

MARKET REACTION TO SUPRANATIONAL BANKING SUPERVISION IN EUROPE. DO FIRM- AND COUNTRY- SPECIFIC FACTORS MATTER?

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Abstract

This paper investigates the financial market's perception regarding the effectiveness of the Single Supervisory Mechanism in Europe. Do investors believe that centralized supervision adds value compared to multiple supervision? Do they feel uncertain about the supervisory role of the ECB? To answer these questions, a sample of 118 European Banks has been used finding that whereas in early dates the market reaction was positive reflecting the expectation of greater stability, it turned negative at the time the scope of the supervision was limited to only a group of banks. As might be expected, the reaction is significantly more negative for the directly supervised entities, anticipating a different and more demanding style of supervision that could lead to higher cost. This negative wealth effect is intensified for banks with higher price-to-book ratios or those located in countries with more developed financial systems and better investor protection. However, solvency and productivity firm indicators or low levels of perceived corruption moderate it. This research not only highlights the doubts and uncertainty of investors about the final applications of the SSM, but it could be also useful for policy makers and regulators in order to achieve a more harmonized supervision that improves the credibility of the systems and promote financial stability.

Keywords

European Banking Union, Financial Regulation, SSM, Stock Prices, Event Studies

JEL codes: G14, G21, G38, M21

1. INTRODUCTION

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The European Banking Union, initiated in 2012, has had an undeniable impact on the governance of banking entities, but there is still a long way to go to consolidate the industry in terms of greater financial stability. The financial crisis has evidenced the failures in the governance of these entities, insofar as those banks that supposedly fulfilled the standards of ‘good practices’ have been the ones that suffered the consequences of the crisis the most. This crisis was exacerbated by different factors such as the fragmentation in the supervision of the large and cross-border banks, deficiencies in the application of EU legislation and the existence of inadequate mechanisms at the national level for the supervision of integrated financial markets (Quaglia, 2013; Beck and Wagner, 2016). Since then, international organizations have focused on prudential regulation as the best way to prevent or avoid the recurrence of a crisis of such magnitude and to restore confidence in financial markets. Examples of this are the important legislative changes resulting from the Dodd-Frank Act in the US or Basel III and the Market and Financial Instruments Directive (MIFID II) in the EU.

As of 2014, the Banking Union consists of two key pillars, the Single Supervisory Mechanism (SSM) and the Single Resolution Mechanism (SRM), which are based upon the EU’s “single rulebook” (European Commission, 2014). In November 2015, a third pillar of the BU was proposed by the EC, the European Deposit Insurance Scheme (EDIS) that aims to establish common rules for deposit coverage in the EU.

The SSM meant a change from supervision based on the principle of ‘comply or explain’ to more effective control by the ECB, from which concrete actions and sanctions can be derived. The SRM, based on the Bank Recovery Resolution Directive 2014/59/EU (BRRD), provide the regulatory framework for orderly bank resolution, which marked the end of the culture of bailout and the beginning of the culture of bail-in² (Pancotto, 2019). Both initiatives have led to a profound change in the regulation and governance of the banking business and represent a relevant step in safeguarding financial stability in Europe, particularly in mitigating moral hazard.

Following on from the so-called Larosièrè Report³, a series of measures were put in place to reform the financial supervision system that resulted in the development of a supranational banking supervision between 2012 and 2014. The coming into force of the Single Supervisory Mechanism (SSM) at the end of 2014 assigned to the ECB not only the supervisory functions traditionally carried out by national authorities, but also new supervisory powers. Thus, the

² The bail-in rule implies that losses must be imposed on shareholders and junior creditors before a bailout can be implemented by the EU or the member states

³ High Level Group on Financial Supervision Report, Brussels, 25 February 2009

supranational regulator has been given much power to control and limit the business expectations of credit institutions, demanding a capital base that must guarantee each entity's risk strategy. All of this has led to a profound change in the regulation of the banking business, mainly affecting the areas of corporate governance and risk management.

Accordingly, the SSM may be seen as a compromise regarding the distribution of power between the European Central Bank (ECB) and the national competent authorities (NCAs) with respect to banking supervision. Several authors, such as Howard and Quaglia (2016), have considered that this compromise amounted to a radical initiative to rebuild financial market confidence in banks, to stabilize the national banking systems and to reverse the fragmentation of European financial markets. Other authors (Shaddady et al, 2019) note, rather, that financial regulation and supervision may enhance or impede stability.

However, centralized supervision in the EU suffers from a number of limitations that must be overcome. Ferrarini (2015) highlights the decoupling of supervision from regulation within the Banking Union, deriving from the fact that the ECB lacks sufficient regulatory powers when acting as a supervisor of the Eurozone banking systems. The separation of regulation and supervision may create problems to the extent that the single supervisor cannot create a prudential rulebook for the Eurozone, but is subject to EU prudential regulation and national law provisions often unduly limiting its supervisory discretion.

Even though the change from a multiple supervisory mechanism carried out by the national authorities to a single supervision (SSM) undoubtedly has medium- and long-term effects, it is possible to analyze the reactions during the launch period (Fiordelisi et al, 2017; Loipersberger, 2018). We argue that markets react in anticipation of the possible consequences of the SSM effects on banking activities, assuming that stock prices incorporate the expected costs and benefits of the regulation. Carboni *et al.* (2017) highlight the relevance of this market reaction for three reasons: first, the fragmentation of the European banking industry due to the different characteristics of each country; second, the heterogeneity in the supervision exercised by each national authority in the euro area; and, finally, the existence of consensus regarding the need to adopt a more intrusive role on the part of the EU in terms of supervision.

Within this context, the aim of this paper is to examine the immediate reaction of the banking stock market to the implementation of the Single Supervisory Mechanism in the EU, assessing the expectations of investors when faced with the new regulation. Do investors believe that the SSM will increase confidence in the financial sector and hence improve financial stability? That is to say, do investors believe that centralized supervision adds value compared to that carried out by national authorities? Do they feel uncertain about the supervisory role of the ECB?

This paper represents a valuable contribution to the literature since it is one of the first research studies to analyze the reaction of the market to the creation of the SSM, while most of the papers related to this topic focus on studying the effect of some measures, such as the Comprehensive Assessment (see section 2). Unlike them, our work takes into account each of the stages in the development and implementation of the supranational supervision. From an agency perspective, we provide empirical evidence to the debate regarding the effectiveness of single supervision in Europe analyzing the initial perception of shareholders about:

- i. The ECB's ability to reduce potential moral hazards problems in the supervision carried out by NCAs and, hence, to improve banking stability.
- ii. The possibility that an ECB's over control adversely affects bank profits.
- iii. The credibility and consistency of the SSM in applying a dual system of supervision between “significant” and “less significant” banks.

In addition, rather than relying solely on the market reaction, we contribute by implementing a cross sectional regression model to measure firm and country specific factors that could influence said reaction.

Employing a sample of 118 European banking entities, we use the event study methodology to analyze the existence of abnormal returns around four relevant dates for the start-up of the SSM. Since the reaction of the investors may be different, the sample will be divided into two groups depending on whether the bank is under the direct supervision of the ECB or not, studying the wealth effect for each of them separately. Subsequently, we investigate whether these returns may be influenced by other relevant factors, in addition to the corresponding event, using a cross-sectional regression model.

Our results show a positive reaction on the part of investors in the first dates to the decision to harmonize supervision. This result reflects investor confidence that centralized supervision reduces risk and improves financial stability. However, this reaction becomes negative on the announcement of the limitation of the scope of the ECB and the start-up of the SSM. This effect can be explained by the expectation of greater rigidity on the part of this institution compared to national authorities, together with the anticipation of the new costs that this can imply for banks. This latter reaction is even more negative if we only take into account the sample of entities under the direct supervision of the ECB, showing the uncertainty on a double system of supervision. If we go deeper into the factors that may influence this reaction, we observe that investors respond more negatively the greater the degree of financial development and investor protection regulation of the entity's country of origin or higher price to book ratios. However, they react less negatively in the case of countries where the level of perceived corruption is low, the more solvent and productive the banks are and those that are smaller in size.

