.05813**
9	-0.00319	-0.96152	-0.01300	-5.03632**	-0.00635	-3.47722**
10	-0.01276	-3.25970**	0.01413	5.78961**	-0.00033	-1.28665

* Significant at the 5 percent level

** Significant at the 1 percent level

Table 10. *List of the next 50 largest banks, sorted by country and ranked by market capitalization.*

Country	**Banking institution**	**Market cap. (Millions Euros)**
Austria	OBERBANK	1380,04
	BKS BANK	614,29
	BK.FUR TIROL UND VBG.	452,56
Belgium	BANQUE NALE.DE BELGIQUE	1479,37
	KBC ANCORA	1155,56
Cyprus	HELLENIC BANK	283,45
Denmark	RINGKJOBING LANDBOBANK	466,26
	SPAR NORD BANK	445,5

	SPAREKASSEN HIMLD.	196,65
	BANKNORDIK	172,4
	SPAREKASSEN LOLLAND	168,96
	GRONLANDSBANKEN	120,90
	NORDJYSKE BANK	113,20
	LAN & SPAR BANK	108,89
	VESTJYSK BANK	97,22
Finland	ALANDSBANKEN 'A'	145,73
France	CIC 'A'	6811,36
	BANQUE TARNEAUD	198,49
Germany	OLDENBURGISCHE LB.	912,06
	IKB DEUTSCHE INDSTRBK.	552,77
	UMWELTBANK	134,7
Greece	BANK OF GREECE	815,33
	ATTICA BANK	270,12
Italy	MEDIOBANCA	6831,68
	BANCA CARIGE	5590,04
	BANCA PPO.EMILIA ROMAGNA	2748,30
	BANCA PPO.DI SONDRIO	2301,11
	CREDITO EMILIANO	1795,43
	BANCA POPOLARE DI MILANO	1160,24
	CREDITO VALTELLINES	893,07
	BNC.DI DESIO E DELB.	462,96
	BANCA POPOLARE ETRURIA	239,99
	BANCA FINNAT	183,52
Luxembourg	ESPIRITO SANTO FINL.GP.	566,57
Malta	FIMBANK	122,4
Netherlands	VAN LANSCHOT	917,88
Norway	SPAREBANK 1 SR BANK	1021,05
	SPAREBANK 1 SMN	733,61
	SPAREBANK 1 NORD-NORGE	295,2
	SPB.1 RINGERIKE HADELAND	227,17
	SPAREBANKEN MORE	223,44
	SPAREBANKEN VEST	122,34
Poland	GETIN HOLDING	2786,12
	GETINOBLE BANK	1944,41

	BANK MILLENNIUM	1898,17
	BANK BPH	1609,44
	BOS	322,46
Portugal	BANIF-SGPS	512,99
Slovenia	ABANKA VIPA	304,77
United Kingdom	STANDARD CHARTERED	45128,91

Table 11. *List of stress-tested banks in the 2010 EU exercise.*

Country	**Banking institution**
Austria	ERSTE GROUP BANK AG
	RAIFFEISEN ZENTRALBANK OESTERREICH AG (RZB)
Belgium	KBC GROUP
	DEXIA
Cyprus	MARFIN POPULAR BANK PUBLIC CO LTD
	BANK OF CYPRUS PUBLIC CO LTD
Denmark	DANSKE BANK
	JYSKE BANK A/S
	SYDBANK A/S
Finland	OP-POHJOLA GROUP
France	BNP PARIBAS
	CREDIT AGRICOLE
	BPCE
	SOCIETE GENERALE
Germany	DEUTSCHE BANK AG
	COMMERZBANK AG
	HYPO REAL ESTATE HOLDING AG
	LANDESBANK BADEN-WÜRTTEMBERG
	BAYERISCHE LANDESBANK
	DZ BANK AG DT. ZENTRAL-GENOSSENSCHAFTSBANK
	NORDDEUTSCHE LANDESBANK -GZ-
	DEUTSCHE POSTBANK AG
	WESTLB AG
	HSH NORDBANK AG
	LANDESBANK HESSEN-THÜRINGEN GZ
	LANDESBANK BERLIN AG

