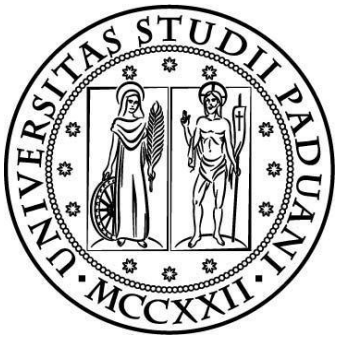

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"STRESS TEST IMPACT ON BANKS' STOCK MARKET: EMPIRICAL EVIDENCE ON 2016 EU STRESS TEST"

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Abstract

The most important tools in banking supervisory in the last years are the so-called *Stress Tests*. This instrument has been introduced in United States in 2009, immediately followed by European Union in the same year.

In this dissertation, in accordance with the past years' academic literature, the aim of the author is to investigate whether the key events of the stress test lead to shocks in banking stock's market. In particular, for the first time in literature, the point of view of the work is corporate oriented rather than macroeconomic oriented, since the focus of the analysis is to establish which type of banks react in a stronger manner to these events. In order to do this, five macro-categories of bank are investigated: Dimension, Capitalization, Profitability, Riskiness and Test Performance. The so-called Event Study Technique has been implemented to perform the econometric analysis. The results, explicated in Chapter 5 and in Final Remarks of this thesis, show that there are evidences of an impact in stock's market due to the three most important events of the stress test (Announcement, Scenarios Disclosure and Publication of Results) that are different in significance and magnitude for different type of banks.

Chapter One: An Overview of Stress-testing

The 2008 financial and banking crisis, started in US with the fall of housing prices and the subsequent crisis of subprime mortgages, exploited the fragility of the banking sector not only in the United States but also in the EU-area through a contagion effect due to the deep interconnection and internationalization that characterizes the banking industry (Ghosh 2016, Dungey et al. 2015, Dungey et al. 2018).

One of the crucial aspects of this situation was the incapacity of banking supervisory authorities to properly assess whether financial firms could effectively bear the risks coming from deterioration of macroeconomic conditions and the successive loss of confidence by markets and surveillance authorities in banking sector.
In order to overcome this situation and restore trustworthiness, authorities began to search alternative methods to assure the stability of financial system and in particular the capital adequacy of institutions that went beyond Basel I and Basel II that were already in force at the time.
The results of this effort are the introduction of new set of rules common for every country about banking surveillance and risk assessment, the so-called Basel III, and the assessment of the ability of the bank to bear losses deriving from adverse macroeconomic condition trough the so-called *Stress Tests.*

Several studies support the use of stress test as a procedure to increase transparency and restore confidence in the financial industry.
For instance, Jordan et al. (2000) supported the idea that the announcement and the disclosure of results of supervisory acts helps to diminish the information asymmetry that characterizes the relationship between banks and investors.
Other authors that support this perspective are Sorge & Virolainen (2006), Besancenot & Vranceau (2011), Lazzari et al. (2017).

The first institution to perform Stress Test as assessment of capital adequacy of banks was the Federal Reserve System in the so-called Supervisory Capital Assessment Program (SCAP), in which in February 2009, the FED embarked on a comprehensive and simultaneous assessment of the capability of bearing losses by the largest 19 US bank holding company.
The necessity of this program was also stated by the at-the-time New York Federal Reserve President and CEO William C. Dudley in a speech in March 2009: "*I believe this program is*

very important if we are to break the adverse dynamic that I outlined early… many bank holding companies don't have an incentive to raise sufficient capital to ensure that they can handle a very bad outcome. That is because such capital-raising would severely dilute existing shareholders. This implies that, left to their own devices, banks might end up being undercapitalized in a stress environment."

Investors positively reacted to the assessment (Hirtle et al. 2009) and even if they were capable to anticipate the banks with possible capital shortfall in an adverse scenario, the SCAP revealed them the size of the gap (Peristiani et al. 2010).

The Committee of European Banking Supervisors (CEBS), that was the institution in charge to EU banking surveillance from 2004 to 2011, performed their version of stress test called EU-wide stress testing in May 2009 and release the results on October of the same year.

As opposed to the SCAP, the 2009 EU-wide stress testing failed to restore confidence in EU banking system (Spargoli 2012).

Other criticisms about EU-wide stress test arose in December 2011 when Dexia, a french-belgian bank, defaulted despite it had passed the previous test (Xoual, 2013).

From that time several other stress tests were executed both in US and EU. Many studies have been made in order to understand the impact of this tool in the banking sector. The literature section of this work will describe in a detailed manner the results of these studies.

1.1 *How Stress Tests are implemented*

In order to properly analyse the impact of Stress Test on stock market, it is important to have a general knowledge of its functioning.

There are two types of stress-testing: micro and macro. The first one is used to assess the performance of a single portfolio or the resilience of a single institution. The second one is used to assess the stability of a group of financial institution which default would have a huge impact on the stability of the economy as a whole (Borio et al. 2014).

Obviously, since the stability of the financial system is the main task of EBA, the EU-wide stress tests are macro stress test.

The figure 1.1 illustrates an example of macro stress testing.

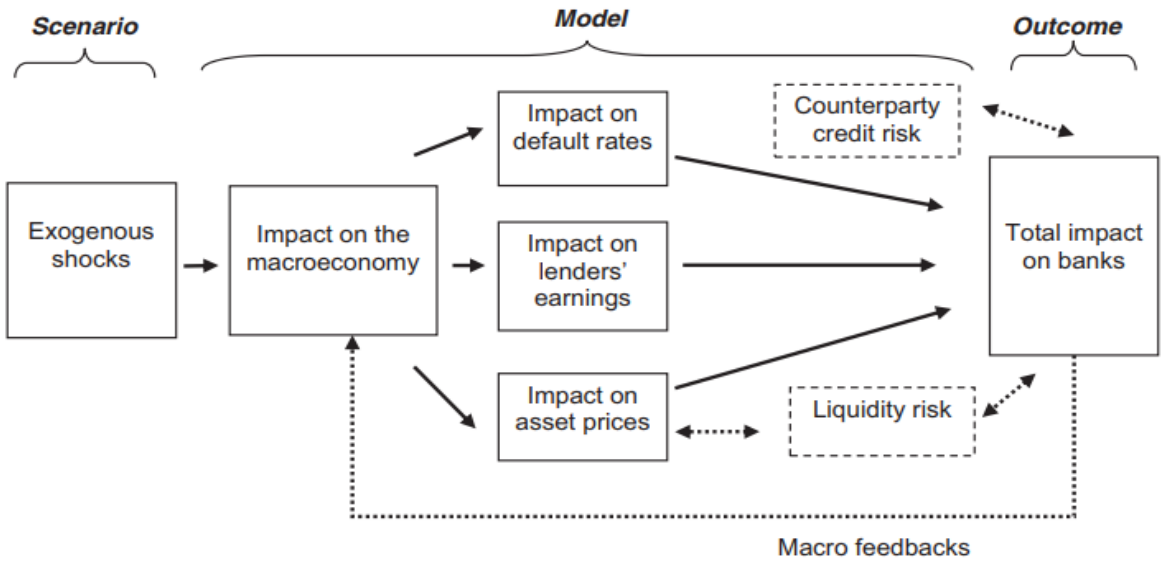

FIGURE 1.1 / HOW A STRESS TEST IS CONDUCTED. SOURCE: C. BORIO ET AL. / JOURNAL OF FINANCIAL STABILITY 12 (2014) 3–15

There are two types of approach in macro stress-testing:

- Bottom-up, if the central authority gives a common scenario to each institution that use their own model to estimate the impact of the adverse macroeconomic condition in their performance and then the central authority aggregates the results.
- Top-down, if the central authority uses their own model to estimate the impact of macroeconomic shocks on financial stability without the direct participation of the single institutions in the process (Borio et al. 2014).

Another classification of stress test is whether the institutions perform a Sensitivity Analysis or a Scenario Analysis.

In particular:

- Sensitivity analysis, if the test is conducted only on a single variable, keeping constant all the remaining factors. Easier and faster to implement, but it lacks plausibility since it does not consider the contagion effect that a shock on one variable could have on the other variables. (Ex. The impact of a change in the interest rate on credit risk.)
- Scenario analysis, if the test considers the impact of more variables on risk portfolios or on the institution itself. It is more plausible since it considers also the contagion effect that could arise.

A further classification of scenario analysis could be made regarding the approaches used in the forecast of the future scenario:

- Historical: based on observed event from the past. Easier to compute but possibly irrelevant;

- Hypothetical: based on forecast of plausible events that are not realized yet. More difficult to apply since it requires a number of experts that are able to make proper projections about future events, but more informative then the historical approach.

If we focus on the type of scenario, we can distinguish:

- Event-driven Scenario: based on a specific event independent of portfolio characteristics.
- Portfolio-driven Scenario: directly linked to the portfolio composition.
- Macroeconomic Scenario: assess the impact on the institution of a shock in the whole economy.
- Market Scenario: focus on shock of financial and/or market nature.
- Worst case / Catastrophic Scenario: Exogenous events to the market or economy that have a great impact on institutions (ex. terrorist attack).

1.2 *EU Stress Tests before 2016*

From the first EU-wide Stress Test in 2009 there were other four stress test.
After the failure of the first two stress test in restoring confidence in EU market, CEBS went on retirement in 2010 and in its place European Banking Authority (EBA) were instituted.
The 2011 EU-wide Stress Test was the first conducted by EBA that in an attempt to improve the work made by its predecessor, expanded the disclosure of results. Candelon and Sy (2015) proved that this test had a negative effect on stock market returns of tested banks.
Since the market reacted, then new information was priced, and this means a decrease in term of opaqueness in banking industry, thus this result showed that markets began to have more confidence in this tool and in the institution in charge to prosecute it.

To understand why EU-markets did not rely on the past stress tests and the evolution of themselves, it is crucial to make a brief summary of the tests conducted before 2016.

1.2.1 *CEBS 2009 EU-Wide Stress Test*

This was the first stress test in EU-area. As stated by CEBS, the main goal of this test was not to identify banks that may have need of recapitalization, since the main idea at the time was that national authorities were the only institutions with the prerogative to ask for a capitalization, but to assess the general condition of EU banking system.

Although the common scenario for the institutions subject to stress test was released jointly with the results at EU-aggregate level, nor the individual results of banks, nor the list of institutions stressed have been disclosed. CEBS affirmed only that the sample was formed by banks of 22 Member States that held 60% of total assets in EU banking system.

Regarding the assumption, from the table 1.1, released by CEBS at the end of the exercise, the forecast is based on the macroeconomic environment of 2008 and the first half of the 2009. It is composed by a baseline projection on GDP and Unemployment rate of European Union, Eurozone and United States and an adverse scenario of the same parameters on the same areas. Nonetheless the projections were negative for both variables and the adverse scenario looks severe, as we will see, the successive stress tests will have a stronger difference in the two scenarios.

This, along with the non-disclosure of the individual results of stressed institution, is the principal cause of the failure of the first EU-wide stress test.

	Realised		Baseline		More Adverse	
	2008	1H 2009	2009	2010	2009	2010
EU 27						
GDP	0.7%	-4.8%	-4.0%	-0.1%	-5.2%	-2.7%
Unemployment	7.6%	8.9%	9.4%	10.9%	9.6%	12.0%
Eurozone						
GDP	0.9%	-4.7%	-4.0%	-0.1%	-5.2%	-2.7%
Unemployment	8.2%	9.4%	9.9%	11.5%	10.0%	12.5%
US						
GDP	1.1%	-3.6%	-2.9%	0.9%	-3.7%	-0.3%
Unemployment	7.2%	9.5%	8.9%	10.2%	9.2%	11.2%

TABLE 1.1 / MAIN MACRO-ECONOMIC ASSUMPTION APPLIED IN THE EXERCISE. SOURCE: CEBS'S PRESS RELEASE ON THE RESULTS OF THE EU-WIDE STRESS TESTING EXERCISE, CEBS 2009

In regard to aggregate results, according to CEBS, in the baseline scenario banks' aggregate Tier 1 ratio is well above 9% (over the minimum requirement established by Basel II).
Under the adverse scenario a loss of € 400 bn has been estimated, but in any case, the Tier 1 ratio should have been above the capital requirements and no bank would have fallen below 6% of capital ratio.

1.2.2 *CEBS EU-Wide Stress Test 2010*

One year after the first experiment, CEBS tried to implement again the stress test technique in order to verify the stability condition of EU banking system.
Learning from their mistakes, this time CEBS released the name of the banks subjected to stress test along with their individual results.
The number of banks subjected to the assessment were 91 from 27 member states, representing the 65% of the total assets in EU banking system.
The focus of this stress test was mainly assessing the impact deriving from credit risk and market risk (including sovereign debt risk) on capital adequacy. Liquidity risk was not directly tested.

As in the previous test, there has been tested the resilience of institutions in two main macro-economic scenarios: baseline and adverse. In addition, the losses deriving from sovereign debt deterioration are taken in consideration separately.
Differently from the 2009 test, this time CEBS suited the scenario for every country included in the test and the assumptions became more severe in the adverse scenario.

Table 1.2 shows the baseline assumption made for every stressed country.
It is important to underline that the projection for Eurozone GDP growth was positive in both 2010 and 2011 forecast, in particular it was 0.7% and 1.5% respectively. Notice that in the rest of EU projection this variable was higher, 1.0% for 2010 and 2.2% in 2011. The estimated unemployment rate in 2010 was 10.7% in Euro-area and 9.2 in the rest of EU, for 2011 the forecasts were 10.9% and 8.9%.
The best GDP growth performance at a country level was Slovakia (1.9%) in Eurozone and Poland (2.9%) in the rest of EU in 2010, Ireland (2.6%) and Estonia (4.0%) in 2011. The worst performing countries for this variable were Greece that maintained negative GDP growth in 2010 and 2011 for the Euro-area and Latvia that had a severe negative GDP growth in 2010 for the rest of EU.
Netherlands had the best Eurozone UR prediction in both 2010 and 2011 projections (5.4% and 6.0% respectively), Denmark had the best UR prediction in the rest of EU area (5.8% and 5.6%). The highest UR estimate in Eurozone was Spain with an UR over 20% and the highest UR in the rest of EU is Latvia.
Respect to the previous test the baseline scenario is more optimistic, since the GDP growth projections were usually positive even if the UR expected was higher.

2010 - Benchmark	GDP at constant prices	Unemployment	Short-term interest rates	Long-term interest rates	Nominal USD exchange rate	CPI
Austria	1.1	6.0	1.2	4.0	0.7	1.3
Belgium	0.6	9.9	1.2	4.0	0.7	1.3
Cyprus	0.1	6.6	1.2	4.7	0.7	3.1
Finland	0.9	10.2	1.2	3.5	0.7	1.6
France	1.2	10.2	1.2	3.8	0.7	1.2
Germany	1.2	9.2	1.2	3.5	0.7	0.7
Greece	-4.1	11.7	1.2	6.8	0.7	1.4
Ireland	-1.4	14.0	1.2	5.1	0.7	-0.6
Italy	0.7	8.7	1.2	4.4	0.7	1.7
Luxembourg	1.1	7.3	1.2	3.8	0.7	1.8
Malta	0.7	7.4	1.2	4.5	0.7	2.0
Netherlands	0.9	5.4	1.2	3.8	0.7	0.8
Portugal	0.5	11.1	1.2	4.7	0.7	1.3
Slovakia	1.9	12.8	1.2	4.1	0.7	1.9
Slovenia	1.3	8.3	1.2	3.9	0.7	1.7
Spain	-0.6	20.0	1.2	4.4	0.7	1.1
Euro area	**0.7**	**10.7**	**1.2**	**3.5**	**0.7**	**1.1**
Bulgaria	0.4	8.8		6.9	1.4	2.4
Czech R.	1.4	8.1		4.7	18.7	1.4
Denmark	1.5	5.8	2.1	3.8	5.0	1.5
Estonia	1.0	16.0		12.1	11.5	1.3
Hungary	0.9	11.8		8.4	196.5	4.9
Latvia	-3.3	20.4		12.7	0.5	-3.4
Lithuania	0.5	17.1		12.1	2.5	0.4
Poland	2.9	10.4	4.8	6.3	2.9	1.6
Romania	-0.7	8.1		9.4	3.0	4.3
Sweden	1.4	10.2	1.4	3.6	7.0	1.7
UK	0.6	8.7	1.5	4.3	0.6	2.4
Rest of the EU	**1.0**	**9.2**				**2.3**
2011 - Benchmark	**GDP at constant prices**	**Unemployment**	**Short-term interest rates**	**Long-term interest rates**	**Nominal USD exchange rate**	**CPI**
Austria	1.5	5.7	2.1	4.3	0.7	1.6
Belgium	1.5	10.3	2.1	4.4	0.7	1.5
Cyprus	1.3	6.7	2.1	5.1	0.7	2.5
Finland	1.6	9.9	2.1	3.9	0.7	1.5
France	1.5	10.0	2.1	4.1	0.7	1.4
Germany	1.7	9.3	2.1	3.8	0.7	1.0
Greece	-2.6	14.1	2.1	7.1	0.7	2.1
Ireland	2.6	13.2	2.1	5.4	0.7	1.0
Italy	1.4	8.7	2.1	4.7	0.7	2.0
Luxembourg	1.8	7.7	2.1	4.2	0.7	1.7
Malta	1.6	7.3	2.1	4.9	0.7	2.2
Netherlands	1.6	6.0	2.1	4.1	0.7	1.2
Portugal	0.2	11.9	2.1	5.1	0.7	1.4
Slovakia	2.6	12.6	2.1	4.6	0.7	2.5
Slovenia	2.0	8.5	2.1	4.4	0.7	2.0
Spain	1.0	20.5	2.1	4.7	0.7	2.0
Euro area	**1.5**	**10.9**	**2.1**	**3.8**	**0.7**	**1.5**
Bulgaria	4.0	8.0		6.9	1.5	2.5
Czech R.	1.8	8.5		4.4	18.8	1.8
Denmark	1.8	5.6	2.9	4.1	5.0	1.8
Estonia	4.0	14.5		12.1	11.6	1.1
Hungary	3.2	11.9		6.2	197.2	3.0
Latvia	3.9	18.2		12.7	0.5	0.2
Lithuania	3.1	15.9		12.1	2.6	1.7
Poland	2.4	11.5	5.7	6.3	2.9	1.7
Romania	3.6	8.8		9.4	3.1	2.4
Sweden	2.1	10.1	2.8	3.9	7.0	1.7
UK	1.9	8.0	3.0	4.7	0.6	1.6
Rest of the EU	**2.2**	**8.9**				**1.7**

TABLE 1.2 / 2010 BASELINE ASSUMPTION. SOURCE: AGGREGATE OUTCOME OF THE 2010 EU WIDE STRESS TEST EXERCISE COORDINATED BY CEBS IN COOPERATION WITH THE ECB. CEBS 2010

With regard to adverse scenario, a negative GDP growth of -0.2% was estimated for Eurozone in 2010 and -0.6% in 2011. The rest of EU forecasts of GDP growth were slightly better since the projections were 0.2% and 0.5% in 2010 and 2011 respectively. At a country level the best forecasts on GDP growth remained Slovakia and Poland, the worst Greece and Latvia.

Concerning the UR, the forecasts were 10.8% and 11.5% in 2010 and 2011 respectively in Euro-area and 9.6% for both exercise year in rest of European Union.

Table 1.3 illustrates all the assumptions of the exercise.

2010 - Adverse	GDP at constant prices	Unemployment	Short-term interest rates	Long-term interest rates	Nominal USD exchange rate	CPI
Austria	-0.1	6.1	2.1	4.5	0.7	1.5
Belgium	-0.3	9.9	2.1	4.8	0.7	1.2
Cyprus	-0.7	6.7	2.1	5.4	0.7	3.1
Finland	-0.1	10.4	2.1	4.0	0.7	1.3
France	0.7	10.2	2.1	4.3	0.7	1.2
Germany	0.2	9.2	2.1	4.0	0.7	0.7
Greece	-4.6	11.8	2.1	11.8	0.7	1.4
Ireland	-2.1	14.1	2.1	6.7	0.7	-0.6
Italy	-0.3	8.8	2.1	5.4	0.7	1.7
Luxembourg	-0.1	7.3	2.1	4.6	0.7	1.8
Malta	-0.8	7.6	2.1	5.1	0.7	1.8
Netherlands	0.0	5.5	2.1	4.3	0.7	0.8
Portugal	-0.3	11.3	2.1	7.0	0.7	1.3
Slovakia	0.8	12.9	2.1	4.5	0.7	1.8
Slovenia	0.7	8.5	2.1	4.4	0.7	1.8
Spain	-1.4	20.3	2.1	5.8	0.7	1.0
Euro area	**-0.2**	**10.8**	**2.1**	**4.4**	**0.7**	**1.1**
Bulgaria	-0.7	9.2		8.0	1.4	2.0
Czech R.	0.9	8.6		5.8	18.7	0.9
Denmark	0.8	6.0	3.0	4.4	5.0	1.2
Estonia	-0.1	16.4		13.2	11.5	0.9
Hungary	-0.2	12.6		9.5	196.5	4.8
Latvia	-4.2	20.7		13.8	0.5	-3.9
Lithuania	-0.9	17.6		13.2	2.5	-0.2
Poland	2.1	10.7	5.7	7.4	2.9	2.5
Romania	-1.8	8.5		10.5	3.0	3.9
Sweden	0.9	10.2	2.4	4.3	7.0	1.3
UK	-0.2	9.1	2.4	5.0	0.6	2.4
Rest of the EU	**0.2**	**9.6**				**2.3**
2011 - Adverse	**GDP at constant prices**	**Unemployment**	**Short-term interest rates**	**Long-term interest rates**	**Nominal USD exchange rate**	**CPI**
Austria	-1.2	6.1	3.3	5.3	0.7	1.0
Belgium	-0.6	11.1	3.3	5.6	0.7	0.6
Cyprus	-0.1	7.3	3.3	6.3	0.7	2.1
Finland	-0.6	11.4	3.3	4.9	0.7	0.1
France	-0.1	10.5	3.3	5.1	0.7	1.0
Germany	-0.6	9.7	3.3	4.7	0.7	0.6
Greece	-4.3	14.8	3.3	14.7	0.7	2.1
Ireland	1.0	13.7	3.3	7.8	0.7	0.7
Italy	-0.3	9.3	3.3	6.3	0.7	1.7
Luxembourg	-0.8	7.7	3.3	5.5	0.7	1.4
Malta	-1.2	8.2	3.3	6.0	0.7	1.6
Netherlands	-1.0	7.0	3.3	5.1	0.7	1.0
Portugal	-2.3	12.8	3.3	8.5	0.7	0.9
Slovakia	-0.6	13.2	3.3	5.4	0.7	1.4
Slovenia	0.6	9.1	3.3	5.3	0.7	1.9
Spain	-1.2	21.6	3.3	6.8	0.7	1.2
Euro area	**-0.6**	**11.5**	**3.3**	**5.3**	**0.7**	**1.1**
Bulgaria	2.8	8.4		8.0	1.5	0.5
Czech R.	0.6	9.6		5.8	18.8	0.9
Denmark	0.2	6.3	4.1	5.1	5.0	1.2
Estonia	3.0	14.8		13.2	11.6	-1.0
Hungary	1.6	13.2		9.5	197.2	2.5
Latvia	2.5	18.8		13.8	0.5	-3.6
Lithuania	2.4	16.3		13.2	2.6	-2.3
Poland	0.5	12.2	7.0	7.6	2.9	2.3
Romania	2.1	9.2		10.5	3.1	1.2
Sweden	0.9	10.3	4.1	4.9	7.0	1.2
UK	0.1	8.8	4.2	5.7	0.6	0.6
Rest of the EU	**0.5**	**9.6**				**0.9**

TABLE 1.3 / 2010 ADVERSE SCENARIO ASSUMPTIONS. SOURCE: AGGREGATE OUTCOME OF THE 2010 EU WIDE STRESS TEST EXERCISE COORDINATED BY CEBS IN COOPERATION WITH THE ECB. CEBS 2010

Other variables stressed were changes in short and long-term interest rates, exchange rates calculated respect to USD and inflation calculated using the Consumer Price Index.

The aggregate results of the stress test say that the Tier 1 Ratio should have increased in the baseline scenario, in particular from 10.3% to 11.2% in the end of exercise.

The decrease on the capital ratio in the adverse scenario was 0.7% from the starting point, since it went from 10.3% to 9.6%, in the case of a sovereign shock, a further fall would have made the ratio went to 9.2% at the end of the exercise period.

The delta between the benchmark and the adverse scenario was 200 basis points as Figure 1.2 depicts.

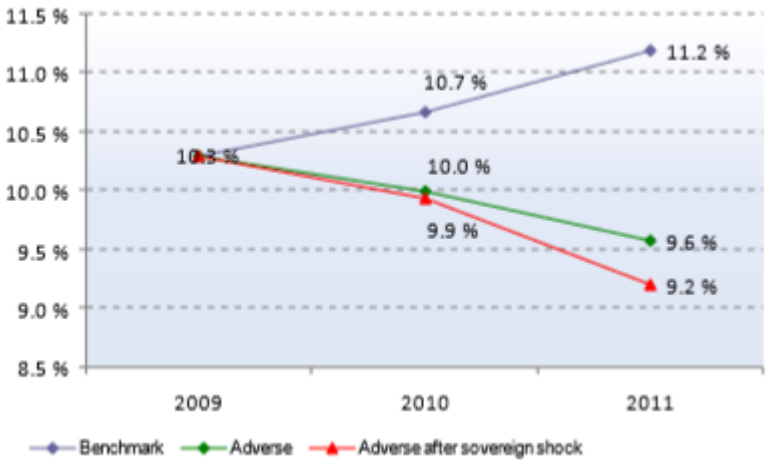

FIGURE 1.2 / 2010 STRESS TEST RESULTS. SOURCE: AGGREGATE OUTCOME OF THE 2010 EU WIDE STRESS TEST EXERCISE COORDINATED BY CEBS IN COOPERATION WITH THE ECB. CEBS 2010

1.2.3 *EBA 2011 EU-Wide Stress Test*

As the two previous stress test, 2011 EU-Wide Stress Test considered a time horizon of two years from the starting point that is the 31st December 2010.

90 banks were taken in consideration inside the sample and just as 2010 test the authorities disclosed the results both at the aggregate level and individual bank level.

This was the first test carried out by the new-constituted European Banking Authority.

The test kept in consideration the possibility for banks to strengthen balance sheets trough recapitalization and mandatory restructuring plans during the first four months of 2011. As result of that, in aggregate around € 50 bn were raised in this period by the sample tested banks. This capital raising was achieved through issuance by banks of common equity in private markets, government injections of capital, conversion of lower-quality capital instruments into CET1 capital instruments and restructuring plans approved by competent authorities.

Regarding the assumptions of the exercise scenarios, the baseline scenario was based on the forecast on the economy of the European Union made by the European Commission in the Autumn 2010.

According to their expectation, the short-term interest rates should have increased by 1.5% in 2011 and 1.8% in 2012 in the euro-area. The long-term interest rates should have been 2.7% and 2.9% in the same period. A depreciation of dollar against the euro was considered in the baseline scenario, in particular the exchange rate would have been moved from 1.33 in 2010 to 1.39 in 2011 and 2012.

The GDP was projected to grow over the exercise period, by 1.7% in 2011 and 2% in 2012 in EU, regarding the Eurozone the baseline projections were 1.5% and 1.8% respectively in 2011 and 2012.

Similarly of adverse scenarios implemented in the previous stress tests, the 2011 stress test's adverse scenario is based on the baseline scenario and it is composed by three elements: a set of EU shocks, a global negative demand shock and a strong depreciation of USD against Euro. In line with the period, the first element of disorder in adverse scenario is due principally to the hypothesis of an aggravation of the at-the-time ongoing sovereign debt crisis.
Country-specific bond yields shocks have been introduced in for each state member. For instance, yield of German 10-years bond was assumed to remain stable, while on average the yields of euro-area 10-years government bonds was assumed to rise of 75 basis point, 66 if the whole European Union is considered.
Stock prices were assumed to fall by 15% in the euro-area and by 14% in EU. House prices were assumed to decrease as well, and this reduction was, as usually, calibrated for every country.

The last endogenous internal shock concerned the European money-market: the adverse prediction for short-term interest rates was an average increase of 125 basis points.
The aforementioned endogenous shocks come along with exogenous negative shocks. In particular, a common for every country belonging to eurozone negative consumption shock of 1.4%, that was 4.5% for investment. The similar shocks for the rest of EU countries was less severe, since the consumption shock considered was 0.8% and the investment shock was 2.5%. For the exogenous foreign demand shock was considered a decreasing in consumption and investment of 2.2% and 5.6% respectively in the US economy. This shock starts in US but would expand in the rest of the world in two quarters. Finally, a USD depreciation of 4% during the test horizon was considered.
Table 1.4 and 1.5 indicates respectively the main assumption of adverse scenario and its deviation from the baseline.

	GDP growth		HICP inflation		Unemployment rate	
	2011	2012	2011	2012	2011	2012
Belgium	0.0	-0.2	1.2	-0.2	9.0	9.8
Bulgaria	1.1	1.5	3.1	2.9	9.2	8.9
Czech Republic	-0.3	1.5	1.7	0.1	7.8	8.4
Denmark	0.4	-0.3	1.6	1.5	7.2	8.3
Germany	-0.9	0.5	1.4	1.0	6.8	6.9
Estonia	1.8	-0.9	2.8	1.7	15.4	15.0
Ireland	-1.6	0.3	0.1	0.6	14.9	15.8
Greece	-4.0	-1.2	2.2	-0.1	15.2	16.3
Spain	-1.1	-1.1	0.9	-0.2	21.3	22.4
France	0.4	0.2	1.3	0.9	9.6	9.8
Italy	-0.1	-1.0	1.3	0.8	8.6	9.2
Cyprus	-0.6	0.6	2.9	1.7	6.9	7.1
Latvia	1.6	0.5	0.6	0.9	18.3	18.8
Lithuania	0.8	-1.4	2.0	2.1	17.3	17.2
Luxemburg	0.2	0.8	1.4	1.3	5.6	5.7
Hungary	1.9	1.2	3.1	2.6	11.1	10.9
Malta	-3.1	0.5	0.7	1.6	7.4	8.8
Netherlands	-0.7	-0.8	0.5	0.1	4.9	5.9
Austria	-0.7	-0.6	1.4	1.1	4.5	4.8
Poland	3.0	2.5	2.6	2.3	9.4	9.8
Portugal	-3.0	-2.7	1.2	-0.3	11.6	13.0
Romania	0.0	2.1	4.1	0.6	7.5	7.4
Slovenia	0.8	1.0	1.6	1.9	7.7	7.7
Slovakia	0.3	1.2	2.0	0.5	14.4	14.3
Finland	-0.5	0.6	0.6	-1.3	8.3	8.1
Sweden	0.4	-1.2	0.2	-0.9	8.8	10.1
United Kingdom	-0.7	0.9	1.9	-0.8	9.0	10.6
Euro Area	**-0.5**	**-0.2**	**1.3**	**0.6**	**10.3**	**10.8**
Non Euro Area	**2.0**	**2.6**	**1.9**	**0.0**	**9.0**	**10.1**
European Union	**-0.4**	**0.0**	**1.5**	**0.5**	**10.0**	**10.5**

Percentage point deviations from the baseline

	GDP growth		HICP inflation		Unemployment rate	
	2011	2012	2011	2012	2011	2012
Belgium	-1.8	-2.2	-0.7	-2.1	0.2	1.1
Bulgaria	-1.5	-2.3	-0.1	-0.2	0.1	0.9
Czech Republic	-2.6	-1.6	-0.4	-2.1	0.8	1.7
Denmark	-1.5	-2.1	-0.5	-0.5	0.9	2.5
Germany	-3.1	-1.5	-0.4	-1.0	0.1	0.6
Estonia	-2.6	-4.4	-0.8	-0.6	0.3	1.4
Ireland	-2.5	-1.6	*-0.3*	*0.0*	*1.5*	*3.1*
Greece	-1.0	-2.3	0.0	-0.6	0.2	1.1
Spain	-1.8	-2.8	-0.6	-1.6	1.1	3.2
France	-1.2	-1.6	-0.3	-0.7	0.1	0.6
Italy	-1.2	-2.4	-0.5	-1.1	0.3	1.0
Cyprus	-2.1	-1.6	-0.4	-0.8	0.3	1.2
Latvia	-1.7	-3.5	-0.5	-0.9	0.6	2.6
Lithuania	-2.0	-4.6	-0.3	-0.7	0.4	2.1
Luxemburg	-2.6	-2.4	-0.7	-0.3	0.0	0.1
Hungary	-0.9	-2.0	-0.8	-1.1	0.1	0.6
Malta	-5.1	-1.7	-1.3	-0.7	0.8	2.3
Netherlands	-2.2	-2.5	-1.0	-1.5	0.5	1.6
Austria	-2.4	-2.7	-0.7	-0.7	0.3	0.8
Poland	-0.9	-1.7	-0.3	-0.7	0.2	1.3
Portugal	-2.0	-3.5	-1.1	-1.6	0.5	1.8
Romania	-1.5	-1.7	-1.4	-2.6	0.1	0.4
Slovenia	-1.1	-1.6	-0.4	-0.3	0.5	1.1
Slovakia	-2.7	-2.7	-1.2	-2.3	0.2	0.9
Finland	-3.4	-1.7	-1.5	-3.1	*0.5*	*0.9*
Sweden	-2.9	-3.5	-1.2	-2.8	0.8	2.6
United Kingdom	-2.9	-1.6	-0.7	-2.2	1.1	2.8
Euro Area	**-2.0**	**-2.0**	**-0.5**	**-1.1**	**0.3**	**1.2**
Non Euro Area	**-2.4**	**-1.9**	**-0.7**	**-1.9**	**0.9**	**2.3**
European Union	**-2.1**	**-2.0**	**-0.6**	**-1.3**	**0.5**	**1.4**

TABLE 1.4 AND 1.5 / 2011 ADVERSE SCENARIO AND DEVIATION FROM BASELINE. SOURCE: MACROECONOMIC ADVERSE SCENARIO FOR 2011 EU-WIDE STRESS TEST: SPECIFICATION AND RESULTS. ECB 2011

The test showed that in the adverse scenario and without a capital raising 20 out of the 90 banks considered in the sample would have suffered a fall in CET 1 so strong that this one would have been declined under the threshold of the 5% ratio with a capital deficit of €25 bn. In average, the CET 1 ratio would have passed from 8.9% to 7.4%.

