

Louvain School of Management

**Do Stress Tests still have a
significant effect on the market?
Evidence from the 2018, 2019 and
2021 stress test**

Author(s): Camila Moya
Supervisor(s): Professor Bertrand Candelon
Academic year 2022-2023.
Dissertation for the master of 120 in Management
Master subject and focus on Professional with specialization in
International Finance
Daytime schedule/Staggered schedule August 5th 2023

Table of contents

INTRODUCTION.....	3
LITERATURE REVIEW	5
UNITED STATES AND EUROPEAN STRESS TESTS DESIGN	11
UNITED STATES STRESS TESTS	11
EUROPEAN STRESS TESTS	13
EUROPEAN STRESS TEST VS US STRESS TEST.....	14
METHODOLOGY	16
DATA	16
EMPIRICAL METHOD.....	17
<i>Event study methodology</i>	17
RESULTS	20
U.S. STRESS TESTS RESULTS	20
<i>The impact of the announcement of the stress tests</i>	20
<i>The impact of the publication of the stress test results</i>	20
EU STRESS TESTS RESULTS	21
<i>The impact of the announcement of the stress tests</i>	21
<i>The impact of the publication of the stress test results</i>	21
INTERPRETATION OF RESULTS	24
<i>The market impact of stress test announcements</i>	24
<i>Differences in stress test governance</i>	28
CONCLUSION	34
REFERENCE.....	36
APPENDIX.....	40

Introduction

Public authorities and policymakers from high- and medium-income economies around the world have been pursuing financial stability since 1990 (Čihák, 2006). According to Allen and Wood (2006), financial stability is defined as state of affairs where episodes of instability are unlikely to occur. This broad definition of the authors allows to take a large bunch of sectors into account when asserting financial stability since not only financial institutions collapse can lead to economic damage. Regulatory interventions during financial turmoil are therefore provide not only to the banking sector but also to non-financial companies. Nevertheless, in this paper we only focus on the analysis of banking sector financial stability through stress testing.

To oversee global financial crises and assess the main vulnerabilities (Čihák, 2007), public authorities employ a risk management tool called stress tests. These stress tests can either focus on more macro or micro perspectives. In the micro view – as considered by the Committee on the Global Financial System (2005) –, the main objective is to assess banks' exposure to risk factors during stressful periods (Čihák, 2007). By obtaining this information, financial institutions gain insights into the fluctuation of capital requirements under alternative market conditions. Additionally, the tool assists banks in determining the additional capital they may need to incorporate in the event of extreme and plausible market conditions (Quagliariello, 2009). In the macro view – as considered by the IMF –, the stress tests have the primary goal of "identifying structural vulnerabilities in the financial system and assessing its resilience to shocks" (Quagliariello, 2009, p.21). Therefore, this tool aids both the financial market and banking authorities in identifying potential risks and their interconnections among economic sectors during times of financial instability.

This paper is inspired by three main studies: Candelon and Sy (2015), Ahnert, Vogt, Vonhoff, and Weigert (2018), and Georgescu, Gross, Kapp, and Kok (2017). It focuses on the impact of the stress test exercise of financial markets in two geographical zones, namely the European Union and the United States. The paper tests two important hypotheses. The first one is inspired by the work of Georgescu, Gross, Kapp, and Kok (2017), aiming to determine whether the stress test tool reveals new information about the banks being tested and consequently impacts their stock prices. The second hypothesis examines the impact of the publication of the stress test results on the existence or not of price discrimination based on the stress test governance (Candelon and Sy, 2015). Therefore, the literature review of this paper is divided in two parts. A first part where we review papers that analyze the influence of stress test events on the stock

prices of financial institutions. And a second part where we overview the literature that focuses on studies that analyzed the governance of stress tests and their impact on the market.

In order to test our hypotheses, this paper employs an event study methodology developed by MacKinlay (1997). The reason behind this choice is to compare the abnormal returns during the studied events (announcement date and results date) with the normal returns of banks to understand if there is a price discrimination between tested banks and non-tested banks. Our empirical strategy relies on daily equity prices. Our paper contributes to the stress testing in the European and US context by investigating market reactions before and after the disclosure of the EU-wide stress test results in 2016, 2018, and 2021, as well as the CCAR US exercises from 2018 to 2020.

The results found in this paper reveal that stress tests can influence stock prices of market participants, but that it is not the case for every stress test exercise. For instance, the publications of US stress tests result significantly and positively impacted the market value of stressed and non-stressed banks. In contrast, two out of three EU stress test studied in our paper had no significant impact on the stressed group in the results event. Furthermore, we find that for the US exercises two out of three stress tests showed a prices discrimination between stressed and non-stressed banks. Concerning the EU stress test, only the stress test of 2021 shows a prices discrimination – as it is the only one significant. These results suggest that, in total, only one exercise among the six studied (EU and US together) shows non-discrimination in prices between stressed banks and non-stressed ones. Indeed, the 2019 US stress test suggest a similar impact on stressed and non-stressed banks, with a cumulative abnormal return (CAR) of +2.3% for the stressed group and of +2.4% for the non-stressed group.

Linking our finding to the literature, the impact of the results publication on stressed banks during the US 2018 and EU 2016 and 2018 exercises correspond to what is obtained by Ahnert, Vogt, Vonhoff, and Weigert (2018).

Additionally, because our study is inspired by Candelon and Sy (2015) work, we also looked at the stress test governance. We therefore rely on Candelon and Sy (2015) for the second part of our analysis and try to determine whether the impact of the stress tests on the market can be explained by the stress test governance. Our observations suggests that the US stress test possess an institutional framework much more favorable than the EU stress test. The US regulatory framework do not suffer from critics like the EU 2018 stress test had about possible

manipulation of the scenarios (Magnus, Deslandes, and Dias, 2019). Indeed, the EU 2018 stress test was criticized of lack of credibility by the market, because of the issues arising from the bottom-up approach (Haselmann, and Wahrenburg, 2018). This regulatory framework leaves room for countries to manipulate the scenarios. The second aspect of the governance that we analyze is the communication. During the 2019 CCAR stress test, the Federal Reserve increases the level of information regarding the models they used in their scenarios (Feldberg, and Metrick, 2021), which had a positive effect since we do not observe price discrimination for this exercise. In contrast, the EU stress test had some issues regarding communication, since they did not disclose the actions that regulators would take in case of an unsuccessful exercises (Magnus, et al., 2019). Nevertheless, for the 2021 EU stress test, the EBA tried to disclose as much information as possible in order to mitigate the impact of the COVID-19 crisis (European Banking Authority, 2021a)¹. We suggest this was the main reason to observe a significant impact on stock prices for that exercise. Concerning the information gather, we agree with Candelon and Sy (2015) that having a strong institutional framework providing a high coordination of policies, clear communication to the market and credible financial backstop are essential to successfully achieve the stress test.

The corresponding structure of this paper is as follows: next is subsection 1.1, which describes the literature review, followed by section 2 on the designs of the stress tests in the US and Europe. Section 3 clarifies the data and presents the empirical strategy, section 4 presents the results, and finally, section 5 concludes.

Literature review

According to the literature, stress testing has the main purpose of assessing the financial resilience of the financial system and its institutions, as well as analyzing possible contagion effects resulting from the spillover of shocks (Čihák, 2004). Additionally, it helps to understand how key economic variables respond to these shocks.

This section reviews recent and important studies on stress testing and is divided in two parts. In the first part, we examine literature that studies the impact of stress tests on the financial market, while in the second part, we explore papers that emphasize the importance of stress test governance in determining market participants' behavior. Furthermore, we focus mostly on literature that studies stress tests on the US and EU markets, which are generally the most frequently analyzed.

¹ See more on <https://www.eba.europa.eu/coronavirus>

Many studies (Peristian, Morgan, and Savino (2010), Pella & Resti (2012), Durrani, Ongena, and Ponte Marques (2022), among others) have demonstrated that stress tests disclose information to market participants. Events such as the announcement dates of the exercise or the release of results can affect stock prices differently during each stress test process.

Among the literature on stress tests, papers focus the outcomes observed **before** and **after** the release of the stress tests results. The following studies look at outcomes before the results.

For instance, Petrella & Resti (2012) examine the EU 2011 stress test and test three hypotheses based on four events². Regarding the pre-results dates, the authors aim to determine if increased opaqueness of banks' information leads to financial stability and higher stock prices for tested banks. This is because market participants can anticipate the stress test results through the test's transparency³. Unfortunately, according to the evidence provided by Petrella and Resti (2012), the financial market is unable to anticipate stress test results. This suggests a lack of transparency from banks in their operations and disclosures during the announcement timeframe. However, when the methodology event occurs in Petrella and Resti's (2012) study, the authors support the hypothesis of the dilution effect⁴. This effect may trigger issuance of rights for under-capitalized banks, meaning they would need to sell shares to increase their capital. The panic behavior of investors in response to this effect could potentially lead to a decline in stock prices. Indeed, Petrella and Resti's (2012) findings illustrate that market participants expect greater scrutiny of stressed banks compared to non-stressed banks. Tested banks are observed regarding their financial health, risk management, and capital sufficiency (Petrella, et al., 2012). This effect opens the possibility that tested banks may need to issue additional equity, such as injecting capital through the sale of shares. Consequently, this effect could depress stock prices and have a negative impact on the market (Petrella, et al., 2012).

Other studies such as Peristian, Morgan, and Savino (2010), Sahin, de Haan, and Neretina (2020), or Durrani, Ongena, and Ponte Marques (2022) also find that market had some information about tested banks prior to the disclosure of results, but this time for other types of events. For example, Durrani et al. (2022) show that during the announcement of the key features of the stress test, there was an effect on the stock prices of the tested banks. Similarly, in Peristian et al. (2010), the clarification event - which included events such as the release of

² Pres results dates that includes: the announcement, detailed announcement, methodology, and capital definition dates

³ Transparency effect

⁴ Potential dilution of shareholders' participation or reduction in share value if negative results are revealed by the stress test

the capital assistance plan and Federal Reserve Chairman Bernanke's announcement that stress-tested banks would not be nationalized⁵ - had the most impact on the abnormal stock returns of the tested banks. Sahin et al. (2020) also found similar results regarding the clarification event as observed in Peristian et al. (2010). Indeed, in Sahin (2020) the authors observed that in the financial crisis of 2008, the stress test of 2009 in the U.S. had a minor impact on the banks' equity returns. And Sahin et al. (2020) suggest that this effect comes from the information of the clarification event in 2009⁶. For instance, Sahin et al. (2020) observed that the value of information provided by the stress test depends on the financial environment of the period studied. This is reasonable because in times of crisis such as the 2008 financial crisis, which are untrusted environments, participants appreciate and demand credible information (Sahin et al., 2020).