	DEKABANK DEUTSCHE GIROZENTRALE
	WGZ BANK AG WESTDT. GENO. ZENTRALBK
Greece	NATIONAL BANK OF GREECE
	EFG EUROBANK ERGASIAS S.A.
	ALPHA BANK
	PIRAEUS BANK GROUP
	AGRICULTURAL BANK OF GREECE S.A. (ATEbank)
	TT HELLENIC POSTBANK S.A.
Hungary	OTP BANK NYRT.
	JELZÁLOGBANK NYILVÁNOSAN MŰKÖDŐ RT.
Ireland	BANK OF IRELAND
	ALLIED IRISH BANKS PLC
Italy	UNICREDIT
	INTESA SANPAOLO
	MONTE DEI PASCHI DI SIENA
	BANCO POPOLARE – S.C.
	UNIONE DI BANCHE ITALIANE SCPA (UBI BANCA)
Luxembourg	BANQUE ET CAISSE D'EPARGNE DE L'ETAT
	BANQUE RAIFFEISEN
Malta	BANK OF VALLETTA (BOV)
Netherlands	ING BANK
	RABOBANK GROUP
	ABN/ FORTIS BANK NEDERLAND (HOLDING) N.V
	SNS BANK
Poland	POWSZECHNA KASA OSZCZĘDNOŚCI BANK POLSKI S.A. (PKO BANK POLSKI)
Portugal	CAIXA GERAL DE DEPÓSITOS
	BANCO COMERCIAL PORTUGUÊS BANCO COMERCIAL PORTUGUÊSS.A. (BCP OR MILLENNIUM BCP)
	ESPÍRITO SANTO FINANCIAL GROUP S.A. (ESFG)
	BANCO BPI
Slovenia	NOVA LJUBLJANSKA BANKA (NLB)
Spain	BANCO SANTANDER S.A.
	BANCO BILBAO VIZCAYA ARGENTARIA S.A. (BBVA)
	JUPITER - CAJA DE AHORROS Y MONTE DE PIEDAD DE MADRID (CAJA MADRID); CAJA DE AHORROS DE VALENCIA, CASTELLÓN Y