Considering the possible strengthen of balance sheet permitted by the authority to the banks subject to the test, the CET 1 would have declined from 8.9% to 7.7% on average, while only eight banks would have gone below the aforementioned 5% CET 1 ratio threshold.

The overall capital deficit would have been € 2.5 bn.

The figure 1.3 describes the evolution of weighted average CET 1 ratio over the exercise scenario in both baseline and stressed scenario.

The figure shows how the theoretical EU recovery in baseline scenario would have led to a strengthen in banks' capital position, since the difference between the starting point and the end date would have been 0.9 % in favour of the latter (from 8.9% to 9.8%).

The difference between baseline and adverse scenario would have been 210 basis points.

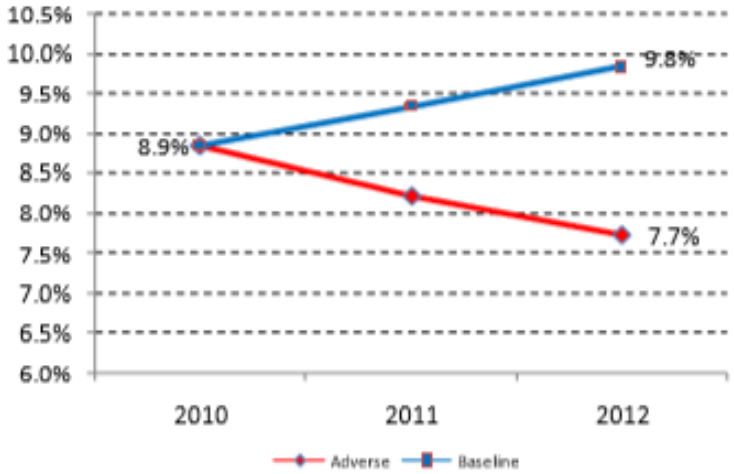

FIGURE 1.3 / 2011 STRESS TEST RESULTS. SOURCE: EUROPEAN BANKING AUTHORITY 2011 EU-WIDE STRESS TEST AGGREGATE REPORT. EBA 2011

1.2.4 *2014 EU-Wide Stress Test*

The 2014 EU-Wide Stress Test includes 123 banking groups across EU and Norway, that represent the 70% of total EU banking assets.
EBA coordinated the test in cooperation with ESRB, the European Commission, the ECB as well national competent authorities.
EBA developed the methodology and assured the disclosure of results, the ESRB and the European Commission produced the macroeconomic scenarios and competent authorities along with ECB were responsible for the quality of banks' results.

As usual, two main scenarios were taken in consideration in order to test the resilience of EU banking system: a baseline scenario and an adverse scenario. Considering a weighted aggregate average Common Equity Tier 1 capital ratio of 11.1% at the starting point, EBA set the hurdle rate for the baseline scenario at 8% of CET 1 ratio and for the adverse scenario 5.5% of CET 1 ratio.

The baseline scenario was based on the economic projections made by The Directorate General for Economic and Financial Affairs of the European Commission in February 2014 as part of their three European Economic Forecast per year. The exercise horizon is two years long.
From the aforementioned European Economic Forecast, the projections of the baseline scenario in terms of GDP evolution were a growth of 1.5% and 1.2% in 2014 for the euro-area and EU respectively and a growth of 1.8% and 2% in 2015. Since the European Economic Forecast calculated projections only for 2014 and 2015, the baseline forecast for 2016 came from a model-based approach by EBA. According to these projections, GDP was expected to be grown by 1.8% in EU and 1.7% in eurozone.

With regards to labour market, the Unemployment rate was forecasted to be 10.4% in EU and 11.7% in euro-area at the end of 2015, while a further reduction was predicted for 2016, bringing the UR to 10.1% and 11.3% in 2016.
The inflation expectation was 1.2% and 1% respectively in EU and eurozone in 2014 with a grew of 0.25% in both area in 2015. A further rise in inflation was estimated to verify in 2016, since the expectation were 1.5% in euro-area and 1.7% in EU. Other variables that were taken in consideration were house prices, long and short-term interest rates, exchange rates, stock prices and sovereign debt yields.

The adverse macroeconomic scenario was designed to consider the main risk that imperilled the stability of EU banking system. In particular, four major threats were accounted: (i) an increase in global bond yields, (ii) a deterioration of credit quality in countries with feeble demand, with weak fundamentals and still vulnerable banking sectors, (iii) stalling policy reforms that could represent a risk for confidence in sustainability of public debt in some countries, (iv) the lack of necessary balance sheet repairs to maintain affordable market funding.
The first shock considered was a government bond shock, in which, after a shock in US government bond market, a contagion effect involves EU-countries in differ manners, but the EU average shock considered in the adverse scenario would have been 150 basis point in 2014, 110 basis points in 2015 and 2016.
The turmoil caused by sovereign debt shock would have caused also a permanent 80 basis point increase in short-term interbank rates and a shock calibrated for every country in stock market prices that in average would have loss of 18-19 % in European Union and euro-area as well. The country-specific shock varies from -11% in Poland to almost -27% in Greece.
A severe exchange rate shock was also considered, in particular in Hungary, Poland, Czech Republic, Croatia and Romania.
Other shocks considered regarded corporate bond and house prices. Oil and non-oil commodities prices and monetary policy were considered identical to their baseline levels.

The cumulative effect of these shock on GDP, with particular attention to the difference with the deviation from the baseline scenario, is reported in Table 1.6.
The growth theorized in adverse scenario would have been -0.7%, -1.5% and 0.1% in 2014, 2015 and 2016 respectively in average for EU and it would have been very similar in eurozone. The negative deviation from the baseline would have been in average 6.6 percentage points in 2016 for euro-area and 7 percentage points in European Union. Netherlands and Croatia were

the two extremity looking at the impact of the macroeconomic adverse scenario on GDP growth since the first one deviation in 2016 would have been -5.4% and the second one -13.6%.

	Baseline growth in %			Deviations in PP			Adverse growth in %			Level deviation 2016
	2014	2015	2016	2014	2015	2016	2014	2015	2016	in %
Belgium	1.4	1.7	1.4	-1.6	-3.2	-1.4	-0.2	-1.5	0.0	-6.0
Bulgaria	1.7	2.0	2.7	-2.0	-3.8	-2.8	-0.3	-1.8	-0.2	-8.3
Czech Republic	1.8	2.2	1.5	-3.4	-5.1	-2.1	-1.6	-3.0	-0.6	-10.1
Denmark	1.7	1.8	2.3	-2.6	-3.8	-0.9	-0.9	-2.0	1.4	-7.1
Germany	1.8	2.0	1.8	-2.7	-3.8	-1.5	-0.9	-1.7	0.3	-7.6
Estonia	2.3	3.6	3.0	-4.6	-5.4	-1.0	-2.3	-1.8	2.0	-10.4
Croatia	0.5	1.2	1.0	-4.2	-6.9	-3.3	-3.8	-5.7	-2.3	-13.6
Ireland	1.8	2.9	2.4	-3.0	-3.6	-1.9	-1.3	-0.7	0.5	-8.1
Greece	0.6	2.9	3.7	-2.2	-3.6	-2.5	-1.6	-0.6	1.2	-7.9
Spain	1.0	1.7	2.2	-1.3	-2.7	-2.1	-0.3	-1.0	0.1	-5.9
France	1.0	1.7	2.3	-1.4	-2.8	-1.9	-0.4	-1.1	0.4	-6.0
Italy	0.6	1.2	1.3	-1.5	-2.8	-2.0	-0.9	-1.6	-0.7	-6.1
Cyprus	-4.8	0.9	1.9	-1.5	-1.4	-0.8	-6.3	-0.5	1.1	-3.7
Latvia	4.2	4.3	2.2	-5.5	-6.5	-1.7	-1.3	-2.2	0.5	-12.6
Lithuania	3.5	3.9	3.1	-3.8	-7.1	-3.5	-0.3	-3.2	-0.4	-13.3
Luxembourg	2.2	2.5	1.8	-2.6	-4.3	-2.3	-0.4	-1.8	-0.5	-8.7
Hungary	2.1	2.1	1.4	-2.0	-4.0	-2.3	0.1	-1.9	-0.9	-7.9
Malta	2.1	2.1	1.0	-2.4	-3.4	-1.2	-0.3	-1.3	-0.2	-6.7
Netherlands	1.0	1.3	1.7	-1.6	-2.8	-1.2	-0.5	-1.5	0.5	-5.4
Austria	1.5	1.8	1.7	-1.7	-3.4	-1.8	-0.2	-1.5	-0.1	-6.7
Poland	2.9	3.1	3.5	-2.7	-3.9	-1.4	0.2	-0.8	2.1	-7.6
Portugal	0.8	1.5	1.7	-1.5	-3.8	-2.8	-0.8	-2.3	-1.1	-7.8
Romania	2.3	2.5	2.3	-3.7	-4.2	-3.0	-1.4	-1.8	-0.7	-10.3
Slovenia	-0.1	1.3	1.2	-1.7	-2.7	-1.4	-1.8	-1.3	-0.2	-5.6
Slovakia	2.3	3.2	3.2	-3.2	-5.5	-1.1	-1.0	-2.4	2.1	-9.4
Finland	0.2	1.3	1.6	-3.0	-3.5	-0.8	-2.8	-2.2	0.8	-7.1
Sweden	2.5	3.3	2.5	-2.9	-5.2	-2.7	-0.4	-1.9	-0.3	-10.2
United Kingdom	2.5	2.4	1.6	-3.3	-3.7	-1.0	-0.8	-1.3	0.6	-7.6
Euro Area	**1.2**	**1.8**	**1.7**	**-1.9**	**-3.2**	**-1.8**	**-0.7**	**-1.4**	**0.0**	**-6.6**
European Union	**1.5**	**2.0**	**1.8**	**-2.2**	**-3.4**	**-1.7**	**-0.7**	**-1.5**	**0.1**	**-7.0**

TABLE 1.6 / 2014 STRESS TEST GDP GROWTH BASELINE AND ADVERSE PROJECTIONS. SOURCE: EBA/SSM STRESS TEST: THE MACROECONOMIC ADVERSE SCENARIO. ESRB 2014

The impact of the scenario on price inflation is reassumed in Table 1.7.

The estimate average impact on price inflation were 1% in 2014, 0.6% in 2015 and 0.3% in 2016 for euro-area, whether the same impact on EU were 1.1%, 0.6% and 0% in 2014, 2015 and 2016 respectively. The average deviation from baseline scenario calculated respect to 2016 were -1.9% in eurozone and -2.8% considering all the EU. At a country-specific level the two opposite were Luxembourg with a deviation of -0.7% and Sweden with a deviation of -8.8%.

	Baseline inflation in %			Deviations in PP			Adverse inflation in %			Price level deviation
	2014	2015	2016	2014	2015	2016	2014	2015	2016	2016 in %
Belgium	0.9	1.4	1.5	-0.1	-1.3	-1.5	0.8	0.1	0.0	-2.8
Bulgaria	0.5	1.8	2.4	-0.3	-0.7	-0.5	0.2	1.1	1.8	-1.5
Czech Republic	1.0	1.8	2.2	-0.1	-1.8	-4.6	0.8	0.0	-2.4	-6.3
Denmark	1.5	1.7	1.8	0.0	-0.3	-0.7	1.5	1.5	1.0	-1.0
Germany	1.4	1.4	1.5	0.0	-0.4	-1.1	1.4	0.9	0.4	-1.5
Estonia	1.8	2.8	3.2	0.0	-0.4	-1.2	1.8	2.5	1.9	-1.6
Croatia	1.3	1.5	1.6	-0.1	-0.7	-1.8	1.3	0.8	-0.3	-2.5
Ireland	0.8	1.1	1.4	-0.1	-0.7	-1.1	0.7	0.4	0.3	-1.9
Greece	-0.6	0.2	1.1	-0.4	-1.1	-1.8	-1.0	-0.9	-0.7	-3.3
Spain	0.3	0.9	1.3	0.0	-0.5	-0.5	0.3	0.4	0.8	-1.0
France	1.2	1.2	1.3	0.0	-0.5	-1.6	1.1	0.7	-0.3	-2.2
Italy	0.9	1.3	1.8	0.0	-0.3	-1.2	0.9	1.0	0.6	-1.4
Cyprus	0.4	1.4	1.7	-0.1	-0.7	-0.8	0.4	0.8	1.0	-1.5
Latvia	1.9	2.1	1.8	-0.7	-2.6	-3.4	1.2	-0.5	-1.6	-6.4
Lithuania	1.1	1.9	2.5	-0.1	-0.2	-1.0	1.0	1.8	1.4	-1.2
Luxembourg	1.5	1.7	1.8	0.0	-0.2	-0.6	1.5	1.6	1.2	-0.7
Hungary	1.2	2.8	2.4	-0.1	-0.4	-1.2	1.1	2.4	1.2	-1.5
Malta	1.2	1.9	1.8	-0.2	-0.6	-1.3	1.0	1.3	0.5	-2.0
Netherlands	1.1	1.3	1.6	-0.2	-1.2	-1.0	0.9	0.1	0.6	-2.3
Austria	1.8	1.8	1.9	-0.4	-0.6	-0.7	1.4	1.3	1.2	-1.6
Poland	1.4	2.0	2.4	-0.4	-2.0	-2.5	0.9	0.0	-0.1	-4.7
Portugal	0.8	1.2	2.0	0.0	-1.1	-2.7	0.7	0.1	-0.7	-3.7
Romania	2.4	3.4	2.6	-0.4	-1.7	-3.3	2.0	1.7	-0.8	-5.2
Slovenia	0.8	1.3	1.6	-0.3	-1.2	-1.4	0.5	0.0	0.2	-2.8
Slovakia	0.7	1.6	1.4	-0.3	-2.3	-3.7	0.4	-0.7	-2.3	-6.1
Finland	1.7	1.6	1.7	-0.6	-2.6	-2.5	1.1	-1.0	-0.8	-5.6
Sweden	0.9	1.8	2.1	-1.1	-3.6	-4.6	-0.2	-1.8	-2.5	-8.8
United Kingdom	2.0	2.0	2.1	-0.3	-1.9	-3.3	1.7	0.1	-1.2	-5.3
Euro Area	**1.0**	**1.3**	**1.5**	**-0.1**	**-0.6**	**-1.3**	**1.0**	**0.6**	**0.3**	**-1.9**
European Union	**1.2**	**1.5**	**1.7**	**-0.1**	**-1.0**	**-1.7**	**1.1**	**0.6**	**0.0**	**-2.8**

TABLE 1.7 / 2014 STRESS TEST INFLATION BASELINE AND ADVERSE PROJECTIONS. SOURCE: EBA/SSM STRESS TEST: THE MACROECONOMIC ADVERSE SCENARIO. ESRB 2014

The Table 1.8 depicts the impact of adverse scenario on unemployment rate for every country in the European Union.

The average deviation from baseline scenario of eurozone countries were estimated in 0.3% in 2014, 1.2% in 2015 and 2.2% in 2016. Regarding the EU, the average deviation would have been 0.6%, 1.9% and 2.9% in the three years considered in the exercise.

	Baseline unemployment rate in %			Deviations in PP			Adverse unemployment rate in %		
	2014	2015	2016	2014	2015	2016	2014	2015	2016
Belgium	8.5	8.2	8.0	0.2	1.4	3.0	8.7	9.6	11.0
Bulgaria	12.7	12.1	12.0	0.2	1.0	1.8	12.9	13.2	13.8
Czech Republic	6.8	6.6	6.7	1.6	3.2	4.4	8.4	9.8	11.1
Denmark	6.9	6.7	6.5	0.8	3.0	4.5	7.7	9.7	11.0
Germany	5.2	5.1	5.2	0.2	0.9	1.8	5.4	6.0	7.0
Estonia	8.3	7.7	7.7	1.0	4.8	6.5	9.3	12.5	14.2
Croatia	17.6	17.2	17.7	0.9	3.3	5.5	18.5	20.5	23.2
Ireland	11.9	11.2	11.4	0.5	1.7	2.6	12.4	12.9	14.0
Greece	26.0	24.0	19.5	0.4	1.3	2.1	26.5	25.3	21.6
Spain	25.7	24.6	23.2	0.6	2.2	3.9	26.3	26.8	27.1
France	11.0	11.0	10.9	0.1	0.6	1.3	11.1	11.6	12.2
Italy	12.6	12.4	12.0	0.3	1.3	2.4	12.9	13.7	14.4
Cyprus	19.2	18.4	17.0	0.5	1.0	1.4	19.6	19.4	18.4
Latvia	10.5	9.2	10.7	1.8	5.0	7.1	12.3	14.2	17.8
Lithuania	10.4	9.6	9.8	0.9	3.7	5.3	11.3	13.3	15.1
Luxembourg	6.0	5.9	5.8	0.0	0.1	0.2	6.0	6.0	6.0
Hungary	9.6	9.3	9.6	0.2	1.2	2.1	9.8	10.6	11.7
Malta	6.4	6.4	6.4	0.2	0.9	1.4	6.7	7.3	7.8
Netherlands	7.4	7.2	6.8	0.1	1.4	2.8	7.5	8.5	9.6
Austria	4.8	4.7	4.7	0.2	0.8	1.4	5.0	5.5	6.1
Poland	10.3	10.1	9.1	0.9	3.3	4.8	11.2	13.4	13.9
Portugal	16.8	16.5	14.5	0.4	1.7	2.8	17.2	18.2	17.3
Romania	7.2	7.1	7.2	0.5	1.5	2.0	7.7	8.6	9.2
Slovenia	10.8	10.7	10.7	0.4	1.6	2.6	11.2	12.3	13.3
Slovakia	13.9	13.4	13.0	0.5	1.7	3.3	14.3	15.1	16.3
Finland	8.3	8.1	7.9	1.1	3.2	3.3	9.4	11.4	11.2
Sweden	7.7	7.3	7.2	0.9	3.5	5.4	8.6	10.8	12.6
United Kingdom	6.8	6.5	6.4	1.9	4.4	5.1	8.7	10.9	11.5
Euro Area	**12.0**	**11.7**	**11.3**	**0.3**	**1.2**	**2.2**	**12.3**	**12.9**	**13.5**
European Union	**10.7**	**10.4**	**10.1**	**0.6**	**1.9**	**2.9**	**11.3**	**12.3**	**13.0**

TABLE 1.8 / 2014 STRESS TEST UR BASELINE AND ADVERSE PROJECTIONS. SOURCE: EBA/SSM STRESS TEST: THE MACROECONOMIC ADVERSE SCENARIO. ESRB 2014

Under the adverse scenario, the test revealed an aggregate capital loss of €261 bn, due mainly to a credit loss of €492 bn. In terms of capital position, the weighted average CET 1 fall was 260 bps, in particular from 11.1% of starting CET 1 in 2013, the ratio calculated in the adverse scenario would have been 8.5% in 2016.

Figure 1.4 depicts the evolution of aggregate Common Equity Tier 1 ratio in baseline and adverse scenario and the delta respect to the starting point of the two scenarios.

FIGURE 1.4 / 2014 EVOLUTION OF CET 1 UNDER BASELINE AND ADVERSE SCENARIO. SOURCE: RESULTS OF 2014 EU-WIDE STRESS TEST. EBA 2014

24 banks subject to stress test fall below the capital threshold set by EBA for this stress test, leading to maximum shortfall of € 24.2 bn in the adverse scenario. In particular, 9 banks were from Italy, 3 banks from Greece and other 3 banks from Cyprus.

The figure 1.5 shows the evolution of number of banks failing the stress test capital shortfall.

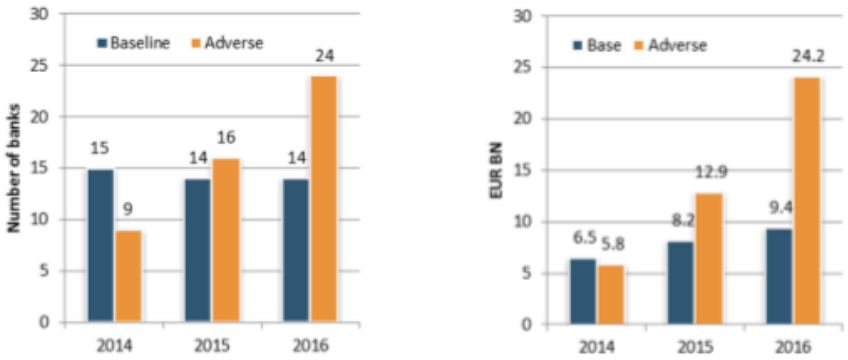

FIGURE 1.5 / EVOLUTION OF NUMBER OF BANKS FAILING THE STRESS TEST CAPITAL SHORTFALL. SOURCE: RESULTS OF 2014 EU-WIDE STRESS TEST. EBA 2014

Chapter Two: 2016 EBA EU-wide Stress Test

Since the aim of this dissertation is the analysis of the 2016 EBA's EU-wide Stress Testing market impact, this section contains a review of the methodology, the scenarios and the results of this test.

The task of the EU-wide Stress Test is to provide a common analytical framework to compare and assess the resiliency of EU banks and EU banking system to shocks and losses of capital deriving from them.

In order to verify the soundness of institution and the stability of the EU financial sector, EBA provided a common methodology that banks used to calculate the impact of a common stressed macroeconomic scenario with further constraints.
It was a so-called bottom-up approach, since any bank had the duty to individually assess their capability to bear losses deriving from a worsening macroeconomic scenario under the guidance and support of the European Banking Authority.

2.1 *Key Aspects: Sample of Banks*

From the EU-wide Stress Test Methodology document released by EBA, the banks should have the following characteristics to be included in the stress test sample:

- Banks covering broadly 70% of the national banking sector in the Eurozone, each non-Eurozone EU member and Norway, as expressed in term of total consolidated assets as of end 2014. Lower representatives were accepted for countries with a wide presence of subsidiaries of non-domestic EU banks.
- Banks had to have a minimum of € 30 bn in assets.
- Competent authorities could, at their discretion, request to include additional institutions in their jurisdiction if they had a minimum of € 100 bn in assets.
- Banks subject to mandatory restructuring plan agreed by the European Commission could be included in the sample if they were assessed to be near the completion of the plan.

The table 2.1 illustrates all the institutions subjected to Stress Test.

Country	Bank
Austria	Erste Group Bank AG
	Raiffeisen-Landesbanken-Holding GmbH
Belgium	Belfius Banque SA
	KBC Group NV
Denmark	Danske Bank
	Jyske Bank
	Nykredit Realkredit
Finland	OP Osuuskunta
France	Groupe Crédit Mutuel
	La Banque Postale
	BNP Paribas
	Groupe Crédit Agricole
	Groupe BPCE
	Société Générale S.A.
Germany	Deutsche Bank AG
	Commerzbank AG
	Landesbank Baden-Württemberg
	Bayerische Landesbank
	Norddeutsche Landesbank Girozentrale
	Landesbank Hessen-Thüringen Girozentrale
	NRW.BANK
	Volkswagen Financial Services AG
	DekaBank Deutsche Girozentrale
Hungary	OTP Bank Nyrt.
Ireland	Allied Irish Bank plc
	The Governor and Company of the Bank of Irland
Italy	Intesa Sanpaolo S.p.A.
	UniCredit S.p.A.
	Banca Monte dei Paschi di Siena S.p.A.
	Banco Popolare - Società Cooperativa
	Unione Di Banche Italiane Società Per Azioni

Country	Bank
Netherlands	ING Groep N.V.
	Coöperatieve Centrale Raiffeisen-Boerenleenbank B.A.
	ABN AMRO Group N.V.
	N.V. Bank Nederlandse Gemeenten
Norway	DNB Bank Group
Poland	Powszechna Kasa Oszczędności Bank Polski SA
Spain	Banco Santander S.A.
	Banco Bilbao Vizcaya Argentaria S.A.
	Criteria Caixa, S.A.U.
	BFA Tenedora de Acciones S.A.U.
	Banco Popular Español S.A.
	Banco de Sabadell S.A.
Sweden	Nordea Bank – group
	Svenska Handelsbanken – group
	Skandinaviska Enskilda Banken - group
	Swedbank – group
UK	HSBC Holdings
	Barclays Plc
	The Royal Bank of Scotland Group Public Limited Company
	Lloyds Banking Group Plc

TABLE 2.1 / BANKS SUBJECT TO THE TEST. SOURCE: 2016 EU-WIDE STRESS TEST METHODOLOGICAL NOTES

2.2 *Key Aspects: Macroeconomic Scenarios and other assumption*

Here is a recap of how EBA set macroeconomic scenarios and other key features of the 2016 Stress Test:

- The exercise was carried out on the basis of year-end 2015 figures, and the scenarios have been applied over a period of three years from end 2015 to 2018.
- The exercise assessed the resilience of institution under a common macroeconomic baseline and adverse scenario.
- The application of market risk methodology was based on a common set of stressed market parameters, calibrated from the macroeconomic scenario, historical experience and on haircuts from sovereign exposures.

- The credit risk methodology included a prescribed increase in REA (Risk Exposure Amount) for securitization exposure.
- The impact of Stressed Scenario was measured as impact on CET 1 capital.
- The definition of CET 1 was the one given by the CRD 2013/36/EU and CRR 575/2013.
- The resulting impact in CET 1 of Additional Tier 1 and Tier 2 instruments eligible as regulatory capital in CRR/CRD were not taken in consideration in the calculation of capital ratio.
- A common approach for the application of prudential filters for gain and losses deriving from sovereign assets in the AFS (Available for Sale) portfolio was required across all EU-Countries. Minimum transitional requirements set in CRR applied to all EU-Countries independently from national derogation. Non-sovereign exposure in AFS were treated as the domestic legislation required.
- No hurdle rates or capital threshold were defined for the purpose of the exercise.
- Neither the roll-out of new internal model nor the modification of existing one during the time horizon of the stress test were considered for the calculation of REA.
- Banks were not required to anticipate changes to the accounting and tax regimes that come into effect after the launch of the exercise.
- Assumption of a static Balance Sheet.
- Assumption of the maintaining the same business mix during the time horizon of the test.
- The approach is a constrained bottom-up Stress Test. Banks were in charge of the calculation of the impact of the scenarios, but they were subject to constraint and a review of the competent authority.
- Banks were required to assess the following set of risks:
    - Credit Risk: including securitization;
    - Market Risk, CCR (Counterparty Credit Risk) and CVA (Credit Valuation Adjustment);
    - Operational Risk, including conduct risk.
- In Addition, banks were required to project the effects of scenarios on NII (Net Interest Income) and to stress P&L (Profit and Loss) and other capital items not covered by other risk type.
- The risks arising from sovereign exposures were covered in market risk and credit risk, according to accountability treatment.

In table 2.2, there is an overview of the methodology by risk type.

Section	Scope	Impact on P&L and OCI	Impact on REA	Key constraints
Credit risk	P&L: Loans and receivables, HTM; sovereign positions included; CCR and fair value positions excluded REA: CRR scope for credit risk including securitisations; CCR and fair value positions included	Banks' internal models based on stressed point-in-time PD and LGD parameters and grade migration Additional impact for old defaulted assets based on worsening LGD Explicit projections for FX loans Prescribed loss parameters for sovereign exposures	CRR requirements based on stressed PD and LGD parameters	No negative impairments permitted The coverage ratio for non-defaulted assets cannot decrease REA floored by 2015 value (separately by regulatory approach and defaulted, non-defaulted exposures) Prescribed increase for securitisations and REA for securitisations floored separately for aggregate STA and IRB portfolios
Market risk, CCR and CVA	P&L: HFT, AFS, FVO, hedge accounting portfolios; sovereign positions included; CCR exposures, positions subject to CVA accounting REA: CRR scope for market risk and CVA	Banks' own projections for NTI before the impact of the market risk shock under the comprehensive approach for HFT Full revaluation of the HFT portfolio for comprehensive approach NTI; worst estimate across three market risk scenarios (macroeconomic adverse, and two historical scenarios) Revaluation of AFS/FVO positions; macroeconomic adverse scenario only Consistent valuation of hedging positions for AFS/FVO Maximum CVA across the three market risk scenarios Default of the two most vulnerable of the 10 largest stressed CCR exposures; highest impact across the three scenarios	Constant for STA approaches VaR constant in the baseline and replaced by SVaR in the adverse Stressed IRC and CVA capital requirements APR constant in the baseline and scaled in the adverse	Prescribed simplified approach based on historical NTI volatility for HFT NTI starting values prescribed as the minimum of the averages across the last 2, 3, and 5 years (the 2-year average floored at 0) NTI projections before loss impact capped by 75% of the starting value Simplified approach serves as floor for the impact of the comprehensive approach Prescribed haircuts for AFS/FVO sovereign positions REA for IRC and CVA floored by the increase for IRB REA
Section	**Scope**	**Impact on P&L and OCI**	**Impact on REA**	**Key constraints**
NII	P&L: All interest-earning or interest-paying positions across all accounting categories	Banks' own methodology to project NII based on the repricing of their portfolio Separate projections for margin and reference rates	N/A	NII cannot increase under the baseline or the adverse scenario Interest expenses cannot decline under the adverse scenario No income on defaulted assets under the adverse scenario, except income from discount unwinding (capped by the 2015 value and a constraint depending on the changes in provisions and defaulted exposure) The margin paid on liabilities cannot increase less than the highest amount between a proportion of the increase in the sovereign spread and that of an idiosyncratic component The increase of the margin on repriced assets is capped by a proportion of the increase in sovereign spreads
Conduct risk and other operational risks	P&L: Impact of potential future losses arising from conduct risk and other operational risks REA: CRR scope for operational risk	Banks' own estimations Specific approach based on qualitative guidance and additional reporting requirements for material conduct events Losses calculated as a function of gross earnings (the relevant indicator) as a fall-back approach in case banks are unable to provide historical data	Banks' own projections for the advanced measurement approach (AMA), basic approach and standard approach	Losses from new conduct risk events are subject to a floor, computed in the baseline scenario as the average of the historical conduct risk losses reported by the bank during the 2011-2015 period for non-material events only. A more conservative floor in the adverse scenario is achieved by applying a stress multiplier to the average Other operational risk losses are subject to a floor computed in the baseline scenario as the average of the historical losses 2011-2015 period times a multiplier. A more conservative floor in the adverse scenario is achieved by applying a stress multiplier to the average Capital requirements for operational risk cannot fall below the 2015 value

TABLE 2.2 / METHODOLOGY BY RISK TYPE. SOURCE: 2016 EU-WIDE STRESS TEST METHODOLOGICAL NOTES

2.3 *Macroeconomic Scenarios*

In this section there is a recap of the common scenarios which any bank listed above based its stress test.
As stated before, EBA and ESFS prepared two common scenarios for the stress test: a baseline scenario and an adverse scenario.

2.3.1 *Macroeconomic Scenarios: Baseline*

The Baseline macroeconomic scenario is based on the periodic projections made by the Directorate General for Economic and Financial Affairs (DG ECFIN) that releases their forecast every winter, spring and autumn.

The principal scenario is the one released the 5th November 2015 that covers the period 2015-2017. For the forecast of year 2018 a model-based approach not released by the DG ECFIN has been used. Also, projections of house prices are derived from a model-based approach not published by any institution.

The euro-area GDP forecast was a growth of 1.6% in 2015, rising to 1.8% in 2016 and 1.9% in 2017. For the EU as a whole, real GDP was expected to rise from 1.9% this year to 2.0% in 2016 and 2.1% in 2017.

Concerning the labour market, the employment forecast was a growth of 0.9% in 2015 and 2016 and 1% in 2017 in euro area, 1% in 2015 and 0.9% in 2016 and 2017 in EU as a whole.
Annual inflation projections were: a rise of 0.1% in the euro area and 0.0% in the EU in 2015, to 1.0% and 1.1% respectively in 2016, and to 1.6% in both areas in 2017. Auto-regressive models have been used to calculate projections for 2018.

2.3.2 *Macroeconomic Scenarios: Adverse Scenario*

According to ESRB (European Systemic Risk Board) there were four main risk that jeopardized the EU financial stability:

1. An abrupt reversal of compressed global risk premia, amplified by low secondary market liquidity.
2. Weak profitability prospects for banks and insurers in a low nominal growth environment, amid incomplete balance sheet adjustments.

3. Rising of debt sustainability concerns in the public and non-financial private sectors, amid low nominal growth.
4. Prospective stress in a rapidly growing shadow banking sector, amplified by spillover and liquidity risk.

In particular, the supervisory authority was concerned mainly on the first systemic risk, that was considered as a potential trigger to the other three risks.

The table 2.4 reassumes the shocks that the risks stated above could cause.