We believe that our study, focused on investors' perception of regulatory reforms, constitutes a relevant contribution to researchers, policy makers and regulators since it allows them to understand the effectiveness of government responses to the financial crisis.

The rest of the paper is structured as follows. First, we review some previous studies and state our research hypothesis. Section 3 identifies the key dates in the implementation of the SSM that are the subject of this study. Section 4 provides details about the methodology and databases that we have applied in the analysis. In Section 5, we present and discuss our main results, while the conclusions are drawn in Section 6.

2. BACKGROUND AND HYPOTHESIS DEVELOPMENT

Our research is related to the literature studying the effectiveness of government policies adopted in response to the financial crisis. In this regard, it analyzes the impact of prudential regulation that has led to important changes in governance and banking activities. Taking into consideration the fact that financial markets pay attention to all the measures adopted by governments to reduce risk and uncertainty (Fiordelisi and Ricci, 2016), this paper falls within the literature interested in the reaction of financial markets to the different legislative reforms that affect financial institutions.

Prudential regulation raises the standards of prudence and transparency to moderate risk-taking. From an agency perspective (Myers and Majluf, 1984), the existence of prudential regulation is effective due to reducing the discretionary power of executives, thus avoiding the moral hazard problems that would arise if they made decisions in compliance with their own goals at variance with shareholder interests⁴. When supervision is the sole responsibility of national authorities, i.e., a multiple supervisory mechanism, compliance with standards may be required by these authorities with greater or lesser intensity, resulting in a "home bias" produced by national interests that may condition supervision (Bundesbank, 2014). In this respect, the SSM minimizes this bias by conferring on the ECB the responsibility "to ensure that all the banks of the Member States participating in the system are subject to supervision of the highest quality implemented in a coherent and effective manner" (Council, 2013).

Much of the credibility of the SSM is due to the design of *ex ante* and *ex post* controls on the NCAs in order to ensure a degree of consistency in supervision, given that the ECB is solely responsible for the efficient functioning of the mechanism. These controls may be understood, within the context of agency theory, as a principal-agent structure⁵. The ECB may be considered

⁴ An interesting discussion about this issue can be found in the paper by Allen et al (2015)

⁵ The principal-agent approach has been used by some authors (Pollack, 2003; Tallberg, 2003; Thatcher, 2011) to

as the principal that adopts a series of controls to ensure that its objectives regarding prudential supervision policies are carried out by the NCAs, reducing potential moral hazard problems (Elgie, 2002; Boone and Johnson, 2011; Gren et al, 2015; Carletti et al, 2016). This relationship arises especially in the case of the “less significant banks”, which continue under the supervision of the NCAs, while the ECB directly supervises the “significant banks”. This dual system can generate divergences in the intensity of supervision between the two groups of entities.

Following this approach, the SSM ensures more effective supervision which, in the long term, will result in a reduction of bankruptcy or rescue risk and hence in greater stability of the financial system. If the market estimates that centralized supervision may be more efficient than multiple supervision to achieve these objectives, it will expect the SSM to yield benefits for the sector, resulting in higher stock prices.

From another point of view, if the ECB carries out stricter supervision than the national authorities, greater requirements will be demanded and the probability of suffering penalties will increase (Agarwal et al, 2014). The market will expect higher compliance and control costs and/or a lower potential for benefits due to committing resources to less profitable activities. All this will negatively affect bank profits and will penalize the value of shares.

In this respect, a number of empirical studies in the economic and finance literature has been published in recent years, which consider that the effect of political or governmental interventions on financial stability may be evaluated from the stock market reaction. With this aim, they analyze abnormal returns around the date of the intervention, implicitly assuming that the market prices incorporate the expected costs and benefits of the regulation. Some of these papers use the event study methodology to verify the existence of abnormal returns associated with legislative reforms.

For example, Fiordelisi and Ricci (2016) investigate the effect on global systematically important banks (G-SIBs) prices of various actions taken by policymakers between 2007 and 2012. The response found by these authors for a sample of banks in Europe, the US and Japan is positive, especially in the case of interventions related to monetary policy. This reaction is explained by the increase in the expected value of shares due to the reduction in interest rates derived from certain measures, the reduction in the probability of bankruptcy and the improvement in the expectation of cash flows generated by banks. Lubys and Panda (2020) examine the effects of monetary authorities in Europe and US unconventional policy announcements on emerging stock markets (BRICS). They found significant returns during

explain the delegation of functions and their costs between EU Member States, Supranational Institutions and other authorities.

some events that are also dependent on the announcing central bank authority and a group of macroeconomic variables.

On the other hand, some papers find opposing evidence supporting the argument that regulatory changes exert a negative wealth effect motivated by anticipation by the market of possible costs associated with the new rules. This is the case of the paper by Schäfer *et al* (2016), who study the reaction of the markets to different important legislative reforms since the financial crisis in US and Europe and find abnormal negative returns. These authors conclude that, contrary to the public perception that nothing has changed, the reforms have actually succeeded in reducing the expectations of bailouts, especially in the case of global banks, although they do not show that this leads to a reduction in risk-taking. Along the same lines, Moenninghoff *et al.* (2015) and Gao *et al* (2018) find negative abnormal returns in the case of the largest banks before regulation by the EU, the former, and the US, the latter. In general, the larger the size of the entity, the more negative the abnormal returns of shareholders. This result shows that the G-SIBs benefit from the official “too big to fail” status (Molyneux *et al.*, 2014), as well as from government support for this status. Pancotto *et al* (2019) test the markets’ perception of the effectiveness of the new European Bank Recovery and Resolution Directive, concluding that an overall narrowing of the gap between bank and sovereign risk occurs which implies a lack of credibility in financial markets.

However, we have found very few studies that analyze supervisory mechanisms, the main focus being on the effect of some of the measures adopted. This is the case of Morgan *et al.* (2014), Petrella and Resti (2013), Sahin and de Haan (2016), Lazzari *et al.* (2017) and Carboni *et al.* (2017), who examine the effect of stress tests performed by the supervisory authorities, the first in the US and the rest in the EU. Most of them (except for Sahin and Haan) conclude that this action has produced new information that can be evaluated by the market and obtain similar results, highlighting a negative reaction from investors both on the announcement date and on the date the results are published. The paper by Carboni likewise finds that returns are more negative for ‘treated banks’, which also react negatively to the launch of the SSM. These findings confirm the hypothesis that investors expect the ECB to exercise stricter oversight than national authorities and may reflect uncertainty regarding differential treatment for the two groups of banks. Contrary results are found by Loipersberger (2018) who analyzes the reaction of the market to the creation of the SSM for a sample of 88 EU banks, finding a positive impact on returns. The paper concludes that the SSM can improve banking stability by increasing supervisory standards. Abad *et al* (2020) analyze the impact of news related to the SSM on systemic risk and the degree of integration among markets. They find significant reactions that decrease value and increase risk mainly in the banking sector.

Consequently, and in the light of the available empirical evidence, the effect of single supervision at a European level, as opposed to multiple supervision, can be evaluated positively or negatively according to investors' perception. This result will depend on the equilibrium relationship between the expected costs and benefits of centralization. This leads us to propose the following hypotheses:

H1: Moral hazard hypothesis. If the market estimates that centralized supervision will be more effective than multiple supervision when it comes to reducing moral hazard problems, thus providing stability to the banking system, we expect the implementation of the SSM to increase shareholder value, observing positive abnormal returns around the analyzed dates.

H2: Over control hypothesis. If the market considers that the SSM supposes stricter supervision, and hence higher compliance and control costs for the banks, there will be a reduction in shareholder value and negative abnormal yields will be observed around the key events of the SSM.