But what happened once the stress test results were published? Studies that analyze EU and US markets, such as Petrella and Resti (2012), Georgescu, Gross, Kapp, and Kok (2017), Guerrieri and Modugno (2021), and Durrani, Ongena, and Ponte Marques (2022), suggest that the results of the stress test exercises provide new information to the market, especially in times of financial turmoil (Fernandes, Igan, & Pinheiro, 2015). In Petrella and Resti (2012), the new information that the exercise provides is about different risk dimensions of the tested banks for the market. For example, the market reacts positively to risk factors such as higher capital adequacy in 2010 or lower risk weights used to compute the Risk Weighted Asset for the tested bank. This means that market participants consider these factors, among others⁷, as favorable indicators of the bank's financial health, resilience, and risk management abilities.

In Guerrieri and Modugno (2021), they study the US stress test results before and after any regulatory measures. Their results indicate that tested banks with no regulatory measures yet but with a large portion of capital to cover unexpected losses or adverse economic conditions experience a decrease in their CDS (Credit Default Swaps) and an increase in their stock price. This means that market participants believe these banks have a lower probability of default. Nevertheless, once US regulations are applied to stop dividend increases or share buybacks, the stock price decreases but there is no significant response in terms of CDS spreads. These

⁵ See more on Peristian et al., 2010

⁶ Sahin et al., 2020, follow the Morgan et al., 2014 definition of the clarification event as "Bernanke's testimony on 24 March 2009 and the release of further details about the stress test on 23 and 25 March 2009. They disentangle the effects of the events by considering how equity and bondholders are affected. They reason that the former event mattered for both market participants, but the release of the Capital Assistance Plan details mattered only for equity holders"

⁷ Capital adequacy, risk weights, credit losses, geographical exposure, trading income, funding costs, and coverage of defaulted exposures, p. 5414

findings by Guerrieri and Modugno (2021) suggest that the stress test provides information about the banks' resilience even if market participants do not take into account a direct supervisory action.

Durrani et al. (2022), Georgescu et al. (2017), and Petrella and Resti (2012) find that the stress test provides new information about the robustness of banks (both good and bad) that market participants then use to make financial decisions. Indeed, the results of Durrani et al. (2022) support the hypothesis that EU-wide stress tests have a certification role⁸ and contribute to price discrimination between a "good" bank and a "bad" one. Indeed, they find that following the release of the stress test results, underperforming banks experience a reduction of their average stock return and an increase of their variance stock returns. These results show that financial investors believe less in the performance of these "bad" banks and consider them riskier, so this behavior is reflected in the volatility of the stock price.

Georgescu et al. (2017) is not far from the findings of Durrani et al. (2022) because they found that once the result event occurs, the stock prices are affected, and their values are related to the performance of the tested banks. Following the same idea, Petrella and Resti (2012) show that the stress test is effective in providing information to investors that demonstrates the resilience of the banks in case of a downturn, despite possible limitations such as data quality issues⁹. Additionally, the results of Petrella and Resti (2012) support the "zoom hypothesis" – which is defined by Petrella and Resti (2012) as the fact that “the market reaction to stress test results is driven by new information concerning historical financial data” – indicating that investors take stress test information into account when making decisions. Finally, Peristian et al. (2010) show that market participants react to the size of the capital shortfall of tested banks. The authors' results show that banks experiencing a large capital gap have negative effects on their stock prices. Still, Sahin et al. (2020) explain that non-gap banks¹⁰ can also be affected by a negative reaction in the stock price by the market.

Following the review of studies that analyze the market reaction to the stress test process, the second part of this section focuses on the governance of the stress test and the potential effect that the governance can have on the market's evaluation on banks.

⁸ Market participants use stress test information to validate the performance of different banks

⁹ Confirming the "stress hypothesis" of Petrella and Resti, 2012

¹⁰ Banks without a capital shortfall or disapproval of capital distribution plans

The subsequent literature study the *governance*¹¹ of the stress test and its impact on economic factors of tested banks. Candelon et al. (2015) use their event study results of macroprudential US and EU-wide stress tests from 2009 to 2013 to evaluate the way the stress tests are conducted and managed during those periods. Our paper will use the same definition of *governance* as Candelon et al. (2015), which refers to the framework for conducting stress tests, the entities included in the stress test, the way stress tests are calculated and reported, and the actions taken by the authorities based on the results of the stress test. Additionally, *governance* considers the actions taken by the banks before and during the exercise. For example, as shown by the literature, banks can increase their capital positions to improve their assets and financial structure before the stress test. Lastly, Candelon et al. (2015) study draws an important conclusion regarding the governance of stress tests. The authors find that the governance of the stress test holds more weight in restoring market confidence than technical specifications of the stress test, such as the minimum capital adequacy threshold or the level of data disclosed by banks. In our paper, we will try to review if these hold true for recent stress tests (from 2018 to 2021) in both geographical zones.

Regarding the design of the stress test, the results of Sahin et al. (2020) align with Quarles (2018) in suggesting that certain aspects of the stress test in the US should be reviewed and improved. For instance, the authors agree that the stress test can be more efficient if banks are more transparent, but up to a certain level. This perception stems from the observed market reactions in the stock price and credit default swap (CDS) with the Supervisory Capital Assessment Program (SCAP). They believe that this reaction is due to the Federal Reserve's trust in the banks' own estimates, which has contributed to a credible stress test.

On the other hand, the EU-wide stress test follows a "solid quality assurance process" (Durrani et al., 2022), which encompasses three main stages: the design of the stress test, the realization of models and methodologies, and the execution of the stress test. Another crucial consideration is that this process helps enhance the EU stress test, ensuring that the banks' own projections and estimations are reviewed by the top-down model¹² provided by the European Central Bank (ECB).

In Lazzaria, Venab, and Venegoni (2017) observe the market's reaction to the information provided by the European Central Bank's 2014 Comprehensive Assessment. What they found is that this assessment didn't help distinguish between "good" and "bad" banks. Nevertheless,

¹¹ Candelon et al., 2015 define *governance* as the process to put in place the stress test

¹² This model is developed at the sub-section "Differences in stress test governance"

the market considers the information provided by this assessment to better understand the approach of supervisory policies. This is because, the authorities' policies themselves can have repercussions on the banks' costs, risks, and regulatory requirements. Hirtle and Lehnert (2014) highlight the importance of stress test design through their analysis of the US stress test. They examine whether market participants' own estimates or supervisory estimates are used. The choice of estimates influences the outcome of the scenario. Market participants' own estimates are based on their individual risk, whereas supervisory estimates consider the system as a whole (Hirtle and Lehnert, 2014). They show that the choice of estimates influences the outcome of the scenario. Additionally, the literature finds that the level of disclosure is important in designing stress test scenarios. Based on the findings of Petrella and Resti (2012) and Peristian et al. (2010), stress tests have been shown to contribute to reducing banks' opacity. Being transparent, credible, and providing market participants with valuable insights about the bank's risk management processes is important for enhancing market confidence in the banking system (Hirtle and Lehnert, 2014). In fact, Peristian et al. (2010) findings suggest that stress tests may have helped reduce financial panics since the tests provided information about tested banks that market participants used to reevaluate banks' value.

And as information as shown to influence market confidence, Goldstein and Leitner (2018) try to determine the optimal level of disclosed information in stress tests. The authors studied two different environments to determine an optimum disclosure rule. The first environment is when regulators have information that banks do not have. In this circumstance, banks with capital above the critical level (good times) can benefit from risk-sharing opportunities without any disclosure from the regulator¹³. However, in the same circumstance where the bank's capital is below the critical level, disclosing relevant information seems to be optimal. In this environment, the authors suggest separating two categories of banks (good score and bad score) to avoid losing risk-sharing arrangements. Unfortunately, the disclosure rule is not straightforward because Goldstein and Leitner (2018) observed that providing higher scores can have both benefits and costs. If a bank is below the capital threshold (weak bank) and receives a high score, it can lead to a reduction in the average capital level of the weak group, making it harder for the weaker group to achieve a high score. For the second environment where regulators and banks have the same information but no market participants, an optimal disclosure rule is to have multiple groups. This is because banks that are not too far from the right threshold may suffer from possible exclusion from risk-sharing arrangements.

¹³ Goldstein and Leitner, 2018 provide an example of risk-sharing opportunities: if a bank experiences an unexpected liquidity shortfall, it can make arrangements with other banks or markets to cover itself from that shock

Finally, Pereira (2021) observed that when regulators have a certain level of credibility, manipulating information by disclosing general data can help avoid financial turmoil. However, if the institutions have little credibility and want to regain trust, it will be necessary to disclose even banks' specific reports. Pereira's findings help our paper understand the EU stress test results because in states with low debt, the proportions of "good banks" are high, but in states with high debt (which is the case for most of the EU states), the proportion of "good" banks is underestimated. Pereira (2021) also suggests that in order to make investors believe in the trustworthiness of the test, some banks need to fail, and sometimes strong banks are targeted.

Last but not least, our paper aims to see if the governance of the stress test has influenced the financial market. There are some literatures such as Cappelletti, Melo, Ponte, and Silva (2019) and Cornett, Minnick, Schorno, and Tehranian (2020) that have observed how the stress test framework can impact banks' behavior and, for instance, how market participants perceive information. Indeed, Cappelletti et al. (2019) found that before the stress test occurs, banks tend to increase their capital ratios by decreasing their credit supply to certain clients. This behavior is not limited to the US zone since Cornett et al. (2020) find that EU tested banks tend to increase their capital ratios prior to annual stress test exercises. Furthermore, the authors' results suggest that dividends decrease more in stressed banks than in non-stressed banks. In contrast, the findings of Cappelletti et al. (2019) support the assumption that stress tests enhance market discipline by reducing banks' risk-taking, but during a certain period, it can negatively impact credit supply and profits in the economy. Pierret and Steri (2018) also support the hypothesis that stress tests reduce risk-taking by banks. The reasons behind this are that stressed banks undergo scrutiny examinations of their investment portfolios.

United States and European stress tests design

As mentioned earlier in the introduction, bank stress tests are preventive assessments that were introduced after the global financial crisis in 2007-2009 to take early actions against weaknesses in banking systems (Quagliariello, 2009).

