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The Effect of Supranational Banking Supervision on the Financial Sector: Event Study Evidence from Europe*

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Abstract

This paper investigates how the introduction of the Single Supervisory Mechanism, the European Union's implementation of harmonized banking supervision, has affected the banking sector in Europe. I perform an event study on banks' stock returns and find evidence for small but significant positive effects. A potential hypothesis for this result is the fact that a single supervisory authority can take spillover effects between countries into account and is therefore able to stabilize the European banking sector. Splitting the sample by an indicator for supervisory power, an indicator for corruption and by Debt/GDP reveals that the positive impact of the SSM was stronger for banks in countries that perform poorly with respect to these measures.

Keywords: Banks, event study, supervision, SSM, harmonization

JEL: G28, H77, F55

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1 Introduction

Since November 2014, the Single Supervisory Mechanism (SSM) monitors large banks in the euro area. It replaces national authorities to ensure harmonized supervision of significant financial institutions. Resulting from the financial crisis, the SSM was founded as part of the European banking union, Europe's response to an unstable financial sector. In particular, the SSM is supposed to put an end to the negative feedback loop between government debt and bank bailout.[1] In order to accomplish this purpose, banks must be monitored by an institution that aligns the interests of all countries in the euro area. For this reason, the European Central Bank (ECB) was designated as executive institution of the SSM. The political objective of the SSM is clearly stated. The underlying mechanisms and their impact on banks, however, are more ambiguous.

There can be various ways in which the SSM influences the financial sector and thus the profitability of banks in the euro area. One of these channels is the level of rigor applied by the new institution. If, on the one hand, investors expect harsher enforcement and interpretation of rules than the average of previous national supervisors, bank profits should decrease. In essence, banks face more restrictions, which can entail considerable private costs.[2] On the other hand, the opposite scenario can occur as well. In that case, the SSM follows a more lenient approach, leading to an increase in bank profits.

However, the level of supervision might not only affect the cost side of banks. In the presence of agency problems, shareholders could even appreciate rigor. In case bank managers take decisions that are undesired by investors (e.g. excessive risk), harsh external monitoring will improve bank performance. Moreover, the SSM could exert an indirect impact on financial institutions via positive spillover effects of good supervision. Again, profits rise: Banks in country A could benefit from banks in country B that are less prone to insolvency due to network effects. Therefore, the risk of contagion is mitigated. All in all, there are multiple effects which can point in opposite

[1] This mechanism arises when risky banks hold a large amount of bonds of their own indebted government. Bailout of banks leads to higher government debt. In turn, government bonds and, therefore, bank assets become more risky. In this case, the default risks of banks and governments mutually reinforce each other (Acharya et al. (2014), for instance, propose a model). See also the Euro Area Summit statement on June 29, 2012, `https://www.bankingsupervision.europa.eu/about/milestones/shared/pdf/2012-06-29_euro_area_summit_statement_en.pdf`.

[2] As an example, SSM officials could impose a more conservative portfolio on risky European banks to shield other EU member states from high bailout payments. Formally, the SSM can do so as it has the right to disallow certain bank operations, see also Section 2.

directions. Their size, however, is not ex-ante clear.

The purpose of this paper is to determine whether negative or positive channels dominate. Using event study methodology, the paper investigates the SSM's impact on European banks' profits. Given this setting, two aspects are essential for the analysis. First, announcements that regard the implementation of the SSM or revealed information about institutional details are exploited. As long as investors did not foresee the introduction of the SSM and there have been no other essential announcements on the event day, SSM announcements can be utilized to achieve identification of its impact. Second, this study uses stock returns as the measure of interest. If investors' expectations of the SSM are different from their perceptions of national supervision, there should be an impact on stock prices. Assuming rational investor behavior, these prices are a proxy for future profits. Therefore, stock returns are suitable to analyze if bank business (on average) is improved or hampered by the introduction of supranational bank supervision.

As a first result, the event study finds evidence in favor of the hypotheses that predict positive effects. This is accomplished by measuring the impact on several event dates. The day that the SSM was announced (29.06.2012), stock returns of banks increased significantly around 3.9 percentage points on average. When a more detailed plan was released (12.09.2012), there was another significant impact of around 2.5 percentage points. Hence, the overall effect cumulates to about 6.4 percentage points.