However, the reaction of the market may be different for the group of “Significant Supervised Entities”, i.e. those under the direct supervision of the ECB than for the rest. Following Carboni *et al.* (2017), we assume that the market estimates that national authorities are more lenient in their demands than the ECB, so the market reaction for entities under centralized supervision will be more negative. This reaction also has its origin in the doubts that supervision at two levels raises concerning the consistency of the SSM in terms of the application of supervisory standards to all EU entities (Gren *et al.*, 2015). This leads us to formulate a new hypothesis:

H3: Credibility hypothesis. If the market expects the supervision exercised by NCAs over the “less significant entities” to be more lenient or less strict, doubts will be raised concerning the consistency of the SSM. In this regard, differentiated abnormal yields will be observed between the two groups of banks, being penalized those entities under the direct supervision of the ECB.

On the other hand, the investors reaction to the implementation of the SSM may be motivated by various factors related to the country of origin. For example, different degrees of financial development, investor protection and institutional corruption may affect investors' expectations about the consequences of the new supervisory model on the financial sector. Similarly, some specific variables of each bank, such as size, market capitalization or risk, may influence the expectations of the shareholders about the effects of this new situation.

3. EVENT DATES

An important characteristic of a successful event study is the ability to identify the date of the event precisely. In cases where the event date is difficult to identify or partially anticipated, such as regulatory changes, the wealth effects may be difficult to detect (MacKinlay, 1997).

As Binder (1985) and Lamdin (2001) point out, the market usually anticipates legislative reforms, which, in addition, tend to extend over long periods of time, thus making it more difficult to set a specific date. In effect, legislative reforms usually entail a long period of time, imply consultations with experts and with the parties involved, negotiations between the governments of the different European countries, where appropriate, as well as political parties, and a long journey until they are finally approved. If the outcome of the reform were predictable, markets would value it only at the time the reform was announced for the first time. However, this is usually not the case when it comes to regulatory reform. Many things can change between the initial expectation and the result, while, in the process, different information is sent to the market which is sometimes contradictory, as Schäfer et al (2016) point out.

In order to capture all the relevant market reactions, we identified a set of events associated with the SSM. Such selected events are related to initiatives from the European Commission or the European Council, some of which become regulations. The first one refers to the initiation of idea of centralized supervision and the remaining, which occurred between 2012 and 2014, are associated with the development and implementation of the SSM (fig. 1)

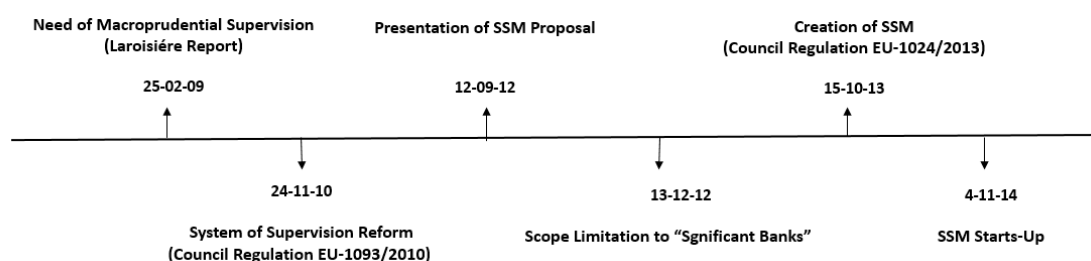


Figure 1. Timeline of Supranational Supervision

The first signs indicating the path to single supervision can be found in the Larosière Report presented on February 25, 2009 at the request of the European Commission, highlights the need for adequate macro prudential supervision in order to reduce the risk and severity of future financial crises. Following the indications of this report, Regulation (EU) No. 1093/2010 of the European Parliament and of the Council of November 24, 2010 was approved, which reforms the system of supervision as a step towards convergence and centralization.

On September 12, 2012, the European Commission presented proposals to design a single banking supervision mechanism in the euro area, further strengthening its response to the current crisis. This proposal did not change rule-making for the single market of 27 countries, but did

change the way in which banks in the euro area will be supervised; hence, it will fully preserve the integrity of the single market. On December 13 of this year, the Eurogroup decided to limit the scope of the ECB as single supervisor to a set of “significant” banks. The criteria according to which banks fall under direct supervision of the ECB include size, importance for the economy of the EU or a Member State, and significance of cross-border activities.

The initiative for the creation of the Single Supervisory Mechanism (SSM) became a reality on October 15, 2013 via the approval, by the Council of the European Union, of Regulation (EU) 1024/2013, taking a very important step towards greater harmonization at a European level. The SSM is the first pillar of the European Banking Union, consisting of the European Central Bank (ECB), which retains responsibility for its functioning, and the national supervisory authorities of the euro area and of those other Member States of the European Union that wish to join it by establishing close cooperation with the ECB.

The entry into force of the SSM, on November 4, 2014, was a clear commitment aimed at significantly improving the banking supervision of financial institutions in the euro zone.

From the possible dates, we have chosen those that contain relevant information and that, therefore, may involve a reaction from investors that affects prices in financial markets. Furthermore, we have discarded the dates of November 2010 and October 2013, due to the detection of possible confounding events. On November 24, 2010 the European Directive 2010/76/EU concerning executive compensation was approved, while October 15, 2013 is too close to the stress test announcement (October 23), event which produced significant stock market reactions.

In this regard, table 1 represents the final events that have been selected for our study.

	Event Date	Description
1	<i>February 25, 2009</i>	Presentation of the Larosière Report, at the request of the European Commission, highlighting the need for adequate macro prudential supervision
2	<i>September 12, 2012</i>	The Commission proposes new ECB powers for banking supervision as part of a Banking Union. It is the first relevant date in the development of the SSM.
3	<i>December 13, 2012</i>	Euro group decision about limiting the scope of the SSM to significant banks
4	<i>November 4, 2014</i>	The SSM starts-up

Table 1: Overview of event dates

4. DATA AND METHODOLOGY

A crucial preliminary step to the methodological approach applied in this study is to have a dataset that has been suitably obtained. Our sample consists of all European Union listed banks that meet three conditions: the country has been in the EU since at least 2009; financial information about the bank is provided by the Thomson Eikon DataStream and SNL Financial

databases; and the bank was active and continuously traded in our period of study, between 2009 and 2014. In this way, more than a 40% of the listed banks met those conditions, so the final sample consists of 118 banking entities based in 23 countries⁶ of the European Union. From among them, 54 entities are listed as significant by the ECB in 2014, nearly the 50% of the total directly supervised entities, i.e., banks subject to the SSM⁷.

Table 2 shows the composition of the sample by countries, detailing both the total number of entities considered in each of them and the number of those included on the “Significant Supervised Entities” list.

The market efficiency hypothesis assumes that the market’s reaction is produced by a change in investors’ expectations; e.g., when new regulatory measures are announced, not only when those measures are implemented. With this idea in mind, we apply the event study methodology via which we can accurately estimate the response of the market to announcements of new regulation (Schwert, 1981). Following Bhagat and Romano (2007), we consider the event study methodology to be suitable as it offers a fruitful way of evaluating the implications of government actions on the well-being of society by analyzing its impact on stock prices.

In the first step, we estimate the abnormal stock returns for the entities in the selected sample around the key dates related to SSM regulation. Next, although the generation of abnormal returns is motivated by the event itself, we cannot rule out the possibility that such returns are also influenced by some specific characteristics not directly related to the implementation of the SSM. For this reason, a cross-sectional analysis regression was performed in which the dependent variable comprises the abnormal returns estimated in the previous stage for each bank, while an attempt was made to select a set of representative variables or indexes of the main characteristics that may increase or decrease the effect of the analyzed event on abnormal returns.

Country	Banks	ECB Supervised
Austria	4	2
Belgium	3	2
Bulgaria	3	0
Cyprus	2	2
Czech Republic	1	0

⁶ Banks headquartered in Estonia, Latvia and Slovenia do not meet all the conditions since none of them is included in the SNL Financial database while those in Slovenia are not in the datastream list either. As regards Lithuania, we have found a bank “Siaulių Bankas” related in the two databases but we have not been able to include it in the sample due to the lack of much information necessary for our research.