United States stress tests

The first single banking stress test is considered to be the Federal Reserve's 2009 Supervisory Capital Assessment Program (SCAP). The stress test from the SCAP is divided into the Dodd-Frank Act stress tests (DFAST) and the Comprehensive Capital Analysis and Review (CCAR). The DFAST stress test examines the capital adequacy of banks by estimating their balance

sheet, RWAs, net income and then uses that information to predict the capital levels of banks after being stressed. To be specific, this test evaluates the financial risks a bank could face under various severe economic conditions. The process must follow certain rules in the Dodd-Frank Act (Board of Governors of the Federal Reserve System, 2017a).¹⁴

From 2014 until 2018, the DFAST exercise covers banks with average total consolidated assets ranging from \$10 billion to \$50 billion (data found from the Board of Governors of Federal Reserve System, 2018)¹⁵. Starting from 2019, the DFAST exercise is applied to large banks with total consolidated assets between \$100 billion and \$250 billion (data found from the Board of Governors of Federal Reserve System). The CCAR assesses how well the capital planning of large holding banks is and reviews their capital adequacy in stressful scenarios. By analyzing the capital held by banks, the US authorities can determine if banks are capable of maintaining financial stability during adverse periods. For example, banks with sufficient capital can continue lending to households and businesses during times of distress. The CCAR analysis is applied to large bank holdings that exceed \$50 billion in total consolidated assets for the 2018 exercise. However, starting from 2019, the CCAR exercises are carried out for large banks with more than \$100 billion in total consolidated assets (data found from the Board of Governors of Federal Reserve System).

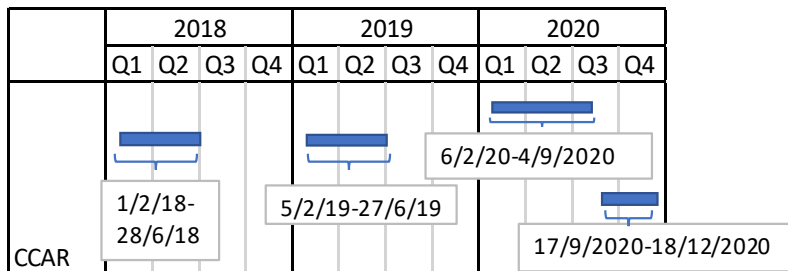
Our study will provide an overview of four US CCAR stress tests conducted between 2018 and 2020. To gain a better understanding of the analysis conducted in the US CCAR exercises, we will explain the approach that will be followed. The Federal Reserve reviews both quantitative and qualitative factors in the bank's capital plan. The quantitative factors represent the bank's anticipated capital ratio during potential adverse periods. On the other hand, the qualitative factors involve analyzing the bank's approach to capital planning, including risk management, internal controls, and governance practices (from Board of Governors of Federal Reserve System official website, 2018a). Banks are then either approved or not approved by the Board for each evaluation.

The following table (Table 1) represents the chronology of the four US CCAR stress tests on which our analysis is based.

¹⁴ See more on <https://www.federalreserve.gov/publications/2017-june-dodd-frank-act-stress-test-background-on-dodd-frank-act-stress-testing.htm>

¹⁵ See more on <https://www.federalreserve.gov/supervisionreg/ccar-2018-archive.htm>

Table 1: Timeline of the US CCAR Stress Tests



Note: Table 1 illustrates the timeline of US stress tests that in this study is considered. We cover four stress tests conducted in the US in the period from 2018 to 2020. The stress test announcement is defined based on the public communication of supervisors in the stress test cycle. The results release of the stress test is based on the date that supervisors published the results. The dates are taken from the Fed website.

Our sample is composed of a total of 28 tested US Bank Holding Companies (BHCs) for the 2018 exercise, 13 tested banks for the 2019 exercise and 24 tested banks for both of the 2020' exercises. The non-stressed group is composed of 21 banks in the 2018 stress test, 37 banks in the 2019 stress test and 26 banks for both round of exercises in 2020. During these three exercises only one bank failed the 2018 stress test.

It should be noted that the year 2020 is a particular period since the FED decided to conduct a second round due to the possible downturns caused by the COVID-19 crisis. The aim of it was to assess the resilience of banks in the face of the upcoming crisis.

European stress tests

The wide stress test exercises in the European Union are led by the European Banking Authority (EBA) since 2011, in close cooperation with the European Systemic Risk Board (ESRB), the European Central Bank (ECB), and the national authorities (from European Banking Authority official website, 2023)¹⁶.

The main purpose of the EU-wide stress test is to examine the resilience of financial institutions in unfavorable market conditions. Additionally, the wide stress test aims to promote consistency among banks. The EBA has taken charge of the wide stress test to establish a unified set of exercises that enable comparisons across countries within the EU, as well as with other

¹⁶ See more on <https://www.eba.europa.eu/risk-analysis-and-data/eu-wide-stress-testing>

countries in Europe such as Sweden or the United Kingdom. This single mechanism will include standardized methodologies and scenarios (from European Banking Authority official website).

Our paper will focus on the last three EU-wide stress tests from 2016 until 2021. The EBA decided not to perform an EU-wide stress test for 2019¹⁷ to allow authorities and market participants to analyze, improve, and prepare for future exercises (from European Banking Authority official website).

Table 2 represents the chronology of the three EU-wide stress tests that our analysis is based on.

Table 2: Timeline of EU-wide Stress Tests																																
	2015				2016				2017				2018				2019				2020				2021							
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
EBA																																
															</																	

First, Petrella et al. (2016) explain that the institutional architecture of European banking supervision since 2014 is considered a three-layer architecture. The top layer is the EBA, which ensures the issuance of common standards and has a supervisory role. Additionally, this organization is responsible for overseeing the framework and coordination of the banking system. The next layer consists of the competent authorities, which includes the National Competent Authorities (NCAs) and the Single Supervisory Mechanism (SSM). Their role is to supervise financial institutions such as banks. Finally, in the last layer we also find the SSM, which works closely with the European Central Bank (ECB) for the supervision of large banking groups in the Eurozone, and with NCAs for the supervision of less significant institutions (Petrella et al., 2016).

Regarding the US, the Federal Reserve is the main actor that manages the entire process of the stress test and is responsible for designing and developing scenarios, validating data and disclosing the results. A first striking element observed in Petrella et al. (2016) is the relative complexity of the EU stress-test supervisory architecture, compared to the one of the US.

The second factor that Petrella et al. (2016) consider a key factor for comparison between the US and EU is the number of tested banks. In our paper, as well as in many others that compare both geographical exercises (Candelon et al. (2015), Ahnert et al. (2018), among others) the EU-wide stress test covers a larger number of tested banks than the US CCAR. The main reason for this difference is that the US CCAR focuses on a small set of financial institutions that represent a large nationwide banking asset. In contrast, the banks tested in Europe are those that have a strong presence in their domestic market but less in other EU countries (Ahnert et al., 2018). In 2023, Silicon Valley Bank (SVB) in the US collapsed, causing potential contagion in the financial system. According to the Federal Reserve (Fed), SVB had low regulatory standards, and as a result, it will be considered a large bank for future monitoring¹⁸. Our assumption is that this event could trigger actions to include important banks that are not necessarily considered large banks in the US stress tests.

Moreover, EU and US stress-test are different in the way they include qualitative dimensions in their analysis. As mentioned in the description of the US stress test, the Fed reviews both qualitative and quantitative dimensions in their CCAR exercises. In contrast, the EU banking authority does not evaluate the capital plan, methodology, or governance of tested banks (qualitative side).

¹⁸ See more in the press release of the Fed in 2023: <https://www.federalreserve.gov/publications/files/svb-review-20230428.pdf>

Another difference used by Petrella et al. (2016) is the credibility of the regulatory system's ability to address potential adverse scenarios. The Fed discloses credible and uniform rules for failing banks, such as halting capital distributions or providing capital injections. This is not the case in the EU, where, during periods of distress, there are no fiscal backstops, and domestic authorities are responsible for announcing or implementing potential actions, which leads to uncertainty for market participants¹⁹.

Lastly, the level of information disclosed differs. The EBA provides more detailed information about the banks' figures, including the balance sheet, which allows market participants to analyze the banks' financial health. By contrast, the Fed publishes less information about the participating banks²⁰.

Methodology

In this section is review first the stock market data used in the empirical analysis of our research. Second, we illustrate the event study methodology used to compute the abnormal returns of specific event windows.

Data

Our research paper covers a total of seven stress tests, which include the US CCAR and the EU-wide stress test. Of these, four tests are from the US exercises, and three tests are from the EU tests. The US regime covers the period from 2018 until 2020, while the EU exercises is from 2016 until 2021. There are two reasons for analyzing up to 2020 for the US exercise. First, there is no disclosure of the results for the 2021 US CCAR exercises. Secondly, we find it interesting to analyze the impact of conducting two rounds of exercises in one year on the US banks' stock market. The idea is to observe if there is any change in the market as a consequence of this unexpected action taken by the FED.

Our sample contains daily stock prices of 50 US and 72 European banks and financial institutions as well as country stock market index obtained from Yahoo Financials. Among the listed banks in our analysis, we categorize them into two groups: the *stressed banks*, which were subject to perform the stress test, and the *non-stressed banks*, which were not subject to the test. Banks assessed only once in the stress test are considered *non-stressed* banks for

¹⁹ Speech by Andrea Enria, Chairperson of the European Banking Authority (EBA) in 2018

²⁰ While the Fed sometimes discloses more information than the ECB in some specific cases, see in the sub section "Differences in stress test governance"

subsequent exercises. Furthermore, our paper adopts the same framework as Ahnert et al. (2018) to extend the *non-stressed* banks group to include the "next-20" listed US banks based on their average balance sheet sizes from 2018 to 2020. Similarly, for the EU *non-stressed* group, we include the "next-30" listed banks from the European area based on the average balance sheet size from 2016 to 2021.

Empirical Method

To investigate the key components of stress testing that have the most influence on the market, we first analyze the market's reaction to two important events: the date of the first announcement and the date of the results. After that, the attention is directed to the exercise that has the most impact on the equity value of the studied firms. Then, we examine which factors in the governance of the significant stress test are related to this impact.

Event study methodology

Our paper will employ the standard event study techniques developed by Campbell and MacKinlay (1997) to compute estimates of abnormal returns. This methodology is recognized as the pioneering approach in stress test literature, as demonstrated by Georgescu et al. (2017) and Durrani et al. (2022), who used it for analyzing stress tests conducted between 2016 and 2021. Additionally, Guerrieri and Modugno (2021) and Candelon and Sy (2015)²¹ reviewed the CCAR (Comprehensive Capital Analysis and Review) and DFAST (Dodd-Frank Act stress tests) stress tests conducted from 2013 to 2019. The event study methodology consists of three traditional steps: defining the events, estimating the normal returns and estimating the abnormal returns.