	ALICANTE (BANCAJA); CAIXA DÉSTALVIS LAIETANA; CAJA INSULAR DE AHORROS DE CANARIAS; CAJA DE AHORROS Y MONTE DE PIEDAD DE AVILA; CAJA DE AHORROS Y MONTE DE PIEDAD DE SEGOVIA; CAJA DE AHORROS DE LA RIOJA.
	CAIXA- CAJA DE AHORROS Y PENSIONES DE BARCELONA (LA CAIXA); CAIXA DÉSTALVIS DE GIRONA.
	CAM - CAJA DE AHORROS DEL MEDITERRÁNEO (CAM); CAJA DE AHORROS DE ASTURIAS; CAJA DE AHORROS DE SANTANDER Y CANTABRIA; CAJA DE AHORROSY MONTE DE PIEDAD DE EXTREMADURA.
	BANCO POPULAR ESPAÑOL, S.A.
	BANCO DE SABADELL, S.A.
	DIADA - CAIXA DÉSTALVIS DE CATALUNYA; CAIXA DÉSTALVIS DE TARRAGONA: CAIXA DÉSTALVIS DE MANRESA.
	BREOGAN – CAJA DE AHORROS DE GALICIA; CAIXA DE AFORROS DE VIGO, OURENSE E PONTEVEDRA (CAIXANOVA).
	MARE NOSTRUM - CAJA DE AHORROS DE MURCIA; CAIXA DÉSTALVIS DEL PENEDES; CAJA DE AHORROS Y MONTE DE PIEDAD DE LAS BALEARES (SA NOSTRA); CAJA GENERAL DE AHORROS DE GRANADA.
	BANKINTER, S.A.
	ESPIGA – CAJA DE AHORROS DE SALAMANCA Y SORIA (CAJA DUERO); CAJA DE ESPAÑA DEINVERSIONES CAJA DE AHORROS Y MONTE DE PIEDAD (CAJA ESPAÑA).
	BANCA CIVICA, S.A.
	CAJA DE AHORROS Y M.P. DE ZARAGOZA, ARAGON Y RIOJA
	ANTEQUERA Y JAEN (UNICAJA)
	BANCO PASTOR, S.A.
	CAJA SOL - MONTE DE PIEDAD Y CAJA DE AHORROS SAN FERNANDO DE HUELVA, JEREZ Y SEVILLA (CAJA SOL); CAJA DE AHORRO PROVINCIAL DE GUADALAJARA.
	BILBAO BIZKAIA KUTXA, AURREZKI KUTXA ETA BAHITETXEA
	UNNIM – CAIXA DÉSTALVIS DE SABADELL; CAIXA DÉSTALVIS DE TERRASSA; CAIXA DÉSTALVIS COMARCAL DE MANLLEU.
	CAJA DE AHORROS Y M.P. DE GIPUZKOA Y SAN SEBASTIAN
	CAI - CAJA DE AHORROS Y MONTE DE PIEDAD DEL CÍRCULO CATÓLICO DE OBREOS DEBURGOS (CAJA CÍRCULO); MONTE DE PIEDAD Y CAJA GENERAL DE AHORROS DE BADAJOZ; CAJA DE AHORROS DE LA INMACULADA DE ARAGÓN.
	CAJA DE AHORROS Y M.P. DE CORDOBA
	BANCA MARCH, S.A.
	BANCO GUIPUZCOANO, S.A.
	CAJA DE AHORROS DE VITORIA Y ALAVA

	CAJA DE AHORROS Y M.P. DE ONTINYENT
	COLONYA – CAIXA D'ESTALVIS DE POLLENSA
Sweden	NORDEA BANK
	SKANDINAVISKA ENSKILDA BANKEN AB (SEB)
	SVENSKA HANDELSBANKEN
	SWEDBANK
United Kingdom	ROYAL BANK OF SCOTLAND (RBS)
	HSBC HOLDINGS PLC
	BARCLAYS
	LLOYDS BANKING GROUP

Table 12. *List of the 50 stress-tested banks in our final sample.*

Country	Banking institution
Austria	ERSTE GROUP BANK AG
	RAIFFEISEN ZENTRALBANK OESTERREICH AG (RZB)
Belgium	KBC GROUP
	DEXIA
Cyprus	MARFIN POPULAR BANK PUBLIC CO LTD
	BANK OF CYPRUS PUBLIC CO LTD
Denmark	DANSKE BANK
	JYSKE BANK A/S
	SYDBANK A/S
Finland	OP-POHJOLA GROUP
France	BNP PARIBAS
	CREDIT AGRICOLE
	SOCIETE GENERALE
Germany	DEUTSCHE BANK AG
	COMMERZBANK AG
	LANDESBANK BERLIN AG
Greece	NATIONAL BANK OF GREECE
	EFG EUROBANK ERGASIAS S.A.
	ALPHA BANK
	PIRAEUS BANK GROUP
	TT HELLENIC POSTBANK S.A.
Hungary	OTP BANK NYRT.