⁷ The whole sample includes euro and non-euro countries since our objective is to study the reaction of bank shareholders to different news related to supranational supervision. The sub-sample of “significant entities” only includes banks in euro zone countries.

Denmark	19	0
Finland	1	0
France	15	15
Germany	7	3
Greece	6	4
Hungary	1	0
Ireland	3	3
Italy	13	10
Luxembourg	1	0
Malta	4	2
Netherlands	2	1
Poland	7	0
Portugal	3	2
Rumania	3	0
Slovakia	4	2
Spain	6	6
Sweden	4	0
UK	6	0
TOTAL	118	54

Table 2: Sample composition

4.1. Event Studies: Abnormal Stock Returns

In order to determine the impact of these events, we estimated the market model for each bank's returns relating to the market portfolio return represented by the stock indexes of the respective bank's home countries. This model is the most frequently method employed in the literature for computing abnormal returns in banking⁸. We use local benchmark indexes, as suggested by Campbell *et al.* (2010) and Moenninghoff *et al.* (2015); however, for robustness, we have repeated the analysis with a different market benchmark (the MSCI World Index) to consider the exposure to global factors. We then estimate abnormal stock returns (AR) for the 118 institutions around the four events identified in Table 1. We calculate the AR as the difference between actual stock returns and the returns expected according to the market model (McKinlay, 1997). These abnormal returns are assumed to reflect the stock market's reaction to the arrival of new information.

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

⁸ See McKinlay (1997), Moenninghoff *et al.* (2015), Nguyen *et al.* (2015), Fiordelisi and Ricci (2016), Carboni *et al.* (2017) or Andries *et al.* (2020) among others.

where R_{it} is the return of the bank i security on day t , R_{mt} is the return of the market portfolio (the stock indexes of the respective banks' home countries), α and β are the model parameters, and ε_{it} is the error term, with $E(\varepsilon_{it})=0$.

The model was estimated from the daily returns calculated based on the closing prices of each security and each index listed on the Thomson Eikon datastream over a period of 240 trading days ending 20 days before the date of the announcement to avoid the influence of confounding events.

We estimate the cumulative abnormal returns (CAR) over different event windows around the event date ($t=0$). Following McWilliams & Siegel (1997), we analyzed event windows of different lengths, short enough to avoid the problems of overlapping events and long enough to capture the effect of the analyzed event, the longest one being 6 days, while the shortest one covers 3 days. In this respect, we focused on the event window $(-1, +1)$ to analyze the reaction around the date. Furthermore, we analyzed the $(-5, 0)$ and $(-3, 0)$ window with the aim of capturing the market's possible anticipation of the announcement and also included the post-event reaction in the $(0, +3)$ and $(0, +5)$ windows. We sought to improve the reliability of the tests using daily performances and short event windows to avoid overlap with other possible news.

We subsequently calculated the cumulative average abnormal returns (CAAR) as the mean of our estimates for each of the windows. The statistical significance of the CAAR was verified by means of parametric tests such as the T-test, Patell's Z test (Patell, 1976) and the Standardized Cross-sectional test developed by Boehmer *et al.* (1991), and nonparametric tests like the Generalized Sign Test.

Like Gao *et al.* (2018), we adopt a portfolio approach, calculating the average abnormal returns of each bank for each of the different events, thereby obtaining a portfolio for each date. Correlations between returns are thus avoided seeing that the portfolio returns associated with the different events are uncorrelated (Fama & MacBeth, 1973).

4.2. Cross-sectional analyses of CAR

Having estimated the abnormal returns generated for the sample of banks around the analyzed events, we next seek to identify some variables that may be relevant in explaining these returns, besides the event itself. In order to analyze this possibility, we developed a cross-sectional regression analysis in which the dependent variable is the CAR for each bank in the selected event window. In this respect, we chose two windows prior to and two following the event in order to discern whether the market reacts in advance of the announcement, or not, and to

determine what variables, if any, influence this reaction. The study will be conducted for 5- and 3-day windows before or after the date of the event. Furthermore, we selected one date that we consider crucial for the study, the start-up of the SSM in November 2014, once the list of entities under the direct supervision of the ECB had been previously published in September of the same year.

This study requires developing various modelling and analysis techniques to find a relationship between several independent variables and the dependent variable in different windows. First, regression analysis techniques depend on the steps taken to select the appropriate variables before including them in the model.

Second, an OLS technique in R was developed to test the proposed hypothesis: “CAR depend on the group of variables included in the dataset” and generate an output that allows us to draw conclusions regarding the model and each variable. Thus, the null hypothesis of linear regression states there is no relationship between the dependent and independent variables, i.e., all coefficients are zero, while the alternative hypothesis states that there is at least one non-zero coefficient and hence a relationship exists between the dependent and independent variables.

4.2.1 Theoretical selection of variables

The SSM entails a profound change in the regulation and supervision of the banking business that can affect the profit expectations of these entities and hence their market value. In this respect, we believe that the reaction of investors to its implementation will be conditioned not only by the specific characteristics of each bank, but also by the country to which the entity belongs. This leads us to consider two vectors of relevant variables: macroeconomic variables, which depend on the country of origin; and economic and financial variables from the bank reports. Table 3 provides the definition of the selected variables.

The estimated model is the following:

$$CAR_{ij} = \alpha + \beta_1 \text{Country Variables}_j + \beta_2 \text{Bank Variables}_i + \varepsilon_{ij} \quad (2)$$

where CAR_{ij} represents the cumulative abnormal return in the window selected for bank i that is located in country j , α is the constant term, $\text{Country Variables}_j$ is the vector of macroeconomic variables representative of the country, while $\text{Bank Characteristics}_i$ is the vector representing the individual characteristics of each banking entity.

Variable	Definition	Source
<i>Country level</i>		
GDP	Nominal value of the Country GDP (€)	World Bank

DESFIN	Country Index of Financial Development	IMF
STINVPROT	Strength of Minority Shareholders Protection Index	World Bank
DTFINVPROT	Protecting Minority Investors Distance to the Frontier Score	World Bank
CPI	Corruption Perception Index	Transparency International
<i>Bank level</i>		
LN(TASS)	Logarithm of Total Assets	SNL
RSIZE (TASS/GDP)	Bank Total Assets / GDP	SNL
GSIB	A dummy variable that takes the value 1 if the bank is on the 2014 official publication list of G-SIBs (11 banks)	FSB
LARGSIZE	A dummy variable that takes the value 1 if the bank has total assets over €100 billion (41 banks)	SNL
BOOKLEV	Total Liabilities / Total Assets	SNL
CAPIT	Total Equity / Total Assets	SNL
PROVLOAN	Provision Loan Losses / Total Assets	SNL
PROBLEM.LOANS	Problem Loans/Total Loans	SNL
PRICEBOOK	Price-to-book ratio = Stocks Market Value / Stocks Book Value	SNL
TIER1RAT	Tier 1 Capital / Risk-weighted Assets	SNL
CAPT.COMP	Total Equity / Regulatory Capital Required	SNL
ROA	Return on assets=Pre-tax profits / Total Assets	SNL
ROE	Return on equity=Net profits / Total Equity	SNL
CREDITRISK	Provision Loan Losses / Total Loans	SNL

Table 3. Definition of variables

Although the banks included in this analysis are all based in EU countries, they show differences in their degree of financial development, the orientation of their regulation towards investor protection or the level of institutional corruption, aspects related to the efficiency of the markets and to corporate governance that we consider relevant for our research.

Markets are more efficient in countries with greater financial development and hence so is the market's reaction to new information. In this respect, we include a variable, DESFIN, which corresponds to the Index of Financial Development developed by Svirydenka (2016) for the International Monetary Fund. On the other hand, we believe that the orientation of each country's legislation regarding investor protection, i.e., the regulations in force regarding corporate governance and transparency, can also exert an important influence when the market assesses the effects of the SSM. In this respect, we include two measures developed by the World Bank, the Strength of Investor Protection Index (STINVPROT), which measures the strength of minority shareholders' protection, and the Protecting Minority Investors Distance to the Frontier Score (DTFINVPROT). The former is calculated as an average between two indexes that respectively measure the protection of shareholders against directors' misuse of

corporate assets for personal gain and, on the other hand, the extent of shareholder rights index and transparency. The latter index measures the distance of each country to the border in investor protection. At a macroeconomic level, we also include GDP.