Defining events

In the event study methodology, various events need to be established to facilitate the analysis. First, it is crucial to define the key days in the stress test procedure, which correspond to the stress test announcement. This refers to the day when supervisors publicly communicate about the stress test cycle for the first time. In our analysis, we utilized the same announcement dates for both geographical zones, as employed by Ahnert et al. (2018) until 2018. The authors of this study also adopted the same announcement dates from other papers, such as Georgescu, Gross, Kapp, and Kok (2017), which covered the EBA stress test of 2016. For exercises

²¹ Covering the years 2009 to 2013 for the US exercise and the EU-Wide stress test

conducted after 2018, we relied on dates obtained from public press releases by supervisors confirming the stress test methodology. Another key day in the exercises is the disclosure of the stress test results. If the release date coincides with the market closing, the event day will be the next available trading day²².

Estimating normal returns

The methodology of the event study consists of a two-stage regression, with the first regression consisting of the estimation of the abnormal return. We employed a single index Market Model to estimate the abnormal return. The estimation of abnormal returns involves two main components: the stock return price of each bank and the country stock market index²³.

Once the data is collected, we establish an estimation window of 250 days preceding the event window, which corresponds to the release of the stress test announcement. The estimation window is consistent with other studies such as Petrella and Resti, (2012) or Candelon and Sy (2015). The estimation window is used to compute the estimated values of α and β in the one-factor model. The equation below represents the excess returns (R_{it}) of individual stocks in relation to a constant α_i and the country index R_{mt} :

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it} \quad (1)$$

We follow the approach of Candelon and Sy (2015) by employing a one-factor model focused on the non-financial sector, applying country-specific stock market indices.

The event study methodology assumes that the normal return represents the expected behavior of the market in normal situations (MacKinlay, 1997). Therefore, we use the estimation window to calculate the normal return, as it is a period characterized by normal circumstances preceding the stress test in our case.

Estimating abnormal returns

The second step involves estimating the abnormal return using the estimated normal return obtained in the first step. The abnormal return $\hat{\epsilon}_{it}$ for bank i at time t is the difference between the actual stock return R_{it} and the estimated normal return (NR_{it}) found in the previous step of the event study.

²² Following the approach taken by Ahnert et al. (2018)

²³ For EU we used the S&P Europe 350 index

$$\hat{\varepsilon}_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt} \quad (2)$$

According to the event study method, the abnormal return captures the impact of the event studied. By calculating the abnormal return, we can quantify the deviation of the firm's equity value from its normal return during a specific event window. We will compare the abnormal returns during the anticipation period, which includes the days before and after the events under study.

In this case, we consider a two-day window prior to the event and a two-day window following the event, resulting in a total of five days around the event dates $t - 2, t - 1, t, t + 1, t + 2$. We adopt the same hypothesis as Candelon and Sy (2015) in choosing a five-day window, which it suggests that information related to the events does not have influence on the market beyond one week.

The purpose of both computations is to observe the difference between the normal return and the abnormal return for each bank in our sample, with the aim of comparing stressed banks and non-stressed banks.

In addition to calculating the abnormal returns (AR_{it}) for our entire sample of banks, we also compute the average abnormal returns (AAR_{it}) and cumulative abnormal returns (CAR_{it}). For the AAR_{it} we simply compute the mean of the abnormal returns obtained for each bank during the event window, while the CAR_{it} we compute their cumulative sum following MacKinlay (1997).

$$AR = \frac{1}{N} \sum_{i=1}^N AR_i \quad (3)$$

$$CAR_i = \sum_{t=-2,-1,0,+1,+2} AR_{it} \quad (4)$$

The cumulative abnormal returns (CAR) reflect the deviation of equity returns from the expected returns throughout the event period. Finally, having the CAR allow us to compute the cumulative average abnormal return $CAAR_{it}$ for our entire sample of banks.

Our paper examines two statistical tests to assess the significance of the average abnormal returns (AAR) and the cumulative average abnormal returns ($CAAR$). Firstly, a t-statistic (t) is employed for the AAR and the $CAAR$ to determine whether the observed AAR or $CAAR$ values are significantly different from zero. This test examines the probability of the observed AAR or $CAAR$ values being obtained by chance or random variation. The second test is an alternative

to the t-statistic proposed by Brown S.J. and Warner J.B (1985) but it is only performed on the average abnormal returns (*AAR*).

Results

In this section we provide the empirical results and test both hypotheses displayed prior in this paper. The first two subsections show the US and EU results obtained from the methodology describe above. After displaying the results, we provide an interpretation of them by answering the first hypothesis. Finally, we analyze the governance of the studied stress tests.

U.S. Stress Tests Results

The impact of the announcement of the stress tests

In table 3 we show the results of the significance tests for the average abnormal returns (*AAR*). They suggest that for the full sample of banks, the stress test announcement of the 2018 exercise had a positive effect on the market valuation of banks. More precisely, this effect seems to come from the effect on the non-stressed banks' returns. However, the announcement of the 2019, and both 2020 exercises did not have a significant impact on banks returns. Regarding the significance test for the cumulative average abnormal returns (*CAAR*) during the announcement period, results suggest that the 2018 US exercise as well as the 2019 US exercise had a positive impact on the market valuation of non-stressed banks. Stressed banks, however, are not affected.

When comparing the impact of the 2018 stress test results period and the 2019 stress test announcement period on non-stressed banks, there is an opposite impact on banks stock returns. However, if we compare the impact of the 2018 stress test results period and the 2019 stress test announcement period, but this time on stressed banks, we observe the same negative impact on the values of banks. For the 2019 and both 2020 exercises we could not continue with the same comparison because even if the results of the 2019 exercise impact the banks returns, the announcement of both 2020 exercises do not have a significant effect on the financial market value of banks.

The impact of the publication of the stress test results

The test made for the average abnormal returns (*AAR*) suggest that the 2019 exercise had a statistically significant effect on the market stock value of stressed banks, but no effect on the

non-stressed banks. For the results publication of 2018 and 2020 stress tests, results show no significant effect on the market valuation of neither bank (stressed or non-stressed). However, regarding the cumulative average abnormal returns (*CAAR*), the stress test results publication had a statistically significant effect on the stock returns of stressed and non-stressed banks for every exercise (2018, 2019 and 2020). Regarding the direction of the effect, the 2020 and 2019 stress tests show a positive impact on bank returns, while the 2018 test suggest a negative effect. Overall, the results suggest that the size of the impact increased over time and that the second round of exercises in 2020 were not significant.

EU Stress Tests Results

The impact of the announcement of the stress tests

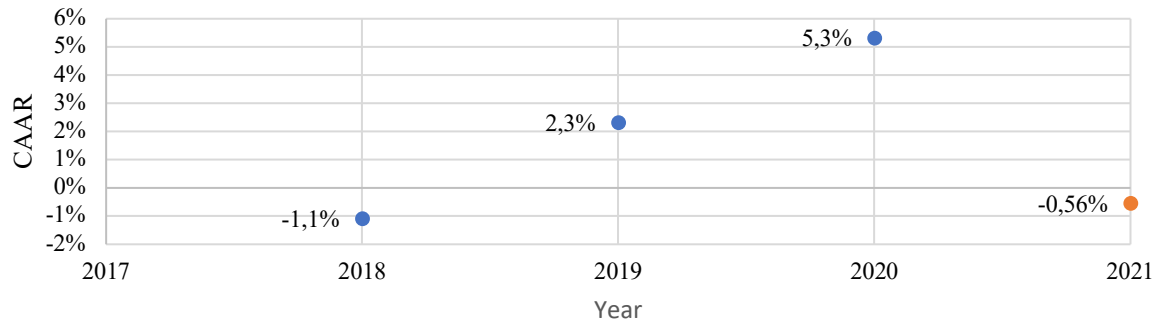
The results obtained concerning the average abnormal returns (*AAR*) show a negative significant effect on the stock returns of non-stressed banks for the 2016 wide stress test. For the 2018 and 2021 stress tests, we observe however no significant effect on banks returns. Concerning the cumulative average abnormal returns (*CAAR*), the overall results suggest that the stress test announcement had a negative and significant impact on non-stressed banks returns. Stressed banks are also negatively impacted but only for the 2021 stress test. Overall, the results suggest a size reduction in the impact of the stress test announcement on the capital market valuation of banks.

When comparing the results publication of the EU 2018 stress test with the announcement of the 2021 stress test, our finding suggests the same negative impact on the stock market of the non-stressed banks. However, we do not find any significant impact on the market valuation of stressed banks for any of the exercises. The comparison between the 2016 and 2018 exercise could not be made because although the announcement of the 2018 stress test show a negative effect on bank returns, the results publication of the 2016 stress test had no statistically significant impact on the banks' market value.

The impact of the publication of the stress test results

Concerning the impact of results publication on the abnormal returns (*AAR*), we do not find any significant impact for any of the exercise. Nevertheless, testing for the effect on cumulative average abnormal returns (*CAAR*), we find a negative and significant impact on stressed banks for the 2021 exercise, as well as a negative effect on the non-stressed banks for the 2018 exercise.