Ireland	BANK OF IRELAND
	ALLIED IRISH BANKS PLC
Italy	UNICREDIT
	INTESA SANPAOLO
	MONTE DEI PASCHI DI SIENA
	BANCO POPOLARE – S.C.
	UNIONE DI BANCHE ITALIANE SCPA (UBI BANCA)
Malta	BANK OF VALLETTA (BOV)
Netherlands	ING BANK
Poland	POWSZECHNA KASA OSZCZĘDNOŚCI BANK POLSKI S.A. (PKO BANK POLSKI)
Portugal	BANCO COMERCIAL PORTUGUÊS BANCO COMERCIAL PORTUGUÊSS.A. (BCP OR MILLENNIUM BCP)
	ESPÍRITO SANTO FINANCIAL GROUP S.A. (ESFG)
	BANCO BPI
Spain	BANCO SANTANDER S.A.
	BANCO BILBAO VIZCAYA ARGENTARIA S.A. (BBVA)
	CAJA DE AHORROS DEL MEDITERRÁNEO (CAM)
	BANCO POPULAR ESPAÑOL, S.A.
	BANCO DE SABADELL, S.A.
	BANKINTER, S.A.
	BANCO PASTOR, S.A.
Sweden	NORDEA BANK
	SKANDINAVISKA ENSKILDA BANKEN AB (SEB)
	SVENSKA HANDELSBANKEN
	SWEDBANK
United Kingdom	ROYAL BANK OF SCOTLAND (RBS)
	HSBC HOLDINGS PLC
	BARCLAYS
	LLOYDS BANKING GROUP

Table 13. *List of the 25 PIIGS banks.*

Country	Banking institution
Cyprus	MARFIN POPULAR BANK PUBLIC CO LTD
	BANK OF CYPRUS PUBLIC CO LTD
Greece	NATIONAL BANK OF GREECE
	EFG EUROBANK ERGASIAS S.A.
	ALPHA BANK
	PIRAEUS BANK GROUP
	TT HELLENIC POSTBANK S.A.
Ireland	BANK OF IRELAND
	ALLIED IRISH BANKS PLC
Italy	UNICREDIT
	INTESA SANPAOLO
	MONTE DEI PASCHI DI SIENA
	BANCO POPOLARE – S.C.
	UNIONE DI BANCHE ITALIANE SCPA (UBI BANCA)
Malta	BANK OF VALLETTA (BOV)
Portugal	BANCO COMERCIAL PORTUGUÊS BANCO COMERCIAL PORTUGUÊSS.A. (BCP OR MILLENNIUM BCP)
	ESPÍRITO SANTO FINANCIAL GROUP S.A. (ESFG)
	BANCO BPI
Spain	BANCO SANTANDER S.A.
	BANCO BILBAO VIZCAYA ARGENTARIA S.A. (BBVA)
	CAJA DE AHORROS DEL MEDITERRÁNEO (CAM)
	BANCO POPULAR ESPAÑOL, S.A.
	BANCO DE SABADELL, S.A.
	BANKINTER, S.A.
	BANCO PASTOR, S.A.

Table 14. *List of the 25 non-PIIGS banks.*

Country	Banking institution
Austria	ERSTE GROUP BANK AG
	RAIFFEISEN ZENTRALBANK OESTERREICH AG (RZB)
Belgium	KBC GROUP
	DEXIA
Denmark	DANSKE BANK
	JYSKE BANK A/S
	SYDBANK A/S
Finland	OP-POHJOLA GROUP
France	BNP PARIBAS
	CREDIT AGRICOLE
	SOCIETE GENERALE
Germany	DEUTSCHE BANK AG
	COMMERZBANK AG
	LANDESBANK BERLIN AG
Hungary	OTP BANK NYRT.
Netherlands	ING BANK
Poland	POWSZECHNA KASA OSZCZĘDNOŚCI BANK POLSKI S.A. (PKO BANK POLSKI)
Sweden	NORDEA BANK
	SKANDINAVISKA ENSKILDA BANKEN AB (SEB)
	SVENSKA HANDELSBANKEN
	SWEDBANK
United Kingdom	ROYAL BANK OF SCOTLAND (RBS)
	HSBC HOLDINGS PLC
	BARCLAYS
	LLOYDS BANKING GROUP