Another country indicator, close related with the incentives to stricter supervision of financial entities and enforcement mechanisms, is the level of institutional corruption. Generally, corruption represents the abuse of delegated public power for private benefits and ultimately it can lead to a less efficient financial system (Beck, 2006; Cooray and Schneider, 2018; Toader et al., 2018). In order to measure the level of public sector corruption, the Corruption Perception Index (CPI) developed by Transparency International⁹ has been used. From our point of view, the SSM implies higher costs and less benefits of supervision for banks in more developed countries with more protection to investors (according to H2). However, it presents value added to investors in countries with higher level of corruption since moral hazard problems are mitigated (as we have pointed out in H1).

Regarding the economic-financial information of each entity, we consider a group of variables representative of size, performance, capitalization, leverage and risk, assuming that they may influence the market reaction to the SSM.

Firstly, we have initially used four variables related to the size of each entity. We use the logarithm of the variable Total Assets (TASS) as a proxy of the total size and the relative size based on the ratio between Total Assets and GDP of the corresponding country. Furthermore, following other studies that report a reaction of the market to legislative reforms of a different sign for very large banks compared to the rest (Díaz *et al.*, 2017 and Gao *et al.* 2018, among others), we introduce two dummy variables: The variable LARGSIZE, that takes the value of 1 when the size of the bank exceeds €100 billion, in accordance with the criterion followed by the Liikanen Report (Liikanen, 2012) to distinguish large banks from small and medium-sized entities. The variable GSIB, which takes the value of 1 if the bank belongs to the list of Global Systemically Important Banks drawn up by the Financial Stability Board. In this regard, we expect a negative relationship for larger banks, as greater supervision can mean the loss of some of the privileges resulting from the too-big-to-fail status, as the aforementioned studies conclude.

Then, the proportion of debt on the balance sheet is estimated by the book leverage ratio (BOOKLEV), which is the ratio of total liabilities to total assets. Moreover, as performance measures, we take into account both financial profitability (ROE) and economic profitability (ROA), while the PRICEBOOK ratio reflects future investment opportunities. We expect lower

⁹ The index is constructed in a way that a high CPI is associated with low perceived corruption.
<https://www.transparency.org/research/cpi/overview>

abnormal returns for banks with higher leverage, perceived as riskier, and a more positive reaction for the most profitable entities.

Lastly, it should be noted that one of the functions of the ECB as a supranational regulator is to exert control over business expectations by demanding a capital base as collateral against the risk assumed by each entity. In this respect, we have included several measures related to capital in the analysis. The variable Capitalization (CAPIT) indicates the relationship between Total Equity and Total Assets in order to measure capitalization in an overall manner, without taking into account the regulatory risk-weights for each type of asset. The variable TIER1RAT, equal to the TIER 1 capital divided by the risk-weights assets, measures the financial strength of the banks, a higher ratio meaning a greater capacity to absorb future losses. And the percentage of compliance with the regulatory capital requirement (CAPT.COMP). Moreover, as a proxy for credit risk, we use the variable CREDITRISK, the ratio between the loan losses provision and total loans, the variable PROVLOAN, which reflects the relationship between this provision and total assets, and the percentage of problem loans over the total of loans (PROBLEM.LOANS). It is expected that capitalization and financial strength will be associated with positive abnormal returns and riskier entities with negative ones due to the lack of bank stability.

Table 4 provides some descriptive statistics for the set of variables.

Variable	Mean	St Dev
DESFIN	0.6824	0.1569
DTFINVPROT	64.0290	5.6477
STINVPROT	6.5145	0.6282
CPI	63.0357	15.7279
GDP (€billion)	927.1154	931.8050
Ln(TASS)	11.5346	1.6621
RSIZE	0.3335	0.4614
BOOKLEV	0.9106	0.0386
PROVLOAN	0.0114	0.0156
PROBLEM LOANS	0.168768	0.172876
CAPIT	0.0894	0.0386
TIER1RAT	0.142824	0.036652
CAPT.COMP	1.210784	0.190630
ROA	0.001632	0.011025
ROE	0.011267	0.154862
PRICEBOOK	0.864561	0.606223

Table 4. Summary Statistics

4.2.2 Variable reduction techniques

Variable reduction or selection techniques are focused on identifying the best subset of variables to include in a model. A model with too many predictors is an indicator of overfitting and makes the efficient monitoring of the variable more difficult. The objective here is to find a set of predictor variables that provides a good fit, predicts the dependent value well, and is as small as possible. Nonetheless, it is important to use these methods avoiding to eliminate relevant variables, given that variable reduction methods sometimes perform poorly and some of their techniques, disparagingly called *blind data analysis*, could lead to error.

In the present study, the following two techniques were used to select the final subset of variables:

1. Some effects are overrepresented with variables practically identical each other affecting the frequency with which authentic predictor variables can find their way into the final model. In this regard, when two variables have a covariance above 80% the less representative variable is eliminated, obtaining an equally balanced dataset without redundancies.
2. Secondly, a stepwise selection routine has been used to exclude some variables that do not bring added value to any model, although it can be used to select the smaller subset, thus avoiding common severe problems in the presence of collinearity.

In this analysis, even after the elimination of some variables, the assumption of the absence of collinearity or multicollinearity remained under suspicion. As will be shown in the results, there are quite a large number of variables and the correlation between two or more independent variables is not as low as might have been expected. These reasons are sufficient to suggest improving the model by means of Factor Analysis

4.2.3 Factor analysis

Factor analysis is the most appropriate method in this case since, starting from a broad set of variables that present important interrelationships, it allows a number of structural factors to be obtained that summarize the information without an excessive loss of information and clarify the relationships between the variables.

This method, applied through the statistical computer software R, allows us to estimate the factor loadings, which represent the level of correlation each variable has with respect to the factor and to what degree, and factor scores for each observation (Perkins, 2014). Furthermore, the factors should be interpreted in the search for the effects they represent.

Once a factor has been estimated and its interpretation is clear, a specific model will be

developed to estimate the dependent variable using multiple linear regression, or Ordinary Least Squares regression (OLS), technique in R, minimizing the sum of square differences between the observed and predicted values. In this way, it is possible to test whether there is any significant relationship between each explanatory variable and the CAR in each window.

5. RESULTS AND DISCUSSION

This section presents the results of the previously described methodology in order to contrast the hypothesis formulated in section 2. With this aim, it has been divided in three sub-sections: The first one is focused on investigating the market reaction to the SSM news, subsection 2 analyzes investor reaction for the subsamples of directly and indirectly supervised entities, while sub-section 3 identifies the factors that influence the abnormal returns found. Finally, a robustness test of the results is performed.

5.1 Did the market react to SSM-related news?

The analysis of the market reaction to the relevant dates for the start-up of the SSM begins with the study of the CAAR calculated in each of the selected windows around each event. As can be seen in Table 5, the analysis shows that the market reacts significantly to each of the four events separately. This reaction can be understood as the result of the evaluation made by the market to the expected costs and benefits of single supervision.

As regards the initial events, we notice that the presentation of the Larosière Report in February 2009 (event 1) generates positive abnormal returns of 1.16% in the 3 days around the date, which may be interpreted within the context of the moral hazard hypothesis (H1). In the midst of the financial crisis, the market believes that the idea of centralized supervision may be effective in controlling the opportunistic behavior of executives, thus reducing moral hazard problems.

The proposal regarding single supervision made by the European Commission in September 2012 (event 2) is very positively valued by investors. Abnormal returns of 1.88% are observed in the short, 3-day window around the date, and of 3.45% in the long, 6-day window prior to the event. The decision to centralize and harmonize supervision seems to have positively surprised the market and this reaction is favorable to the hypothesis of moral hazard (H1). Investors expect centralized supervision to provide stability to the banking system and reduce risk-taking.