The SSM replaces different national institutions, so it is likely that there is heterogeneity in its impact. Analyzing this heterogeneity helps to distinguish between the mechanisms stated above. Therefore, in a second step, the sample is split into countries with high and low pre-SSM banking supervision. Employing a permutation-based test reveals that the SSM had a higher impact on less supervised banks. A split by the Corruption Perception Index results in a higher positive impact of the SSM in countries where corruption is perceived to be more intense. In the last split, countries with high and low debt-to-GDP ratios are analyzed separately. The SSM had a higher impact on banks in countries with higher indebtedness. In conclusion, the impact was higher for banks in countries with weak institutions.

This second result is in line with the idea that the SSM is a remedy to international contagion. It is also in line with the notion that stricter supervision mitigates agency problems. It is less compatible with the idea of laxer supervision. In that case, stock returns of loosely monitored banks should have risen by less as they started from a lower level of supervision. As

an additional result, the impact on banks in euro area countries is compared to the impact on banks in European countries outside the eurozone. From this procedure it can be concluded that the impact of the SSM remains positive for both groups and was about 2 percentage points higher for euro area banks.

The existing literature provides several arguments why the SSM should influence bank profits, corresponding to the different channels introduced above. A first strand of the literature examines how the level of supervision is changed by harmonization. Theoretical work includes Morrison and White (2009). They show that harmonization of regulation can lead to the imposition of the weakest regulatory standards. On average, banks profit from harmonization. Others have argued that harmonized supervision goes hand in hand with strictness. This imposes costs on commercial banks and leads to lower profitability. Dell'Ariccia and Marquez (2006), for instance, show that harmonized regulation is only implemented when high standards can be agreed upon. Acharya (2003) argues that risk spillovers among banks force supervisory agencies in less forbearing regimes to increase their level of forbearance. Joint harmonization of supervision and regulation inhibits this race to the bottom. Agarwal et al. (2014) empirically find that a central supervisor can be more strict, even when the same law applies. Analyzing US banks, they show that, compared to state authorities, the federal supervisory agency has a higher taste for downgrading supervisory ratings.

Second, bank supervision and regulation can alter the shareholder-manager relationship of a bank. Positive effects on stock prices arise if supranational supervision is able to solve principal-agent issues. Conducting health checks and investigations, improved supervision could reduce information asymmetries between CEOs and investors. Myers and Majluf (1984) find that information asymmetry can result in forgone profitable investment opportunities. Additionally, strong supervision might protect shareholders from overconfident managers. Malmendier and Tate (2005), for instance, find that overconfident CEOs can distort investment. Empirically, it seems that shareholders of banks do not favor too much risk. Houston and James (1995) show that bank CEOs receive contracts that induce them to engage in less risk compared to other CEO contracts. Saunders et al. (1990) and Laeven and Levine (2009) find that owner-controlled banks usually engage in more risk than their manager-controlled counterparts.

Lastly, positive effects of the SSM occur when international externalities and spillover effects exist but are internalized by decisions of one harmonized authority. If the SSM can stabilize risky banks, the lower probability of

contagion affects the remaining network of banks in a positive way. Allen and Gale (2000), Dasgupta (2004) and Niepmann and Schmidt-Eisenlohr (2013) for instance, propose models with externalities via international bank deposits across countries. Others like Acharya and Yorulmazer (2008) have argued that information spillovers can lead to financial contagion. Empirically, Iyer and Peydró (2011) find that interbank linkages cause financial contagion. Helwege and Zhang (2016) conclude from their results that there is also scope for information contagion.

This paper also relates to the empirical literature on the effects of banking supervision and regulation. Barth et al. (2004), for instance, examine the efficiency of different regulatory and supervisory instruments. Petrella and Resti (2013) perform an event study to test the impact of stress tests on investor perceptions. These two papers evaluate the effects of certain supervisory means and measures. This paper adds to the list of supervisory features by assessing the effect of harmonization, in particular the case of the SSM, on bank returns.

The remainder of the paper is structured as follows. The next section briefly discusses the institutional background of the SSM and outlines the events that are subject to this study. Section 3 provides details about the data and the methodology that is applied in this paper to test for impacts of events. Section 4 presents the results of the study, consisting of full sample and sample split estimations. Section 5 discusses these results and then concludes.