Source of risk	Financial and economic shocks
An abrupt reversal of compressed global risk premia, amplified by low secondary market liquidity	- Rising long-term interest rates and risk premia in the United States and other non-EU advanced economies - Global equity price shock - Increase in the VIX volatility index and spillover to emerging market economies - Foreign demand shocks in the EU via weaker world trade - Exchange rate shocks - Oil and commodity price shocks
Weak profitability prospects for banks and insurers in a low nominal growth environment, amid incomplete balance sheet adjustments	- Investment and consumption demand shocks in EU countries - Residential and commercial property price shocks in EU countries
Rising of debt sustainability concerns in the public and non-financial private sectors, amid low nominal growth	- Country-specific shocks to sovereign credit spreads - Shocks to corporate credit spreads
Prospective stress in a rapidly growing shadow banking sector, amplified by spillover and liquidity risk	- EU-wide uniform shock to interbank money market rates - Shocks to EU financial asset prices - Shocks to financing conditions in EU countries (via shocks to household nominal wealth and user cost of capital)

TABLE 2.3 / MAIN STABILITY RISKS. SOURCE: ADVERSE MACRO-FINANCIAL SCENARIO FOR THE EBA 2016 EU-WIDE BANK STRESS TESTING EXERCISE, ERSB 2016

The first specific shock considered by ERSB was the sovereign debt shock. The yields on long-term Treasury securities United States were assumed to rise sharply, deviating by 250 basis points (bps) from the baseline by end-2016, this affects the prices of EU fixed income and in particular a rise of 80 basis point on ten-year German sovereign debt is estimated.

A contagion effect is also considered and a worsening in sovereign debt condition is also assumed and showed in Table 2.4. Overall a rise of 71 basis point in 2016, 80 in 2017 and 68 in 2018 in EU long-term interest rates is assumed.

Notice that Greece, Italy, Poland, Hungary and Romania would have the higher shock, Germany the lowest.

	Shocks (basis points)			Baseline (percentages)				Adverse (percentages)		
	2016	2017	2018	2015	2016	2017	2018	2016	2017	2018
Belgium	63	75	61	0.9	1.0	1.2	1.3	1.7	2.0	1.9
Bulgaria	64	83	69	2.4	2.4	2.6	2.7	3.1	3.5	3.4
Czech Republic	79	80	72	0.6	0.7	0.9	1.0	1.5	1.7	1.7
Denmark	56	67	53	0.7	1.0	1.3	1.3	1.6	1.9	1.9
Germany	44	67	53	0.5	0.7	0.9	1.0	1.2	1.6	1.5
Ireland	81	87	74	1.2	1.3	1.5	1.6	2.1	2.4	2.3
Greece	234	162	148	10.0	8.0	8.2	8.3	10.4	9.9	9.8
Spain	98	100	87	1.8	2.0	2.2	2.2	2.9	3.2	3.1
France	55	73	60	0.9	1.1	1.3	1.4	1.6	2.0	2.0
Croatia	65	82	68	3.5	4.0	4.2	4.2	4.6	5.0	4.9
Italy	107	102	89	1.7	1.8	2.0	2.1	2.9	3.0	3.0
Cyprus	68	71	58	4.6	4.1	4.3	4.4	4.8	5.1	5.0
Latvia	56	76	63	0.9	1.1	1.3	1.4	1.7	2.1	2.0
Lithuania	62	72	59	1.4	1.7	1.9	2.0	2.3	2.6	2.6
Luxembourg	52	72	59	0.4	0.5	0.7	0.8	1.0	1.4	1.4
Hungary	210	160	160	3.4	3.4	3.7	3.7	5.5	5.3	5.3
Malta	62	76	62	1.5	1.7	1.9	1.9	2.3	2.6	2.6
Netherlands	54	70	57	0.7	0.9	1.1	1.2	1.4	1.8	1.7
Austria	55	72	58	0.8	1.0	1.2	1.3	1.5	1.9	1.9
Poland	165	158	146	2.7	2.7	2.9	2.9	4.4	4.4	4.4
Portugal	121	111	97	2.4	2.5	2.7	2.8	3.8	3.9	3.8
Romania	119	124	115	3.5	3.8	4.0	4.1	5.0	5.2	5.2
Slovenia	95	100	86	1.7	1.9	2.1	2.2	2.9	3.1	3.0
Slovakia	60	76	63	0.9	0.9	1.1	1.2	1.5	1.9	1.8
Finland	52	70	57	0.7	1.0	1.2	1.2	1.5	1.9	1.8
Sweden	66	80	64	0.7	0.9	1.2	1.2	1.5	2.0	1.9
United Kingdom	50	59	47	1.8	1.9	2.1	2.1	2.4	2.7	2.6
Euro area	**70**	**81**	**68**	**1.2**	**1.4**	**1.6**	**1.6**	**2.1**	**2.4**	**2.3**
European Union	**71**	**80**	**68**	**1.3**	**1.5**	**1.7**	**1.7**	**2.2**	**2.5**	**2.4**

TABLE 2.4 / 2016 LONG-TERM INTEREST RATES SCENARIO. SOURCE: ADVERSE MACRO-FINANCIAL SCENARIO FOR THE EBA 2016 EU-WIDE BANK STRESS TESTING EXERCISE, ESRB 2016

The next specific risk European financial stability had to deal with was exchange rate risk. It was assumed that the exchange rate of the central and eastern European countries currencies would depreciate between 8% and 24% in the course of 2016 and remain stable for the rest of the exercise horizon period.

On the other side Swiss Franc would appreciate of 23% against the euro.

These exchange rate movements would have taken place despite the implied strong fundamental misalignment of the respective currencies that would not began to correct before end-2018.

Another specific risk taken in consideration was a shock on Global equity prices triggered mainly by the global increase in risk premia. It has been assumed a decrease of 36% in prices before the end of 2016.
This shock would lead to a fall of 25% on EU stock prices in comparison with the baseline scenario attenuated by a weak recovery in 2018.
These events would have effects also on commodity prices, with a decrease of oil price of 48% in 2016 and 44% in 2017.

To complete the scenario, authorities hypothesized a rise in the money market premium of 33 basis point in 2016, and addition of 23 basis point in 2017 and other 6 basis point in 2018.

All these condition with the addition of a reduction in the availability of funding from shadow banking would cause a contraction in credit activity and a subsequent contraction in the economy.
The results of hypothesis are reassumed on stock market are reassumed in Table 2.5.

	2016	2017	2018
Belgium	-25.5	-24.3	-16.1
Bulgaria	-10.3	-12.4	-8.2
Czech Republic	-23.3	-20.9	-13.9
Denmark	-20.4	-22.0	-14.6
Germany	-24.6	-25.6	-17.0
Estonia	-14.1	-16.9	-11.2
Ireland	-25.6	-25.0	-16.6
Greece	-26.4	-23.6	-15.7
Spain	-26.0	-24.9	-16.6
France	-28.0	-26.5	-17.6
Croatia	-12.1	-14.7	-9.7
Italy	-28.8	-25.3	-16.8
Cyprus	-21.4	-23.1	-15.4
Latvia	-10.0	-10.3	-6.8
Lithuania	-12.2	-15.2	-10.1
Luxembourg	-22.1	-20.7	-13.7
Hungary	-17.4	-19.9	-13.2
Malta	-11.2	-13.8	-9.2
Netherlands	-25.5	-25.5	-16.9
Austria	-30.5	-25.4	-16.9
Poland	-19.4	-19.9	-13.2
Portugal	-24.0	-20.3	-13.5
Romania	-18.6	-22.1	-14.7
Slovenia	-9.8	-12.1	-8.0
Slovakia	-11.4	-13.4	-8.9
Finland	-23.0	-25.4	-16.9
Sweden	-23.9	-24.7	-16.4
United Kingdom	-25.3	-24.6	-16.3
Euro area	**-26.2**	**-25.2**	**-16.7**
European Union	**-25.4**	**-24.7**	**-16.4**

TABLE 2.5 / 2016 STOCK PRICES SCENARIO. SOURCE: ADVERSE MACRO-FINANCIAL SCENARIO FOR THE EBA 2016 EU-WIDE BANK STRESS TESTING EXERCISE, ESRB 2016

All these factors with the addition of negative foreign demand shocks have effects on GDP growth. This scenario would lead, according to ERSB, to an average negative EU GDP growth in Europe of -1.2% in 2016, -1.3% in 2017 and a small growth of 0.7% in 2018.

In the euro-area the adverse scenario would lead to a growth of -1.0% in 2016, -1.3% in 2017 and 0.6% in 2018.

The most affected countries would have been the Baltic ones and the Balkan ones.

Table 2.6 reassumes the estimated scenario of every country in Europe.

	Baseline growth rates (percentages)			Deviations (percentage points)			Adverse growth rates (percentages)			Level deviation 2018 (percentages)
	2016	2017	2018	2016	2017	2018	2016	2017	2018	
Belgium	1.3	1.7	1.6	-2.9	-4.0	-1.0	-1.6	-2.3	0.6	-7.6
Bulgaria	1.5	2.0	2.1	-2.9	-5.0	-2.1	-1.5	-3.0	0.0	-9.5
Czech Republic	2.4	2.7	1.8	-4.5	-5.1	-1.4	-2.1	-2.4	0.4	-10.4
Denmark	2.0	1.8	1.8	-4.1	-3.9	0.1	-2.1	-2.0	1.8	-7.6
Germany	1.9	1.9	1.6	-3.5	-3.0	-0.3	-1.6	-1.1	1.3	-6.6
Estonia	2.6	2.6	2.1	-5.5	-5.6	-1.1	-3.0	-3.0	1.0	-11.6
Ireland	4.5	3.5	3.6	-4.6	-4.6	-1.9	-0.1	-1.2	1.7	-10.4
Greece	-1.3	2.7	3.1	-4.4	-5.5	-1.5	-5.7	-2.8	1.6	-10.9
Spain	2.7	2.4	2.0	-2.0	-3.3	-1.8	0.6	-0.8	0.2	-6.7
France	1.4	1.7	1.6	-2.0	-2.7	-1.1	-0.6	-1.1	0.6	-5.6
Croatia	1.4	1.7	1.5	-5.3	-4.3	0.9	-3.9	-2.6	2.4	-8.4
Italy	1.5	1.4	1.7	-1.8	-2.6	-1.7	-0.4	-1.1	0.0	-5.9
Cyprus	1.5	2.0	2.2	-3.2	-3.2	-0.3	-1.7	-1.3	1.9	-6.5
Latvia	3.0	3.3	2.6	-5.0	-7.4	-3.7	-1.9	-4.1	-1.1	-14.8
Lithuania	2.6	3.4	1.7	-5.0	-4.9	0.9	-2.5	-1.5	2.6	-8.6
Luxembourg	3.2	3.0	3.3	-4.3	-3.6	-0.7	-1.1	-0.7	2.6	-8.2
Hungary	2.2	2.5	1.9	-1.7	-2.8	-0.5	0.5	-0.3	1.4	-4.8
Malta	3.6	3.1	2.7	-4.6	-4.6	0.2	-0.9	-1.5	2.9	-8.4
Netherlands	2.1	2.3	1.4	-3.0	-3.9	-1.9	-1.0	-1.6	-0.4	-8.4
Austria	1.5	1.4	1.3	-3.1	-3.7	-1.1	-1.7	-2.3	0.2	-7.6
Poland	3.5	3.5	3.0	-2.6	-4.0	-2.5	0.9	-0.5	0.5	-8.5
Portugal	1.7	1.8	1.6	-3.8	-4.4	-2.2	-2.1	-2.6	-0.6	-9.9
Romania	4.9	3.6	3.1	-7.1	-3.6	-1.1	-2.2	0.0	2.0	-11.0
Slovenia	1.9	2.5	1.3	-4.2	-4.4	-0.2	-2.3	-1.9	1.2	-8.4
Slovakia	2.8	3.3	4.0	-5.3	-7.3	-1.5	-2.5	-4.0	2.5	-13.1
Finland	0.7	1.1	1.6	-3.4	-5.3	0.1	-2.7	-4.1	1.6	-8.3
Sweden	2.8	2.7	2.0	-3.5	-6.1	-4.9	-0.7	-3.4	-2.9	-13.5
United Kingdom	2.4	2.2	1.2	-4.6	-2.9	0.4	-2.2	-0.7	1.6	-6.8
Euro Area	**1.8**	**1.9**	**1.7**	**-2.8**	**-3.2**	**-1.1**	**-1.0**	**-1.3**	**0.6**	**-6.8**
European Union	**2.0**	**2.1**	**1.7**	**-3.2**	**-3.3**	**-1.0**	**-1.2**	**-1.3**	**0.7**	**-7.1**

TABLE 2.6 / 2016 EU GROWTH SCENARIO. SOURCE: ADVERSE MACRO-FINANCIAL SCENARIO FOR THE EBA 2016 EU-WIDE BANK STRESS TESTING EXERCISE, ERSB 2016

A further analysis on the factors that would have affected more the reduction in GDP growth proved that the higher shock was due to the reduction of domestic demand in consumption and investment. The second cause of reduction in GDP growth was given by foreign demands shocks, whether the combined impact of interest rate, house price and stock price shocks were weaker.

The figure 2.1 describes in detail what exposed above.

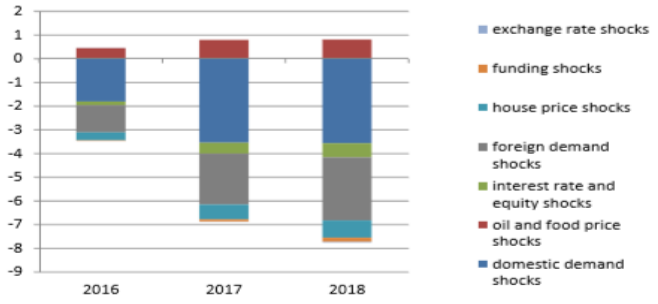

FIGURE 2.1 / 2016 CONTRIBUTION OF SHOCKS ON GDP GROWTH. SOURCE: ADVERSE MACRO-FINANCIAL SCENARIO FOR THE EBA 2016 EU-WIDE BANK STRESS TESTING EXERCISE, ERSB 2016

Concerning the inflation, the adverse scenario presents a HICP (Harmonized Index of Consumer Prices) rate of -0.9% in 2016, -0.2% in both 2017 and 2018, with a reduction respect to the baseline scenario of -2.0%, -1.9% and -2.1% in 2016, 2017 and 2018 respectively.

The deviation from the baseline scenario in Euro-area is -1.9% in both 2016 and 2018 and -1.7% in 2017. The HICP would be -0.9%, -0.1% and 1.0% in 2016,2017 and 2018 respectively.
According to the projections, Latvia and Sweden would have had the higher deviation from the baseline scenario, Czech Republic the lowest and Croatia was the only country with a positive impact.
The first trigger would have been due to the fall in commodity prices and it was worsened by the subsequent contraction in domestic and foreign demand.
Table 2.7 contains details of the forecast.

	Baseline inflation rate (percentages)			Deviations (percentage points)			Adverse inflation rate (percentages)			Price level deviation 2018 (percentages)
	2016	2017	2018	2016	2017	2018	2016	2017	2018	
Belgium	1.7	1.5	1.5	-1.9	-3.2	-2.4	-0.2	-1.7	-0.9	-7.2
Bulgaria	0.7	1.1	1.8	-2.2	-1.7	-1.2	-1.5	-0.6	0.6	-5.0
Czech Republic	1.0	1.6	1.9	-0.7	-2.0	-4.3	0.2	-0.4	-2.4	-6.8
Denmark	1.5	1.9	2.1	-1.8	-1.3	-1.3	-0.3	0.6	0.8	-4.3
Germany	1.0	1.7	2.1	-2.4	-2.2	-2.6	-1.3	-0.5	-0.5	-6.8
Estonia	1.8	2.9	3.3	-3.7	-4.0	-3.0	-1.9	-1.1	0.2	-10.1
Ireland	1.4	1.6	1.5	-0.9	-1.6	-1.1	0.6	0.0	0.4	-3.5
Greece	1.0	0.9	1.0	-1.8	-4.0	-5.5	-0.8	-3.1	-4.5	-10.8
Spain	0.7	1.2	1.6	-2.6	-0.8	-0.6	-1.9	0.5	1.0	-3.9
France	0.9	1.3	1.6	-1.5	-0.8	-0.5	-0.5	0.5	1.0	-2.7
Croatia	0.9	1.7	2.2	0.7	-1.7	-2.8	1.6	0.0	-0.6	-3.7
Italy	1.0	1.9	2.8	-1.1	-1.7	-2.5	-0.1	0.3	0.3	-5.1
Cyprus	0.6	1.3	1.5	-3.0	-1.5	-1.4	-2.5	-0.2	0.1	-5.7
Latvia	1.4	2.1	2.0	-3.1	-4.7	-4.6	-1.7	-2.6	-2.6	-11.7
Lithuania	0.6	2.2	2.6	-1.9	-2.5	-1.9	-1.3	-0.3	0.7	-6.0
Luxembourg	1.7	1.7	1.7	-3.2	-0.7	-0.5	-1.5	1.0	1.2	-4.3
Hungary	1.9	2.5	2.4	-2.5	-0.8	-0.7	-0.6	1.8	1.6	-3.9
Malta	1.8	2.2	2.1	-1.8	-1.6	-3.3	0.1	0.6	-1.2	-6.4
Netherlands	1.2	1.5	1.7	-1.3	-0.9	-1.9	-0.1	0.6	-0.2	-4.0
Austria	1.8	2.0	2.1	-3.3	-0.9	-1.0	-1.5	1.1	1.1	-5.0
Poland	1.4	1.9	2.1	-1.1	-1.4	-3.5	0.2	0.5	-1.3	-5.8
Portugal	1.1	1.3	1.6	-2.4	-3.2	-2.6	-1.3	-1.9	-1.0	-7.9
Romania	-0.3	2.3	2.3	-2.2	-4.0	-5.4	-2.5	-1.7	-3.1	-10.9
Slovenia	0.8	1.4	1.3	-2.6	-3.5	-2.7	-1.8	-2.1	-1.4	-8.5
Slovakia	1.0	1.6	1.5	-1.9	-3.7	-4.9	-0.8	-2.2	-3.4	-10.0
Finland	0.6	1.5	2.4	-2.7	-3.7	-4.9	-2.1	-2.2	-2.6	-10.8
Sweden	1.5	1.7	1.8	-5.3	-2.0	-1.2	-3.9	-0.3	0.6	-8.2
United Kingdom	1.5	1.7	1.9	-2.0	-3.0	-3.0	-0.6	-1.3	-1.1	-7.7
Euro Area	**1.0**	**1.6**	**1.9**	**-1.9**	**-1.7**	**-1.9**	**-0.9**	**-0.1**	**0.1**	**-5.3**
European Union	**1.1**	**1.6**	**2.0**	**-2.0**	**-1.9**	**-2.1**	**-0.9**	**-0.2**	**-0.2**	**-5.8**

TABLE 2.7 / 2016 HICP SCENARIO. SOURCE: ADVERSE MACRO-FINANCIAL SCENARIO FOR THE EBA 2016 EU-WIDE BANK STRESS TESTING EXERCISE, ERSB 2016

The reduction of GDP growth would lead to a rise in unemployment rate. The estimated EU unemployment rate would be 9.9% in 2016, 10.8% in 2017 and 11.6% in 2018 with a deviation of 11.0%, 11.7% and 12.4% in 2016, 2017 and 2018 respectively.
The Euro-Area would have had a deviation of 0.4%, 1.4% and 2.3% respect to the baseline scenario in the three years of the exercise horizon. The UR would have been 11.0%, 11.7% and 12.4% in the years considered in the forecast.
The countries with the higher reduction would have been Poland and Latvia.
The table 2.8 shows the projections.

	Baseline unemployment rate (percentages)			Deviations (percentage points)			Adverse unemployment rate (percentages)		
	2016	2017	2018	2016	2017	2018	2016	2017	2018
Belgium	8.4	7.9	7.7	0.4	2.3	4.2	8.8	10.2	11.9
Bulgaria	9.4	8.8	8.7	0.3	1.5	2.3	9.7	10.3	11.0
Czech Republic	5.0	4.8	4.9	0.4	1.2	1.4	5.4	6.0	6.3
Denmark	5.8	5.5	5.5	1.4	4.2	5.3	7.2	9.7	10.8
Germany	4.9	5.2	5.4	0.5	1.3	1.9	5.4	6.5	7.3
Estonia	6.5	7.6	7.8	1.7	4.8	5.0	8.2	12.4	12.8
Ireland	8.7	7.9	8.1	1.0	3.2	4.6	9.7	11.1	12.7
Greece	25.8	24.4	23.0	0.9	2.1	2.8	26.7	26.5	25.8
Spain	20.5	19.0	18.2	0.8	2.3	3.3	21.3	21.3	21.5
France	10.4	10.2	10.1	0.1	0.4	0.9	10.5	10.6	11.1
Croatia	15.6	14.7	13.8	1.0	3.1	4.0	16.6	17.8	17.8
Italy	11.8	11.6	11.3	0.3	1.2	2.2	12.1	12.8	13.5
Cyprus	14.5	13.2	11.9	0.8	2.1	2.6	15.3	15.3	14.5
Latvia	9.5	8.8	9.7	1.4	4.3	6.5	10.9	13.1	16.2
Lithuania	8.6	8.1	9.0	0.2	0.5	0.5	8.8	8.6	9.5
Luxembourg	5.8	5.8	5.9	0.1	0.6	1.2	5.9	6.4	7.1
Hungary	6.7	6.2	6.3	0.1	0.8	1.1	6.8	7.0	7.4
Malta	5.7	5.8	5.7	0.0	0.8	1.0	5.7	6.6	6.7
Netherlands	6.6	6.3	6.3	0.3	2.2	4.3	6.9	8.5	10.6
Austria	6.1	6.0	5.9	0.6	1.1	1.7	6.7	7.1	7.6
Poland	7.2	6.8	7.0	0.8	3.8	6.1	8.0	10.6	13.1
Portugal	11.7	10.8	11.0	0.7	2.5	4.2	12.4	13.3	15.2
Romania	6.6	6.5	6.5	0.8	1.6	1.7	7.4	8.1	8.2
Slovenia	9.2	8.7	8.3	1.6	3.3	4.6	10.8	12.0	12.9
Slovakia	10.5	9.6	9.7	0.9	3.1	4.6	11.4	12.7	14.3
Finland	9.5	9.4	9.1	1.1	1.4	1.4	10.6	10.8	10.5
Sweden	7.7	7.4	7.4	0.5	2.7	5.2	8.2	10.1	12.6
United Kingdom	5.4	5.5	5.7	2.1	3.5	3.9	7.5	9.0	9.6
Euro area	**10.6**	**10.3**	**10.1**	**0.4**	**1.4**	**2.3**	**11.0**	**11.7**	**12.4**
European Union	**9.2**	**8.9**	**8.9**	**0.7**	**1.9**	**2.8**	**9.9**	**10.8**	**11.6**

TABLE 2.8 / 2016 UNEMPLOYMENT RATE SCENARIO, SOURCE: ADVERSE MACRO-FINANCIAL SCENARIO FOR THE EBA 2016 EU-WIDE BANK STRESS TESTING EXERCISE, ERSB 2016

2.4 *Results of 2016 EU-Wide Stress Test*

The 2016 EU-Wide Stress Test, on the opposite of the stress tests conducted by the FED, did not have a pass threshold.

From Table 2.9, one can see that the weighted average reduction of CET1 Capital Ratio in the adverse scenario respect to the baseline scenario at the exercise end-date of the stressed banks is 380 basis points, specifically the average CET1 at the starting point is 13.2% and at the end of the stress exercise is 9.4%.

The weighted average loss of CET1 is €269 bn. The main cause is due to Cumulative Credit Risk losses of €349 bn. The other losses are due to operational risk (€ -105 bn) and market risk losses including Counterparty Credit Risk (€ -98 bn).

Metric	Starting 2015	Adverse 2018	Delta adverse 2018
Transitional CET1 capital ratio	13.2%	9.4%	-380bps
Fully loaded CET1 capital ratio	12.6%	9.2%	-340bps
Transitional leverage ratio	5.2%	4.2%	-100bps
Transitional CET1 capital	1,238bn	970bn	-269bn
Cumulative credit risk losses (impairment or reversal of impairment on financial assets not measured at fair value through profit or loss)	N/A	-349bn (-370bps)	N/A
Cumulative gains or losses arising from operational risk	N/A	-105bn (-110bps)	N/A
Cumulative market risk losses including CCR	N/A	-98bn (-100bps)	N/A
Cumulative profit or loss for the year	N/A	-90bn (-100bps)	N/A

TABLE 2.9 / 2016 KEY RESULTS. SOURCE: 2016 EU-WIDE STRESS TEST RESULTS, EBA 2016

Concerning the evolution of the Capital Ratio during the exercise time horizon, Figure 1.3 shows the results.

Notice that, in the baseline scenario the stressed banks increased their capital ratio by 20, 60 and 70 basis point, while the reduction in the adverse scenario was -260 the first year, -330 the second and -380 the third.

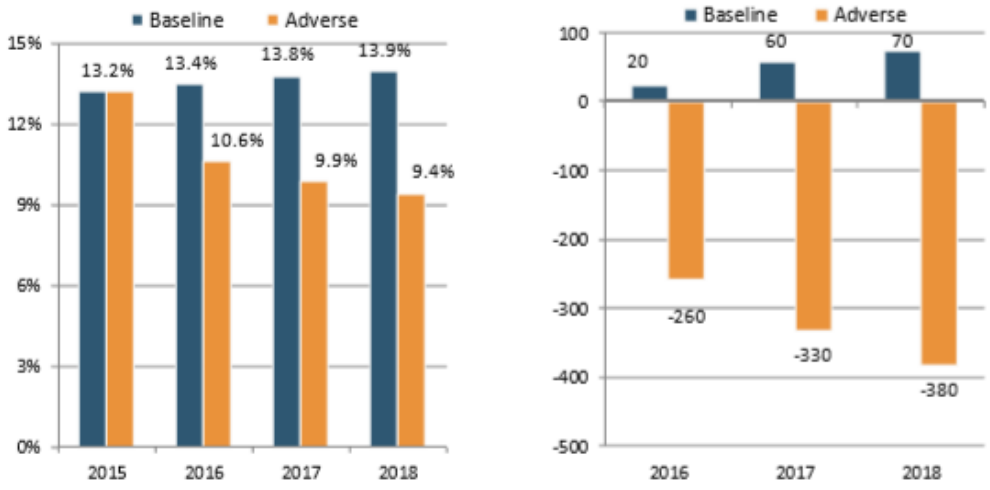

FIGURE 2.2 / 2016 EVOLUTION OF CET1 IN BASELINE AND ADVERSE SCENARIO. SOURCE: 2016 EU-WIDE STRESS TEST RESULTS, EBA 2016

The Bank with the higher loss of CET 1 Ratio in the adverse scenario was Monte dei Paschi S.p.a. (-1443 basis points from the baseline), followed by Royal Bank of Scotland (-905 basis point) and Allied Irish Banks plc (-851 basis point).

The banks that had the lower loss in the adverse scenario was DNB Bank Group (-10 basis point), followed by Powszechna Kasa Oszczędności Bank Polski SA (-182 basis point) and Jyske Bank (-225 basis point).

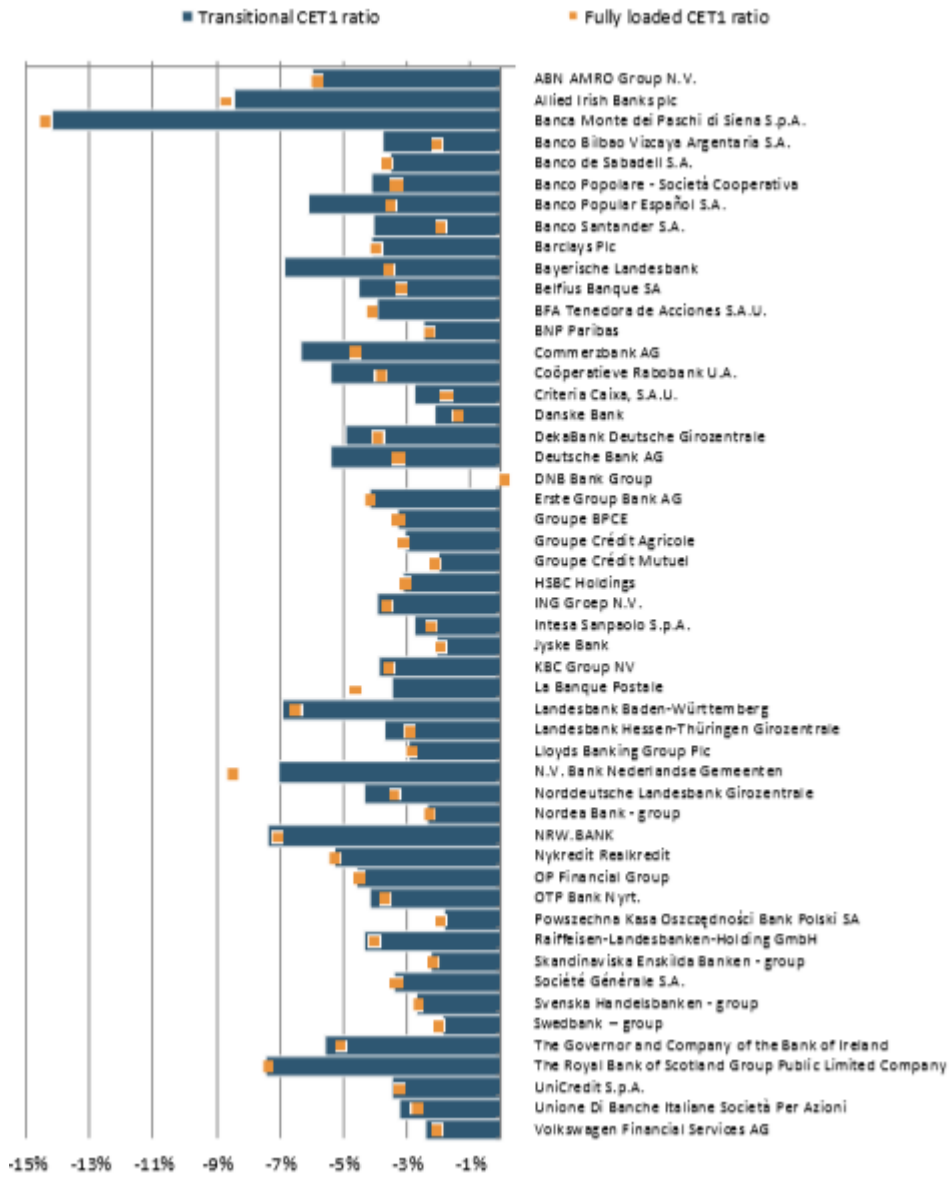

FIGURE 2.3 / 2016 CET 1 RESULTS FOR BANKS. SOURCE: 2016 EU-WIDE STRESS TEST RESULTS, EBA 2016

From a transactional CET 1 perspective, at-the-end of the projection, only one bank presented a negative ratio (Monte dei Paschi), the German bank NRW was the one that performed better from this point of view.

It is important to notice that, if we exclude the case MontePaschi, all banks were assessed to have the minimum capital requirement requested by Pillar 1 even in a stressed scenario.

Figure 2.4 shows the results for any single bank.

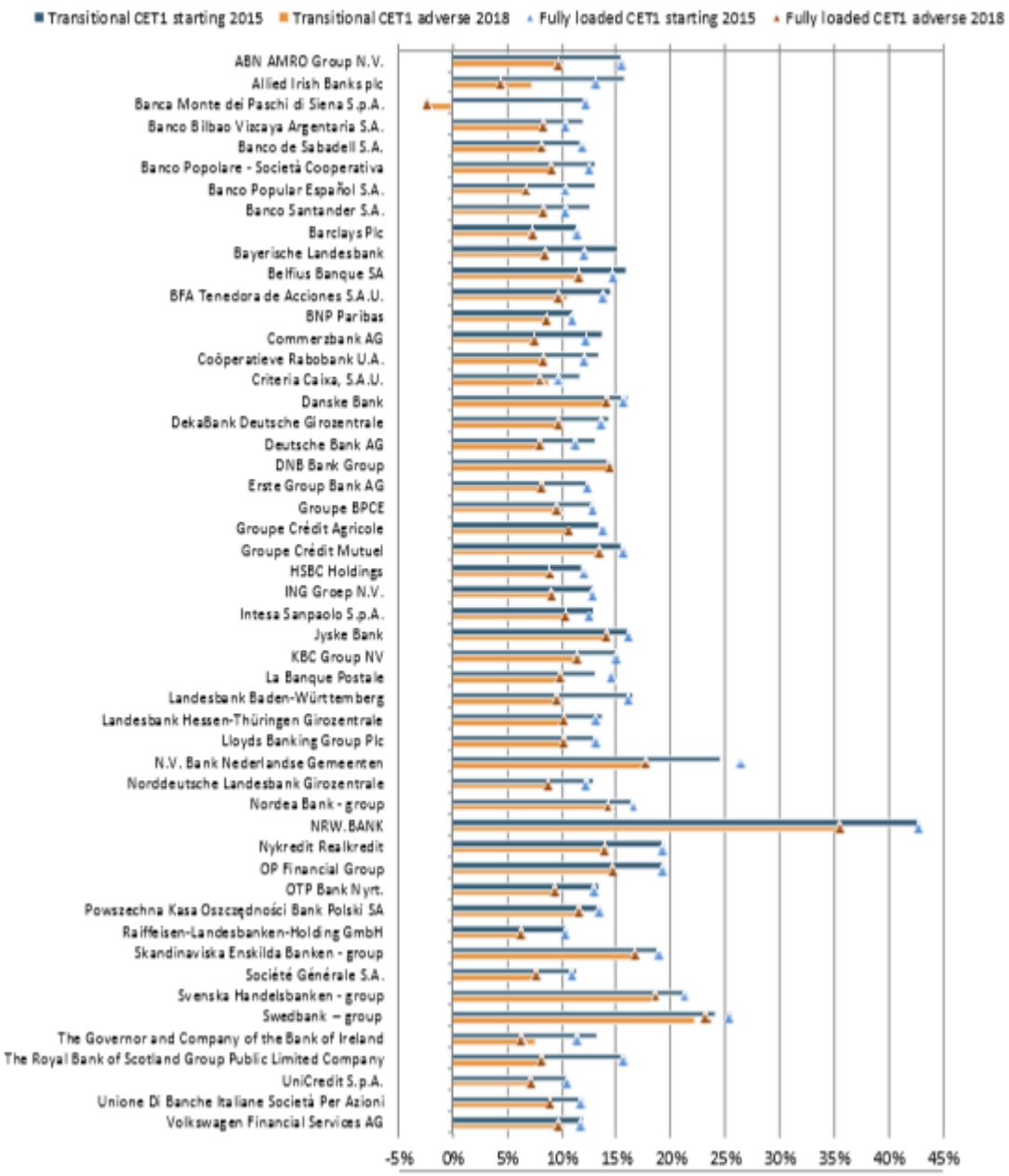

FIGURE 2.4 / 2016 CET 1 IN STARTING POINT AND ADVERSE SCENARIO. SOURCE: 2016 EU-WIDE STRESS TEST RESULTS, EBA 2016

Concerning the main drivers of the impact, Figure 2.5 shows the contribution of every P&L and Balance Sheet items to the CET 1 changes.