However, the decision to limit the scope of ECB supervision to banks that meet certain criteria (event 3) had valued in the contrary sense by investors. The market reacts in the 3- and 6-day windows before the event with abnormally negative returns of -1.05% and -1.59%, respectively. Investors distrust the SSM treating all banks equally and show their fear of inconsistencies in

centralized supervision that lessen their effectiveness

The entry into force of the SSM on November 4, 2014, produced an immediate negative reaction of the market both in the previous and following days. We observe abnormal average returns of -1.52% when considering the longer, 6-day windows pre- and post-event, as well as similarly negative CAAR in the shorter windows. It could be considered that there was no new information released to the market on this date, but the results show that investors are still concerned about the final implementation of the SSM and react accordingly. To confirm that these results are non-random, we conducted a placebo test (Nguyen et al. 2015) during a 4-day or 6-day event window before the period of influence for the event (-20, 20). In particular, the event windows considered were (-40,-37), (-35,-30), (-30,-27). The results confirm our expectations since none of the coefficients takes significant values in these windows, showing that the abnormal returns we have obtained in our analysis are indeed driven by the event analyzed (results are available upon request).

Event window	CAAR %	T-test	Patell -Z	Boehmer	Sign-Test
<i>25/02/2009</i>					
<i>(-1,+1)</i>	1.16	22.179**	20.019**	16.781*	0.4761
<i>(-3, 0)</i>	-0.89	-14.843	-25.649**	-21.730**	-17.427*
<i>(-5, 0)</i>	-0.85	-11.464	-28.152***	-21.510**	-11.880
<i>(0,+3)</i>	0.19	0.3165	0.7514	0.7401	-0.2635
<i>(0,+5)</i>	-0.82	-11.140	-0.6423	-0.5888	-0.4484
<i>12/09/2012</i>					
<i>(-1,+1)</i>	1.88	41.136***	39.500***	42.950***	33.270***
<i>(-3, 0)</i>	2.81	53.244***	62.804***	55.164***	36.953***
<i>(-5, 0)</i>	3.45	53.247***	66.823***	64.199***	44.318***
<i>(0,+3)</i>	1.62	30.656***	31.088***	35.167***	33.270***
<i>(0,+5)</i>	1.22	18.892*	16.558*	19.417*	11.173
<i>13/12/2012</i>					
<i>(-1,+1)</i>	0.23	0.5255	0.6071	0.9137	0.6308
<i>(-3, 0)</i>	-1.05	-20.861**	-29.422***	-43.222***	-32.367***
<i>(-5, 0)</i>	-1.59	-25.839***	-28.895***	-37.249***	-28.684***
<i>(0,+3)</i>	-0.06	-0.1135	0.2969	0.3453	-0.2900
<i>(0,+5)</i>	-0.07	-0.1093	0.7612	0.9069	0.8150
<i>04/11/2014</i>					
<i>(-1,+1)</i>	-0.32	-0.9155	-18.541*	-18.792*	-19.392*
<i>(-3, 0)</i>	-0.52	-12.839	-16.516*	-14.711	-0.8342
<i>(-5, 0)</i>	-1.52	-30.634***	-44.623***	-33.947***	-24.917**
<i>(0,+3)</i>	-1.23	-30.231***	-46.221***	-48.895***	-43.335***
<i>(0,+5)</i>	-1.61	-32.341***	-47.579***	-47.343***	-34.126***

*** significant at 1%, **significant at 5%, *significant at 10%

Table 5. The stock market reaction to the SSM

According to overcontrol hypothesis (H2), investors anticipate higher compliance and control costs on the final implementation of the SSM resulting in negative returns. The results are also in

line with the supranational supervision credibility hypothesis (H3). In this regard, abnormal returns could present different results if they are measured separately for different groups of banks. It will reinforce our analysis since averaging may reduce the power of the test, as some effects may offset one another (Schäfer & Di Mauro, 2016). In our analysis, we believe that it is necessary to differentiate those entities that are subject to direct supervision by the ECB from those overseen by national supervisors and to test whether the effect of the entry into force of the SSM presents significant differences for both groups.

5.2 Does the decision on limiting the scope of the SSM penalize the supervised entities (ECB)?

With the previous aim in mind, using the list of “significant supervised entities” published by the ECB on September 4, 2014, we divided our sample into two subsamples: the first consists of 54 entities directly supervised by the ECB, while the second comprises the 64 banks supervised by national authorities. Table 6 shows the abnormal returns to the relevant dates on which the SSM was launched for the two subsamples of banking entities.

In September 12, 2012, the first relevant date in the development of the SSM, the market experienced an important and positive reaction, as shown in table 5. This reaction is similar when we split the sample into two groups; there were positive and significant abnormal returns for the two groups of banks in all the windows around this date, with the exception of the last one. That shows how the investors reacted to the information available at that time, the expectation of a centralized supervision that provides stability to the banking system, but did not perceive the possibility of two levels in the application of such supervision.

However, the decision about limiting the scope of the ECB totally changed investor expectations, since abnormal returns become negative in some windows for this group of banks. The reaction is more important to the start-up of the SSM (November 2014) when the group of directly supervised entities (ECB) exhibit negative abnormal returns in all the analyzed windows. The greatest negative reaction is observed in the $(-5, 0)$ window, where this group of entities shows CAAR of -3.17 %, significant at 1%. High negative abnormal returns are also observed up to 5 days later, with CAAR of -2.94% in the $(0,+5)$ window. Figure 2 shows the differences in daily abnormal returns between the two subsamples.

Event window	Group	CAAR (%)	
		12/09/2012	04/11/2014
$(-1, +1)$	ECB	+2.29***	-0.53
	NAT	+1.54**	-0.14
$(-3, 0)$	ECB	+3.91***	-1.29**
	NAT	+1.89***	+0.13

(-5, 0)	ECB	+4.66***	-3.17***
	NAT	+2.42***	-0.14
(0, +3)	ECB	+1.39*	-1.96***
	NAT	+1.82***	-0.61
(0, +5)	ECB	+1.04	-2.94***
	NAT	+1.38	-0.48

*** significant at 1%, **significant at 5%, *significant at 10% (t-test)

Table 6. Abnormal returns (CAAR) of Directly (ECB) and Indirectly (NAT) Supervised Entities

The sample of entities that are under the supervision of the National Authorities (NAT) includes 64 entities headquartered in the euro zone countries (20 banks) and those located in EU countries that do not belong to the euro zone (44 banks). For this reason, we have considered it interesting to divide the sample into these two groups and perform the analysis once again only for banks in the euro zone. Table 7 presents the results obtained that are similar to those of table 6.

Event window	Group	CAAR (%)	
		12/09/2012	04/11/2014
(-1, +1)	ECB	+2.29***	-0.53
	NAT €	+1.30	-0.39
(-3, 0)	ECB	+3.91***	-1.29**
	NAT €	+2.38**	+0.24
(-5, 0)	ECB	+4.66***	-3.17***
	NAT €	+2.68*	-0.22
(0, +3)	ECB	+1.39*	-1.96***
	NAT €	+1.66*	-0.27
(0, +5)	ECB	+1.04	-2.94***
	NAT €	+1.21	-0.50

*** significant at 1%, **significant at 5%, *significant at 10% (t-test)

Table 7. Abnormal returns (CAAR) of Directly (ECB) and Indirectly (NAT €) Supervised Entities from Euro-Zone

This result definitively shows that banks subject to direct supervision by the ECB were penalized by the market. This negative wealth effect may be explained in the context of over control (H2) and credibility hypothesis (H3). The expectation of greater rigidity on the part of the ECB with respect to the supervision exercised by national authorities and the anticipation of the new costs, both due to compliance with new regulations and because of possible penalties that they may incur, generate doubts about the consistency of the SSM. Moreover, these costs could intensify the negative results of banks in difficult situations, either by country or specific factors.