Figure 1. The average cumulative abnormal returns (CARs) for banks under stress following the disclosure of stress test outcomes (US and EU CARs in percent)



Source: Authors' calculations

● US ● EU

Table 3. Average Abnormal Return plus the Average Cumulative Abnormal Returns with their significance at the announcement and the results release of the Stress Tests

US Stress Tests		CCAR US 2018		CCAR US 2019		CCAR US 2020(1)		CCAR US 2020 (2)	
		Announcement	Results Releas	Announcement	Results Release	Announcement	Results Release	Announcement	Results Release
Full Sample	AAR	0.0062	-0.0037	0.0033	0.0072	-0.0023	0.0116	-0.0012	0.0046
	t-BW	1.75(*)	-1.16	0.91	1.81(*)	-0.67	1.22	-0.13	0.43
	CAAR	0.0144	-0,016	0.007	0.024	-0.003	0.051	-0.0008	-0.00013
	t	2.50(*)	-6.04(***)	3.22(**)	4.38(***)	-1.14	3.12(**)	-0.113	-0.021
	N	49	49	49	49	49	49	49	49
Stressed banks	AAR	-0.0022	-0.0023	-0.0022	0.0078	-0.001	0.0131	-0.00067	0.0052
	t-BW	-0.75	-0.77	-0.61	2.15(**)	-0.35	1.54	-0.081	0.54
	CAAR	-0.0018	-0.011	-0.004	0.023	0.00030	0.053	0.00072	0.0046
	t	-0.62	-8.51(***)	-2.7(**)	3.9(***)	0.155	3.24(**)	0.10	0.74
	N	28	28	13	13	24	24	26	26
Non stressed banks	AAR	0.0097	-0.0056	0.0054	0.0069	-0.0036	0.0001	-0.0016	0.004
	t-BW	2.06 (**)	-1.44	1.41	1.59	-0.93	0.92	-0.15	0.33
	CAAR	0.021	-0.022	0.012	0.024	-0.0065	0.049	-0.0026	-0.004
	t	2.35(*)	-4.76(***)	3.19(**)	4.57(***)	-1.63	2.985(**)	-0.33	-0.73
	N	21	21	37	37	26	26	26	26

EU Stress Tests		EU wide-ST 2016		EU wide-ST 2018		EU wide-ST 2021	
		Announcement	Results Release	Announcement	Results Release	Announcement	Results Release
Full Sample	AAR	-0.0065	-0.0018	-0.0024	0.0012	-0.001	-0.00075
	t-BW	-1.89(*)	-0.39	-1.05	0.49	-0.25	-0.19
	CAAR	-0.027	0.0027	-0.007	0.00022	-0.011	-0.0029
	t	-5.15(***)	0.71	-2.39(*)	0.087	-3.72(***)	-2.39(*)
	N	69	69	71	71	72	72
Stressed banks	AAR	0.00077	-0.0012	-0.0034	0.0037	-0.0016	-0.00055
	t-BW	0.22	-0.26	-1.10	1.30	-0.31	-0.123
	CAAR	-0.0056	0.006	-0.0043	0.0103	-0.014	-0.0056
	t	-1.368	1.52	-1.068	2.09	-3.68(***)	-3.079(**)
	N	26	26	28	28	31	31
Non stressed banks	AAR	-0.011	-0.0024	-0.0018	-0.0007	-0.00063	-0.00094
	t-BW	-2.51 (**)	-0.44	-0.82	-0.27	-0.16	-0.26
	CAAR	-0.040	0.00013	-0.009	-0.0074	-0.0088	-0.00105
	t	-4.62(***)	0.036	-2.79(**)	-6.117(***)	-3.68(***)	-0.836
	N	43	43	43	43	41	41

Note: Table 3 provides the results of the impact of the US/EU stress tests announcement and results on the bank's return for the full sample, the stressed banks, and the non-stressed banks. We estimated the average abnormal return for the full sample, the stressed banks, and the non-stressed banks. *AR* refers to the abnormal returns computed using a 5-day (-2, +2) estimation window. *CAAR* refers to the cumulative average abnormal return computed based on the abnormal returns found in the first step. For the average abnormal return (*AAR*) it was performed a Brown and Warner t-test plus the average cumulative average abnormal returns (*CAAR*) it was performed a t-test. (***), (**), and (*) denotes statistical significance at 1%, 5%, and 10% level, respectively.

Interpretation of results

The market impact of stress test announcement and results release

Our first hypothesis to be tested regards the information provided to market participants during the two main stress test events. We assume that not only the release of the stress test results can affect the value of the bank's stock price, but also the announcement of the stress test. Previous research, as Goldstein & Leitner (2018), had found that stress test disclosures can impact banks and reduce their risk-sharing opportunities, which can spread mistrust among investors. Due to this uncertainty, investors may ask for higher expected returns from banks that are participating in the stress test exercises, and this can eventually cause a decrease in the stock prices of these banks. Alternatively, we believe that due to high uncertainty about the financial environment of banks, we may observe negative abnormal returns.

Our empirical investigation of the first hypothesis is represented in Table 3.

Looking at the impacts of the US and EU stress test, we found that only the US 2019 stress test had a statistically significant impact on stock prices of stressed and non-stressed banks, and for both events (announcement and results release). More precisely, we find that during this stress test, non-stressed banks experienced a greater impact on their stock values of +1.2% during the announcement and +2.4% during the results release (with t-statistics of +3.19 and +4.57, respectively, showing statistical significance at the 5% and 1% levels) than stressed banks, which experienced a negative stock return of -0.4% during the announcement and +2.3% during the results release (the corresponding t-statistics were -2.7 and +3.9 and displayed statistical significance at the 5% and 1% levels, respectively).

When observing the impact of the results release, it seems that market participants did not differentiate between stressed banks and non-stressed banks during the US 2019 stress test – since the impact is almost identical. We see two possible reasons to explain these results. Firstly, it could suggest that investors have greater confidence in the financial conditions of both stressed and non-stressed banks. Secondly, and linked with our first reason, the stress test exercises were credible and delivered adequate and correct information, explaining why the market did not differentiate between banks that followed a stress test and those that did not.²⁴

²⁴ In the subsection "Differences in stress test governance" we argue more about the importance of the different aspects of the stress test process that can influence the market.

By using the same comparisons for the EU, we did not find a stress test that had statistically significant impact on both groups of banks (stressed and non-stressed) for both events (announcement and results release of the stress test). However, our results show that the announcement of the EU-wide stress test of 2021 had a less strong negative effect on the market valuation of non-stressed banks – with cumulative abnormal returns of -0.88% (at 1% level) – than the stressed banks – with -1.4% cumulative abnormal returns at 1% level. These results may indicate that financial investors are more likely to evaluate stressed banks than non-stressed banks in the EU. This assumption is also related to the findings of Petrella and Resti (2012), according to which the market expects greater scrutiny of banks participating in stress test compared to those not participating in the 2011 EU stress test.

After looking more globally at the impact of the stress tests, the following part of this section interpret the empirical results for each stress test separately.

For the 2016 EU-wide stress test, our results during the announcement period had the same significant negative impact as Ahnert et al. (2018) on non-stressed group. Non-stressed banks experienced a negative cumulative abnormal return of -4.1% (with t-statistics amount to -4.62 at 1% level). Still in accordance with the finding of Ahnert et al. (2018), our results show that the 2016 EU-wide stress test and 2018 EU-wide stress test had no significant impact on stressed banks, for any event (announcement and results release). A possible explanation for not having significant results in the 2016 and 2018 European exercises for stressed banks is that we did not incorporate country-specific stock market indices in our methodology, as Petrella et al. (2013) did for the abnormal return calculations. We are aware that by not selecting country-specific indices, our results may be influenced by country specific effects.

Nevertheless, if we do as Durrani et al. (2022) and analyze abnormal returns on the day before and after the stress test release in the EU we observed that, in 2018 for the results release, stressed banks had a significant positive abnormal return of 0.76 the day before the event - with a t-statistics of 1.94 at the 10% level (see Table 5 in Appendix). While this is in line with Durrani et al. (2022) findings, we did not find any significant impact for the day after the event.

In our analysis for the 2021 EU-wide stress test (see Table 3), we found significant results for both events in the stressed group. The announcement event shows a cumulative abnormal return of -1.4% (with t-statistics amount to -3.68 at level 1%), while the release of the results shows a cumulative abnormal return of -0.56% (with a t-statistics amount to -3.07 at 5% level). Unfortunately, we could not find any studies that provide an analysis of the 2021 EU-wide

stress test using our methodology. Therefore, as in the EU 2018 stress test, we also looked at the abnormal return reported in Durrani et al. (2022) for the 2021 stress test. In their 2021 wide-stress test, Durrani et al. (2022) found a significant negative effect on the stressed banks abnormal returns on the day after the stress test result release. In our analysis, we also found a negative abnormal return on the day after the stress test result, with a significant negative impact on the abnormal return of -0.75% (with t-statistics amount to -4.69 at the level 1%, see Table 6 in Appendix). The authors also conclude that during the events of 2020 and 2021, the market responded better in the stock prices of stressed banks than during the 2014 stress test. This is because the EU authorities ensured that enough information was disclose in the stress test results to enhance transparency of the banking sector's resilience during the COVID-19 crisis.

Regarding the US exercises, stressed banks generally experienced positive cumulative abnormal returns upon the release of the stress test results. In contrast, for the EU exercises, we could not observe such a trend over time (Figure 1). During the 2018 US stress test, stressed banks experienced a -1.1% cumulative abnormal returns (with a t-statistic of -8.51 at a 1% level). However, the cumulative abnormal return for the results release in 2019 and 2020 appeared to be significantly positive (+2.3%, +5.3%, respectively, see Figure 1). There could be several reasons why the CCAR 2019 and 2020 exercises for stressed banks in the US showed an increase in stock returns. Three possible reasons were identified. First, in 2018, the Federal Reserve introduced a new method called the "Stress Capital Buffer"; that was applicable for the 2019 stress test. This method required large firms to meet 14 capital-related requirements instead of the previous 24 requirements in the 2018 CCAR exercise, making regulatory measures easier and more transparent (from Board of Governors of Federal Reserve System official website, 2018b)²⁵. Secondly, the Fed announced in 2019 the elimination of the "qualitative objection" for large but non-complex firms (from Board of Governors of Federal Reserve System official website, 2019a)²⁶. Finally, the Federal Reserve released more detailed descriptions about their scenarios in March 2019 (Board of Governors of the Federal Reserve System, 2019b). By being more transparent about their methodology, the Fed can help banks' risk managers to better understand the potential impact of the stress tests on their institutions' capital and associated risks. Therefore, banks are better prepared and more likely to succeed in the stress tests.

²⁵ See more in <https://www.federalreserve.gov/newsevents/pressreleases/bcreg20180410a.htm>

²⁶ See more in <https://www.federalreserve.gov/newsevents/pressreleases/bcreg20190306b.htm>

Based on the different causes we mentioned, we can conclude that the Fed is softening its rules in the capital requirement, but it does not necessarily mean that banks are less protected. The Federal Reserve believes that banks have shown strong resilience with their capital for many years. Therefore, based on the opinions of Guerrieri and Modugno (2021), we can assume that banks that are already well-prepared for possible economic downturns experienced an increase in their stock prices because the market trusted the stress test results. This trust may be explained by the Federal Reserve being more transparent with banks and the market, which helps them to better anticipate their risks.

For the second round of the CCAR 2020, we do not find significant impact on the cumulative abnormal returns (see Table 8 in Appendix). However, by observing the abnormal returns during the five-days window of the event, (see Table 7 in Appendix), we find that banks abnormal returns were significantly negative (-0.74% at level 1%) two days prior to the day of the stress test results release. Moreover, banks experienced a significant positive abnormal return of +1.72% (with a t-statistics of 3.19 at level 1%) on the event day. Finally, we observe a significant negative abnormal return of -0.85% the day after the results release (with a t-statistics of -4.16 at level 1%). To explain these results, we must remember that the 2020 period coincided with the beginning of the COVID-19 crisis, and the market was experiencing a lot of uncertainties about the future of the economy at this time. A good example is the decision of the FED to conduct a second round of stress test to provide the financial market with a better understanding of the banks' balance sheet risks. Therefore, it is plausible to assume that the negative abnormal returns observed during the days before and one day after the event were due to the market's uncertainty at that time.