In particular, credit losses have the greatest impact with -370 basis points. Other important contributing drivers that had a high impact on CET 1 were the total risk amount (-120 bps) and the market risk (-90 bps).

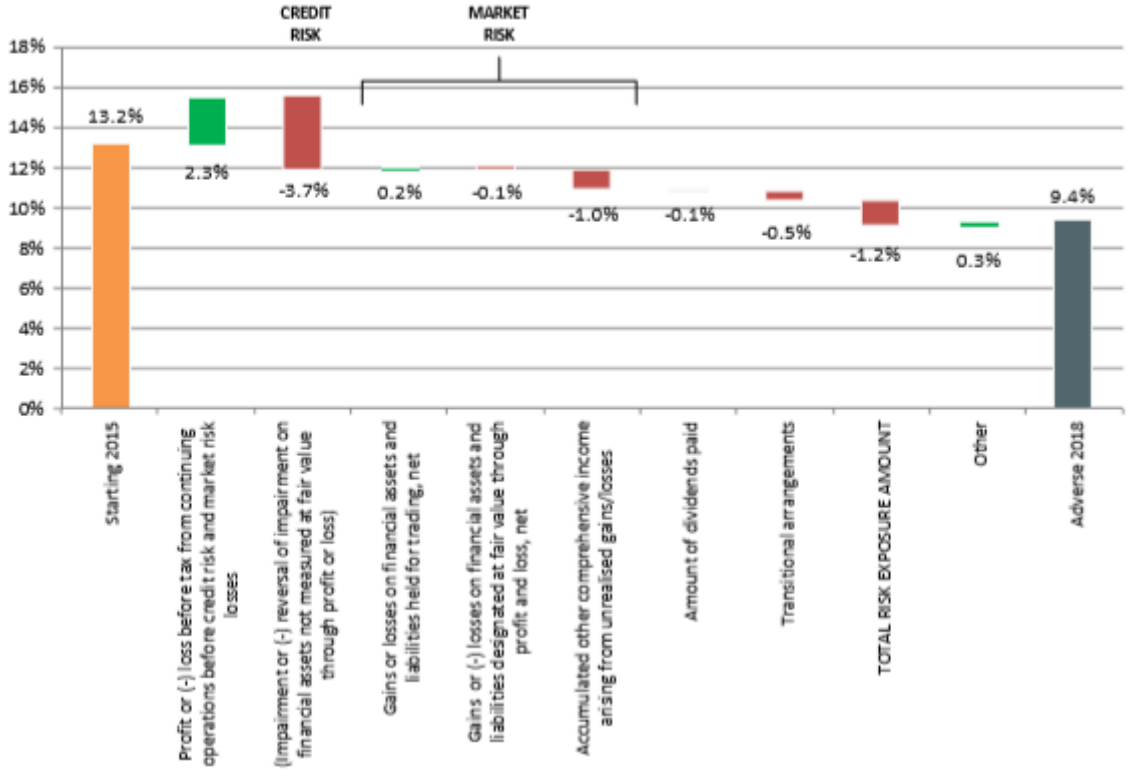

FIGURE 2.5 / MAIN DRIVERS TO CET1 CHANGES. SOURCE: 2016 EU-WIDE STRESS TEST RESULTS. EBA 2016

Finally, Table 2.10 displays the numerical results of the 2016 EU-Wide Stress Test in terms of transactional capital ratio that have been analysed above.

Country	Bank	Starting 2015	Baseline 2018	Adverse 2018	Δ Adverse 2018
Austria	Erste Group Bank AG	12,35%	13,85%	8,19%	-416
	Raiffeisen-Landesbanken-Holding GmbH	10,47%	12,36%	6,14%	-432
Belgium	Belfius Banque SA	15,90%	17,60%	11,41%	-449
	KBC Group NV	15,17%	16,18%	11,27%	-389
Denmark	Danske Bank	16,12%	17,66%	14,02%	-210
	Jyske Bank	16,09%	19,85%	14,00%	-206
	Nykredit Realkredit	19,45%	22,47%	14,19%	-526
Finland	OP Osuuskunta	19,48%	21,24%	14,90%	-458
France	Groupe Crédit Mutuel	15,53%	16,78%	13,54%	-199
	La Banque Postale	13,20%	14,76%	9,72%	-348
	BNP Paribas	11,05%	12,13%	8,59%	-246
	Groupe Crédit Agricole	13,52%	14,81%	10,49%	-303
	Groupe BPCE	13,02%	14,52%	9,73%	-329
	Société Générale S.A.	11,42%	11,94%	8,03%	-339
Germany	Deutsche Bank AG	13,19%	12,08%	7,80%	-539
	Commerzbank AG	13,77%	13,13%	7,42%	-635
	Landesbank Baden-Württemberg	16,62%	15,90%	9,68%	-694
	Bayerische Landesbank	15,23%	12,41%	8,34%	-689
	Norddeutsche Landesbank Girozentrale	12,99%	13,21%	8,67%	-432
	Landesbank Hessen-Thüringen Girozentrale	13,79%	14,42%	10,10%	-369

Country	Bank	Starting 2015	Baseline 2018	Adverse 2018	Δ Adverse 2018
	NRW.BANK	42,82%	39,44%	35,40%	-742
	Volkswagen Financial Services AG	11,97%	12,90%	9,56%	-241
	DekaBank Deutsche Girozentrale	14,44%	14,17%	9,53%	-491
Hungary	OTP Bank Nyrt.	13,41%	14,56%	9,22%	-419
Ireland	Allied Irish Bank plc	15,86%	16,97%	7,39%	-847
	Bank of Irland	13,30%	16,12%	7,69%	-561
Italy	Intesa Sanpaolo S.p.A.	12,98%	12,83%	10,24%	-274
	UniCredit S.p.A.	10,59%	11,57%	7,12%	-347
	Banca Monte dei Paschi di Siena S.p.A.	12,01%	12,04%	-2,23%	-1424
	Banco Popolare - Società Cooperativa	13,15%	14,61%	9,05%	-410
	Unione Di Banche Italiane Società Per Azioni	12,08%	13,01%	8,85%	-323
Netherlands	ING Groep N.V.	12,94%	12,52%	9,00%	-394
	Raiffeisen-Boerenleenbank B.A.	13,49%	13,34%	8,11%	-538
	ABN AMRO Group N.V.	15,51%	16,21%	9,53%	-598
	N.V. Bank Nederlandse Gemeenten	24,67%	28,05%	17,62%	-705
Norway	DNB Bank Group	14,31%	16,56%	14,30%	-1
Poland	PKO SA	13,27%	14,74%	11,45%	-182
Spain	Banco Santander S.A.	12,71%	13,24%	8,69%	-402
	Banco Bilbao Vizcaya Argentaria S.A.	12,04%	12,03%	8,29%	-375
	Criteria Caixa, S.A.U.	11,71%	11,67%	8,97%	-274
	BFA Tenedora de Acciones S.A.U.	14,57%	15,09%	10,64%	-393
	Banco Popular Español S.A.	13,11%	13,45%	7,01%	-610
	Banco de Sabadell S.A.	11,69%	12,96%	8,19%	-350
Sweden	Nordea Bank - group	16,45%	18,60%	14,09%	-236
	Svenska Handelsbanken - group	21,25%	23,09%	18,55%	-270
	Skandinaviska Enskilda Banken - group	18,85%	21,55%	16,60%	-225
	Swedbank – group	24,14%	26,44%	22,26%	-188
UK	HSBC Holdings	11,87%	12,41%	8,76%	-311
	Barclays Plc	11,42%	12,48%	7,30%	-412
	RBS Group	15,54%	15,89%	8,08%	-746
	Lloyds Banking Group Plc	13,05%	16,44%	10,14%	-291

TABLE 2.10 / 2016 TRANSACTIONAL CAPITAL RATIO CHANGES. SOURCE: 2016 EU-WIDE STRESS TEST RESULTS, EBA 2016

Chapter Three: Empirical Studies on Stress Test

Several studies have been made about the relation between ECB Stress Test and Banks' Performance.

It has been proved that stress test helps to enhance banks' transparency since stock's prices reacts to supervisory announcements and inspections, this means that authority actions produce new information to the market (Jordan 2000, Flannery et al. 2012).

According to Gick and Pausch (2012), banking authorities can optimally supervise the banking system through the disclosure of both stress tests results and the methodology with which these are conducted.

Spargoli (2013) analysed why market response in US was favourable and why it was negligible in EU. He developed a model that explain the relation between market reaction and the ability of supervisor to force a recapitalization on banks that had poor stress test performance.
The Spargoli theory deduced that in case of a disappointing performance during the stress test, investors force banks to downsizing by selling assets or recapitalize. However, the cost of recapitalization is often very high during a banking crisis, thus investors prefer the first alternative. Selling assets, however, could cause a deep reduction in assets value that could not be socially optimal respect to a bank default.
Thus, only if the supervisor is strong enough to force a recapitalization for "bad" banks, market will respond positively, and the reduction of value will be avoided.

A qualitative assessment of the 2009 US Supervisory Capital Assessment Program was investigated by Hirtle et al. (2009). They discovered that investors appreciated the assessment, since the aggregate estimated capital shortfall was consistent with the estimation made by market analyst.
However, Hirtle et al. claim that 2009 SCAP did not add new information but it confirmed market's views of American banking system.

Peristian et al. (2010) performed a quantitative analysis of the 2009 SCAP using a standard event study technique to establish if the "stress test" produces information demanded by the market.

Their conclusion was that even if the market had largely deciphered on its own which banks would have capital gaps before the stress test results were revealed, it was informed by the size of the gap.

Neretina et al. (2014) examined the effects on returns and risks due to announcement and disclosure of 2009-2015 US banking stress test clarification, methodologies and results.
According to their findings, the announcements impact equity returns in different ways for different stress test: the stock market response was positive in 2013 but negative in 2012.
Also, clarification and disclosure of methodologies had a mixed impact on stock market. In 2009 clarification had a positive impact, while the disclosure of 2011 CCAR methodology had a negative impact on the market.
In contrast with Peristiani et al. (2010), Neretina et al. showed that there is no evidence of an impact on stock market successive to the disclosure of 2009 SCAP results. They also found a statistically weak evidence of a positive effects in 2012 assessment.

On the other side, Candelon and Sy (2015) compared the market reactions to U.S. and EU wide stress test performed between 2009 and 2013.
They found evidence of an impact on returns of tested banks. In particular, the results of 2009 US stress test had a positive effect on performance of American stress tested banks, while 2011 EU stress test had a negative effect on market evaluation of EU stressed banks.
Moreover, the publication of 2009 EU Stress Test results had no response on banks performance due probably to the fact that the list of stress tested banks was not released.
The publication of results of 2010 EU stress test had a positive impact on stock performance, while the announcement of 2012 EU capitalization exercise had a negative effect on performance of stressed banks (Candelon, Sy 2015).

Blundell-Wingall and Slovik (2010) analysed the market impact of 2010 EU stress test and the role played by sovereign debt exposure in stress tested balance sheet.
They discovered that the greatest part of the sovereign debt is held in the banking book, but the stress test considered only the small exposure of sovereign debt held in the trading book.
This was the main reason of the lack of trust and consequently the absence of a significant reaction of the market.

Cardinali and Nordmark (2011) used a standard event study technique to investigate whether the publication of results of 2010 EU stress test, the release of methodology and the clarification

by the EBA concerning capital requirement of 2011 stress test had a response on banking stock market.
In particular, they examined if there was a difference in the market impact of the stressed banks, the next 50 non-stressed EU largest banks and the geographical division in PIIGS (Portugal, Italy, Ireland, Greece and Spain) and no-PIIGS banks.
According to them there is no evidence that the events analysed had impact on stock market for each of the group the sample was divided in.

Ellahie (2012) also studied the capital market consequences of 2011 EU stress test, looking for changes in information asymmetry and information uncertainty.
He proved that stress test announcement led to no change in information asymmetry and information uncertainty and the disclosure of results led to a decrease of information asymmetry but an increase in information uncertainty due to imprecision of revealed information and/or a worsening sovereign debt crisis.

Furthermore, Petrella and Resti (2013) analysed if stress tests contribute to reduce market opaqueness. They tested three hypotheses.
Concerning the announcement date, they tested two effects:

- Transparency effect: when a stress test is announced stock prices should rise due to the investors' expectation of a reduction of opaqueness in markets.
- Dilution effect: at the announce of a stress test, investors expect a dilution following the imposition upon undercapitalized banks by banking authority. This should lead to a decrease in the stock market.

Regarding the results' disclosure date:

- Irrelevance hypothesis: once released, the results should have no impact on stock prices due to the lack of credibility or results technically flawed that means that stress test does not add new information to the market (Jenkins and Murphy, 2011).

Petrella and Resti found evidence of significant market reaction both at the announcement date and at the results disclosure date. The meaning is that stress tests bring new information to investors that were not available before the test. Moreover, there is evidence of the existence of a dilution effect and the authors rejected the irrelevance hypothesis.

Schuermann (2014) claimed that the quality and the quantity of information disclosed during a stress test should depend on the state of banking system.

If there is a general lack of trust in banks due to low transparency of banks' balance sheet, then stress tests could help to increase trustworthiness in banking system.
Another study that examined 2010 and 2011 EU stress test was the one carried by Alves et al. (2014). Their purpose was to assess whether the disclosure of the outcomes had effect on the stock market and the CDS market as well.
In particular, the main hypothesis they tested were:

- Both CDS spread and stock returns anticipate stress test results;
- The stress test results introduce new information both for stock and CDS market.

In order to test the above hypothesis, they split the sample in two groups: a group formed by banks subject to the test and a control group of financial institutions which were not stress tested, after that they performed an event study methodology on both samples.
According to them, there was evidence of a positive effect on both stock market and CDS market after the publication of results of 2010 EBA stress test.
On the other hand, in the successive test they found several differences: CDS market anticipates the outcomes better then stock market, the announcement had a stronger impact on stock market rather than CDS and riskier financial institutions had negative returns.

During 2014 ECB's Comprehensive Assessment there were no significant evidence of a market reaction due to announcement or the publication of the results of the assessment if we include the full sample of tested banks (Sahin, De Haan 2016).
The same research showed that if the sample is grouped at the country level, there is some evidence for a market reaction in Belgium, Netherlands, Portugal and Spain due to the announcement and short term (i.e. three trading days) stock market reactions in Austria, Ireland, Portugal due to the results. For a longer event window (from 5 to 15 trading days) there is evidence of stock market responses also for French, Spanish and Belgian banks (Sahin, De Haan 2016).

Dendooven (2017) studied the long-term impact of 2014 EU-wide stress test of the disclosure of results on return, market risk and volatility. His findings show that the market, in general, reward banks with positive stress test results.

The market reaction caused by the 2014 ECB Comprehensive Assessment and the 2016 EBA stress test were also investigated by Georgescu et al. (2017).
Using an event study approach, Georgescu et al. showed that the outcomes disclosure reveals new information that are priced in markets and after the publication of results, price

discrimination increase, that means that the impact of the event is greater for the poorer performer banks.

In the table 3.1, there is a brief recap of the empirical research on the argument.

Research	Stress Test	Methodology	Results
Peristian et al. (2010)	2009 US SCAP.	Event study technique.	Confirm the hypotheses that stress test produces information.
Blundell-Wingall and Slovik (2010)	2010 and 2011 EBA EU-Wide Stress Test.	Analysis whether banks hold sovereign debt exposure in trading book or banking book.	Absence of market reaction due to undervaluation of the role of sovereign debt exposure in banking book.
Cardinali and Nordmark (2011)	2010 and 2011 EBA EU-Wide Stress Test.	Event study technique.	2010 EU stress test results not informative for the market; 2011 EU stress test disclosure of methodology and clarification had no impact on stock market.
Ellahie (2012)	2011 EBA EU-Wide Stress Test.	Diff-in-Diff estimator for disclosure and announcement effects on information uncertainty and asymmetry.	No change in IA and IU at announcement. Decrease of IA but increase of IU at disclosure of results.
Petrella and Resti (2014)	2011 EBA EU-Wide Stress Test.	Event study technique.	The results are relevant for investors.
Alves et al. (2014)	2010 and 2011 EBA EU-Wide Stress Test.	Event study technique.	Stock market reacted to disclosure of stress test results. CDS market anticipated results

Research	Stress Test	Methodology	Results
Neretina et al. (2014)	FED stress test from 2009 to 2015.	Event study technique.	Small evidence that stress test affects stock performance of large US banks.
Candelon and Sy (2015)	EU and US stress test from 2009 to 2013.	Event study techniques.	Usually stress test has positive impact in US and negative in EU stock returns.
Sahin and De Haan (2016)	2014 EBA EU-Wide Stress Test.	Event study technique.	Banks' stock returns and CDS spread did not react to the disclosure of results.
Dendooven (2017)	EBA 2014 EU-Wide Stress Test.	Cross-sectional regression technique.	Market reward banks that had good results.
Georgescu et al. (2017)	EBA 2014 and 2016 EU-Wide stress test.	Event study technique.	Results reveal new information priced by the market.

TABLE 3.1 / EMPIRICAL STUDIES ON STRESS TESTS

Chapter Four: Methodology and Data

This section incorporates the description of the data and the explanation of the methodology applied for the empirical analysis of the key events of the 2016 EU-Wide Stress Test and the impact on banks' stock market performance.

4.1 *Methodology: Event Study Technique*

The most used technique to measure the impact of an episode on value of firm or on stock market performance is the so-called event study technique.
This methodology was introduced for the first time by Fama et al. in 1969 and was revisited by MacKinlay in 1997.
As prove of its extensive use, most of the aforementioned studies about the correlation of stress test and banks' performance applied this methodology to perform their analysis (i.e. Petrella and Resti, 2014 or Sahin and De Haan, 2016).

After the definition of the event of interest, the key of event study technique is to find what could be considered a "normal return" of an asset, that in this case is the equity return of each bank in the sample over 255 daily observation, and compute the "abnormal return" considered in a time window in which the event we want to investigate take the central spot (i.e. if we consider a time window of 3 days, this means we have to consider the day before and the day after the event we are interested in). The use of equity returns instead of stock prices solves the problem of an eventual positive or negative trend in the time series.

To define what could be considered as normal returns, according to MacKinlay (1997), we have two methods: statistical and economic models.
The sub-categories belonging to the statistical method are:

- Market Model: it is a statistical model which relates the return of any given security to the return of the market portfolio.
- Constant Mean Return Model: it considers as normal return the mean of returns of the time series.
- Factor Models: they consider a number of variables to explain the variation of normal returns. Market model is a subcategory of factor models. An example of multi-factor model is the use of an industry-specific index along with a market index.

The most important economic models employed in event study technique are:

- Capital Assets Pricing Model: theorized by Sharpe (1964) and Lintner (1969), it is an equilibrium theory where the expected return of a given asset is determined by its covariance with the market portfolio.
- Arbitrage Pricing Theory Model: theorized by Ross (1976), it is an asset pricing theory where the expected return of a given asset is a linear combination of multiple risk factors.

For simplicity's sake, in this section only the *factors model* will be explained analytically since it is the model that has been applied in the econometric analysis of this work.
The factors model is based on an OLS regression between the returns of an asset or a basket of assets and a market index.

$$R_{i,t} = \alpha_i + \beta_{1,i} * R_{m,t} + \beta_{2,i} * R_{s,t} + \varepsilon_{i,t}$$
$$\mathbb{E}\left(\varepsilon_{i,t}\right) = 0 \quad VAR\left(\varepsilon_{i,t}\right) = \sigma_{\varepsilon t}^2$$

In which:

- $R_{i,t}$ is the equity return of each bank in the sample at time t.
- $R_{m,t}$ is the market index return at time t.
- $R_{s,t}$ is the industry index return at time t.
- α_i is the intercept of the regression.
- $\beta_{1,i}$ is the coefficient of correlation between assets' returns and market index.
- $\beta_{2,i}$ is the coefficient of correlation between assets' returns and industry index.
- $\varepsilon_{i,t}$ is the error term of each asset at time t.

In the analysis of this dissertation the market index used is Stoxx 600 EU, while the industry specific index is Stoxx 600 EU Banks. A further description of the data employed in the analysis will be provided in the next paragraph of this chapter.
The variable $R_{i,t}$ has been calculated as the following:

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}$$

In which:

- $P_{i,t}$ is the price of bank's stock i at time t.
- $P_{i,t-1}$ is the price of bank's stock i at time t-1.

Once obtained the parameters α_i and β_i, the successive step is to find the so-called Abnormal Returns (AR). In order to attain the ARs we have to compute the difference between the observed returns in the event window we chose, and the expected normal returns given by:

$$\mathbb{E}\left(R_{i,t}\right) = \widehat{\alpha_i} + \widehat{\beta_{1,i}} * R_{m,t} + \widehat{\beta_{2,i}} * R_{s,t}$$

And the ARs are computed as the following:

$$\widehat{AR_{i,t}} = R_{i,t} - \left(\widehat{\alpha_i} + \widehat{\beta_{1,i}} * R_{m,t} + \widehat{\beta_{2,i}} * R_{s,t}\right)$$

Under the assumptions of Normal distribution with zero conditional mean, efficient markets and serial independence of ARs, the variance of abnormal return is:

$$\sigma^2\left(\widehat{AR_{i,t}}\right) = \sigma_{\varepsilon i}^2 + \frac{1}{L}\left[1 + \frac{(R_{mt} + \widehat{\mu_m})^2}{\sigma_m^2}\right]$$

The third step consist in compute the Cumulative Abnormal Returns (CAR) of each bank in the sample. CARs are composed by the sum of ARs in the event window considered.
The analytical formula is:

$$\widehat{CAR_{i,(t_1;\,t_2)}} = \sum_{t_1}^{t_2} \widehat{AR_{i,t}}$$

Asymptotically, the variance of $\widehat{CAR_i}$ is:

$$\sigma_{i,(t_1;t_2)}^2 = (t_2 - t_1 + 1) * \sigma_{\varepsilon_i}^2$$

After that, we can compute the Cumulative Average Abnormal Returns (CAAR) as:

$$CAAR = \overline{CAR}\,(t_1;t_2) = \frac{1}{N}\sum_{i=1}^{n} CAR_i\,(t_1;t_2)$$

And its variance would be:

$$VAR\left[\overline{CAR}\,(t_1;t_2)\right] = \frac{1}{N^2}\sum_{i=1}^{n} \sigma_i^2\,(t_1;t_2)$$

Under the assumption of Normal distribution:

$$\overline{CAR}\,(t_1;t_2) \sim N[0; VAR\left[\overline{CAR}\,(t_1;t_2)\right]$$

Knowing this, in order to test whether the CARs are statistically significative, we can perform a t-test in which null and alternative hypothesis are respectively:

- H0: $\overline{CAR}\ (t_1; t_2) = 0$
- H1: $\overline{CAR}\ (t_1; t_2) \neq 0$

The mathematical formula is:

$$T = \frac{\overline{CAR}\ (t_1; t_2)}{\sqrt[2]{VAR\ [\overline{CAR}\ (t_1; t_2)]}} \sim N[0; 1]$$

To test the null hypothesis, we have to compare the value of T with the Student's t distribution value with n-1 degrees of freedom, where n represent the number of observation (that is the number of banks in the sample and in the sub-samples).
If the null hypothesis is rejected, then the CARs are statistically significative and there is evidence of an impact of the event in the time series in the time window we considered.

4.2 *Sample Identification*

The aim of this work is to investigate whether there is a correlation between key dates of the 2016 EU-Wide Stress Test and the market performance of the institutions involved, with a specific focus on which type of banks are more subject to shocks due to those events. As said before, according to the financial literature there are three crucial events that could have an impact on market performance of banks: the announcement, the disclosure of methodology along with stressed scenarios and the disclosure of results.
In this dissertation all three events have been taken in consideration. In particular, the dates considered for the analysis are:

- Announcement: November 5th, 2015. EBA announces details of 2016 EU-wide stress test, in which the authorities release the definitive list of the participants to the test after a first announcement about a tentative sample on July 2015.
- Methodology: February 24th, 2016. EBA launches 2016 EU-wide stress test exercise, in which the authorities release officially the methodology and the macroeconomic adverse scenario for the 2016 stress test and formally launch the test itself.
- Results: July 29th, 2016. EBA publishes 2016 EU-wide stress test results.

Regarding the sample, the data has been collected from Eikon Datastream provided by Thompson Reuters. In particular the Table 4.1 contains the banks' sample used in the empirical analysis of this dissertation. Banks involved in EU-Wide Stress Test but outside the analysis of this work are due to two reasons: the first is that there are some banks that are not listed in a stock exchange because it is a government subsidiary (i.e. "La Banque Postale"), or regional

subsidiary (i.e. all the German "Landesbank" such as "Bayerische Landesbank"), or even private subsidiary (i.e. "Volkswagen Financial Services AG"), the second reason is just the lack of availability of data from Eikon Datastream (i.e. OP Osuuskunta).

The total number of banks analysed is 34 out of 51 institutions subject to 2016 EU-Wide Stress Test. Notice that plus indicates banks inside the full sample of the analysis of this work, minuses are outside.

Country	Bank	Subject to analysis
Austria	Erste Group Bank AG	+
	Raiffeisen-Landesbanken-Holding GmbH	+
Belgium	Belfius Banque SA	+
	KBC Group NV	+
Denmark	Danske Bank	+
	Jyske Bank	+
	Nykredit Realkredit	-
Finland	OP Osuuskunta	-
France	Groupe Crédit Mutuel	-
	La Banque Postale	-
	BNP Paribas	+
	Groupe Crédit Agricole	+
	Groupe BPCE	-
	Société Générale S.A.	+
Germany	Deutsche Bank AG	+
	Commerzbank AG	+
	Landesbank Baden-Württemberg	-
	Bayerische Landesbank	-
	Norddeutsche Landesbank Girozentrale	-
	Landesbank Hessen-Thüringen Girozentrale	-
	NRW.BANK	-
	Volkswagen Financial Services AG	-
	DekaBank Deutsche Girozentrale	-
Hungary	OTP Bank Nyrt.	+
Ireland	Allied Irish Bank plc	+
	Bank of Ireland	+

Country	Bank	Subject to analysis
Italy	Intesa Sanpaolo S.p.A.	+
	UniCredit S.p.A.	+
	Banca Monte dei Paschi di Siena S.p.A.	+
	Banco Popolare - Società Cooperativa	+
	Unione Di Banche Italiane Società Per Azioni	+
Netherlands	ING Groep N.V.	+
	Raiffeisen-Boerenleenbank B.A.	-
	ABN AMRO Group N.V.	-
	N.V. Bank Nederlandse Gemeenten	-
Norway	DNB Bank Group	+
Poland	PKO SA	+
Spain	Banco Santander S.A.	+
	Banco Bilbao Vizcaya Argentaria S.A.	+
	Criteria Caixa, S.A.U.	+
	BFA Tenedora de Acciones S.A.U.	-
	Banco Popular Español S.A.	-
	Banco de Sabadell S.A.	+
Sweden	Nordea Bank - group	+
	Svenska Handelsbanken - group	+
	Skandinaviska Enskilda Banken - group	+
	Swedbank – group	+
UK	HSBC Holdings	+
	Barclays Plc	+
	RBS Group	+
	Lloyds Banking Group Plc	+

TABLE 4.1 / BANKS SUBJECT TO ANALYSIS. SOURCE: EBA / AUTHOR'S ELABORATION.

In order to examine which types of banks are more subject to shocks from stress test, in this work the sample is subdivided in another four categories for the first two period taken into consideration, five for the third period:

i. Dimension;
ii. Capitalization;
iii. Profitability;
iv. Riskiness;
v. Results (Only for the “Disclosure of results event”).

The method adopted for the composition of the subsamples in i), ii) and iii) was dividing the sample in two parts depending on whether the value of the parameter taken in consideration for the category (i.e. “Total Asset in euro” for the Dimension category) was higher or lower than the arithmetic mean of the sub-sample.

The parameters used for the constitution of the sub-samples in i), ii) and iii) were respectively the “Total Asset in euro”, the “Tier 1 Risk-Adjusted Capital Ratio” and “Pre-Tax ROE”. Notice the use of Pre-Tax ROE to ruling out different fiscal effects from different countries.
For the Announcement event, data from 2014 banks’ Balance Sheet has been used, for the other two events, data from 2015 banks’ Balance Sheet has been used. This choice is motivated by the assumption that investors should rely only on public information disclosed before each event day.
Regarding the Riskiness category, the average value of the 5 year of CDS of each bank in the period considered for the analysis was compared with the sum between the average value of the CDS index named “ iTraxx Europe 5 years” and its standard deviation in the same period. The choice of using the 5 years CDS is due to the fact that these types of instruments are the most traded CDS and as consequence they are the most representative of the market’s sight about the riskiness of the banks.

For clear reasons the Results sub-samples has been created only for the Disclosure event. The parameter used to discretize among the banks part of the full sample was the Delta CET 1 in the adverse scenario with respect to the starting point.
Table 4.2 presents the composition of the subsamples regarding the categories i), ii), iii) and v).

BANK	SIZE%	Tier 1 2014	Tier 1 2015	ROE Pre-Tax 2014	ROE Pre-tax 2015	Delta CET1 Adverse Scenario bps
ERSTE GROUP	0,97%	10,60%	12,00%	-6,90%	16,15%	-416
RAIFFEISEN INT BANK	0,54%	10,80%	12,10%	-1,20%	9,90%	-432
DEXIA	1,05%	16,54%	16,04%	-22,30%	6,55%	-449
KBC GROEP	1,25%	13,90%	16,40%	15,80%	17,15%	-389
DANSKE	2,16%	16,70%	18,50%	5,30%	13,40%	-210
JYSKE	0,36%	15,80%	16,50%	13,80%	11,80%	-206
BNP PARIBAS	9,68%	10,80%	11,70%	3,60%	11,30%	-246
CREDIT AGRICOLE	7,26%	12,20%	12,20%	7,00%	6,65%	-303
SOCIETE GENERALE	6,39%	12,60%	13,50%	8,20%	10,55%	-339
DEUTSCHE BANK	7,66%	12,90%	12,30%	4,90%	-4,95%	-540
COMMERZBANK	2,41%	9,30%	13,90%	2,40%	4,40%	-636
OTP BANK	0,17%	14,10%	13,30%	-11,10%	11,35%	-419
INTESA SANPAOLO	3,33%	14,20%	13,80%	6,60%	7,75%	-274
UNICREDIT	4,09%	11,12%	11,50%	7,70%	-12,10%	-347
UBI	0,55%	12,33%	12,08%	-7,70%	-4,80%	-323
BANCO POPOLARE	0,56%	12,26%	12,26%	-34,50%	-12,60%	-410
BANCO MONTE DEI PASCHI	0,77%	8,45%	12,85%	-130,30%	-17,65%	-1423
ING GROEP	4,40%	12,38%	14,75%	7,50%	12,25%	-394
DNB BANK	1,16%	17,40%	17,40%	10,90%	11,10%	-1
PKO	0,31%	11,71%	13,27%	15,30%	11,50%	-182
BANCO SANTANDER	6,37%	12,20%	12,55%	14,10%	11,65%	-402
BBV ARGENTARIA	3,52%	12,00%	12,00%	8,70%	11,55%	-375
BANCO DE SABADELL	1,00%	11,70%	11,50%	4,60%	7,05%	-350
CAIXABANK	1,65%	12,90%	12,90%	0,80%	4,40%	-273
NORDEA	0,33%	17,60%	18,50%	14,60%	15,05%	-236
SVENSKA	1,34%	22,10%	23,80%	16,10%	15,85%	-270
SEB	1,33%	19,50%	21,30%	18,10%	12,75%	-225
SWEDBANK	1,12%	22,40%	26,90%	18,50%	17,85%	-187
HSBC	10,30%	12,50%	13,90%	10,00%	6,95%	-312
BARCLAYS	7,53%	10,30%	11,40%	2,30%	3,55%	-412
RBS	5,21%	13,20%	16,30%	4,60%	-6,50%	-746
LLOYDS	5,24%	15,00%	15,20%	4,00%	6,20%	-291
AVERAGE	3,13%	13,67%	14,77%	0,36%	6,75%	-375,56

TABLE 4.2 / SUB-SAMPLE DIVISION. SOURCE: EIKON DATASTREAM. AUTHOR'S ELABORATION

The green cells of table 4.2 indicates all values higher than the mean of the sample with respect to the parameter of the category in which the sub-sample was created. The white cells, instead, indicates the lower values with respect to the mean. From now on, in this dissertation, banks belonging to the green cells will be named high level (i.e. high ROE), banks belonging to white cells low level (i.e. low ROE). Thus, for instance, the sub-sample constituted by big dimension institutions in terms of assets will be formed by: “BNP Paribas”, “Credit Agricole”, “Societe Generale”, “Deutsche Bank”, “Intesa SanPaolo”, “Unicredit”, “ING Groep”, “Banco Santander”, “BBV Argentaria”, “HSBC”, “Barclays”, “RBS”, “Lloyds”. Instead, the sub-sample constituted by small dimension banks will be: “Erste Group”, “Raiffeisen”, “Dexia”, “KBC Group”, “Danske”, “Jyske”, “Commerzbank”, “OTP Bank”, “UBI”, “Banco Popolare”, “Monte dei Paschi”, “DNB Bank”, “PKO”, “Banco de Sabadell”, “Caixabank”, “Nordea”, “Svenska”, “SEB” and “Swedbank”. The same applies for the other categories.