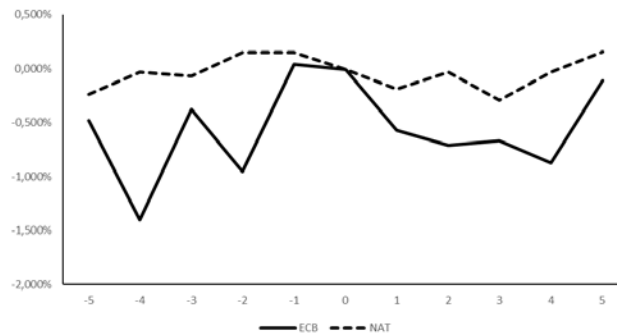


Figure 2. Daily abnormal returns around the SSM start-up date

5.3 What factors have intensified the negative reaction on the supervised entities?

As has been explained in the previous section, a significant market's reaction to the start-up of the SSM was mainly observed for the subsample of entities supervised by the ECB compared to those that remain under the supervision of national authorities. For the former group of banks, we found clearly significant and negative returns, while the reaction is very low for the latter group. These results entail costs that could be especially harmful in some cases. For that reason, we focused this analysis on the “directly supervised entities” and the factors that may influence on the magnitude of the abnormal returns.

After the initial selection of variables, which focused on those that might theoretically affect the analyzed returns; a process of reducing the number of variables was carried out in order to select the optimal subset following the two steps explained previously. First, there were three pairs of variables with excessive similarity between their two components, the variables that represent the orientation towards investor protection (DTFINVPROT and STINVPROT), the two balance sheet variables (BOOKLEV and CAPIT), the variables relating both to the quality of the bank loans (PROVLOAN and PROBLEM.LOANS) and the pair related to profitability (ROA and ROE). We accordingly analyzed which variable in each pair is the one that is less related to the dependent variable, thus discarding ROA, BOOKLEV, PROBLEM LOANS and DTFINVPROT. Furthermore, we use the LARGESIZE variable to distinguish large banks from small and medium-sized entities, since it proved to be more useful than the logarithm of the total assets. On the other hand, three variables did not seem to be sufficiently useful or significant in any of the cases analyzed. These were the relative size (RSIZE), global banks (GSIB) and credit risk (CREDITRISK). Thus, the final model will start out from a subset of ten variables.

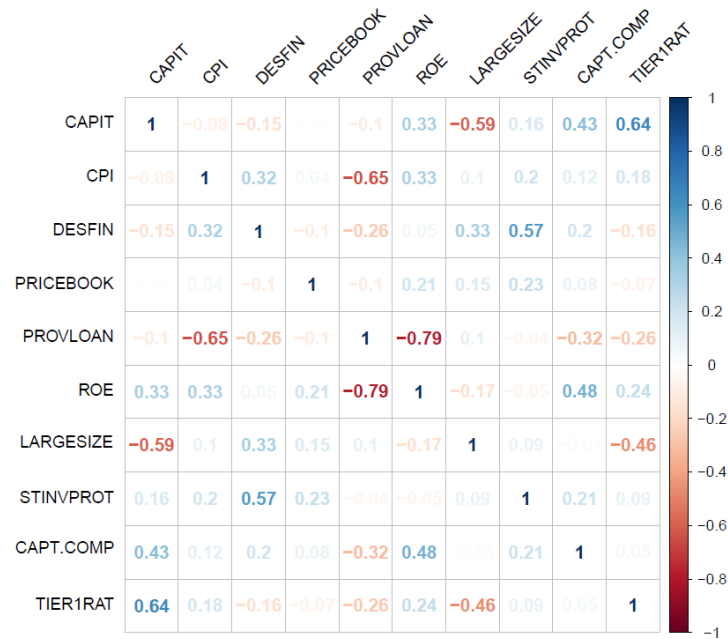


Figure 3. Correlations between variables

However, although this reduction from the initial seventeen variables is useful, it is not sufficient. The correlation between the remaining variables is still too high (Figure 3), though less than 80%, which points to the possibility of performing a factorial model that finds the indexes or intrinsic effects as the best methodological option.

In this respect, the factorial analysis was carried out, as explained in Section 4.2.2, finding six factors (Table 8). Three of these factors or indexes mainly group the effect of two or three variables, while two factors essentially represent a variable.

- The first factor, “Solvency” (SOLV), which explains 24% of the variance, is related to compliance with capital requirements, as it measures the proportion of capital not only in total assets (CAPIT) but also in risk assets (TIER1RAT). The size of the entity has an important weight in this index.
- The second indicator, “Productivity” (PROD), explains 22% of the variance and groups credit risk, measured by PROVLOAN, with a measure of performance such as ROE.
- A third factor, “Market Efficiency” (MEF), mainly considers variables related to the efficiency of the financial markets of each country, weighting the level of financial development with the degree of investor protection, and explains 17% of the variance.

Variables	Solvency	Productivity	Market efficiency	Capital Compliance	Price-Book	Corruption
CAPIT	0.92					
TIER1RAT	0.75					

LARGSIZE	-0.66					
ROE		0.83				
PROVLOAN		-0.95				
DESFIN			0.92			
STINVPROT			0.70			
CAPT.COMP				0.95		
PRICEBOOK					0.99	
CPI						0.56
<i>SS loadings</i>	1.99	1.94	1.47	1.13	1.09	0.52
<i>Proportion Var</i>	0.20	0.19	0.15	0.11	0.11	0.05
<i>Cumulative Var</i>	0.20	0.39	0.54	0.65	0.76	0.81

Table 8. Definition of factors

- In fourth place, we consider a factor that shows the percentage of compliance with the regulatory capital requirement (Capital Compliance).
- The fifth one is a ratio between the market and book values of the entity's own resources, "Price-to-Book Ratio" (PB), is considered.
- Finally, the last factor "Corruption" includes the Corruption Perception Index (CPI). The sum of the five indicators explains 77% of the variance.

Using these six new explanatory variables, a cross-sectional analysis of the accumulated abnormal returns (CAR) was carried out to determine whether any of these indicators might explain the generation of these returns. For this purpose, we focused on the CAR observed in the event already mentioned, the start-up of the SSM on November 4, 2014, and we selected two windows prior to the date of the event and two windows following this date to explain the different reaction of the market in each case.

The estimated model is the following:

$$CAR_{ij} = \alpha + \beta_1 MEF_j + \beta_2 CPI_j + \beta_3 SOLV_i + \beta_4 CAPT.COMP_i + \beta_5 PROD_i + \beta_6 PB_i + \varepsilon_{ij} \quad (3)$$

As shown in table 9, the market reaction is significantly different depending on the selected country and bank factors, in the previous windows to the event date. In this regard, our model concludes that this negative reaction is enhanced for banks listed in countries with a high level of "market efficiency", formed by financial development and investor protection variables. In these cases, investors are protected more by legislation and consider that the costs of supervision by the ECB may not offset the benefits derived from it. However, that negative reaction is moderated in countries with a lower level of perceived "corruption", since they are benefited by the stricter supervision to countries that perform poorly in this respect.

Negative wealth effects are also observed for banks with the best price-to-book ratio, those banks that the market considers have better expectations of future growth are those that react worse when they see they are to be supervised by the ECB, investors negatively value the greater control and compliance costs that may reduce their expectations.

Factors	(-5, 0)	(-3, 0)	(0,+3)	(0,+5)
Solvency	0.3111**	0.1492	0.0670	0.1680
Productivity	0.5247***	0.5813***	-0.1901	-0.2605
Market efficiency	-0.3187***	-0.3725***	0.1489	0.1195
Capital Compliance	0.1327	0.0468	0.0535	0.0279
Price-to-book ratio	-0.2420**	-0.3725**	-0.1684	-0.0450
Corruption	0.4561***	0.0769	-0.0648	-0.0698
<i>R-squared</i>	<i>0.71</i>	<i>0.59</i>	<i>0.08</i>	<i>0.10</i>

*** significant at 1%, **significant at 5%, *significant at 10%

Table 9. Determinants of CAR at the launch of the SSM

However, this negative reaction is moderated by the “Solvency” indicator, which has a positive coefficient. The more solvent banks are the less afraid investors are of being penalized by the ECB. With regard to the case of larger banks, they react negatively to the expectation that they will no longer enjoy the benefits derived from being “too big to fail”, which has been stated in several occasions (Moenninghoff et al., 2015). Likewise, banks with lower credit risk and greater profitability will be more able to cope with the possible costs resulting from greater supervision. The coefficient is positive and therefore these variables have a moderating effect on the market reaction.