By reviewing these results, we can partially support our first hypothesis that stress test announcements reveal important content about banks to the market. First, our study only compares stressed banks and non-stressed banks. In Ahnert et al. (2018), they conducted additional tests with other samples in their analyses. For example, the authors distinguished between banks that underwent their first stress test and those that underwent multiple tests. Also, the authors compared the cumulative abnormal returns of banks that failed the test to those that did not (which demand data on the banks that passed/failed the test). Second, our paper only reviewed the stock returns of banks without including other variables in our analysis. In the paper of Durrani et al. (2022) on the EU wide-stress test, the authors connected abnormal returns to the projected en-CET1 ratio on the day before and after the release of the results. They found that the two variables had a strong connection during the day after the results were released in 2021, confirming that stress tests provided new information to market participants.

Moreover, Ahnert et al. (2018) analyzed not only abnormal returns but also the credit default swap. These additional steps and tests by Ahnert et al. (2018) and Durrani et al. (2022) were not performed in our paper.

Third, in the methodology aspect for the EU analysis, we did not use country-specific stock market indices for the computation of abnormal returns, contrarily to what was done by Petrella et al. (2013). Therefore, we acknowledge that our results may be biased as they are influenced by idiosyncratic effects (country-specific effects) and that they must be verified through further research.

Differences in stress test governance

The second hypothesis of our paper examines the impact of the stress test results publication on the existence/absence of price discrimination, based on the stress test governance. Candelon et al. (2015) consider that the way in which the regulatory structure proceeded with bank assessments is critical to the success of stress tests. In the section regarding the stress test designs (ajouter section), we have seen that both geographic areas (US and EU) have different regulatory procedures on the computation of the stress test. Looking into more details, we observe that the institutional design and the number of tested banks is more constant over stress tests in the US than in the EU. Several studies, such as Ahnert et al. (2018) and Petrella et al. (2016), also show that the US banking authority is more credible in its regulatory backstop than the European one. However, the EU system discloses more banking data than US regulators (Magnus, Deslandes and Dias, 2019).

We assume that the market reaction on the stocks of banks that are subject to the stress test will depend on how the banks are regulated and tested. For instance, we believe as Ahnert et al. (2018) that with more regular and strict regulation - as it is the case in the US - and with high data disclosure - like the case of the EU - the publication of stress test results will have a lower impact on the market.

Our definition of governance is based on Candelon et al. (2015) and is the procedure that is established to perform the stress tests. This procedure includes the structure of the institution conducting the stress tests, the number of banks tested, the methodology and computations used for the stress test results, the level of details of the stress test results, the actions made by the authorities once the results are published - such as financial support from the government - and the communication of all aspects of the stress tests, such as their purpose, methods, and results.

Moreover, the definition of Candelon et al. (2015) also considers the actions made by banks before and during stress tests, such as strengthening their capital position. Indeed, regulators set deadlines for stressed banks to consider any capital actions, like buying assets to increase their capital. Such actions can lead to changes in their business practices or assets prior to the stress test. Therefore, these changes manipulate the results of the stress test and, according to Candelon et al. (2015), can impact the market (stock price of banks) positively. Kohn & Liang (2019) confirmed that, in the US, a qualitative evaluation of the capital planning of banks during the exercises helps stressed banks enhance their capital planning and as a result, perform better in the exercises.

Regarding the transparency aspect of the stress tests, many studies have presented different points of view, of which we have described some in the literature section. Exposing the banks involved in stress tests and providing a high level of detail on their results can generate both positive and negative impact on the market. Studies such as Karakostas et al. (2023) suggest that communicating relevant information about stress test results to the public can increase market confidence in the resilience of banks. However, Goldstein and Sapra (2013), as referenced in Baudino et al. (2018), found that stress test results may weaken some stressed banks, as they may experience a rejection of interbank lending, among other negative effects of stress test information disclosure. Furthermore, the size of the sample participating in the stress test can also have an impact on financial markets. Since in the US there is a small sample of banks representing the major banks, which can be catastrophic if something happens to them in case of a systemic risk. Indeed, for the 2019 US stress test, the FED made a change in the sample of banks, where approximately 15 companies would continue to conduct annual exercise while the rest of the banks that participated in the CCAR 2018 would do a two-year cycle (Feldberg and Metrick, 2021). On the other hand, in the EU, we have a large sample with banks of different sizes that are important, but at national level, which could have a negative effect if a bank in a certain country fails the test.

Another aspect of the stress test governance that can have an impact on the market is the actions taken by the authorities. Candelon et al. (2015) claim that, following the publications of stress test results, authorities may require banks to increase their capital if it has fallen below a certain threshold. Market participants tend to react positively to this since they believe that the authorities are capable of enforcing the rules (Candelon et al., 2015). Comparing the US and EU regulatory frameworks, we observe that the US has a single governing body while the EU is decomposed among different authorities. This absence of a single authority and of common

rules can be perceived negatively by the market, suggesting weakness from the regulators in enforcing rules fairly (Candelon et al., 2015). When looking at the annual CCAR reports, we find that the FED takes immediate action when a bank fails to meet the capital threshold. In contrast, when we look at the EU-wide stress test report, the Competent Authorities and EU banking supervision should decide what actions to take based on the test results. Haselmann, R., & Wahrenburg, M. (2018) confirm our analysis on both US and EU stress test reports. The authors conclude that the US regulatory framework had a fiscal advantage over the EU, where the main objective of the US stress test is to identify banks with capital that do not achieve the threshold. Additionally, the US government has a credible position to assess banks for capital shortfalls, while the European Banking Union has no measures to assess such recapitalization or countries are not able to do so (Haselmann et al., 2018).

In the next two subsections, our paper will analyze the significant differences between the US and EU stress test governance models by discussing the “Bottom-up” vs “top-down” approaches and how important can be the level of communication of the stress tests results. This analysis is meant to help us identifying the causes of the differences observed in our empirical results between the two geographical zones.

Bottom-up vs top-down

In the US, the 2018, 2019, and 2020 stress tests used a ‘top-down’ approach for the realization of their models. The top-down approach consists of the Federal Reserve computing the impact of loan losses and risk-weighted assets for each bank and then building models to estimate the impact on different business segments for each bank (Baudino, Goetschmann, Henry, Taniguchi and Zhu, 2018). In contrast, the EU used a ‘bottom up’ approach model for their 2018 and 2021 stress tests²⁷. With this approach, banks can use their own data and methods to estimate how they may be affected by difficult situations, in micro-financial perspective (Baudino et al., 2018). Baudino et al., (2018) give the limitations and advantages of both approaches. For the top-down approach, the method used is the same for all banks tested, which permits a simpler comparison between banks. In addition, the top-down approach helps authorities to have a greater control and consistency over how the stress test is conducted and how the results are interpreted. However, the implementation of the ‘top-down’ approach in Europe could be complicated, as the current design of stress tests must be coordinated with

²⁷ EU stress test also includes a Top Down Macroprudential stress test (MTD ST) and the Macroprudential Extension stress test (MPE ST) which is done with a ‘top down’ approach, see more on Baudino, Goetschmann, Henry, Taniguchi, and Zhu (2018) work

regulators in different countries. Moreover Haselmann et al., (2018) identifies the work of Niepmann and Stebunovs (2018), where they found evidence that the way EU stress test is designed (bottom-up approach), could potentially encourage European countries to manipulate their stress tests scenarios to suit their own interests²⁸, even though the EBA provide common scenarios. This could lead to underestimating the gravity and the negative impacts of a difficult situation. In addition, banks are encouraged to show good performance in stress tests instead of identifying real risks in adverse scenarios (Tubiana, 2021). Haselmann et al., (2018) even noticed that for the EU wide-stress test of 2018, European authorities designed compliant scenarios to banks coming from countries that can afford recapitalization. Based on these findings, Haselmann et al., (2018) suggest that the EU stress test may not be as strict as it should be.

On the other hand, the “bottom-up” approach considers the individual characteristics and unique features of each bank or sector (Baudino et al. 2018). This approach can be customized based on specific bank characteristics that are important to identify during a stress situation. This approach can have a positive side effect since, as shown by Haselmann et al., (2018) in the work of Camara et al. (2017), European banks predict stressful scenarios that can affect their business and are closer to reality. Additionally, through this approach authorities can get information about major risks faced by each bank and can therefore address those risks with the right policy (Tubiana, 2021). Unfortunately, the models built by European banks are not publicly displayed, which generates distrust from the market.

According to Haselmann et al. (2018), the 2018 EU wide-stress test was not a success. This is especially true when we compare with the 2021 stress test of our study. Haselmann et al. (2018) show evidence of a lack of consistency in the scenarios provided. For example, the stock price scenarios given by the European Systemic Risk Board (ESRB)²⁹ were not consistent with the stock price scenarios provided by the EBA in the “market risk scenario”. In the case of Malta, the ESRB forecast a 21.5% decline in 2018, but the market risk scenario anticipated a loss of 9.6% (Haselmann et al., 2018). The authors suggest that a possible reason for these inconsistencies is the fact that the countries negotiated the formation of the stress test. This in turn lead to inconsistencies in the formulation of the rules. Nevertheless, in 2021, the EBA announced a new approach called ‘constrained bottom-up’, in which banks must disclaim the different scenarios that may impact them. This new approach is strict and requires banks to

²⁸ Also call the “game stress test” where Luis de Guindos, Vice-President of the ECB, explained in a speech held in September 2019

²⁹ Which develop scenarios for the macro-financial shock

follow specific rules and guidelines to avoid any manipulation (European Banking Authority, 2021). However, Tubiana (2021) believes that it is still “unrealistic” to expect the stress test to be fully reliable.

When observing our empirical results, the 2018 wide-stress test did not show statistically significant results, as also pointed out by Ahnert et al. (2018). The main reasons for this lack of effect are the weak credibility of the stress test that we discussed above, as well as strong heterogeneity that made it difficult to compare results across banks. In contrast, for the 2021 EU-wide stress test, we do observe a significant (and negative) impact on banks stock prices. We suppose that the main reasons for this are the additional enforcement of the bottom-up approach, as well as the inclusion of additional actions related to the COVID-19 crisis that the EBA have put in place to mitigate the systemic risk on the European banking sector (from European Banking Authority official website, 2021)³⁰. Concerning the negativity of the impact on banks stock prices, we may suppose that the markets were not confident about banks capitalization and resilience at this time, especially since it was a period of turbulence with high uncertainty after the COVID-19 crisis.