Regarding the category iv), Riskiness, the sub-samples made are summarize in Table 4.3.

BANKS	ANNOUNCEMENT	METHODOLOGY	DISCLOSURE
DS ITRAXX EUROPE	63,82364706	80,87148936	69,33558594
ST. DEVIATION ITRAXX	8,870325615	11,9327421	11,56169197
ALLIED IRISH BANKS	135,4047937	142,4137123	132,5154781
BANK OF IRELAND	150,7862827	160,9564843	145,4741164
INTESA SANPAOLO	91,29262678	114,3045883	93,98397477
UNICREDIT	81,78414902	92,18514043	83,56901563
UBI	117,7691294	176,1479996	137,6587105
ING	65,45	65,45	65,45
DNB	64,10999	64,10999	64,10999
BANCO SANTANDER	95,53781694	139,1126817	112,5737873
BBV ARGENTARIA	95,63316216	135,2492949	111,2681396
CAIXA	93,04999	93,04999	93,04999
BANCO DE SABADELL	141,029089	169,993697	152,2903859
NORDEA	57,32191761	68,43727357	59,13155938
SEB	51,11430471	64,24420123	53,81881688
SWEDBANK	53,54408796	64,52435523	55,01747402
HSBC	158,626	158,626	158,626
BARCLAYS	202,356	202,356	202,356
THE RBS GROUP	68,75102122	100,6896717	71,56039773
LLOYDS	89,44640024	126,6435361	90,24238355
ERSTE GROUP	151,4203873	142,3796498	145,0117488
DEXIA	190,0523784	175,0428949	171,6943762
KBC	66,45306776	57,99003357	61,08835082
DANSKE	71,19491863	66,07099332	67,14555945
BNP PARIBAS	66,48339098	77,66328362	73,40508351
CREDIT AGRICOLE	68,67226639	79,14660153	70,30250414
SOCIETE GENERALE	81,09961349	81,1133506	80,20308832
DEUTSCHE BANK	77,5518838	136,619031	84,53981086
COMMERZBANK	82,86731639	102,1880355	85,91120195
BANCO POPOLARE	173,3129263	231,8556974	187,1040793

TABLE 4.3 / RISKINESS SUB-SAMPLES. SOURCE: EIKON DATASTREAM. AUTHOR'S ELABORATION

On the opposite as above, the green cells represent the low risk banks for each period with respect to the CDS index average and its standard deviation underlined in grey. Notice that the number of banks analysed by riskiness is fewer then the full sample presented before, this is due to the lack of CDS data in Eikon database.

The number of observations that this dissertation takes in consideration is 255 daily observation for each period since this is the minimum number of observations recommended by Fama (1969) in his paper that explain the methodology implemented in this work.

Concerning the event windows, this thesis considers four different time windows that, considering t_0 as the day in which the event investigated takes place, can be reassumed as the following:

- Very short period: 3 trading days ($t_{-1}: t_{+1}$);
- Short period: 7 trading days ($t_{-3}: t_{+3}$);
- Medium period: 15 trading days ($t_{-7}: t_{+7}$);
- Long period: 31 trading days ($t_{-15}: t_{+15}$).

Thus, the observation window went from t_{-270} to t_{-16} in order to not include observation inside the time window of interest in the computation of "normal" returns of the various assets.

Chapter Five: Results of the Empirical Analysis

As stated before, the aim of this dissertation is to investigate whether the Stress Test conducted by the European Banking Authority in 2016 had an impact on the stock's returns of the banks involved in the test during the key events already specified above: announcement of the banks sample, disclosure of methodology and adverse scenario, publication of results.
In this chapter, the results of the empirical analysis will be showed.

5.1 *Evidence from Stress Test: Announcement.*

In this work the date used as announcement date is the 5th of November 2015, in which the European Banking Authority released some important details about the imminent stress test they were about to conduct.
The two main features disclosed on that day were the criteria with which EBA chose the banks subject to the test along with the list of the institutions involved and the draft methodology for discussion before the definitive methodology document was released on the 24th February 2016 that will be investigated in the next section of this chapter.

5.1.1 *Evidence from Stress Test: Announcement, Full Sample.*

Figure 5.1 shows a comparison during the event window between the indexes used to define "normal returns" trough the model already explained in chapter four, pictured in blue and orange, and the average stock return of the banks included in the sample pictured in grey. The central observation represents the day in which the event took place.
The graph underlines that the average returns series follows in a very similar way the series of the Stoxx 600 banks index, while it differs from aggregate multi-industry index that is Stoxx 600.
This suggests that there could be a shock that led to abnormal returns and thus the event could have had an impact on returns.
In particular, there is evidence of this shock in the short period, investigated in the time windows of seven days and three days rather than the medium period of fifteen trading days.
Another insight is that the banks' returns differs from the industry index the most in the extreme days of observation, suggesting that the shock could have took place in the long-term time window.

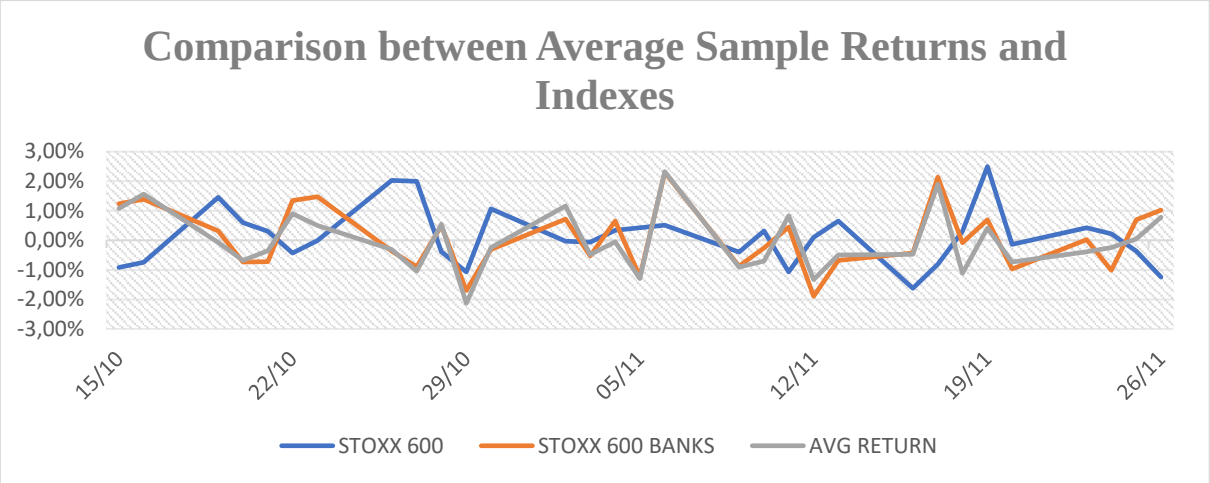

FIGURE 5.1 / COMPARISON BETWEEN AVERAGE SAMPLE RETURNS AND INDEXES, FULL SAMPLE ANNOUNCEMENT. SOURCE: EIKON DATASTREAM. AUTHOR'S ELABORATION

In figure 5.2, instead, there are represented the time series of the observed value in blue and the estimated value in orange.

The main observation from the graph is that the observed value remains below the estimated value for quite all the time windows considered. Thus, we can expect a negative impact of the stress test's announcement event on the returns of banks included in the sample of this work.

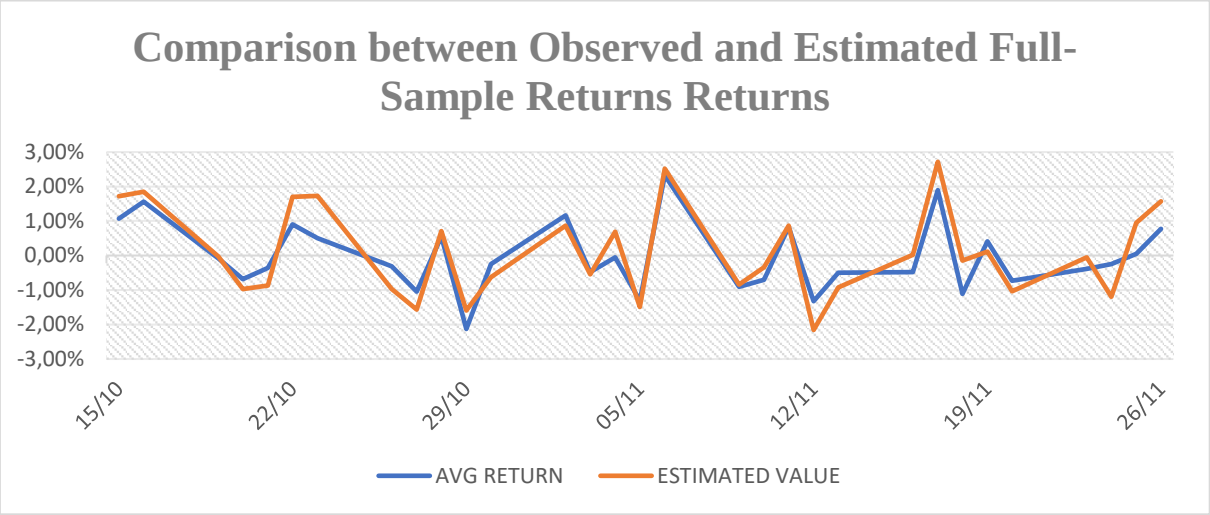

FIGURE 5.2 / COMPARISON BETWEEN OBSERVED AND ESTIMATED RETURNS, FULL SAMPLE ANNOUNCEMENT . SOURCE: EIKON DATASTREAM. AUTHOR'S ELABORATION

Finally, Table 5.1 exhibits the full sample empirical analysis' results. In the first row of the table, we can find the Cumulative Average Abnormal Returns, that are simply the average of the Cumulative Abnormal Returns of the banks included in the sample considering a certain time windows represented in the columns of the tab.

On the other hand, the second row present the p-Values of the t-test in which, as aforementioned, the null hypothesis is the presence of no abnormal returns or, in other terms, CAAR equal to zero, and the alternative hypothesis is CAAR different from zero.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
FULL SAMPLE	-0.007318428	-0.008120189	-2,20E-06	-0.03756489	34
P-VALUE	0.1759	0.1457	0.9999	0.0151	34

TABLE 5.1 / CAAR AND T-TEST P-VALUE OF FULL SAMPLE IN ANNOUNCEMENT EVENT. AUTHOR'S ELABORATION

The tab points out that the effect of the announcement of a stress test on banks' stock performance is negative, confirming the Dilution effect already demonstrated by Petrella and Resti (2014) for the 2011 EU-wide stress test. In particular, the effect is stronger in the long-term period (i.e. 31 trading days).
Regarding the statistical significance of the test, the medium term time window of fifteen trading days shows no significance at all since it has a p-Value of 0.9999 that led us to do not refuse the null hypothesis of the presence of no Cumulative Abnormal Returns. In the short and very-short period (i.e. three and seven trading days) there is weak evidence of the presence of a shock due to the announcement of a stress test. Finally, there are strong evidence of impact on stock market in the long-term period.

It is important to remind that the purpose of this work is not investigate whether the stress test announcement had an impact on banks in aggregate, since it was already examined in previous work (such as Georgescu et al. (2017)), but to establish which kind of bank is more subject to shock during this type of event. Thus, the results displayed in this sub-section must be considered as benchmark in the context of the analysis of the sub-categories of banks that will be explain in the following sub-sections of this work.

5.1.2 *Evidence from Stress Test: Announcement, Dimension.*

The first differentiation in the sample that this work take in consideration is the division between big banks and small banks. The criteria with which this and the next differentiations have been made are already explained in chapter four.

Figure 5.3 shows the correlation between the average observed and estimated return of small banks sub-sample. Notice that the discordance between the returns is concentrated in the central spot of the time window, that means that the impact had took place in the short term, but there is also some evidence of a shock all along the entire time series.

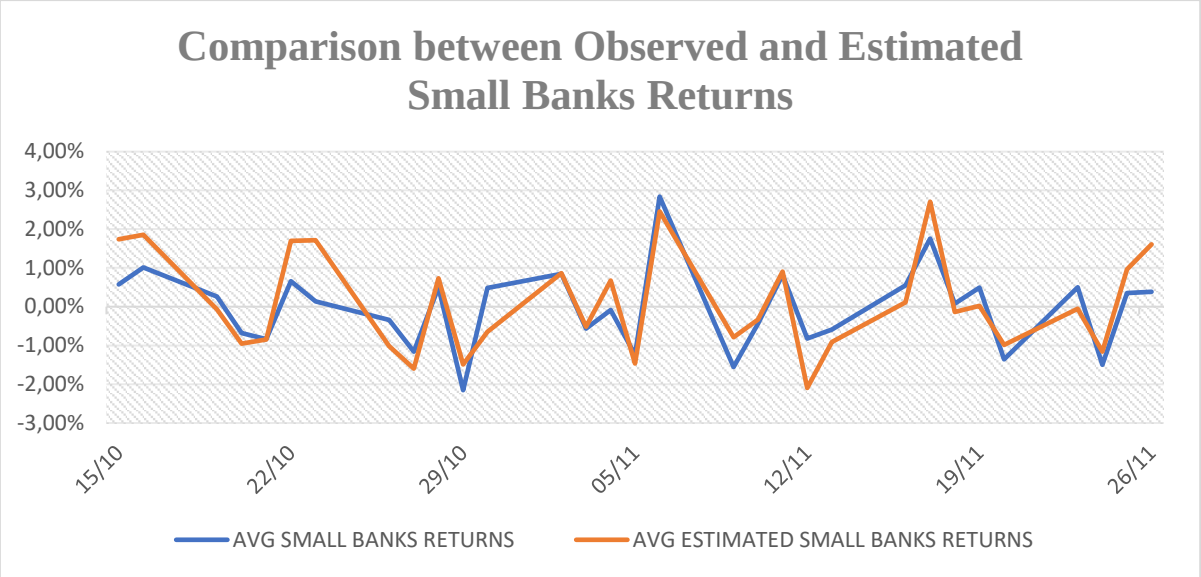

FIGURE 5.3 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, SMALL BANKS ANNOUNCEMENT. AUTHOR'S ELABORATION

On the opposite side, the comparison between big banks returns estimated and real returns pictured in Figure 5.4, evidence a different situation since the estimated returns follows in a quite faithful manner the time series of the observed returns.

Thus, the conclusion of this graphical analysis is that there is no relation between big banks' stock performance and the announcement event.

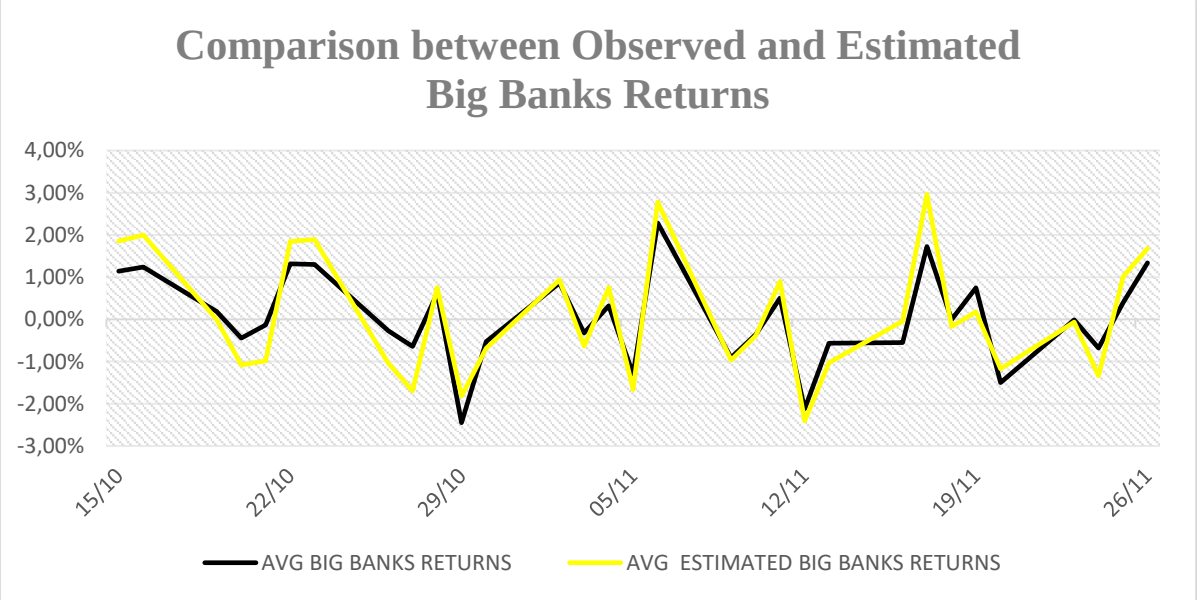

FIGURE 5.4 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, BIG BANKS ANNOUNCEMENT. AUTHOR'S ELABORATION

Table 5.2 summarize the results of the econometric analysis on the difference between big banks sample and small banks sample.

From the econometric analysis, we can see that the average impact of the announcement event is negative for both sample in accordance with the results found for the full sample. The main difference is that only the small banks sub-sample is statistically significant at least for short term (i.e. 7 trading days), even if in a weakly form, and long term that present also the biggest shock just as the full sample case with the exception of the very-short period.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
BIG DIMENSION	-0.005499875	-0.00219927	0.0007549134	-0.01170685	13
P-VALUE	0.5537	0.7725	0.9537	0.4441	13
SMALL DIMENSION	-0.001660455	-0.01107296	0.01530029	-0.04052649	19
P-VALUE	0.7225	0.1728	0.3706	0.01381	19

TABLE 5.2 / CAAR AND P-VALUE OF DIMENSION SUB-SAMPLES IN ANNOUNCEMENT EVENT. AUTHOR'S ELABORATION

A possible explanation of this outcome is that traders and analysts already expected what would have been the big banks subject to the stress test. Expectations rely on the basis of the previous stress test criteria, thus the disclosure of the list of stressed big banks added no new information to the market. Instead, investors could have underestimated the presence of some of the smallest banks that were included in the EBA sample of institution subject to stress test. Thus, the disclosure of small banks adds new information to the market and this led to price movements.

5.1.3 *Evidence from Stress Test: Announcement, Capitalization.*

The relation between the estimated returns of high-capitalized banks and their observed returns is showed in Figure 5.5.

The figure evidence that the banks in the sample performed worse than their estimates. This suggests that the impact of the announcement on the stock performance of the more-capitalized banks was negative at least in the long term.

The graph shows also small evidence of a presence of a shock in the short term since the time series of the observed returns follows closely the estimated one in the days in proximity of the announcement day.

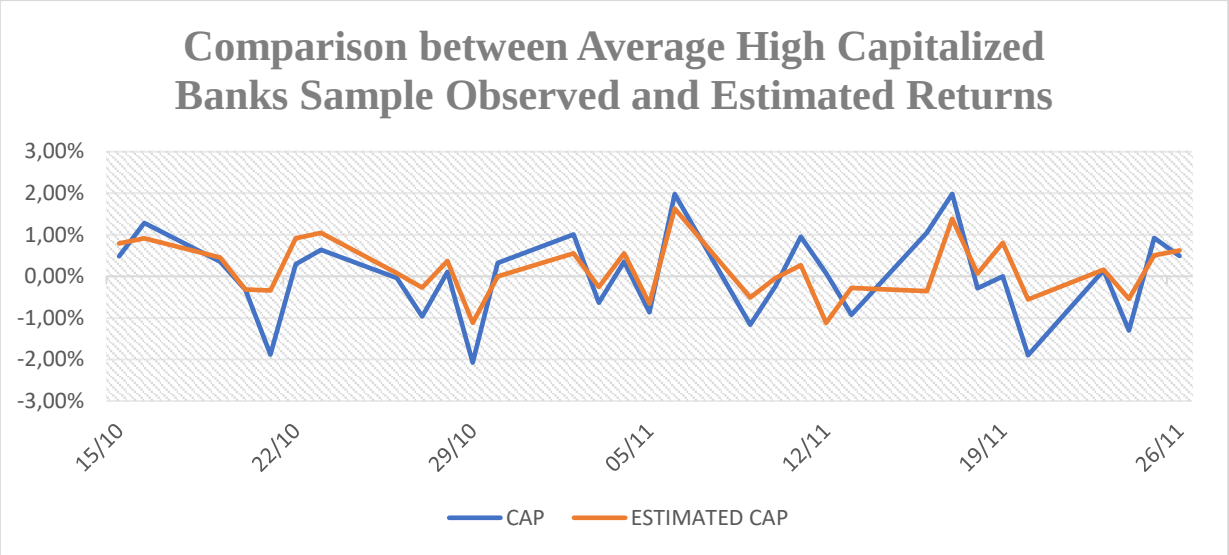

FIGURE 5.5 / COMPARISON BETWEEN AVERAGE SAMPLE OBSERVED AND ESTIMATED RETURNS, HIGH CAPITALIZATION ANNOUNCEMENT. AUTHOR'S ELABORATION

There is no graphical evidence of the presence of significant abnormal returns due to the announcement event of the 2016 EU stress test for the low capitalized banks, as depicted in Figure 5.6.

Notice that the estimated returns are very similar to the observed one.

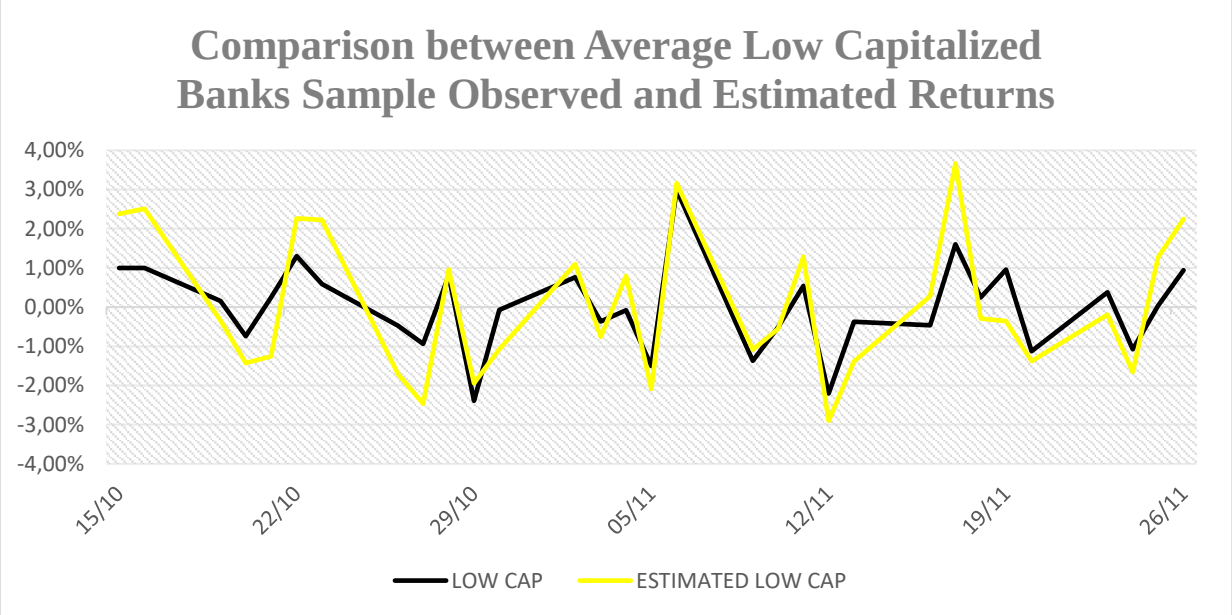

FIGURE 5.6 / COMPARISON BETWEEN AVERAGE SAMPLE OBSERVED AND ESTIMATED RETURNS, LOW CAPITALIZATION ANNOUNCEMENT. AUTHOR'S ELABORATION

Table 5.3 presents the CAARs and the p-Values of the event study on the stock returns of the capitalization sub-samples.

Observing the p-values of both high-capitalized banks and low capitalized banks, we can notice that the only significative value is the long-term high capitalization CAAR which is also negative and the biggest in absolute terms.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
HIGH CAPITALIZATION	-0.0006370479	-0.008311456	0.002188043	-0.04888865	12
P-VALUE	0.9118	0.241	0.9287	0.004765	12
LOW CAPITALIZATION	-0.004770123	-0.006961962	0.01371314	-0.01677643	20
P-VALUE	0.4681	0.3929	0.225	0.2702	20

TABLE 5.3 / CAAR AND P-VALUE OF CAPITALIZATION SUB-SAMPLES IN ANNOUNCEMENT EVENT. AUTHOR'S ELABORATION

The explanation for this result is related to the fact that eight out of twelve banks that are into the High Capitalization sample belong also to the Small Dimension sample. Thus, this result is due to statistical reasons rather than economics.

5.1.4 *Evidence from Stress Test: Announcement, Profitability.*

Looking at the observed and estimated returns plot, notice that the real returns remain below the estimated returns with the exception of the days that are closer to the announcement event. This suggests a negative shock on the medium or long term and no impact on the days immediately before and after the event investigated. Figure 5.7 shows this insight.

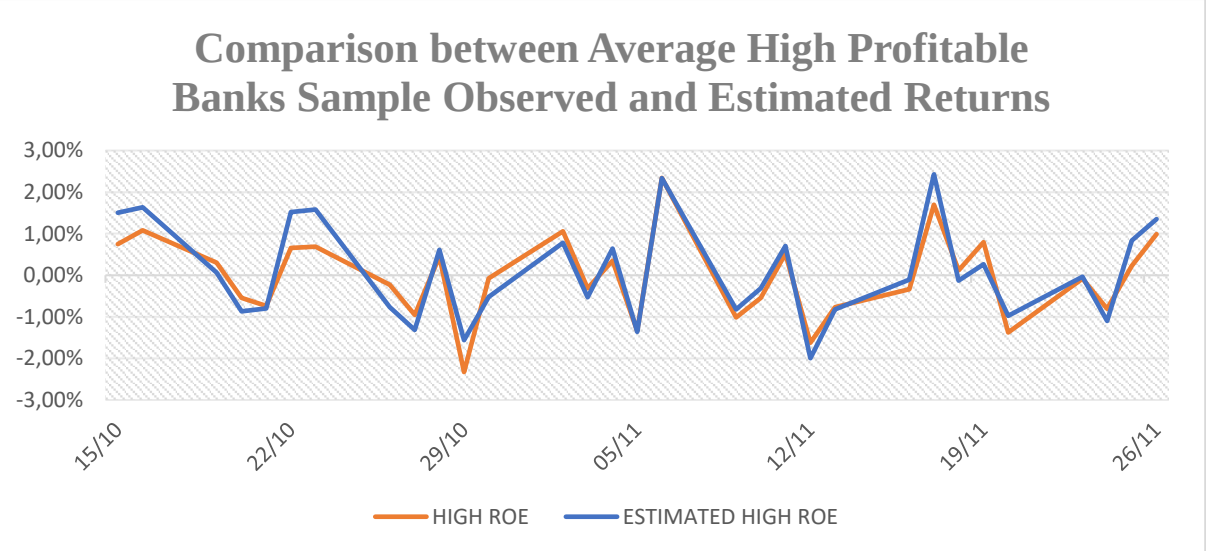

FIGURE 5.7 / COMPARISON BETWEEN AVERAGE SAMPLE OBSERVED AND ESTIMATED RETURNS, HIGH PROFITABILITY, ANNOUNCEMENT. AUTHOR'S ELABORATION

On the opposite, Figure 5.8 underlines that the estimated time series and the observed time series do not have a clearly defined relationship, making difficult to develop insight for the numerical analysis.

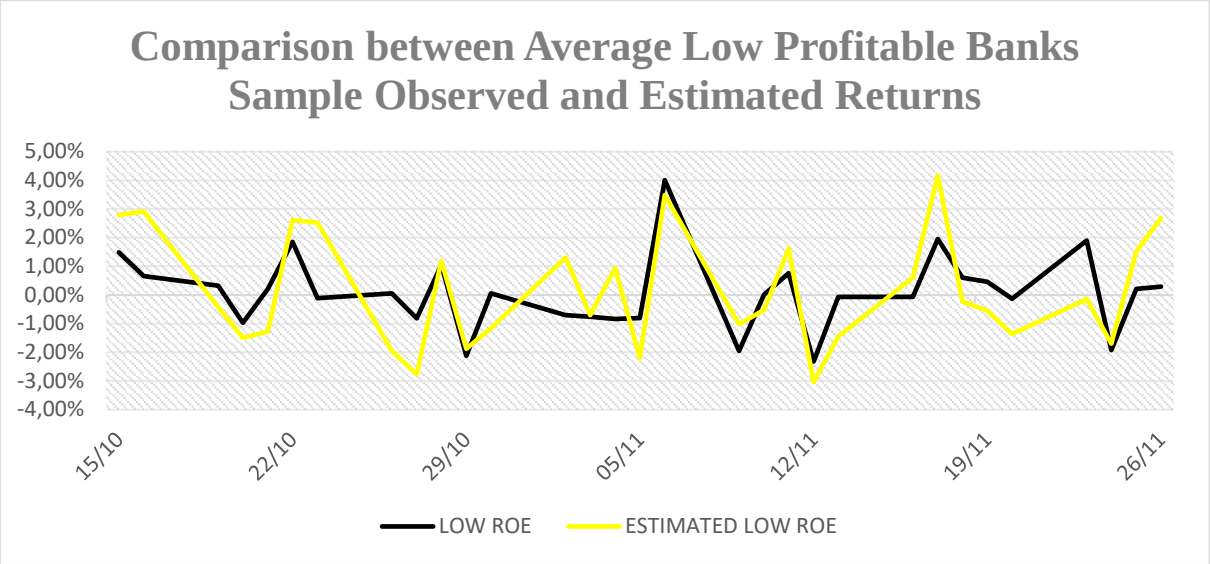

FIGURE 5.8 / COMPARISON BETWEEN AVERAGE SAMPLE OBSERVED AND ESTIMATED RETURNS, LOW PROFITABILITY ANNOUNCEMENT. AUTHOR'S ELABORATION

Following the graphical analysis, Table 5.4 summarizes the results of the empirical analysis on the higher and lower profitable banks sub-sample.

As predicted before, a strongly statistically significant result is given by the long-term high ROE sub-sample, which is also negative as the previous graphical representation showed in Figures 5.7.

It is important to notice that also the medium term analysis on low ROE sub-sample presents weak evidence of significance for the first time respect to all the previous cases examined before.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
HIGH PROFITABILITY	-0.00357208	-0.002644043	-0.003813797	-0.03279447	25
P-VALUE	0.5034	0.5973	0.7078	0.01435	25
LOW PROFITABILITY	-0.001963574	-0.02469652	0.05655203	-0.01461865	7
P-VALUE	0.8361	0.2062	0.1213	0.5434	7

TABLE 5.4 / CAAR AND P-VALUE OF PROFITABILITY SUB-SAMPLES IN ANNOUNCEMENT EVENT. AUTHOR'S ELABORATION

The reason behind these outcomes lies on the fact that the investors look at the low profitable banks as more solid banks since this low profitability could be related to safer assets in the institution's portfolios and as consequence, a higher chance to perform better in the imminent stress test. Instead, the high ROE of some banks could be due to investments on riskier assets and this could lead to a poorer performance during the stress test.

Thus, investors try to anticipate the outcome of the test leading the price's movements upward in the case of lower profitable banks and downward in the case of higher profitable institutions.

5.1.5 *Evidence from Stress Test: Announcement, Riskiness samples.*

The graphical representation of the difference between observed and estimated returns of high risk banks is showed in Figure 5.9, that highlights the lower observed returns with respect to their estimates, suggesting a negative effect of the announcement on the stock's performance at least for the long-term time horizon.