2 Institutional Background and Events

The Single Supervisory Mechanism (SSM) is an institution of the European Central Bank (ECB) that is dedicated to the task of supervising large banks. As of January 2016, it supervised 129 out of roughly 6000 banks in the euro area. The rest of the banks remained under the supervision of national authorities. This fraction of SSM-supervised banks might seem surprisingly small at first glance. However, it accounts for over 80% of total assets of all euro area banks. Several criteria are employed to decide which banks fall under ECB supervision. In this regard, fulfilling a single criterion is sufficient in order to be assigned to the SSM. First of all, total assets of a bank must exceed €30 bn. Second, the bank has to be considered economically important for the specific country or the European economy as a whole. Third, total assets must exceed €5 bn and cross-border activities in two or more euro countries need to be more than 20% of total assets. Fourth,

the bank must have received or requested funds from the European Stability Mechanism or the European Financial Stability Facility. Lastly, the ECB can classify (and therefore supervise) a bank as significant at its own discretion. In short, the SSM captures large and systemically relevant banks of the euro area.

The main purpose of the SSM is to establish stability in the European financial sector and ensure compliance with existing EU banking regulation, thereby harmonizing corrective measures, i.e. its decisions should be in the interest of the entire European community. In an economic sense, this means taking into account spillovers and externalities on countries other than the bank's host nation. For that purpose, the SSM conducts "health checks" on banks that consist of asset assessment and stress tests, which are carried out regularly as well as on an ad hoc basis. Furthermore, the SSM can interfere in a bank's business structure (e.g. by enforcing higher capital buffers or prohibiting certain operations) and has the authority to impose fines in case of non-compliance. Lastly, the SSM can also directly carry out investigations and grant or withdraw bank licenses. In order to cover its costs, the SSM charges fees directly from banks.[3]

Before investigating the results of this study, the history of origins of the SSM helps identifying all major events. The first person to express the idea of centralizing European banking supervision was Mario Draghi, president of the ECB. In April 2012 he claimed that "During the crisis, we have observed strong negative spillover effects across euro area countries and between the banking sector and its respective sovereign. National supervisors and Treasuries are also confronted with the well-known problem that during good times, large banks work as European institutions but in bad times fall on national shoulders. Ensuring a well-functioning EMU implies strengthening banking supervision and resolution at European level."[4] However, this merely seemed to be an isolated remark in a speech that mainly dealt with the economic development in the euro area and the ECB's recent measures. The remark contained neither plans of politicians in charge nor institutional details. The first event to indicate that a single supervision authority was actually planned was the Euro Area Summit on June 29, 2012. In its corresponding statement, the European Council declared that "We affirm that it is imperative to break the vicious circle between banks and sovereigns. The Commission will present Proposals [...] for a single

[3]See `https://www.bankingsupervision.europa.eu`.

[4]See `http://www.ecb.europa.eu/press/key/date/2012/html/sp120425.en.html`.

supervisory mechanism shortly".[5]

The statement also contains an agreement to extend competences of the European Stability Mechanism (ESM). The ESM is an institution that is financed by the states of the euro area. It can provide funds to eurozone governments in case of financial distress. During the Euro Area Summit, it was decided that the ESM will be authorized to recapitalize banks directly once the SSM is in place. This may have increased the bailout probabilities of a few individual banks. In that case, the effect of the announcement of the SSM is slightly confounded. Yet, the SSM is a severe regulatory intervention and should affect all large banks in the euro area. Its announcement can therefore be regarded as the most important part of the Euro Area Summit statement with respect to bank returns.

Following the Summit, the proposal for the SSM was presented to the public on September 12, 2012. At that time the SSM was supposed to cover all euro area banks, as stated in the proposal: "Under the single supervisory mechanism, the ECB will become responsible for supervising all banks within the banking union [...]".[6] These two events seem decisive when it comes to their information content. The first shows the determination of the EU Council to implement harmonized supervision, the second provides details.