Communication results

Another important aspect of the governance of stress tests is the level of communication from the authorities to the public. In the US and EU stress test reports, we notice that one of the main objectives of both authorities is to enhance transparency in order to improve market discipline. However, we have observed significant differences in communication and transparency between both regulatory frameworks.

Baudino et al. (2018) explain that for the EU exercises, each stressed bank receives feedback only about its quality assurance process, while in the US’s CCAR a letter is sent to each stressed bank with detailed information about the analysis performed on the bank’s capital planning, as well as weaknesses found and actions to be taken (Baudino et al., 2018). An interesting observation in Baudino et al. (2018) analysis of the U.S. stress tests, is that the Fed ensures that banks participating in the CCAR have regular monitoring on the findings, as well as horizontal examinations to provide feedback in order to be better prepared for the next CCAR.

Furthermore, Baudino et al. (2018) find differences in the information disclose on the stress test results between US and EU. The US exercises provide information on the original capital plan

³⁰ See more on <https://www.eba.europa.eu/coronavirus>

the bank had before dealing with the stress test, in addition to the changes the bank made in response to the stress test results. The Fed also decided to increase its transparency about the stress tests results by providing more detailed information about the variables and equations that the Fed's models used, such as a range of loss rates that are estimated based on the stressed banks' loans (Board of Governors of the Federal Reserve System, 2017b)³¹. Knowing this, market participants can better interpret the stress test results since they understand how the results are determined. In the case of Europe, the results of each bank participating in the EU wide-stress test are disclosed to the public on a regular and consistent basis (Baudino et al., 2018). Andrea Enria, chairman of the European Central Bank's Supervisory Board, stated in a speech on September 26, 2019³² that European stress tests are among the most transparent compared to other countries and provide a lot of data on a bank-by-bank basis. However, there is still a lack of transparency regarding the results of banks that are not part of the EBA sample, and little information is disclosed on the supervisory measures taken (Magnus, Deslandes and Dias, 2019).

There are two school of thought regarding what information should or should not be disclosed to the public about stress test exercises. When it comes to Fed exercises, the Feldberg and Metrick (2021) study reveals that US banks request more information about the model's regulatory framework to enhance their capital plan, better control financial volatility, and meet the expectations of bank supervisors. It is also suggested that, by making Fed models public, banks can be reviewed by other experts and demonstrate to market participants that they are accurate and reliable (Feldberg and Metrick, 2021). Another view expressed in the Feldberg and Metrick (2021) study suggest that disclosing such detailed information to the public may lead banks to further improve their capital plan or their core business to avoid being publicly announcing that they have weaknesses – as the FED does – and thus avoiding a negative reputation in the market. Similarly, Tubiana (2021) cites Quagliariello (2019) where the authors show that making public too much information about stress test results can create a competitive environment among banks, as they try to present themselves in the best shape to the financial market. In contrast, disclosing too much information can be detrimental to weaker banks that perform poorly in the stress test, as they may be absent from interbank lending (Goldstein and Leitner, 2018).

³¹ See more on <https://www.federalreserve.gov/newsevents/pressreleases/bcreg20171207a.htm>

³² See more on the work of Magnus, Deslandes and Dias (2019)
[https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/624433/IPOL_BRI\(2019\)624433_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/624433/IPOL_BRI(2019)624433_EN.pdf)

From the information gathered on the importance and potential disadvantages of disclosing stress test information to the market, it can be concluded that one potential reason why significant positive results are observed in the CCAR exercises but not in the EU-wide stress test is that the Fed disclose different types of information that can help the market to better understand the stress test results and to use that information to review the stressed banks. On the other hand, although the EU provides a huge amount of data to the public, it still faces criticism not only for the use of bottom-up approach, but also for the perceived lack of credibility, as detailed information is not release to the public as in the U.S.

Conclusion

Since the 2008 financial crisis, stress tests in the United States and the European Union have evolved with the objective of conducting a credible and comprehensive examination of the banking sector. We have pointed out that stress testing is a complex process that involves: a close cooperation between banks and regulators, the design of scenarios attempting to show the real impact of a downturn on banks resilience, as well as extensive data collection.

In this paper we focus on examining the EU and US stress test exercises from 2018 to 2021, which provided the market with important data, and for which we expected they may have impacted the stock price of stressed banks. In addition to the quantitative analysis, we also assess the qualitative aspects of the governance of the stress test. More specifically, in this paper we have chosen to do an in-depth study of the bottom-up versus top-down approaches used in stress tests, as well as of the level of communication from supervisors to the public. On the contrary, most studies in the literature focus on the technical side of stress tests and do not include a qualitative approach, especially for the 2021 stress test. This paper is therefore the first one linking empirical results with stress test governance for the 2021 exercise.

For the methodological part, we conducted an event study analysis to test the impact of the stress test on the market. We found evidence of significant and positive market reaction of stressed banks to the US stress tests, while we found no market reaction to the EU stress test. The only exception for the EU is the 2021 stress test, where we observed a negative impact on the market. These findings are interpreted through the qualitative analysis conducted using the stress test governance. We find that European banking regulations are at the point of criticism for being less credible. In fact, the 2018 wide-stress test was categorized as leaking consistency in the coordination of its scenarios and manipulated by states wanting to avoid being seen as weak. We claim that these are the reasons why we do not find significant results for the EU

exercises. In contrast, we observe that US banking authorities use a top-down approach and have improved their regulatory measures, such as increasing the level of information disclosure. In fact, in 2019 the Fed increases its level of disclosure by providing to the public with details about its scenarios, which was not the case before. Additionally, the Fed changes some policies on behalf of its CCAR exercise, such as reducing the qualitative analysis of major banks. Again, we claim that these features drove the market response to US stress tests. Therefore, as also observed by Haselmann et al. (2018), Acharya et al. (2014) and Camara et al. (2017), differences in terms of stress test design between the US and EU can (partially) explain their heterogeneous impacts on the markets.

To conclude, we think that the qualitative aspects of the stress test governance may continue to influence the market in more recent stress tests. Moreover, we would like to emphasize that our work encountered some limitations. First, we did not incorporate country-specific stock market indices in our methodology, as Petrella et al. (2013) did for the abnormal return calculations. This may cause our results to be influenced by country-specific effects. Second, we have not carried out all the additional steps and tests as in the work of Ahnert et al. (2018) and Durrani et al. (2022). Further research using more detailed information is thus needed to make a more robust analysis of the stress test impact and comparison between US and EU regulatory frameworks.

Reference

Ahnert, L., Vogt, P., Vonhoff, V., & Weigert, F. (2018). Regulatory Stress Testing and Bank Performance. *European Financial Management*. doi:10.2139/ssrn.3179540

Allen, W., & Wood, G. (2006). Defining and achieving financial stability. *Journal of Financial Stability*, 2(2), 152-172. doi: 10.1016/j.jfs.2005.10.001

Baudino, P., Goetschmann, R., Henry, J., Taniguchi, K., & Zhu, W. (2018). Stress-testing banks – a comparative analysis. Bank for International Settlements (BIS), FSI insights on policy implementation, 12. Retrieved from <https://www.bis.org/fsi/publ/insights12.pdf>

Board of Governors of the Federal Reserve System (2017a). Dodd-Frank Act Stress Test 2017: Supervisory Stress Test Methodology and Results. En ligne <https://www.federalreserve.gov/publications/2017-june-dodd-frank-act-stress-test-background-on-dodd-frank-act-stress-testing.htm>, consulted on 25 July 2023.

Board of Governors of the Federal Reserve System (2017b). Press Release. En ligne <https://www.federalreserve.gov/newsevents/pressreleases/bcreg20171207a.htm>, consulted on 28 July 2023.

Board of Governors of the Federal Reserve System (2018a). Comprehensive Capital Analysis and Review 2018. En ligne <https://www.federalreserve.gov/supervisionreg/ccar-2018-archive.htm>, consulted on 25 July 2023.

Board of Governors of the Federal Reserve System (2018b). Press Release. En ligne <https://www.federalreserve.gov/newsevents/pressreleases/bcreg20180410a.htm>, consulted on 26 July 2023.

Board of Governors of the Federal Reserve System (2019a). Press Release. En ligne <https://www.federalreserve.gov/newsevents/pressreleases/bcreg20190306b.htm>, consulted on 26 July 2023.

Board of Governors of the Federal Reserve System (2019b). Dodd-Frank Act Stress Test 2019: Supervisory Stress Test Methodology. Retrieved from <https://www.federalreserve.gov/publications/files/2019-march-supervisory-stress-test-methodology.pdf>

Brown, S.J., & Warner, J.B. (1985). Using daily stock returns: the case of event studies. *Journal of Financial Economics*, 14, 3-31. doi :10.1016/0304-405X(85)90042-X

Candelon, B., & Sy, A. (2015). How did markets react to stress tests? *IMF Working Papers*, 15(75). doi: 10.5089/9781484315378.00

Cappelletti, G., Melo, C., Ponte, A., & Silva, J. (2019). The effects of the stress-testing exercises on banks' lending, profitability and risk-taking: are there unintended side effects? doi: 10.2139/ssrn.3478913

Čihák, M. (2004). Stress testing: a review of key concepts. *Czech Journal of Economics and Finance*, 53(9-10), 417-440. Retrieved from <https://www.cnb.cz/en/economic-research/research-publications/research-and-policy-notes/Stress-Testing-A-Review-of-key-Concepts-00002>

Čihák, M. (2006). How do Central Banks write on financial stability? *IMF Working Papers*, 06(163). doi: 10.5089/9781451864236.001

Čihák, M. (2007). Introduction to applied stress testing. *IMF Working Papers*, 07(59). doi: 10.5089/9781451866230.001

Cornett, M., Minnick, K., Schorno, P., & Tehranian, H. (2020). An examination of bank behavior around Federal Reserve stress tests. *Journal of Financial Intermediation* 41, 100789. doi: 10.1016/j.jfi.2018.05.001

Dowd, K. (2015). Central bank stress tests: Mad, bad, and dangerous. *Cato journal*, 35 (3). 507-524. Retrieved from <https://www.cato.org/sites/cato.org/files/serials/files/cato-journal/2015/9/cj-v35n3-3.pdf>

Durrani, A., Ongena, S., & Ponte Marques, A. (2022). The certification role of the EU-wide stress testing exercises in the stock market. What can we learn from the stress tests (2014-2021)? *Working Paper Series*. Retrieved from <https://www.ecb.europa.eu/pub/research/working-papers/html/index.en.html>

European Banking Authority (2021). Our response to Coronavirus (Covid-19). En ligne <https://www.eba.europa.eu/coronavirus>, consulted on 24 July 2023.