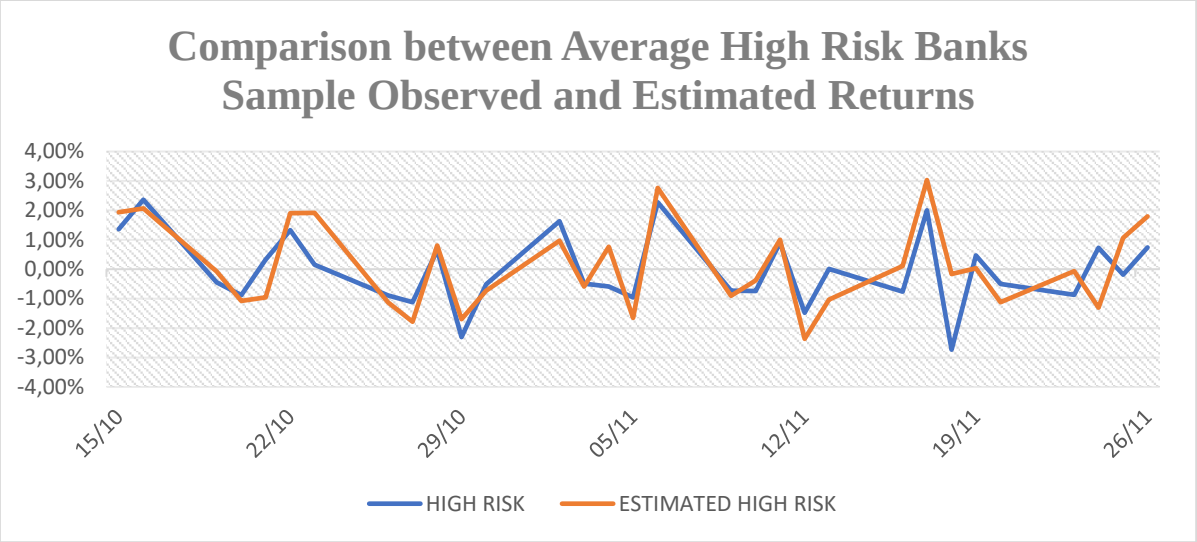

FIGURE 5.9 / COMPARISON BETWEEN AVERAGE SAMPLE OBSERVED AND ESTIMATED RETURNS, HIGH RISKINESS ANNOUNCEMENT. AUTHOR'S ELABORATION

On the opposite, Figure 5.10 does not give any suggestion about the result of the numerical analysis of the announcement effect on the stock's returns of less risky banks, since the time series of the real returns follows in a reasonably faithful manner the time series of the estimated returns.

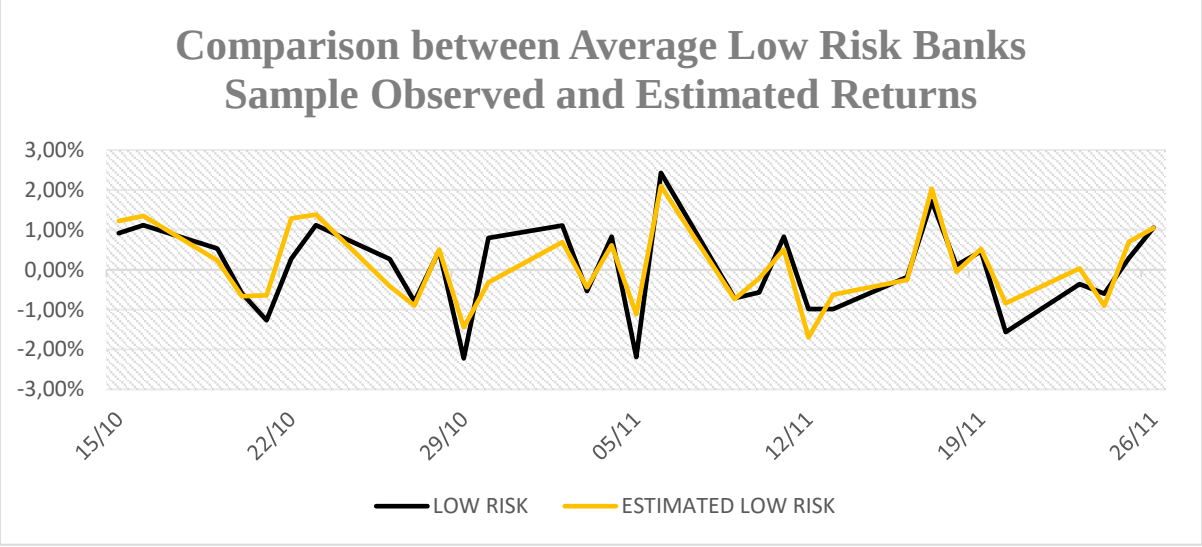

FIGURE 5.10 / COMPARISON BETWEEN AVERAGE SAMPLE OBSERVED AND ESTIMATED RETURNS, LOW RISKINESS ANNOUNCEMENT. AUTHOR'S ELABORATION

The final considerations about the impact of the 2016 stress test announcement on the sub-samples composed by the institutions split by riskiness is given by the Table 5.5, in which the results of the econometric study are illustrated.

The empirical analysis demonstrates that the effect of the announcement is statistically significant for both sub-samples in the long-term time window, even if the impact is stronger for the riskier institution subject to stress test.

Furthermore, there is weak evidence of an impact on the short-run for the riskier banks.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
HIGH RISK	-0.01146531	-0.006011138	0.003409512	-0.04263653	18
P-VALUE	0.1653	0.492	0.8778	0.1018	18
LOW RISK	-0.005245608	-0.005315002	0.00615639	-0.02188156	10
P-VALUE	0.6293	0.4949	0.658	0.1347	10

TABLE 5.5 / CAAR AND P-VALUE OF RISKINESS SUB-SAMPLES IN ANNOUNCEMENT EVENT. AUTHOR'S ELABORATION

The immediate effect on the high risk is due to the fact that the market already assessed the riskiness of those institutions, thus the inclusion of the latter in the sample subject to the test is the new information that makes prices moves downward respect to their estimates.

For the same reason, in the long-run the low risk banks performed better with respect to the high risk institution.

5.1.6 *Evidence from Stress Test: Announcement, Conclusions.*

Finally, this sub-section contains the final remarks about the empirical analysis of the impact that the 2016 EU-wide stress test announcement has had on banks' stock performance.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
FULL SAMPLE	0.1759	0.1457	0.9999	0.0151	34
BIG DIMENSION	0.5537	0.7725	0.9537	0.4441	13
SMALL DIMENSION	0.7225	0.1728	0.3706	0.01381	19
HIGH CAPITALIZATION	0.9118	0.241	0.9287	0.004765	9
LOW CAPITALIZATION	0.4681	0.3929	0.225	0.2702	23
HIGH PROFITABILITY	0.5034	0.5973	0.7078	0.01435	25
LOW PROFITABILITY	0.8361	0.2062	0.1213	0.5434	7
HIGH RISK	0.1653	0.492	0.8778	0.1018	18
LOW RISK	0.6293	0.4949	0.658	0.1347	10

TABLE 5.6 / P-VALUES ALL SAMPLES IN ANNOUNCEMENT EVENT. AUTHOR'S ELABORATION

The analysis of p-values, displayed on Table 5.6, helps to understand which types of banks were more subject to shock due to the announcement and in which time window.

It is clear that the effect of the event had took place in the long-period as proved by the low p-values in the 31-trading-days' time window.

Furthermore, it is important to notice that weak evidence of a short-term shock has been found for the Full-sample since its p-values of the 3-days' and 7-days' time windows are quite low even if they do not reach the common p-value threshold of 0.1. Notice that this evidence was found only in other two sub-samples: High-Risk in the very short-term and Small Dimension in the short time-period. Also, notice that the only evidence of a medium-term impact has been observed in the Low-profitability sub-sample.

According to the analysis, the types of banks that were affected in the long-period were: Small Dimension, High Capitalization and High Profitability.

There is weak evidence of a shock in the long term for High and Low Risk banks.

Table 5.7 provides the CAARs for the sub-samples, useful to understand the level of the effect caused by the stress test announcement of the different kind of banks. The blue fulfilled cells indicate the statistically significative value of Table 5.6.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
FULL SAMPLE	-0.007318428	-0.008120189	-2,20E-06	-0.03756489	34
BIG DIMENSION	-0.005499875	-0.00219927	0.0007549134	-0.01170685	13
SMALL DIMENSION	-0.001660455	-0.01107296	0.01530029	-0.04052649	19
HIGH CAPITALIZATION	-0.0006370479	-0.008311456	0.002188043	-0.04888865	9
LOW CAPITALIZATION	-0.004770123	-0.006961962	0.01371314	-0.01677643	23
HIGH PROFITABILITY	-0.00357208	-0.002644043	-0.003813797	-0.03279447	25
LOW PROFITABILITY	-0.001963574	-0.02469652	0.05655203	-0.01461865	7
HIGH RISK	-0.01146531	-0.006011138	0.003409512	-0.04263653	18
LOW RISK	-0.005245608	-0.005315002	0.00615639	-0.02188156	10

TABLE 5.7 / CAARS ALL SAMPLES IN ANNOUNCEMENT EVENT. AUTHOR'S ELABORATION

The only positive effect on the banks' stock market has been found in the Low-Profitability sub-sample, as afore-mentioned the explanation of this phenomenon relates to the fact that the low-profitability of these banks could be caused by a low level of risky activities that contributes to enhance the possibilities to well-perform the stress test, investors knows that and try to anticipate the outcome leading the price of the stock to overperform.

The highest negative CAAR has been observed in the High-Capitalization sub-sample, this means that the banks that belongs to that sample were the most affected by the stress test announcement.

Other high negative results have been observed in High Risk and Small Dimension sub-samples.

5.2 *Evidence from Stress Test: Methodology and Scenarios Disclosure.*

After announcement effect has been analysed in the previous section, this one will focus on the effect on the stock's market of the 2016 EU-wide stress test disclosure of methodology and the scenarios with which the test has been conducted.
The common methodology and the scenarios for the 2016 stress test were released on the 24th of February 2016, which is the t_0 of the analysis referring to this section.
On this date European Banking Authority disclosed the common methodology which contains all the assumption that the single institutions have to take in consideration for the exercise.
Nonetheless, the most important releases in that day were the baseline scenario and the adverse scenario of the European and world economy, which are the key for the conduction of the stress test itself.
For further explanation, it is important to remind that the Chapter 2 of this work contains all the relevant information about the 2016 EU-wide stress test.

5.2.1 *Evidence from Stress Test: Methodology and Scenarios Disclosure, Full Sample.*

As already made with the announcement event, the focus of the first subsection is to investigate whether there has been a shock due to the event in question in the full-sample, after that, this work will examine the impact on the same sub-samples of the previous section.
Remind that the composition of the sub-samples could be different because in this case it has been made according the 2015 Balance Sheet's data of the institutions. All the explanations about the composition of the sub-samples are contained in Chapter 4 of this dissertation.

Figure 5.11 gives an overview about the time series of the indexes which represent the base for the analysis and the average returns of the full sample. This figure shows that the institution's returns series follow in a quite close manner the indexes of references giving no insight for the numerical results of the analysis.

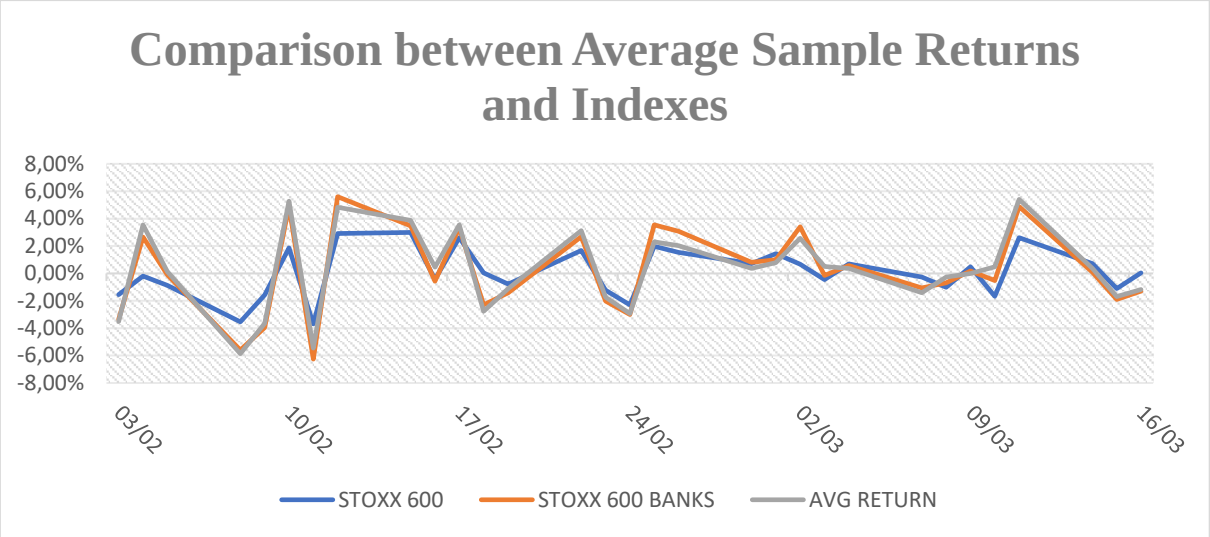

FIGURE 5.11 / COMPARISON BETWEEN AVERAGE SAMPLE RETURNS AND INDEXES, FULL SAMPLE SCENARIO DISCLOSURE. SOURCE: EIKON DATASTREAM. AUTHOR'S ELABORATION

Also Figure 5.12, which displays the comparison between observed and estimated returns, does not give strong intuition of the direction that the empirical analysis would take.

Thus, in order to analyse the phenomenon, the numerical analysis must be taken into consideration rather than the graphical one.

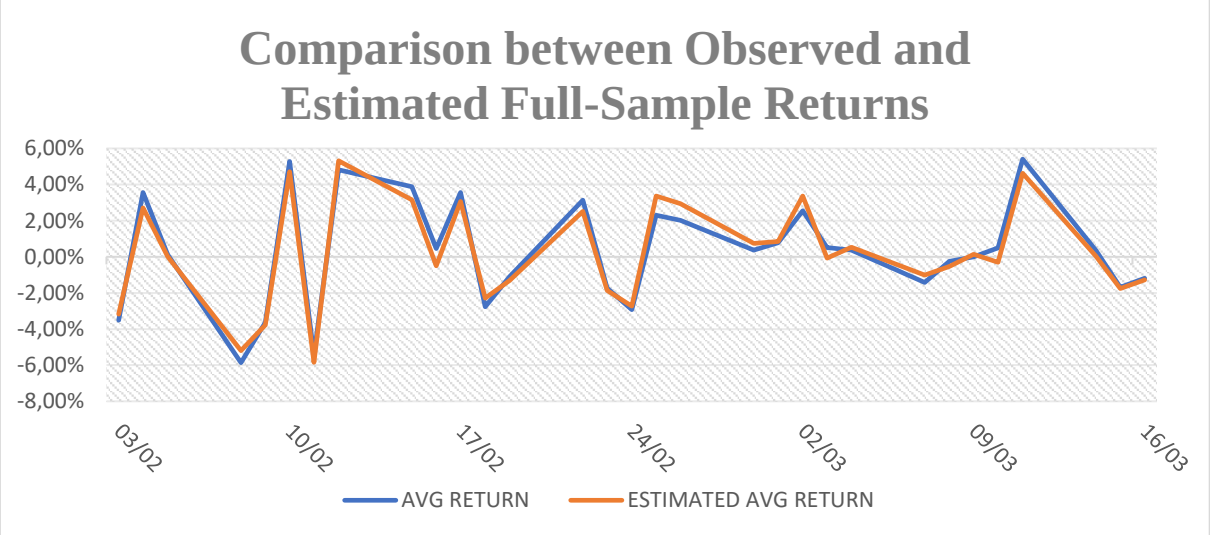

FIGURE 5.12 / COMPARISON BETWEEN OBSERVED AND ESTIMATED RETURNS, FULL SAMPLE SCENARIO DISCLOSURE. AUTHOR'S ELABORATION

The results of the econometric analysis are showed in Table 5.8.

The table shows that the there is an evidence of a negative effect on the banks' stock performance in the short and very short time windows.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
FULL SAMPLE	-0.01305977	-0.01761413	-0.003698681	0.01359444	34
P-VALUE	0.03465	0.02619	0.764	0.6593	34

TABLE 5.8 / CAARS AND P-VALUES FULL SAMPLE IN SCENARIO DISCLOSURE EVENT. AUTHOR'S ELABORATION

As already stated in the announcement section, also in this case these results do not represent the focus of the investigation, but a benchmark which we rely on for the analysis of the other sub-samples.

5.2.2 *Evidence from Stress Test: Methodology and Scenarios Disclosure, Dimension.*

The first sub-samples analysed for the disclosure of scenarios event are the sub-samples composed by the big dimension and small dimension banks.
As usual, the first analysis is the graphical analysis between the real and estimated returns of the two sub-samples.

Figure 5.13 shows the comparison between observed and estimated small banks returns, in which it is evident a discrepancy in the central days of the event.
Thus, the expectation of the numerical analysis is that there should be a shock at least in the closest trading days to the disclosure of methodology and scenarios.

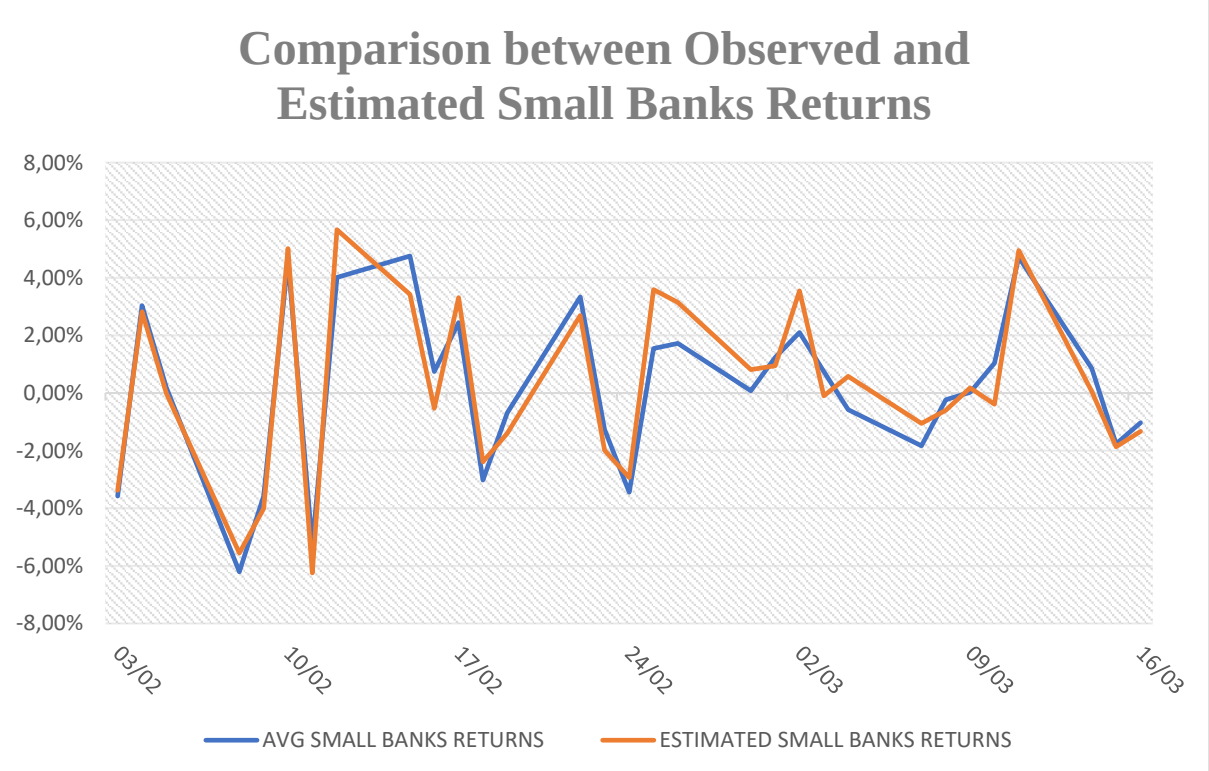

FIGURE 5.13 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, SMALL BANKS SCENARIO DISCLOSURE. AUTHOR'S ELABORATION

The comparison between observed and estimated returns of big banks is explained by Figure 5.14, in which there is no evidence of an impact in the short-term, but the discrepancy in the final part of the graph indicates that a shock could be observed at least in the long-period.

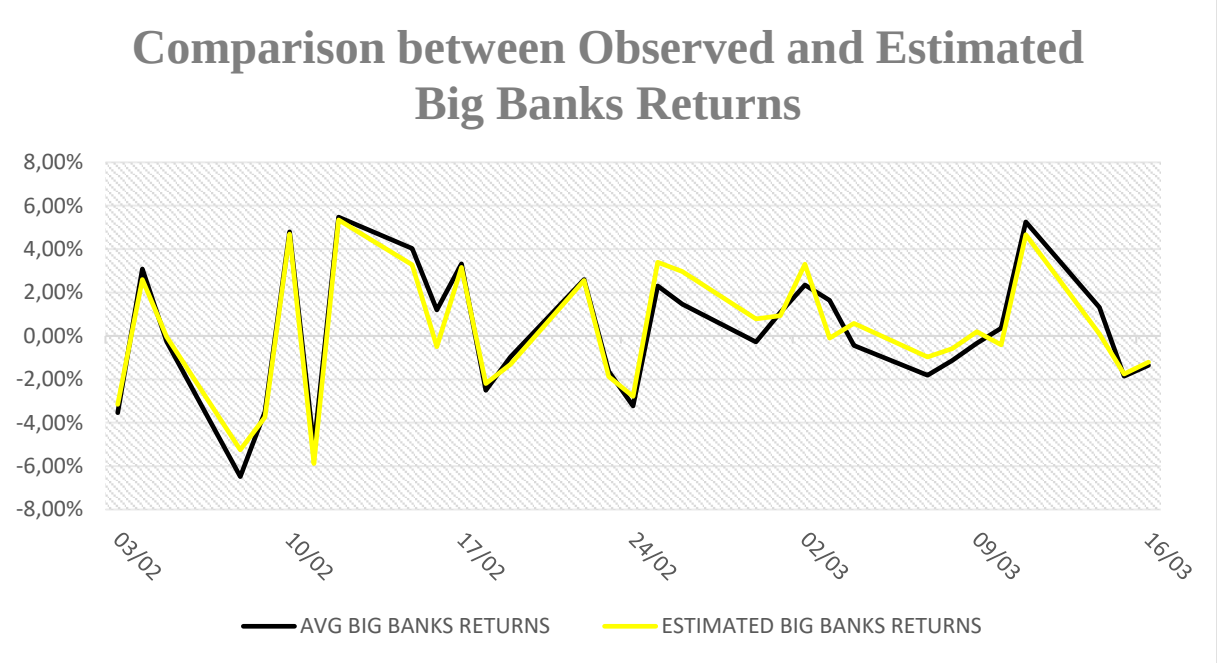

FIGURE 5.14 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, BIG BANKS SCENARIO DISCLOSURE. AUTHOR'S ELABORATION

Finally, Table 5.9 represents the analytical results of the Dimension sub-samples analysis.
The table below suggests that the empirical evidence of a strong statistically significative impact on stock's market in the short and very-short term for small dimension institutions, confirming the insight given by Figure 5.13.
On the opposite whilst the event had no effect on small banks in the long period, big banks were affected by the disclosure of scenarios in a 31 trading days time window.
Notice that, also the direction of the effect was the opposite since it was negative for the small banks and positive for the big ones.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
BIG DIMENSION	0.003213502	-0.005383667	0.007615464	0.03315886	13
P-VALUE	0.7887	0.7503	0.7298	0.09029	13
SMALL DIMENSION	-0.02243323	-0.02344781	-0.01765523	-0.03017407	19
P-VALUE	0.003245	0.008005	0.209	0.4017	19

TABLE 5.9 / CAARS AND P-VALUES OF DIMENSION SUB-SAMPLES IN SCENARIO DISCLOSURE EVENT. AUTHOR'S ELABORATION

There are two explanations for these results.
The first one is that bigger the institution, more difficult for analysts predict the outcome of the test, thus time is needed for processing the new information communicated by EBA and as consequence prices need more time to adjust properly.

The second explanation depends on the fact that analysts know that the governments will not permit the default of a crucial institutions in term of assets and they will be always ready to recapitalize the institution. On the other side, small institutions could be more prone to failures, since they could be not large enough to justify a government intervention.

5.2.3 *Evidence from Stress Test: Methodology and Scenarios Disclosure, Capitalization.*

Concerning the difference between the estimated and observed returns, described by Figure 5.15, notice that there is an evidence of an impact in the stock's market for poor capitalized banks. Furthermore, this shock appears to be concentrated in the central trading days of the analysis, which are the closest days to the event examined.
Thus, the graph suggests a negative effect of the scenarios' disclosure on the stock's price of the low cap institutions since the real returns performed poorly with respect to the estimation.

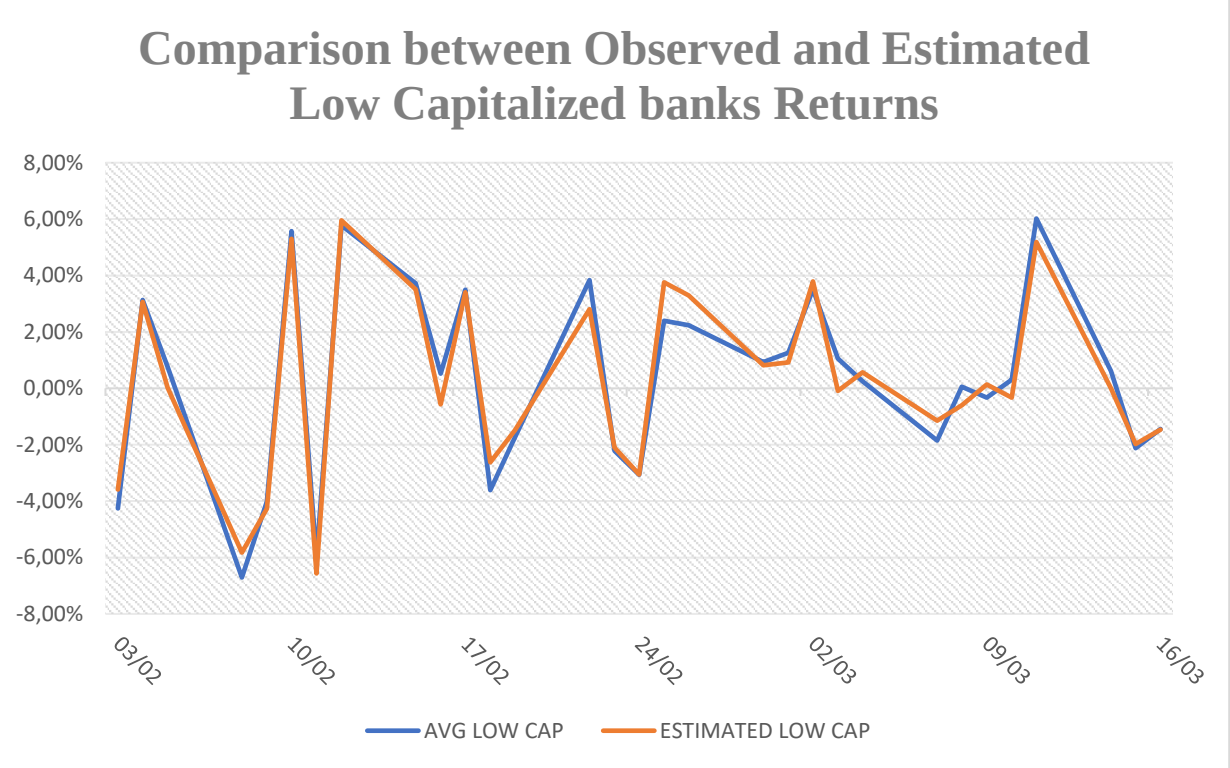

FIGURE 5.15 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, LOW CAPITALIZATION SCENARIO DISCLOSURE. AUTHOR'S ELABORATION

Regarding the comparison between observed and estimated high capitalized banks returns, Figure 5.16 does not give any strong clue to predict the result of the empirical analysis.

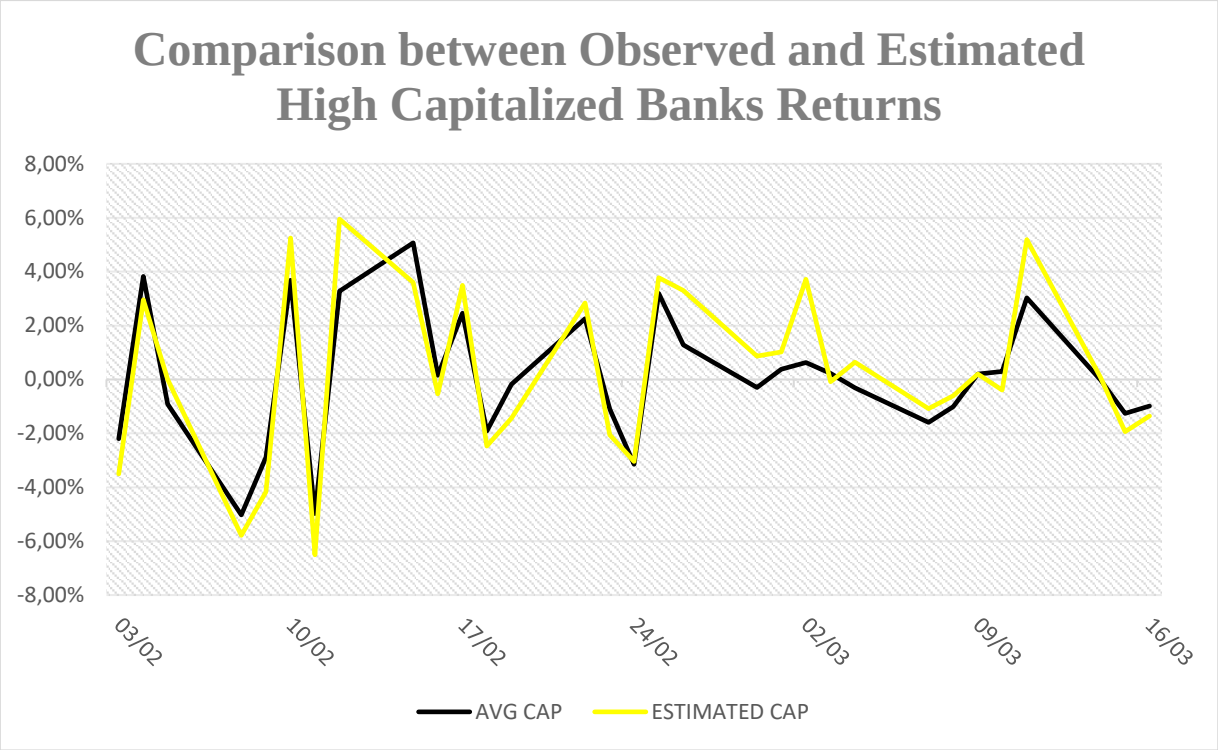

FIGURE 5.16 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, HIGH CAPITALIZATION SCENARIO DISCLOSURE. AUTHOR'S ELABORATION

In Table 5.10, the results of the econometric analysis are showed.

The only statistically significative CAARs are the ones belonging to the short and very-short terms low capitalization sub-sample. This proves that the disclosure of methodology and scenarios had effect in a negative way only on poor capitalized banks, whilst better capitalized banks were substantially untouched by the event.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
HIGH CAPITALIZATION	-0.0009945155	-0.01221954	-0.01748958	-0.04303828	11
P-VALUE	0.9511	0.5489	0.516	0.4617	11
LOW CAPITALIZATION	-0.01778648	-0.01814672	-0.002098237	0.01577043	21
P-VALUE	0.003242	0.02448	0.8669	0.3823	21

TABLE 5.10 / CAARS AND P-VALUES IN CAPITALIZATION SUB-SAMPLES IN SCENARIO DISCLOSURE SUB-SAMPLES. AUTHOR'S ELABORATION

It is interesting to set attention on the fact that in this case the sub-samples behave in the opposite manner respect to the announcement event, in which the effect was long-term orientated, and it involved the better capitalized institutions. Thus, the market anticipated the expectation on the outcome of the stress test in the announcement event for the more capitalized banks, while it preferred to wait for the disclosure of the scenarios for the worse capitalized institutions.

5.2.4 *Evidence from Stress Test: Methodology and Scenarios Disclosure, Profitability.*

The comparison between observed and estimated low profitability returns, depicted in Figure 5.17, shows that in general the low profitability banks performed worse than its estimates.