On December 13, 2012, the European Finance Ministers decided to limit the scope of the SSM to systemically relevant banks and agree upon the aforementioned classification criteria.[7] This agreement, however, was anticipated to some extent as a conflict between German and French politicians on that issue preceded the event.[8] Some months later, on September 12, 2013, the European Parliament approved the proposals and the EU Council adopted SSM regulations on October 15, 2013. About a year later, on the 4$^{\text{th}}$ of September 2014, the ECB published a list of banks to be supervised in the beginning. Ultimately, the SSM commenced its operations on the 4$^{\text{th}}$ of November 2014.[9]

For the remaining analysis, it is crucial to determine the events that revealed new information to investors. These are the days to which financial

[5] https://www.bankingsupervision.europa.eu/about/milestones/shared/pdf/2012-06-29_euro_area_summit_statement_en.pdf.

[6] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52012DC0510.

[7] That way, German Finance Minister Wolfgang Schäuble was able to keep the network of local savings banks ("Sparkassen"), which provides service to most of the German retail customers, under national supervision. See http://ftalphaville.ft.com/2012/12/13/1307482/the-sticks-and-carrots-of-a-banking-union.

[8] See https://euobserver.com/economic/118415.

[9] See https://www.bankingsupervision.europa.eu/about/milestones for details about the events.

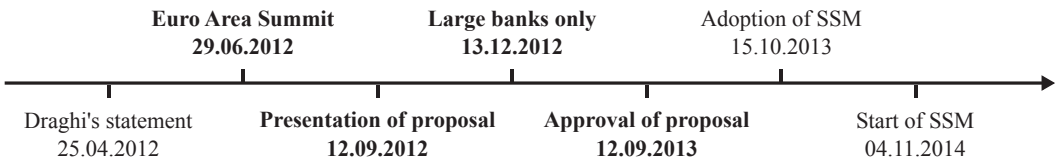

Figure 1: Sequence of events

markets should react to. No impact is expected for Draghi's statement on the need for banking supervision at the European level. As indicated above, this comment seemed rather vague and did not contain any specific plans. Moreover, the day that the SSM was adopted and the day that the SSM started operations do not come as a surprise. All issues regarding the implementation should have been settled already. Therefore, these three events are not analyzed any further.

The dates that appear relevant for financial markets include the announcement that there will be a proposal (June 29, 2012), the presentation of the proposal for a single supervisory mechanism (September 12, 2012) and the decision that only large banks are subject to ECB supervision (December 13, 2012). These events seem to contain most information content. Specifically, the announcement at the Euro Area Summit on June 29, 2012 should have come as a surprise as, except for Draghi's unspecific statement, no plans in that direction had been mentioned before. Presentation of the proposal itself could contain unexpected details. The element of surprise in the large banks announcement stems from the fact that plans were different before this day. Despite some anticipation, the outcome of the negotiations were uncertain. Furthermore, approval of the proposal by the European Parliament (September 12, 2013) appears interesting as well, as it became more certain that the proposal will in fact be implemented. Figure 1 summarizes all events in a timeline. Bold events contain important information for financial markets. These four specific days are therefore expected to have an impact on stock prices and are subject to the remaining analysis.

3 Data and Event Study Methodology

This study tests whether the introduction of the SSM had an impact on stock prices of listed banks in the euro area. The financial data that are required for this kind of analysis are provided by Thompson Reuters

Datastream. The sample consists of 88 euro area banks[10] and their stock prices over the period from January 2, 2012 to January 1, 2015. In the last step of the analysis, the remaining banks in Europe, i.e. in countries with different currencies, are compared to euro banks. Thus, the sample increases to 249 observations. Furthermore, the stock market data are merged with country-specific indicators for corruption (Corruption Perception Index of 2012, CPI[11]) and supervisory power (Supervisory Power Index of 2011, Barth et al. (2013)[12]) as well as debt-to-GDP ratios for the year 2012 (International Monetary Fund[13]). Section 4.2 further discusses these indices.

In the analysis, I follow the literature on event studies for financial data (see for instance Krüger, 2015, Nygaard, 2011). This approach consists of several steps. First of all, abnormal returns need to be calculated. They are the measure of interest because each asset's correlation with the market is removed. In this way, an individual share's reaction to the market can be separated from its reaction to the event. In more detail, abnormal returns for one bank are obtained by regressing its ordinary returns on the returns of the Euro Stoxx 50 (representation of the market) in the pre-event period, the so called estimation period.[14] Residuals of this regression are then predicted for the event period, i.e. the time frame in which the events occur. These residuals constitute abnormal returns, i.e what remains are returns without the component that is explained by the market. This procedure is conducted for each bank separately.