European Banking Authority (2023). EU-wide stress testing. En ligne <https://www.eba.europa.eu/risk-analysis-and-data/eu-wide-stress-testing>, consulted on 24 July 2023.

European Banking Authority. (2021). 2021 EU-Wide Stress Test, Methodological Note Retrieved from https://www.eba.europa.eu/sites/default/documents/files/document_library/Risk%20Analysis%20and%20Data/EU-wide%20Stress%20Testing/2021/936417/2021%20EU-wide%20stress%20test%20-%20Methodological%20Note.pdf

Feldberg, G., & Metrick, A. (2021). Stress tests and policy. *Journal of Financial Crises*, 3(1), 1-19. Retrieved from <https://elischolar.library.yale.edu/journal-of-financial-crises/vol3/iss1/1>

Fernandes, M., Igan, D., & Pinheiro, M. (2015). March madness in Wall Street: (what) does the market learn from stress tests? *IMF Working Paper*, 15(271). doi: 10.5089/9781513537405.001

Georgescu, O-M., Gross, M., Kapp, D., & Kok, C. (2017). Do stress tests matter? Evidence from the 2014 and 2016 stress tests. *Working Paper Series*. Retrieved from <https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2054.en.pdf>

- Goldstein, I., & Leitner, Y. (2018). Stress tests and information disclosure. *Journal of Economic Theory*, 177, 34-69. doi: 10.1016/j.jet.2018.05.013
- Guerrieri, L., & Modugno, M. (2021). The information content of stress test announcements. *Finance and Economics Discussion Series*. doi: 10.17016/FEDS.2021.012.
- Haselmann, R., & Wahrenburg, M. (2018). How demanding and consistent is the 2018 stress test design in comparison to previous exercises? *The Economic Governance Support Unit*. Retrieved from [https://www.europarl.europa.eu/RegData/etudes/IDAN/2018/614520/IPOL_IDA\(2018\)614520_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/IDAN/2018/614520/IPOL_IDA(2018)614520_EN.pdf)
- Hirtle, B., & Lehnert, A. (2014). Supervisory stress tests. *Federal Reserve Bank of New York Staff Reports*, (696). Retrieved from https://www.newyorkfed.org/research/staff_reports/sr696.html
- Kapinos, P., Mitnik, O., & Martin, C. (2015). Stress testing banks: whence and whither? *FDIC Center for Financial Research*. doi: 10.2139/ssrn.2710846
- Karakostas, D., Tsakalos, I. & Fassas, A. (2023), Assessing the financial and informational role of supervisory stress tests: EU-wide 2018 stress test vis-à-vis EU-wide 2021 stress test. *Financial Regulation and Compliance*. doi:10.1108/JFRC-06-2022-0075
- Kohn, D., & Liang, N. (2019). Understanding the effects of the U.S. stress tests. Paper presented at the Federal Reserve System Conference: stress testing: a discussion and review, July 9, 2019. Retrieved from <https://www.brookings.edu/wp-content/uploads/2019/07/effects-of-stress-test-paper.pdf>
- Lazzaria, V., Venab, L., & Venegoni, A. (2017). Stress tests and asset quality reviews of banks: a policy announcement tool. *Journal of Financial Stability*, 32, 86–98 doi: 10.1016/j.jfs.2017.09.001
- Magnus, M., Deslandes, J., & Dias, C. (2019). Towards a fundamental re-design of banks' stress tests in the EU? Retrieved from [https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/624433/IPOL_BRI\(2019\)624433_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/624433/IPOL_BRI(2019)624433_EN.pdf)
- Ong, L., & Pazarbasioglu, C. (2014). Credibility and crisis stress testing. *International Journal of Financial Studies*, 2(1), 15-81. doi:10.3390/ijfs2010015
- Pierret, D., & Steri, R.(2018). Stressed banks. Retrieved from https://www.iese.edu/wp-content/uploads/2019/09/20181127_Stressed-Banks_Pierret.pdf
- Petrella, G., & Resti, A. (2013). Supervisors as information producers: do stress tests reduce bank opaqueness? *Journal Banking & Financial*, 37, 5406-5420. doi: 10.1016/j.jbankfin.2013.01.005
- Petrella, G., and Resti, A. (2016). The interplay between banks and markets: Supervisory stress test results and investor reactions. In T. Beck and B. Casu (Eds.), *The Palgrave Handbook of European Banking*, 401–691 doi: 10.1057/978-1-137-52144-6

Pereira, A. (2021). Rollover risk and stress test credibility. *Games and Economic Behavior*, 129, 370–399. doi: 10.1016/j.geb.2021.06.006

Peristian, S., Morgan, D., & Savino, V. (2010). The information value of the stress test and bank opacity. *Federal Reserve Bank of New York Staff Reports (460)*. Retrieved from <http://dx.doi.org/10.2139/ssrn.1650670>

Quagliariello, M. (Ed.). (2009). *Stress-testing the banking system: methodologies and applications*. Cambridge: The University Press.

Sahin, C., De Haan, J., & Neretina, E. (2020). Banking stress test effects on returns and risks. *Journal of Banking and Finance*, 117, 105843. doi: 10.1016/j.jbankfin.2020.105843

Schuermann, T. (2013). Stress testing banks. doi:10.2139/ssrn.2041579

Tubiana, G. (2021). Stress tests and banks' incentives: the strengths and weaknesses of the EU-wide stress test exercise. *EUDIFIN, research working paper (16)*. Retrieved from https://www.unive.it/pag/fileadmin/user_upload/dipartimenti/economia/doc-eng/eudifin/wp/WP16.pdf

Appendix

Table 5: Summary Statistics of Abnormal Returns for Stressed Banks Following the Release of the 2018 EU-wide Stress Test Results

	<i>EU2018</i>				
	Day -2	Day -1	Day 0	Day +1	Day +2
<i>Mean</i>	-0.52%	0.76%	1.51%	0.07%	0.032%
<i>t-static</i>	-2.31	1.94	5.99		
<i>Stat. significant</i>	5%	10%	1%		

Note: This table presents the summary statistics for abnormal returns during the five-day window following the release of the 2018 EU-wide stress test results. T-statistics and statistical significance are also reported at the 1%, 5%, and 10% levels. Abnormal returns are calculated as the difference between realized returns and expected returns, which are estimated using the one-factor market model.

Table 6: Summary Statistics of Abnormal Returns for Stressed Banks Following the Release of the 2021 EU-wide Stress Test Results

	<i>EU2021</i>				
	Day -2	Day -1	Day 0	Day +1	Day +2
<i>Mean</i>	-1.1%	0.66%	0.31%	-0.75%	0.59%
<i>t-static</i>	-5.92	3.86		-4.69	1.75
<i>Stat. significant</i>	1%	1%		1%	10%

Note: This table presents the summary statistics for abnormal returns during the five-day window following the release of the 2021 EU-wide stress test results. T-statistics and statistical significance are also reported at the 1%, 5%, and 10% levels. Abnormal returns are calculated as the difference between realized returns and expected returns, which are estimated using the one-factor market model.

Table 7: Summary Statistics of Abnormal Returns for Stressed Banks Following the Second Round Release of the 2020 US Comprehensive Capital Analysis and Review (CCAR) Stress Test Results

	<i>US2020</i>				
	Day -2	Day -1	Day 0	Day +1	Day +2
<i>Mean</i>	-0.74%	0.033%	1.72%	-0.85%	2.46%
<i>t-static</i>	-4.26		3.19	-4.16	14.63
<i>Stat. significant</i>	1%		1%	1%	1%

Note: This table presents the summary statistics for abnormal returns during the five-day window following the release of the 2020 US Comprehensive Capital Analysis and Review (CCAR) stress test results. T-statistics and statistical significance are also reported at the 1%, 5%, and 10% levels. Abnormal returns are calculated as the difference between realized returns and expected returns, which are estimated using the one-factor market model.

Table 8 Market reaction to US and EU Stress Tests

Results						
	Positive		Negative		Stat. non-significant	
	AAB	CAAR	AAB	CAAR	AAB	CAAR
Stressed banks	US 2019	US 2019 US 2020 (1)		US 2018	US 2018 US 2020 (1) US 2020 (2)	US 2020 (2)
				EU 2021	EU 2016 EU 2018 EU 2021	EU 2016 EU 2018
Non-stressed banks		US 2019 US 2020 (1)		US 2018	US 2018 US 2019 US 2020 (1) US 2020 (2)	US 2020 (2)
				EU 2018	EU 2016 EU 2018 EU 2021	EU 2016 EU 2021

Announcements						
	Positive		Negative		Stat. non-significant	
	AAB	CAAR	AAB	CAAR	AAB	CAAR
Stressed banks				US 2019	US 2018 US 2019 US 2020 (1) US 2020 (2)	US 2018 US 2020 (1) US 2020 (2)
				EU 2021	EU 2016 EU 2018 EU 2021	EU 2016 EU 2018
Non-stressed banks	US 2018	US 2018 US 2019			US 2019 US 2020 (1) US 2020 (2)	US 2020 (1) US 2020 (2)
			EU 2016	EU 2016 EU 2018 EU 2021	EU 2018 EU 2021	

Note: This table represents significant stress tests, positive or negative, and insignificant stress test for stressed and unstressed banks, based on the announcement events studied in this document.

Abstract:

The objective of this article is to analyze the market reaction to stress tests conducted in the United States and the European Union from 2018 to 2021 using an event study approach. We observe that, in general, US stress tests have a positive impact on the stock value of stressed banks, while we do not find any impact of EU stress test. The only exception in the EU is for the 2021 stress test where we find a negative impact on the market. To interpret these results, we further study the governance of the stress tests. We find that European banking regulations are at the point of criticism for being less credible. This lower credibility comes from a lack of coordination in the scenarios and the manipulation of the results by states to avoid being seen as weak – made possible due to the bottom-up approach used for European exercises. We claim that these are the reasons why we do not find any significant results for the EU exercises. On the contrary, we observed that US banking authorities use a top-down approach and have improved their regulatory measures, such as increasing the level of information disclosure. Again, we claim that these characteristics drive the market response to U.S. stress tests. Finally, we conclude that the qualitative aspects of stress test governance can still influence the market in more recent stress tests.