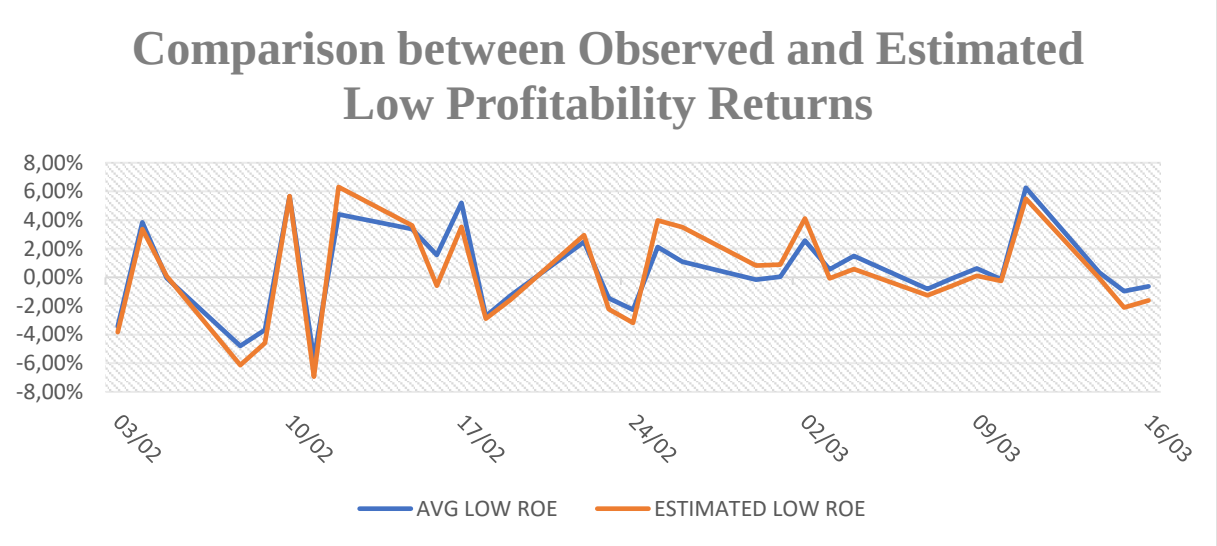

FIGURE 5.17 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, LOW PROFITABILITY SCENARIO DISCLOSURE. AUTHOR'S ELABORATION

On the other side, Figure 5.18 gives indication about the discrepancies between the real and the predicted high ROE institutions. In particular, notice that although the real observation remains below the estimates as the low ROE sub-sample, they are closer to the prediction.

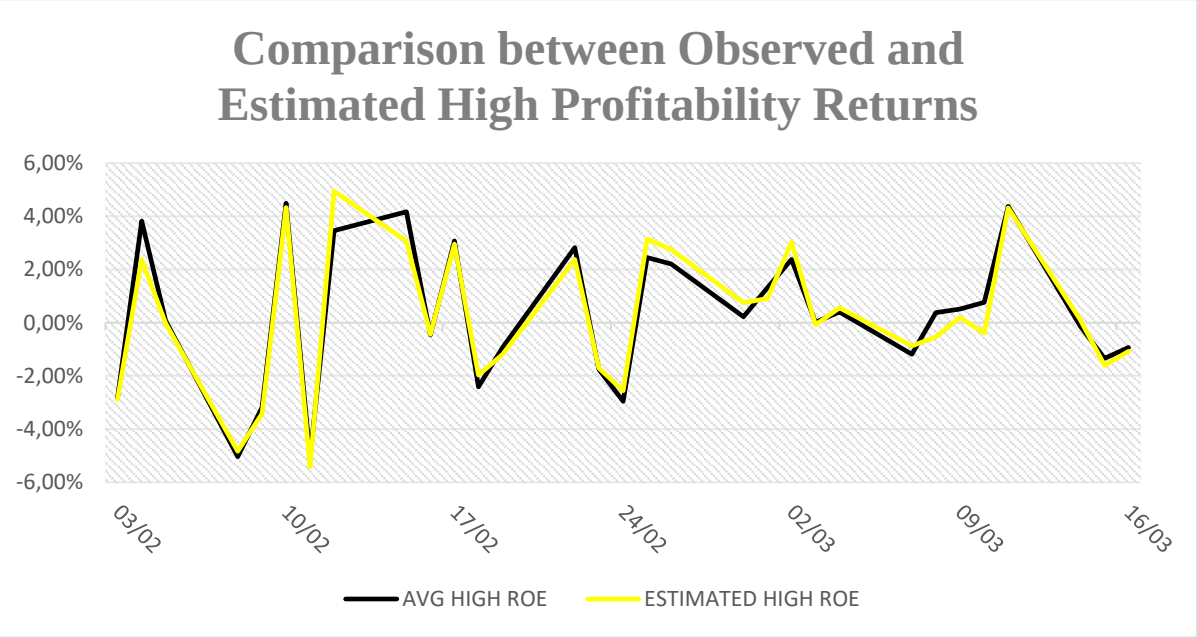

FIGURE 5.18 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, HIGH PROFITABILITY SCENARIO DISCLOSURE. AUTHOR'S ELABORATION

As usual, at the end of the sub-section there is the tab that reassumes the numerical results of the empirical analysis. In this case, the reference is Table 5.11.
The table confirms the fact that in average both sub-samples performed worse that their prediction, but it is important to underline that only the high profitability sub-sample CAARs are statistically significant, nonetheless the CAARs belonging to low profitability sub-sample are similar or even bigger in absolute terms.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
HIGH PROFITABILITY	-0.01320438	-0.01354418	-0.0102568	0.00969311	20
P-VALUE	0.004564	0.03314	0.3828	0.4751	20
LOW PROFITABILITY	-0.01003067	-0.02038437	-0.002609365	-0.02800869	12
P-VALUE	0.5504	0.3297	0.922	0.6315	12

TABLE 5.11 / CAARS AND P-VALUES PROFITABILITY SUB-SAMPLES IN SCENARIO DISCLOSURE EVENT. AUTHOR'S ELABORATION

The impact on the stock's market of the event was negative for the high ROE banks in the short and very short period, confirming what has been already seen for the full-sample case. This result is similar to the one found out in the announcement case, the only difference is the timing of the impact: in this case short term oriented, and in the previous case in the long period.

5.2.5 *Evidence from Stress Test: Methodology and Scenarios Disclosure, Riskiness.*

The last analysis for 2016 EU-wide stress test methodology and scenarios disclosure concerns the sub-samples composed by the high risk and low risk institutions.
Figure 5.19 shows how faithfully the real returns of low risk banks follow their estimate. Thus, no evidence of an impact can be deducted.

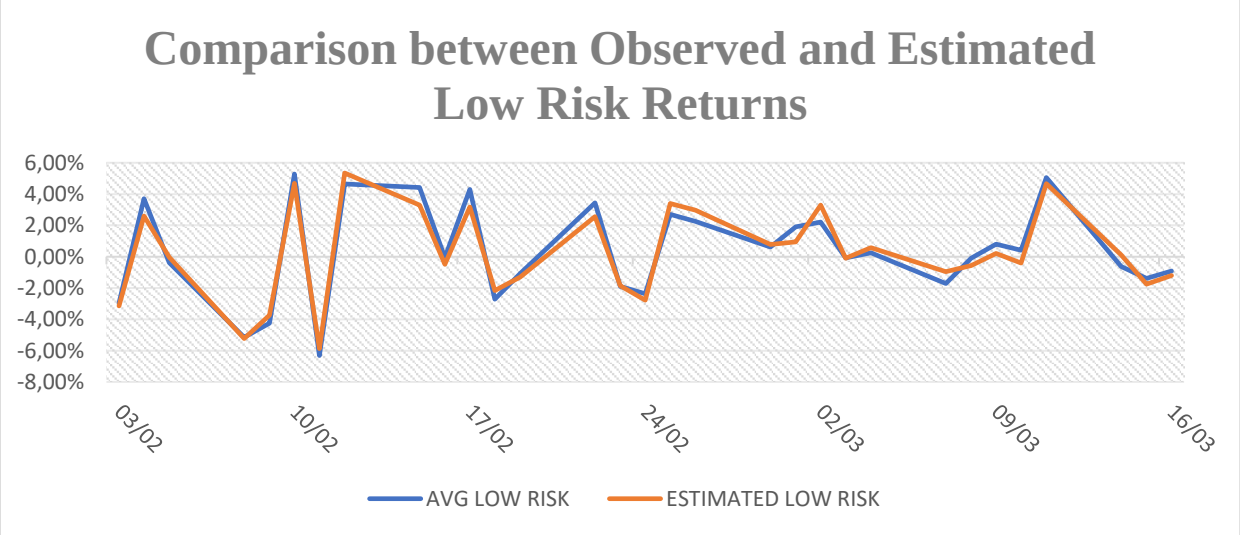

FIGURE 5.19 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, LOW RISKINESS SCENARIO DISCLOSURE . AUTHOR'S ELABORATION

Also, high risk sub-sample presents little graphical evidence of a relation between the event and abnormal returns on the stock's market, as explained by Figure 5.20.
Thus, only the numerical analysis can give some intuitions for the hypothetical impact caused by the disclosure of methodology and scenarios on high and low risk banks.

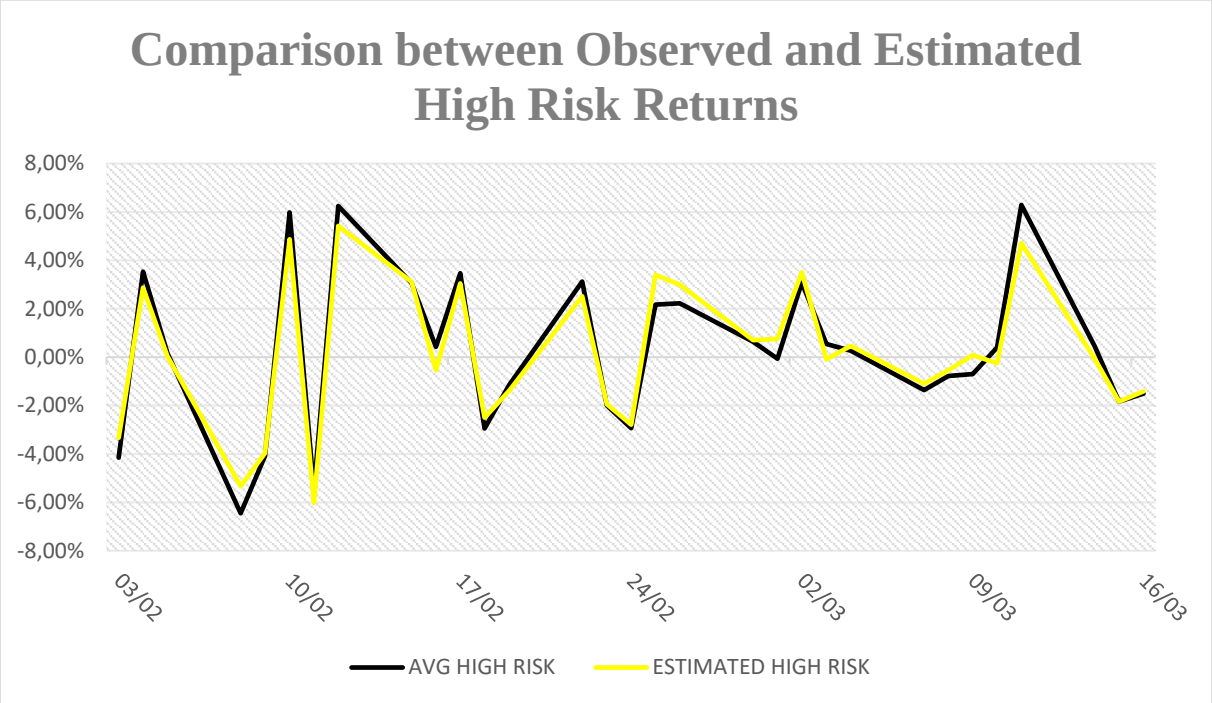

FIGURE 5.20 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, HIGH RISKINESS SCENARIO DISCLOSURE. AUTHOR'S ELABORATION

The Table 5.12 shows little evidence of a shock on the high risk institutions, whilst neither at all for the low risk ones.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
HIGH RISK	-0.01622524	-0.02003724	-0.02063617	-0.004916024	17
P-VALUE	0.1857	0.1647	0.3762	0.938	17
LOW RISK	-0.006373887	-0.003629576	0.01299941	0.02680505	11
P-VALUE	0.2112	0.5046	0.3484	0.2115	11

TABLE 5.12 / CAARS AND P-VALUES RISKINESS SUB-SAMPLE IN SCENARIO DISCLOSURE EVENT

The impact is negative, and it is concentrated only in the central days of the time window. This is one of the differences with the announcement case in which not only the impact took place also in the 31 trading days window but also there was evidence of a shock for the lower risk banks.
Furthermore, the impact on announcement was stronger in absolute terms.

5.2.6 *Evidence from Stress Test: Methodology and Scenarios Disclosure, Conclusions.*

The final observation about the effect of the 2016 EU-wide stress test on banks' stock's market are summarized by Table 5.13 and 5.14.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
FULL SAMPLE	0.03465	0.02619	0.764	0.6593	34
BIG DIMENSION	0.7887	0.7503	0.7298	0.09029	13
SMALL DIMENSION	0.003245	0.008005	0.209	0.4017	19
HIGH CAPITALIZATION	0.9511	0.5489	0.516	0.4617	11
LOW CAPITALIZATION	0.003242	0.02448	0.8669	0.3823	21
HIGH PROFITABILITY	0.004564	0.03314	0.3828	0.4751	20
LOW PROFITABILITY	0.5504	0.3297	0.922	0.6315	12
HIGH RISK	0.1857	0.1647	0.3762	0.938	17
LOW RISK	0.2112	0.5046	0.3484	0.2115	11

TABLE 5.13 / P-VALUES ALL SAMPLES IN SCENARIOS DISCLOSURE EVENT. AUTHOR'S ELABORATION

In table 5.13 it is clear that the event investigated in this section has had effect only in the short and very short term. The only sub-sample in which the scenarios disclosure had a long term effect was the one represented by the big dimension banks.
In particular the most statistically significative affected institution, pictured in green, were Small Dimension, Low Capitalization and High Profitability, which are the same of the previous case. The main difference is in the timing of the shock: short term in this case, long term in the one analysed in the first section of this chapter.
Notice that there is also a weak evidence of an impact in the shortest term for high risk institutions.

After the analysis of the p-Values in tab 5.13, the next one will give insight about the size of the shock due to the event examined in this sub-section.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
FULL SAMPLE	-0.01305977	-0.01761413	-0.003698681	0.01359444	34
BIG DIMENSION	0.003213502	-0.005383667	0.007615464	0.03315886	13
SMALL DIMENSION	-0.02243323	-0.02344781	-0.01765523	-0.03017407	19
HIGH CAPITALIZATION	-0.0009945155	-0.01221954	-0.01748958	-0.04303828	11
LOW CAPITALIZATION	-0.01778648	-0.01814672	-0.002098237	0.01577043	21
HIGH PROFITABILITY	-0.01320438	-0.01354418	-0.0102568	0.00969311	20
LOW PROFITABILITY	-0.01003067	-0.02038437	-0.002609365	-0.02800869	12
HIGH RISK	-0.01622524	-0.02003724	-0.02063617	-0.004916024	17
LOW RISK	-0.006373887	-0.003629576	0.01299941	0.02680505	11

TABLE 5.14 / CAARS ALL SAMPLES IN SCENARIOS DISCLOSURE EVENT. AUTHOR'S ELABORATION

Table 5.14 presents the Cumulative Average Abnormal Returns of all the samples investigated in this sub-section. Those in which a statistically relevance has been observed are pictured in blue cells.

Notice that, among the last mentioned, the only positive one appears to be the long-term CAAR associated with the Big Dimension institution sub-sample. On the opposite, Small Dimension banks registered the biggest negative value.
It is important to remark that the negative results due to the methodology and scenarios disclosure event are weaker than the announcement event case.

5.3 *Evidence from Stress Test: Disclosure of Results.*

Finally, the last event examined in this dissertation is the 2016 EU-wide stress test results publication that took place on 29th July 2016. As reminder of the outcome, contained in Chapter 2 of this dissertation, it is important to recall that, according to the EBA, the EU banking sector proved its resiliency, since from a starting point of 13.2% of CET 1 ratio on average, the theoretical loss due to the adverse scenario was 380 bps on average.
Moreover, this analysis includes a further sub-sample investigated, that is the examination of whether stress test affected better performed and worse performed banks in the exercise.

5.3.1 *Evidence from Stress Test: Disclosure of Results, Full Sample.*

This subsection contains the analysis of the full sample of banks in the disclosure of results event.

Figure 5.21 shows the comparison between the average sample returns and indexes in a time window of 31 trading days. The evidence given by the picture, is that the average returns of the full sample, drawn in grey, usually follows the banking index with some negative deviation in the days that followed the event analysed.

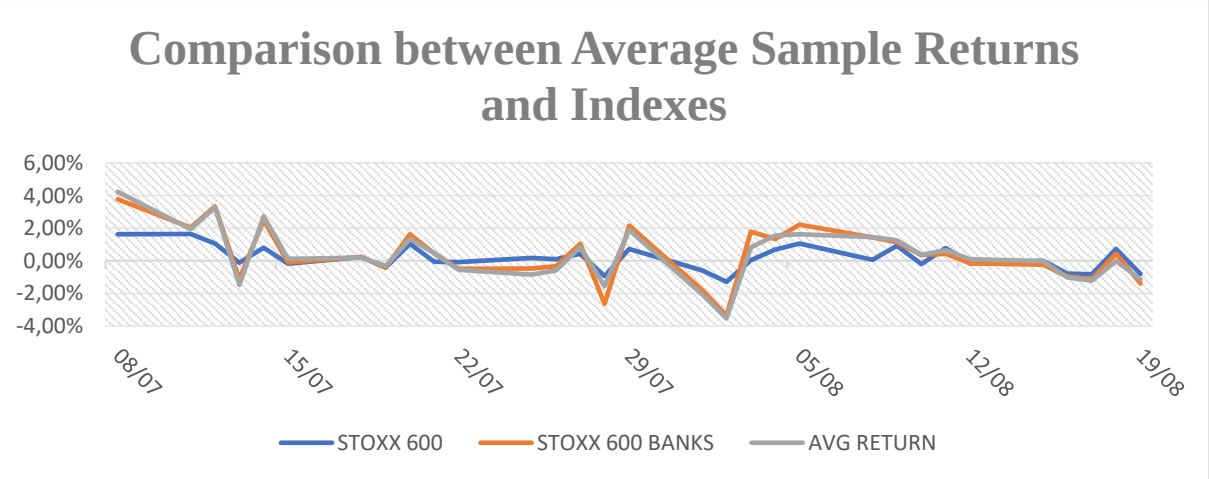

FIGURE 5.21 / COMPARISON BETWEEN AVERAGE SAMPLE RETURNS AND INDEXES, FULL SAMPLE DISCLOSURE OF RESULTS. SOURCE: EIKON DATASTREAM. AUTHOR'S ELABORATION

The estimated and observed full sample returns are depicted in Figure 5.22, in which there is no sign of a shock due to the event in question, since the time series of the average returns rarely shows a significative discrepancy with the estimated average returns.

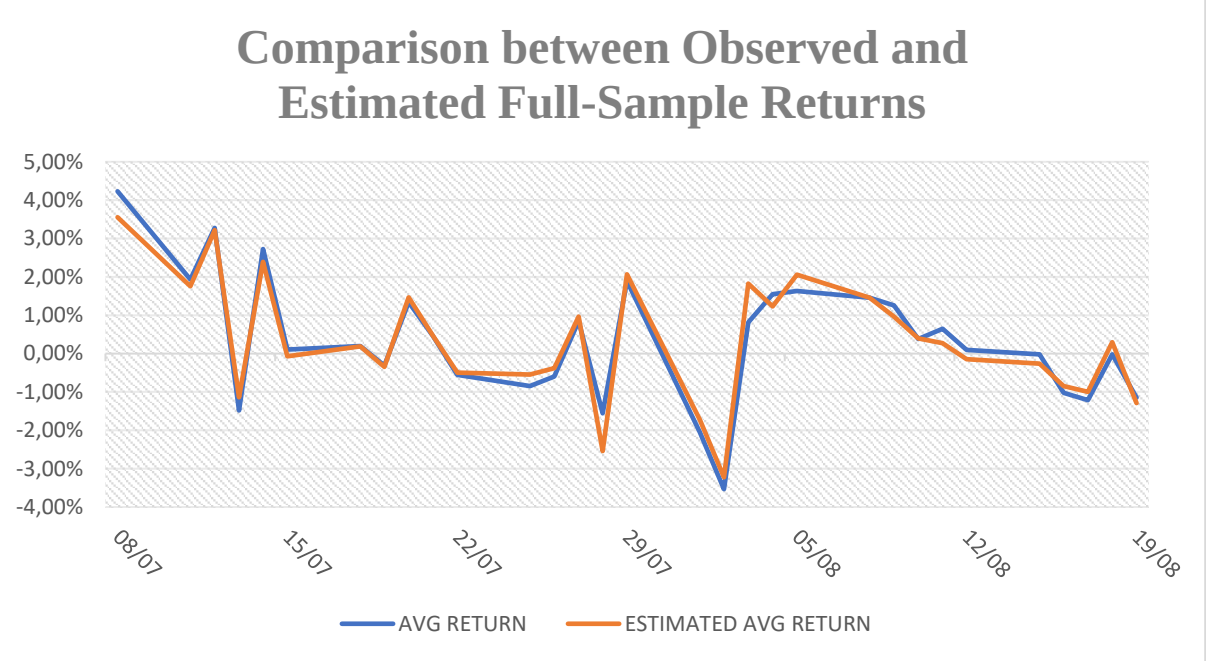

FIGURE 5.22 / COMPARISON BETWEEN OBSERVED AND ESTIMATED RETURNS, FULL SAMPLE DISCLOSURE OF RESULTS. AUTHOR'S ELABORATION

The table 5.15 shows the results of the econometric analysis on the full sample. In particular, the tab confirms the impressions given by the graphical representation in figure 5.29, that there is no statistical significance of a relationship between the event analysed and possible shocks in banking stock's market.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
FULL SAMPLE	0.004705148	-0.01189685	-0.01511588	-0.00131751	34
P-VALUE	0.3563	0.2041	0.2605	0.929	34

TABLE 5.15 / CAARS AND P-VALUE FULL SAMPLE IN DISCLOSURE OF RESULTS. AUTHOR'S ELABORATION

5.3.2 *Evidence from Stress Test: Disclosure of Results, Dimension.*

The first sub-sample analysed is the one composed by big banks and small banks.
In the comparison between observed and estimated returns of big banks, pictured in Figure 5.23, there is no graphical evidence of a shock due to the event investigated.

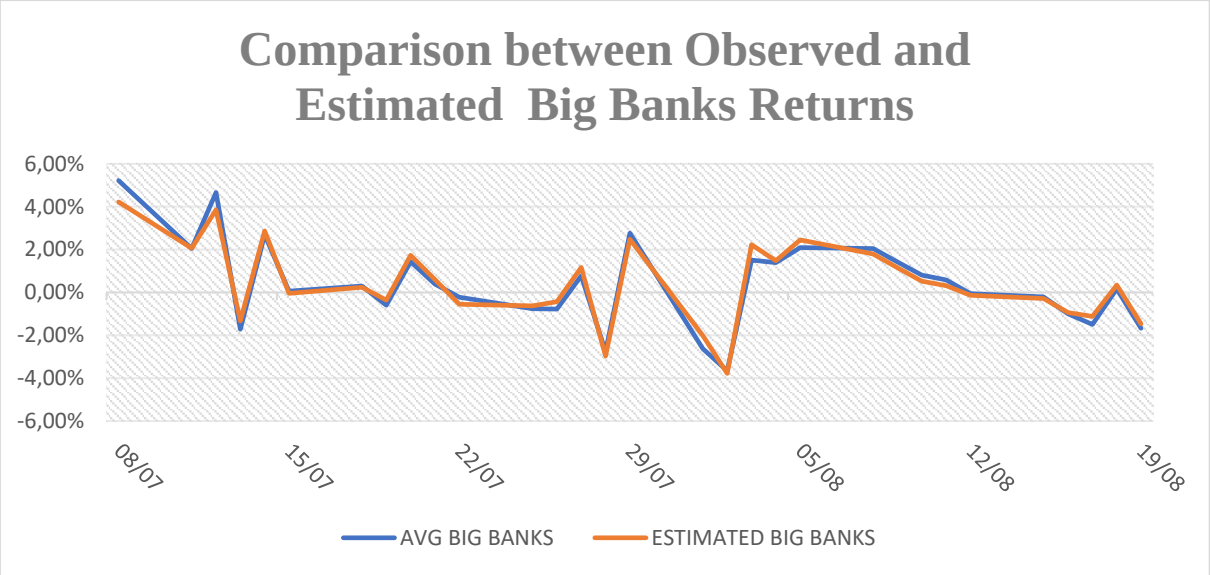

FIGURE 5.23 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, BIG BANKS DISCLOSURE OF RESULTS. AUTHOR'S ELABORATION

Also Figure 5.24, that represents the time series of the real and estimated small banks returns, shows no graphical sign of a relationship between the event and the stock's returns of banks. Thus, only numerical analysis of the CAARs can explain the phenomenon.

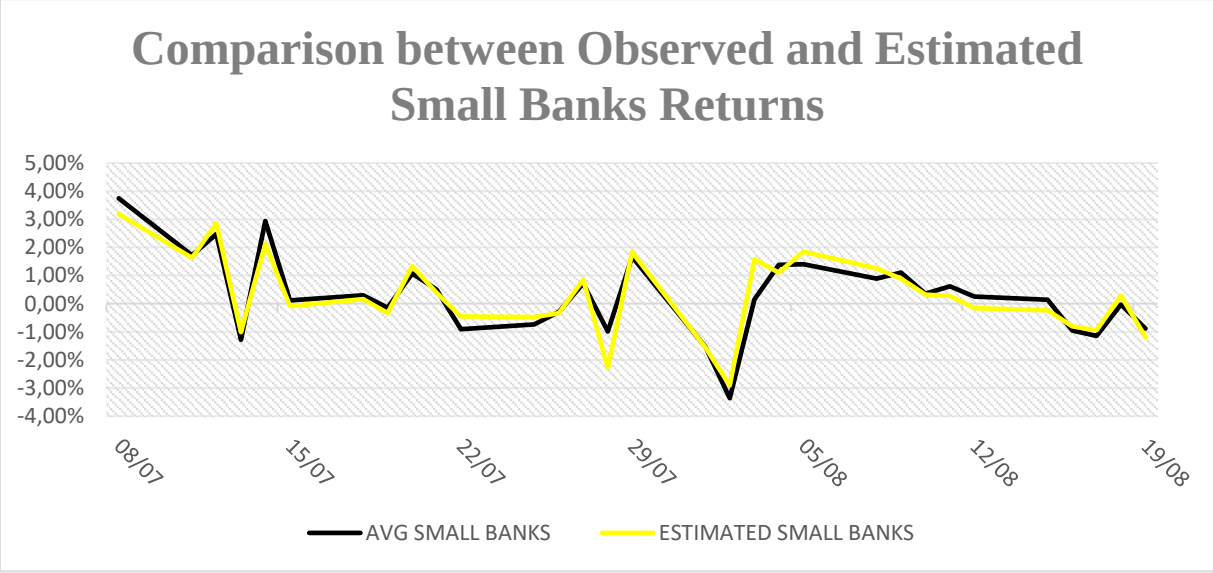

FIGURE 5.24 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, SMALL BANKS DISCLOSURE OF RESULTS. AUTHOR'S ELABORATION

At last, Table 5.16 depicts the numerical results of the econometric examination.
The table below, prove that only small banks were subject to shock at least in the short period. Moreover, the shock was positive, showing a good market response on the stress test outcome.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
BIG DIMENSION	-0.001212475	-0.0146089	-0.01688043	-0.006948686	13
P-VALUE	0.8374	0.4337	0.2621	0.6754	13
SMALL DIMENSION	0.01155344	-0.008115347	-0.01988553	0.001286682	19
P-VALUE	0.1171	0.4086	0.3645	0.9579	19

TABLE 5.16 / CAARS AND P-VALUE OF DIMENSION SUB-SAMPLES IN DISCLOSURE OF RESULTS. AUTHOR'S ELABORATION

In particular, the fact that small banks were more affected denotes that the test added new information about the resiliency of the smaller institution whether info were already available for investors in the case of bigger banks.

5.3.3 *Evidence from Stress Test: Disclosure of Results, Capitalization.*

From the graphical analysis of estimated and observed high capitalized banks returns, provided by Figure 5.25, it is clear that on average real returns were higher than estimated ones. Thus, the expectation from the numerical analysis is that the shock, if present, should be positive.

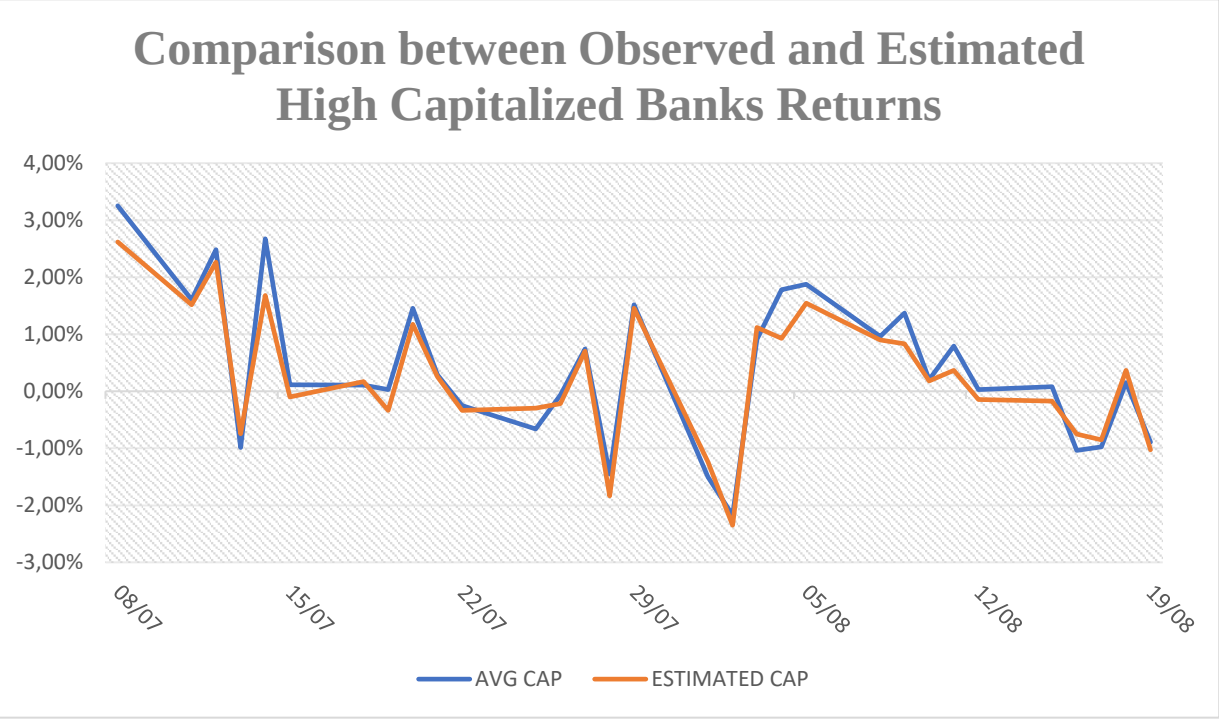

FIGURE 5.25 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, HIGH CAP DISCLOSURE OF RESULTS. AUTHOR'S ELABORATION

On the other side, as evidently showed in Figure 5.26, the expectation of a shock on poorly capitalized banks is negative, since in the figure in question the observed values are worse than their estimates.

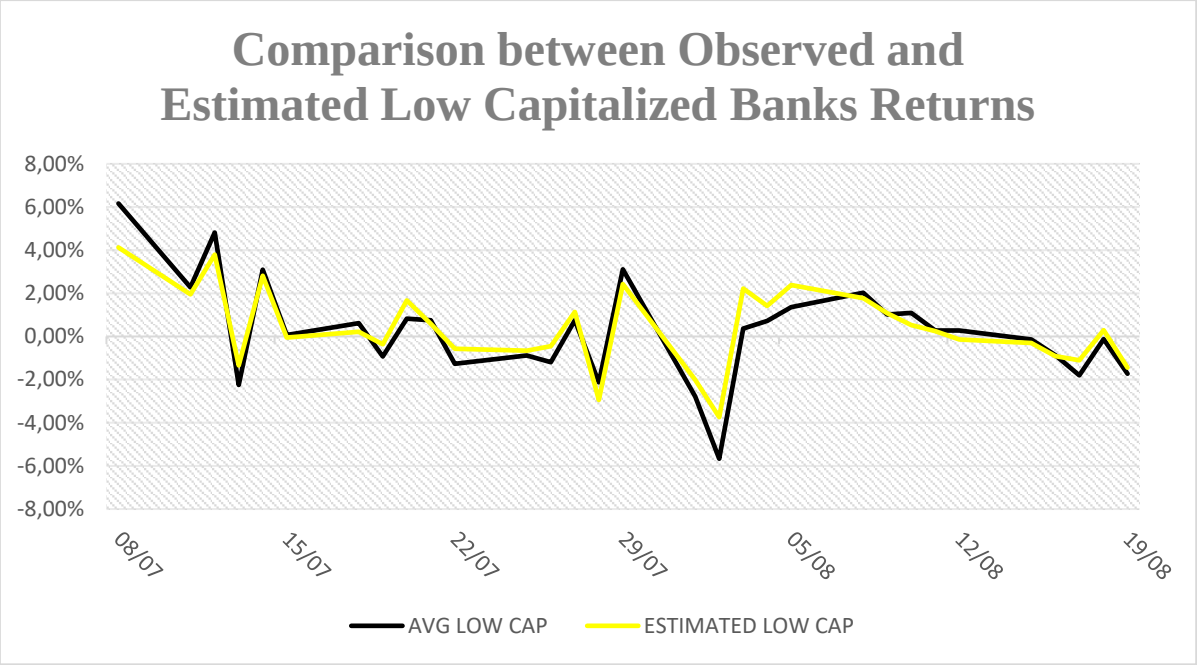

FIGURE 5.26 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, LOW CAPITALIZATION DISCLOSURE OF RESULTS. AUTHOR'S ELABORATION

As usual at the end of the sub-section, Table 5.17 pictures the empirical finding of the analysis. Evidences of statistical significance are present in the short-medium term for both of the sub-samples. Notice also that the signs of the effects of the disclosure of results are the opposite: positive for well-capitalized banks and negative for poorly capitalized bank. This explains why the total effect on the full-sample is negligible: in some way the effects of the two sub-samples in question mutually annihilate themselves.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
HIGH CAPITALIZATION	0.005629691	0.01058639	0.01444564	0.02801559	11
P-VALUE	0.2325	0.05584	0.1206	0.2002	11
LOW CAPITALIZATION	0.006753643	-0.02193131	-0.03600823	-0.01781226	21
P-VALUE	0.3526	0.1101	0.08171	0.3967	21

TABLE 5.17 / CAARS AND P-VALUE CAPITALIZATION IN DISCLOSURE OF RESULTS. AUTHOR'S ELABORATION

Furthermore, the findings have an easy explanation. The market, actually, from the outcome of the exercise rewards the better capitalized firms and punish the worse one.