Furthermore, the possibility that there is information overflow[15] before the event or underreaction[16] afterwards needs to be taken into account. For this purpose, cumulative abnormal returns (CAR) are computed. They are obtained by aggregating abnormal returns in a time frame around the event. If the event day is defined as $t = 0$, then the 5-day window CAR is the sum of abnormal returns from $t = -5, ..., 0, ..., +5$. In this study, results for 5-, 3- and 1-day windows are reported. Furthermore, the 0-day window, i.e. the

[10]Two banks (BANIF and Liberbank) had their IPO later than September 26, 2012, they are therefore removed from the dataset.

[11]`https://www.transparency.org/cpi2012/results`.

[12]`http://harbert.auburn.edu/~barthjr/Web%20Dataset.htm`.

[13]`http://data.imf.org/`

[14]In this case, the pre-event period is the time before the first major event (June 29, 2012). The regression should not include observations on any event day associated with the SSM. Furthermore, the five days before the event are also excluded because they enter the cumulative abnormal return. In the end, the estimation period is chosen to have a length of 120 pre-SSM days.

[15]Stock prices can react before an event, for instance due to insider information.

[16]Reaction to the event can be can be a process that takes more than one day.

abnormal return on the day of the event, is subject to all testing procedures.

Subsequently, it is tested whether the (cumulative) abnormal return on the event day differs statistically from 0 to analyze if the event had an impact. This is done for all major event days identified in Section 2. Three different testing procedures are employed. First of all, a simple cross-sectional t-test on the mean of all CARs on the event day is performed. The results from this test serve as a benchmark case.

Secondly, a test developed by Boehmer et al. (1991) is employed. This test is robust to so-called event-induced variance, i.e. when the event itself changes the variance of the distribution of stock returns. Compared to the t-test, the Boehmer test should be more conservative when the event increases the variance. Furthermore, the authors show that event-date clustering does not affect rejection rates of their test in simulations. Event-date clustering arises when the event occurs on the same day for all banks, as is the case in this analysis.

For the third procedure, a nonparametric rank test proposed by Kolari and Pynnonen (2011) is applied. The advantage of this test is that it does not rely on any distributional assumptions. It can handle correlation among bank returns, i.e. stock prices of different banks do not have to be independent of each other. Moreover, simulations show that the test is robust towards cross-sectional and serial correlation in abnormal returns, event-date clustering as well as event-induced variance. It thus seems that the test of Kolari and Pynnonen (2011) is more robust towards misspecification than the other procedures.[17] If there is a high positive correlation among bank returns, this test should be more conservative than the others.

In a final step, it is investigated whether the impact of the SSM differed for banks in different countries. The sample is therefore split by median Supervisory Power Index (SPI), Corruption Perception Index (CPI) and Debt/GDP, one split at a time. Again, the impact of the SSM is computed and analyzed by all three testing procedures. This time, however, each test is applied separately for banks in countries with high and low values of the split variable. In order to compare the impacts of the SSM on the high and the low group, a permutation-based test is performed. For that purpose, a dummy variable that indicates the group to which a bank belongs is generated. This variable is permuted among all banks and a new pseudo-sample is created. Next, the difference of impacts between both groups in the pseudo-sample is

[17]Kolari and Pynnonen (2011) propose two different versions of their test named GRANK-T and GRANK-Z. I employ the GRANK-T test as the authors show that it is more robust to event-date clustering.

measured. The process is repeated 100,000 times. In doing so, a large amount of impact differences is generated. The newly obtained distribution of impacts is valid under the null hypothesis that the group-dummy is exchangeable among observations and can therefore be permuted. This assumption also implies that the impact on both groups is the same. The original impact difference can now be compared to the distribution of generated impact differences in order to test whether it differs statistically from 0. The last part of the analysis applies the same strategy but compares euro area to non-euro area European banks.

4 Empirical Results

4.1 Full Sample

The impact evaluation strategy discussed in Section 3 is applied to the subset of events discussed in Section 2 (Euro Area Summit, Presentation of Proposal, "Large Banks Only" Announcement, Approval of Proposal).