5.1 Robustness checks

In order to confirm that our main results are robust, this section provide some checks to test the reliability from our results shown in tables 5 and 6.

A possible limitation of event studies is that the results obtained, abnormal returns, may be influenced by confounding events. In order to avoid this possibility and to isolate the event of interest from other events that may substantially affect stock prices, we have first ruled out from our analysis those dates in which other important announcements have been made, as explained in section 3. Secondly, we have looked for banks whose price may have been affected by dividends announcements or payoffs around the dates analyzed. In this regard, the analysis has been repeated only for those entities without any of those affectations, verifying that the estimated abnormal returns to each event are kept very close to those obtained in the previous

analysis.

Moreover, we have considered that the disclosure of the Comprehensive Assessment results, October 2014, may have influenced stock prices of the banks that registered a capital shortfall. In that case, this fact would have contributed to the negative returns observed at the launch of the SSM. With the aim of isolate investors' expectations about the SSM, we have repeated the analysis by removing from the sample those entities. The results obtained has enabled a ruling out of that hypothetical scenario since abnormal returns remain negative and significant, especially for the group of banks directly supervised by the ECB. These results are in line with those of Carboni et al. (2017).

On the other hand, we carried out the event study once again, changing the reference used for the market portfolio to avoid possible bias of the country index. We accordingly substituted the local benchmark indexes by an international portfolio such as that represented by the MSCI World Index. The results obtained with the new index are consistent with our previous analysis, as significant abnormal returns are detected without qualitative alterations, being of the same sign as those detected previously for each of the events (see table 10).

<i>Event window</i>	<i>CAAR %</i>	<i>T-Test</i>	<i>Patell-Z</i>	<i>Boehmer</i>	<i>Sign-Test</i>
<i>25/02/2009</i>					
<i>(-1, +1)</i>	0.99	17.474*	16.062	14.673	0.7547
<i>(-3, 0)</i>	-2.02	-30.732***	-37.388***	-35.598***	-24.980**
<i>(-5, 0)</i>	-1.04	-12.998	-23.365**	-20.121**	-14.137
<i>(0, +3)</i>	0.94	14.345	19.790**	19.718**	22.003**
<i>(0, +5)</i>	0.67	0.8344	11.881	10.545	0.3933
<i>12/09/2012</i>					
<i>(-1, +1)</i>	1.17	22.931**	14.691	18.380*	0.1148
<i>(-3, 0)</i>	3.37	57.029***	52.368***	48.611***	24.531**
<i>(-5, 0)</i>	5.01	69.136***	71.829***	70.413***	51.511***
<i>(0, +3)</i>	0.10	0.1677	-0.1986	-0.2765	-0.4249
<i>(0, +5)</i>	-0.26	-0.3565	-11.250	-15.160	-0.9645
<i>13/12/2012</i>					
<i>(-1, +1)</i>	-0.08	-0.1602	-0.0045	-0.0063	-0.2611
<i>(-3, 0)</i>	-1.17	-20.864**	-29.811***	-45.042***	-38.560***
<i>(-5, 0)</i>	-1.77	-25.766**	-31.102***	-44.262***	-43.952***
<i>(0, +3)</i>	-0.72	-12.786	-0.6058	-0.6731	-11.598
<i>(0, +5)</i>	-0.35	-0.5035	0.3330	0.4086	-0.0813
<i>04/11/2014</i>					
<i>(-1, +1)</i>	-0.42	-11.402	-19.442*	-23.061**	-16.766*
<i>(-3, 0)</i>	-0.40	-0.9370	0.1083	0.1048	0.6583
<i>(-5, 0)</i>	-2.14	-40.886***	-41.556***	-34.179***	-23.950**
<i>(0, +3)</i>	-1.95	-45.585***	-59.671***	-69.132***	-43.707***

(0,+5)	-2.65	-50.474***	-60.538**	-69.321***	-41.911***
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*** significant at 1%, **significant at 5%, *significant at 10%

Table 10. The stock market reaction to the SSM (MSCI World Index)

6. CONCLUSIONS

The start up of the SSM meant a change from a multiple supervision mechanism, based on the principle of “complain or explain”, to a system of centralized supervision with more effective control by the ECB. The SSM may be seen as a compromise regarding the distribution of power between the European Central Bank (ECB) and the national authorities (NCAs) with respect to banking supervision.

Although the consequences of this new system of supervision will be shown in the medium or long term, financial markets could anticipate their effects on the banking activity reacting to the relevant news in the implementation of the Single Supervisory Mechanism. We have analyzed abnormal returns around the dates of the intervention, implicitly assuming that the market prices incorporate the expected costs and benefits of the regulation. Our study has investigated these returns with the aim of empirically testing the perception of investors regarding the effectiveness of this measure.

Employing a sample of 118 European banking entities, we have found abnormal positive returns both in the initial event, in which the idea of centralized supervision is raised, and in the proposal of the creation of the SSM. The first conclusion we have reached is that there is a change in investor expectations regarding the profitability and risk of banking entities when faced with the change in supervision from the NCAs to the ECB. Thus, our first hypothesis is confirmed: Centralized supervision is expected to lower risk and expectations of bank bailouts, providing stability to the financial sector and, ultimately, generating added value.

However, these returns become negative when the decision was taken to limit the direct supervision of the ECB to “significant entities” and on the release date of the single supervision. This decision of limiting the scope of the ECB creates uncertainty in investors about a double yardstick, a differentiated style of supervision between NCAs and the ECB, which reduces the credibility of the system (H3) and could cause inconsistencies. Furthermore, according to the overcontrol hypothesis (H2), higher costs associated with the new rules and greater rigidity in supervision are anticipated on the final implementation of the SSM, resulting in a negative assessment. In this regard, the division of the sample into two groups, significant and no significant banks, have proven that the negative reaction is much greater for the group of entities directly supervised by the ECB, which have been penalized by investors.

This negative reaction entails costs and it could be exacerbated either by firm- and country-

specific factors. On the one hand, banks located in countries with a higher rate of “market efficiency”, with more developed financial systems or better investor protection, and banks with higher price-to-book ratio, were more affected. However, that negative reaction is moderated when the country has a low perception of “corruption” or the economic and financial bank indicators, such as the “solvency” or “productivity” ones, are above the market average. With regard to the solvency factor, it should be noted that investors penalize more the large size banks, despite the fact that they could also be well-capitalized. This conclusion is in line with much of the specialized literature that stated in several occasion that “too big to fail” entities react negatively to new financial regulation frameworks.

Our research provides evidence on the perception of shareholders about supranational supervision, highlighting the change on their expectations since the first until the last events on the development of the SSM. We believe that this fact reflects the doubts and uncertainty of the investors about their final application. Macroprudential regulations are not the only way to deal with risk and create financial stability but, as several authors have already pointed out (Allen and Gu, 2018), it is an outstanding alternative. From our point of view, policy makers should highlight the benefits of more effective supervision which, in the long run, will result in a reduction of bankruptcy risk and, hence, in a greater stability of the financial system.

The different reactions observed for the two groups of entities reveals that investors anticipate a different and more demanding style of supervision by the ECB compared to the NCAs. In this regard, European authorities should promote cooperation between the ECB and the NCAs to achieve more harmonized supervision that improves the credibility of the system.

In short, we hope our findings will contribute to evaluate the effectiveness of government responses to the financial crisis and, ultimately, be useful for regulators and policymakers to guide decisions and to promote economic and financial stability.

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