5.3.4 *Evidence from Stress Test: Disclosure of Results, Profitability.*

Regarding the Profitability sub-samples, Figure 5.27 gives a picture in which appears to be no evidence of discrepancies between the real high ROE banks' returns and the estimates. Thus, no significance of a shock should be found in the empirical analysis.

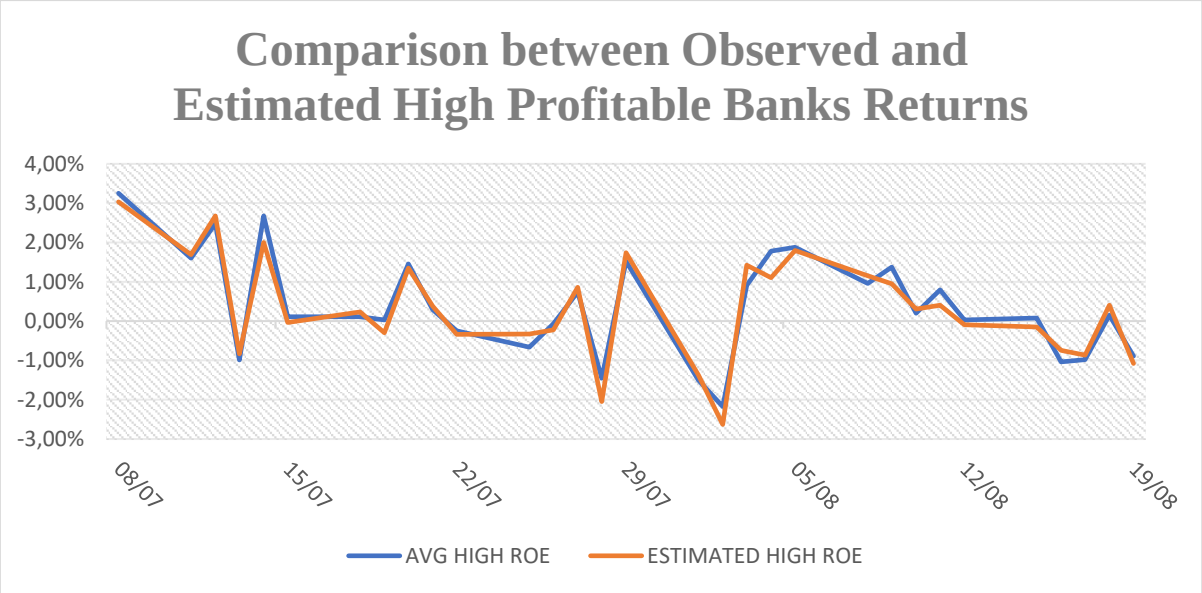

FIGURE 5.27 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, HIGH PROFITABILITY DISCLOSURE OF RESULTS. AUTHOR'S ELABORATION

On the other hand, Figure 5.28 shows how in general the observed low profitable banks performed worse than the expectation.

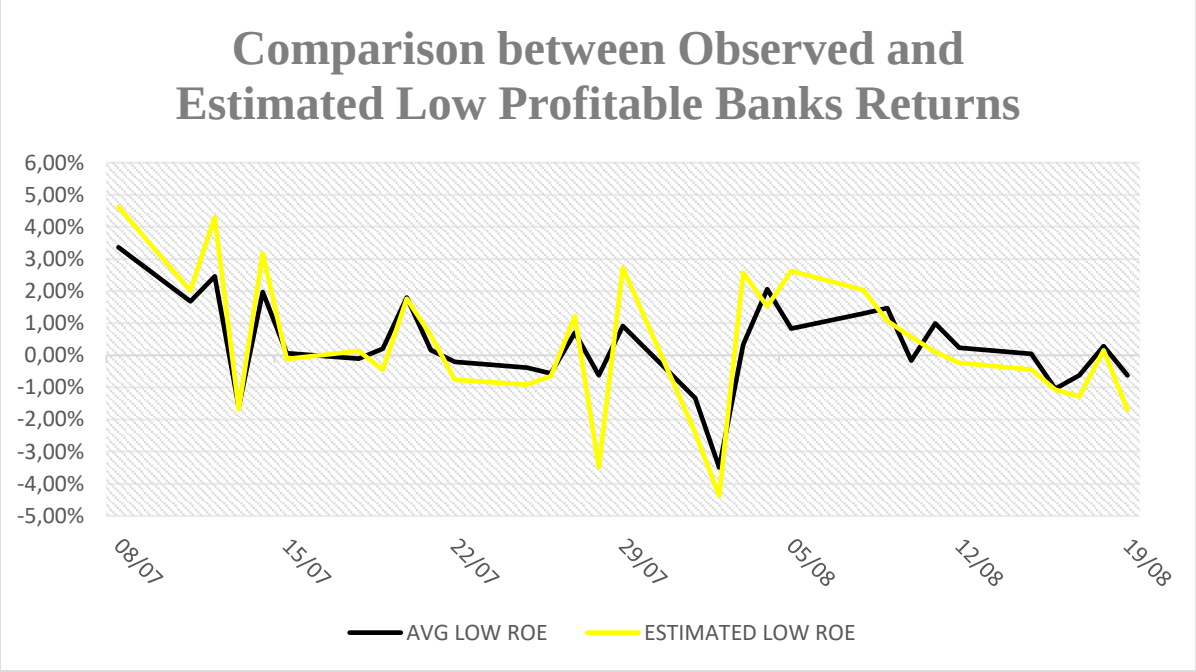

FIGURE 5.28 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, LOW PROFITABILITY DISCLOSURE OF RESULTS. AUTHOR'S ELABORATION

Table 5.18 pictures the outcome of the event study on profitability sub-samples in the disclosure of results event.

The econometric analysis underlines the insight of the graphical one. In particular, there is no evidence of an impact on the higher profitable institutions, whether there is evidence of shocks

for low ROE banks not only in the short-medium term as the capitalization case, but also in the longer-term at least in weak form.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
HIGH PROFITABILITY	0.002374624	0.002158289	0.009672808	0.01950837	20
P-VALUE	0.4622	0.8018	0.3648	0.2799	20
LOW PROFITABILITY	0.01302172	-0.03227275	-0.06589391	-0.03800444	12
P-VALUE	0.2968	0.1128	0.03892	0.1884	12

TABLE 5.18/ CAARS AND P-VALUE PROFITABILITY IN DISCLOSURE OF RESULTS. AUTHOR'S ELABORATION

However, the impact appears to be negative with the strongest impact in the 15-days time window. Thus, the investors give particular attention on how profitable an institution can be once assured by its solidity.

5.3.5 *Evidence from Stress Test: Disclosure of Results, Riskiness.*

Concerning the sub-samples composed by the banks split by riskiness, Figure 5.29 depicts the discrepancies of the observed and estimated high risk sub-sample returns, in which the main insight is that the high risk banks performed worse with respect to their estimates, especially in the days that follows the central event.

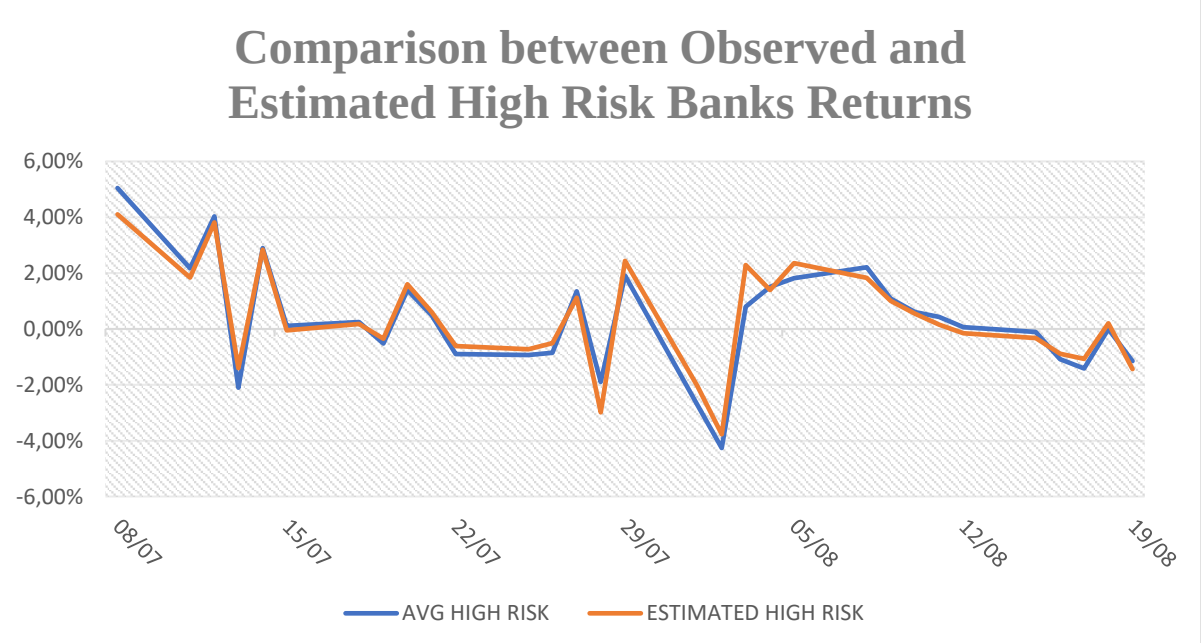

FIGURE 5.29 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, HIGH RISKINESS DISCLOSURE OF RESULTS. AUTHOR'S ELABORATION

With regards to the comparison between observed and estimated low risk returns, pictured in Figure 5.30, the situation is the opposite respect to the high risk case. In fact, the real returns usually stay above the returns estimated in the model.

Thus, the empirical analysis should prove a positive impact on low risk banks and a negative effect on high risk banks.

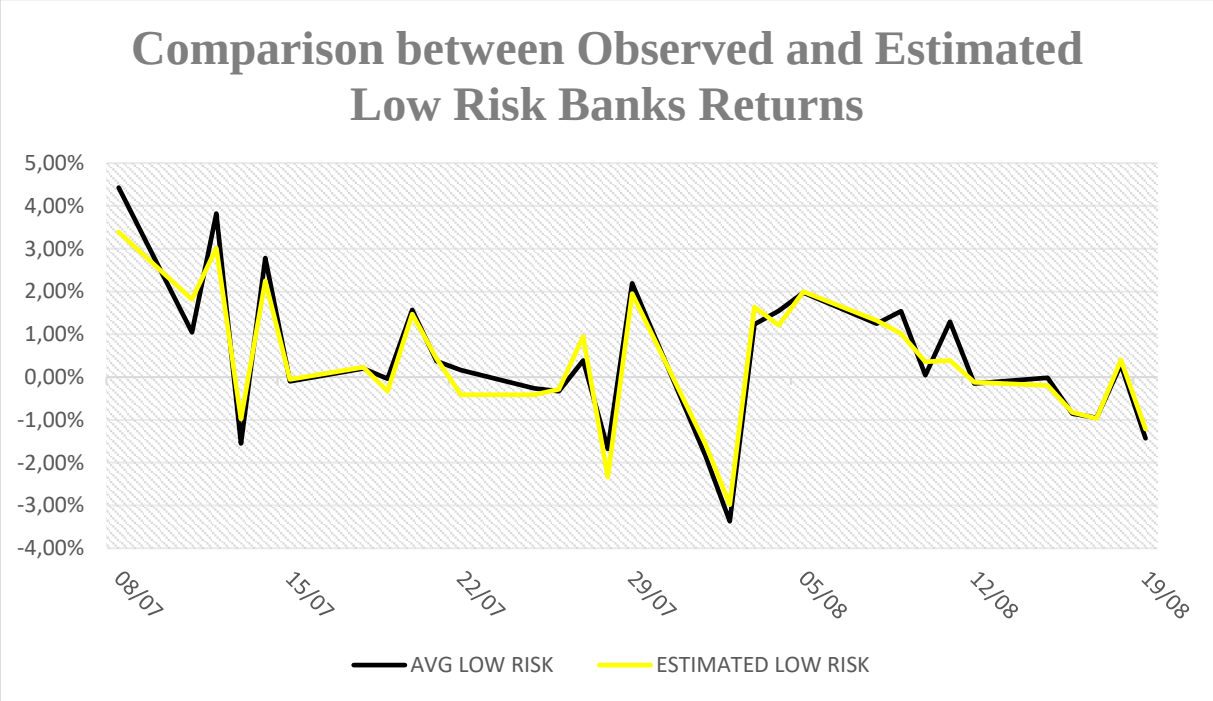

FIGURE 5.30 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, LOW RISKINESS DISCLOSURE OF RESULTS . AUTHOR'S ELABORATION

Table 5.19 presents the results of the empirical analysis regarding the study of the high and low risk sub-samples.

There is a strong empirical evidence of an impact on stocks' market both for high risk and low risk institutions in the short-medium period, and in the very-short period for the low risk sub-sample.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
HIGH RISK	-0.003935357	-0.03452086	-0.03249893	-0.01512626	17
P-VALUE	0.5644	0.02943	0.08886	0.4647	17
LOW RISK	0.008243621	0.01301062	0.01544207	0.01816555	11
P-VALUE	0.06102	0.07384	0.04425	0.4218	11

TABLE 5.19 / CAARS AND P-VALUE RISKINESS IN DISCLOSURE OF RESULTS. AUTHOR'S ELABORATION

Furthermore, the evidence suggests a negative impact on the first sub-sample and a positive one for the second. This proves that the outcome of the test was anticipated by the CDS, since the worse performing institutions in CDS market performed worse in terms of stock's performance in the closest day to the event in question.

5.3.6 *Evidence from Stress Test: Disclosure of Results, Test Performance.*

Finally, the last sub-sample tested in the analysis of this dissertation is the one formed by the better-performers and the worse-performers in terms of fall of CET 1 ratio respect to the starting point of the 2016 stress test.

From the graphical representation of the real and estimated returns of the better results sub-sample, in Figure 5.31, it is clear that the times series of the observed performance follows faithfully the predicted one.
Thus, the outcome of the econometric analysis should give no evidence of shocks.

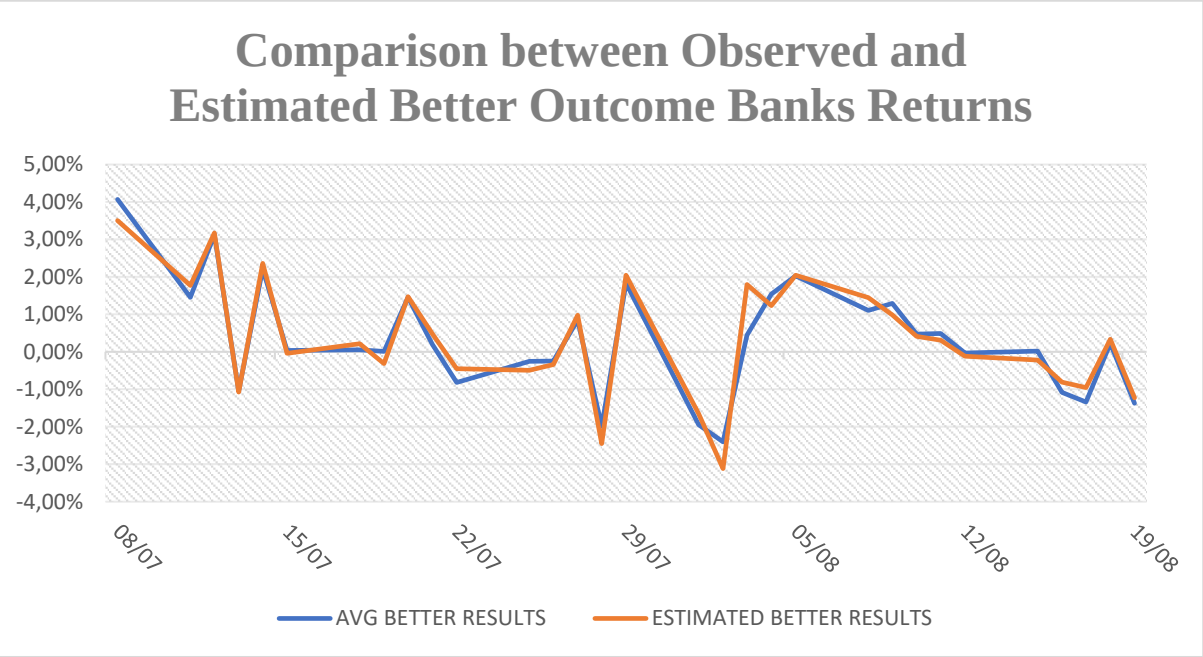

FIGURE 5.31 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, BETTER PERFORMANCE DISCLOSURE OF RESULTS. AUTHOR'S ELABORATION

Regarding the graph of the worse results returns, pictured in Figure 5.32, the insight is that the bad banks performed poorly before the event day, but in the closest days they excess the expectations, only to worsen again in the medium term.

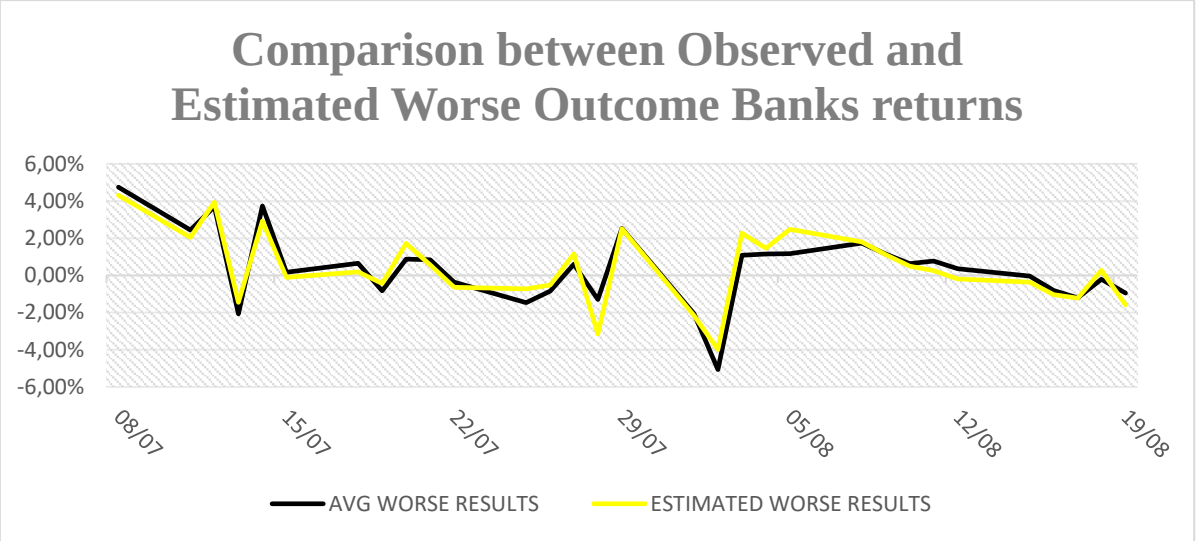

FIGURE 5.32 / COMPARISON BETWEEN AVERAGE OBSERVED AND ESTIMATED RETURNS, WORSE PERFORMANCE DISCLOSURE OF RESULTS. AUTHOR'S ELABORATION

Table 5.20 gives the numerical outcome of the empirical analysis.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
BETTER RESULTS	-0.0007519675	-0.007598342	-0.00836906	-0.007801698	19
P-VALUE	0.8496	0.5571	0.6329	0.6815	19
WORSE RESULTS	0.01677234	-0.01536452	-0.0337122	0.00633433	13
P-VALUE	0.1206	0.2647	0.1672	0.8214	13

TABLE 5.20 / CAARS AND P-VALUE PERFORMANCE IN DISCLOSURE OF RESULTS. AUTHOR'S ELABORATION

The tab above explain that there is no prove of a shock on the better performed banks during the stress test disclosure of the outcome in any of the time windows.
On the opposite, there is weak evidence of a positive impact on the very-short term and negative on the medium term, in the analysis of the poorly performers institutions.

5.3.7 *Evidence from Stress Test: Disclosure of Results, Conclusion.*

At last, this section illustrates a general overview of all the analysis carried on about the 2016 EU-wide Disclosure of results event.
Table 5.21 shows the p-Values of all the sub-samples that compose the empirical research. In the table appears that the impact due to the event is concentrated in the short and medium term with some exceptions. Thus, even if the analysis of the full-sample has a negative response in terms of statistical significance, in general there is evidence of a shock due to the event.
Furthermore, comparing these results with the outcome of the already investigated events, the difference appears to be in the timing of the shock: long term for the announcement case, very short term for the disclosure of methodology and scenarios and medium term in the publication of the results of the test.

The possible explanation for this phenomenon is that in the first case analysts need time to make their evaluation with which they base their trading strategy. Once the banks subject to stress test are already disclosed, it is relatively easier for investors act on the basis of the disclosure of the baseline and adverse scenario, and this explain why the impact of the second event analysed acts in the shortest period. At last, the absence of a clear pass/fail threshold in the disclosure of the outcome makes market's participants need their own evaluation of the results, and this lead to register an effect on the stock's market in a medium time window.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
FULL SAMPLE	0.3563	0.2041	0.2605	0.929	34
BIG DIMENSION	0.8374	0.4337	0.2621	0.6754	13
SMALL DIMENSION	0.1171	0.4086	0.3645	0.9579	19
HIGH CAPITALIZATION	0.2325	0.05584	0.1206	0.2002	11
LOW CAPITALIZATION	0.3526	0.1101	0.08171	0.3967	21
HIGH PROFITABILITY	0.4622	0.8018	0.3648	0.2799	20
LOW PROFITABILITY	0.2968	0.1128	0.03892	0.1884	12
HIGH RISK	0.5644	0.02943	0.08886	0.4647	17
LOW RISK	0.06102	0.07384	0.04425	0.4218	11
BETTER RESULTS	0.8496	0.5571	0.6329	0.6815	19
WORSE RESULTS	0.1206	0.2647	0.1672	0.8214	13

TABLE 5.21 / P-VALUES ALL SAMPLES IN DISCLOSURE OF RESULTS EVENT. AUTHOR'S ELABORATION

Concerning the estimation of the magnitude of the effect in question, Table 5.22 provides the Cumulative Average Abnormal Returns of all the samples analysed in this section with the statistically significative value underlined in blue.

From the table, it is clear that the high level sub-samples performed better than the low level ones, and there is a sort of annihilation effect on the sub-samples of the same categories that lead to a null significance on the full-sample case.

Moreover, the strongest positive effect has been registered on the low risk sub-sample in the medium term, while the most negative impact is given by the low profitability sub-sample in the same time window.

The main difference with the previous case is in the sign of the effect, negative for the majority in the first two event examined, negative in the latter. Thus, this could be a sign of financial market's trustworthy restoration, that is indeed the main goal of the 2016 EU-wide Stress Test.

SAMPLE/EVENT WINDOW	3 TRADING DAYS	7 TRADING DAYS	15 TRADING DAYS	31 TRADING DAYS	NUMBER OF BANKS
FULL SAMPLE	0.004705148	-0.01189685	-0.01511588	-0.00131751	34
BIG DIMENSION	-0.001212475	-0.0146089	-0.01688043	-0.006948686	13
SMALL DIMENSION	0.01155344	-0.008115347	-0.01988553	0.001286682	19
HIGH CAPITALIZATION	0.005629691	0.01058639	0.01444564	0.02801559	11
LOW CAPITALIZATION	0.006753643	-0.02193131	-0.03600823	-0.01781226	21
HIGH PROFITABILITY	0.002374624	0.002158289	0.009672808	0.01950837	20
LOW PROFITABILITY	0.01302172	-0.03227275	-0.06589391	-0.03800444	12
HIGH RISK	-0.003935357	-0.03452086	-0.03249893	-0.01512626	17
LOW RISK	0.008243621	0.01301062	0.01544207	0.01816555	11
BETTER RESULTS	-0.0007519675	-0.007598342	-0.00836906	-0.007801698	19
WORSE RESULTS	0.01677234	-0.01536452	-0.0337122	0.00633433	13

TABLE 5.22 / CAARS ALL SAMPLES IN DISCLOSURE OF RESULTS EVENT. AUTHOR'S ELABORATION

Final Remarks

In this dissertation, the impact on banking stock's market of the 2016 EU-Wide Stress Test has been examined. In particular, the focus of this work was to investigate if different types of banks in corporate point of view reacts in different ways to the exercise. Notice that previous literature focused on a macroeconomic point of view, since the main aim of older works was to investigate whether there was an impact on stocks and if the magnitude of this effect was different among different countries.

As already explained before, in this work we investigated the effect of the stress test in three different key periods: the announcement, the disclosure of methodology and scenarios and the publication of results. Four time windows have been taken into consideration in order to examine the impact on banks' stock market. Also, the full sample of banks was split into several sub-categories to better understand whether the test had a different impact on different types of institutions.

Table 6.1 summarizes the findings of the econometric examination.

The first category investigated in this work was the one concerning the dimension of banks, in which the full sample was split into two sub-samples: Big Banks and Small Banks. The results of the econometric analysis suggest that there was indeed a shock for the smaller banks in the sample in all three periods, whether the stress test had an impact on bigger banks only in the scenarios disclosure. Furthermore, the examination indicates that the shocks were negative in the first two periods for small banks, positive in the last one and took place only in the short time window, whether the only statistically significative shock found for big institutions in concentrated in the long term and took place in the scenario disclosure.

The possible explanation for the findings in the first period is that, since the test is made to ascertain the solidity of the whole EU banking sector and therefore big banks will for sure participate to the exercise, financial investors preliminary assume the inclusion of the latter within the sample. On the other side, there is more uncertainty in which small banks will be subject to examination by EBA, thus the disclosure of the list of participating banks add this new information to the market that prices the information in a negative way for the so-called "Dilution Effect" already found in previous analysis by for example Petrella and Resti (2014).

In the second period, instead, investors already know the institutions subject to the test, and they made their estimates of the possible outcome of the test before the publication of the official scenarios with which the test will be carried out. Once baseline and adverse scenario were published, investors take their position immediately and this explain why the effect of the

test is more short-time oriented than the first period for small banks. The bigger banks, instead, requires a deeper analysis and this difference respect to the sub-sample is well high lined by the fact that the shock took a longer time to take place. Furthermore, the shock observed in big banks was the only positive one in the entire examination of the second period, indicating that investors positively reacted to the scenario disclosure for big banks.
The small banks register a positive impact during the very-short term time window of the publication of results period, whether the bigger banks do not achieve the same outcome. This could be due to the fact that a stress test with such positive results, such as the 2016 EU-Wide Stress Test assured the investors of the solidity of smaller institutions, whether analysts already dispose enough information about solidity of bigger banking groups.

The second type of banks analysed in this dissertation are the more and less capitalized institutions. In the announcement event, the empirical analysis shows no evidence of an impact on low capitalized banking groups, whether there is a statistically significative evidence of a negative shock for high capitalized banks. This result could appear to not have an economic meaning but notice that ten out of twelve banks that belong to the High Capitalization sample are part of Small Banks sample, thus this indicates that investors are more prone to take into consideration the dimension of a bank rather than the capitalization ratio when a stress test is announced.
In the scenario disclosure event, instead, low capitalized banks had a negative shock in the short and very short term. The explanation for the timing is already well described for the previous category of banks. This result is more predictable than the previous one from an economic point of view: once investors know which banks are subject to the exercise, they penalize institutions that have lower probability of success in the test, that are indeed the less capitalized.
Finally, in the last event investigated, there are empirical evidence on the fact that more capitalized institution performed better than lower capitalized one. This is a straightforward result, since once the outcome of the test is published than investors reward more solid banks. Moreover, notice that eight out of eleven well-capitalized banks are also in the Better Performance sample, showing that a good capitalization is a sign of high probability to pass the test.

The next category of banking institutions examined is the profitability one, that is divided into two sub-samples: High Profitability and Low Profitability.
In the first event analysed, the announcement, there is evidence of a shock in the long term for High ROE banks and in the medium term for Low ROE groups. The sign of this impact are

opposite. In particular, it appears to exist a positive shock for low profitability firms and a negative one for high profitability institutions. A possible explanation for this phenomenon is that investors expect that high ROE firms hold too risky positions and they penalize them in the market.

The results of the disclosure of scenarios event shows evidence of a negative shock for low ROE institutions whether high profitable firms remain substantially untouched. This effect is verified in the short term, in accordance with the findings of the other categories. The explanation is similar to the one already expressed above, investors judge the high profitable firms to be too risky and gives a higher probability to underperform the exercise. However, the evidence says that this effect is more mitigated with respect to the first event case.

In the last event, that is the publication of results, there is no evidence of a shock for the high ROE banks but a negative impact on the lower profitable ones. Investors, once assured by the resiliency of the single banks, base their investment decision on which bank is less profitable and penalize the worse performing from this point of view.

The fourth category of bank analysed is the one which the full sample was split by Riskiness on the basis of the CDS performance of each bank. In particular, this is the last category common for the three events since the next one, Test Performance, can be analysed only for the publication of results event.

In announcement event there is evidence of a shock in both sub-samples in the long-run and a shock in the shortest time window for the High Risk institutions. As predictable, even if the impact is negative in both cases, the shock is more severe for the high risk banks.

In the second period analysed, only the riskier institutions were subject to a negative shock, whether there is no significance of an effect for less riskier ones. Thus, investors prefer to wait the response of the test for low risk banks, whether they immediately prices negatively the riskier when the EBA announces the scenarios with which the test will be conducted.

Finally, in the period referring to the publication of results, the empirical analysis of this work showed positive and statistical significative abnormal returns for Low Risk banks and a negative impact on High Risk banks. The meaning of this outcome is that the market reward less riskier banks and punish higher risk institutions.

The fifth and last banking category investigated in this dissertation is the one concerning the outcome of the 2016 EU-Wide Stress Test. For obvious reasons, this examination has been made only in the publication of the results event.

The econometric analysis showed that there is no evidence on an effect on stock's market prices of Better Performance banks, but the shock has taken place only for Worse Performance banks, showing that investors once the results are published do not reward good banks, but they penalize the bad ones.

At the end, here is a general overview of the main results of the work. During the announcement event, the main important information that has been added in the market is the presence of smaller banks. In fact, the reaction of the sub-sample composed by these institutions is stronger with respect to the other sample in the same period. Furthermore, the impact is negative, and it took place in the long term, showing that investors need time to properly process this new information.

Instead, when the baseline and the adverse scenario are disclosed the investors can process the information in a smaller quantitative of time, and this is proved by the fact that the shocks registered in the analysis is concentrated in the short and very-short term. In addition, the general effect of the test on the stock's market is weaker than the previous period, testified by the fact that the cumulative average abnormal returns are lower in absolute terms than the previous case but still negative. Moreover, the most affected type of banks are the smallest, but there is strong evidence of a negative impact also for low capitalized institutions.

Finally, in the last period investors reward high level banks in terms of capitalization, low risk banks and penalizes the one that performed bad in the test, the riskier ones and the institutions poorly profitable. In particular the latter category registered the highest shock in absolute term, showing that despite investors do not reward high profitable banks, once assured by the solidity of the EU banking system, investors prices negatively the poorly performed banks.

Sample	Announcement	Scenario Disclosure	Publication of Results
Full-Sample	Little evidence of schock in short term, strong evidence in long-term. Both negative.	Evidence of shock in short period. Negative impact, stronger than Ann. Case.	No evidence of shock.
Big Banks	No evidence of shock.	Evidence of shock in long-period. Positive impact.	No evidence of shock.
Small Banks	Little evidence of schock in 7-days window, strong evidence in long-term. Both negative.	Evidence of shock in short-term. Negative impact	Weak evidence of shock. Positive impact.
High Cap	Negative evidence of shock in long-term	No evidence of shock.	Evidence of shock in short-medium term. Positive impact.
Low Cap	No evidence of shock.	Evidence of shock in short-term. Negative impact	Evidence of shock in short-medium term. Negative impact.
High ROE	Evidence of shock in long-term. Negative impact.	Evidence of shock in short-term. Negative impact	No evidence of shock.
Low ROE	Weak evidence of shock in medium term. Positive impact.	No evidence of shock.	Evidence of shock in short-medium term, weak evidence in long-term. Negative impact.
High Risk	Weak evidence of shock in very-short and long term. Both negative with stronger effect on long period.	Weak evidence of shock in short-term. Negative impact.	Evidence of shock in short-medium term. Negative impact.
Low Risk	Weak evidence of shock in long-term. Negative impact	No evidence of shock.	Evidence of shock in short-medium term. Positive impact.
Better Outcome	No results.	No results.	No evidence of shock.
Worse Outcome	No results.	No results.	Weak evidence of shock in very-short and medium term. Positive impact in very-short period, negative in longest period.

TABLE 6.1 / SUMMARY OF THE RESULTS OF THE EMPIRICAL ANALYSIS. AUTHOR'S ELABORATION

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