Figure 2 depicts the path of the average abnormal return around these events by plotting a time series line of 51 days. As can already be inferred from the graph, there are large positive spikes on the first two event days. The larger of both effects occurs on the 29th of June 2012. The decision to harmonize supervision seemed to have positively surprised investors. Revealing a more detailed proposal (September 12, 2012) yields a smaller effect. Therefore, the decision to implement the SSM can be regarded as the main event. Adding details seems less important than the main idea of establishing the SSM. It is possible that the European Council did not include major unforeseen aspects in the proposal. The impact on the day of approval by the European Parliament seems rather negligible. This graphical result is confirmed by the empirical tests discussed in Section 3.[18] The impact on September 12, 2013 appears to be close to 0 for the pooled sample as well. The information content of this event day, however, differs between banks. Contrary to prior information, only larger banks fall under the supervision of the SSM. Therefore, the impact will be analyzed for supervised and non-supervised banks separately.

As indicated by visual inspection, a more detailed analysis seems appropriate for the first two events. Table I summarizes the estimated impact of these event days for return windows of size 5, 3, 1 and 0. Moreover, the

[18]Results of these tests can be found in Table A1 of the Appendix.

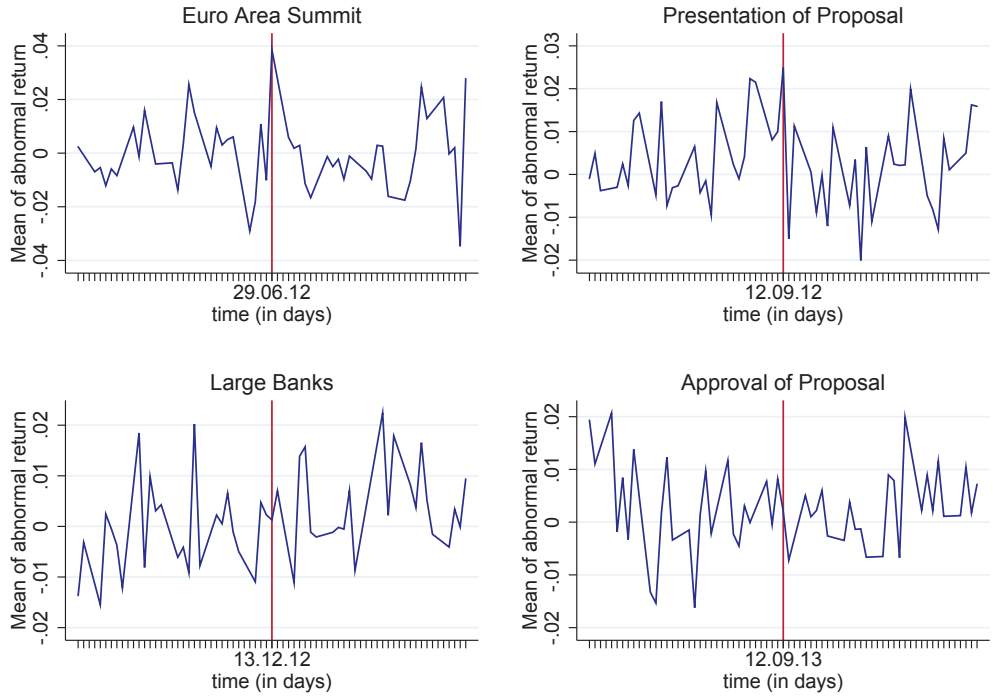

Figure 2: Mean abnormal returns of all banks in the euro area for different event days

impact of the event on the 12$^{\text{th}}$ of September 2013 is differentiated between banks and also included in Table I. In contrast, the impact on the 13$^{\text{th}}$ of December 2012 seems less significant and results are therefore deferred to the Appendix in Table A1. Overall, the results confirm the intuition provided by Figure 2. Announcing the proposal did have a significant impact. The effect of the proposal itself is smaller and less significant. Deciding that the SSM will only supervise large banks leads to small and insignificant impacts for both groups of banks.

Furthermore, examining the significance levels of all tests in Table I helps to get an impression of the econometric properties of the data. The Boehmer test yields results very similar to the common t-test, indicating that event-date clustering and event-induced variance are negligible issues. Kolari results are either equally or less significant than the other tests for most of the table. It therefore seems that there is correlation among bank returns. For that reason, the most robust and conservative Kolari test provides the

Table I: Impact of SSM announcements on stock returns

Window		5 days	3 days	1 day	0 days
Panel A: 29.06.2012			**Euro Area Summit**		
Mean CAR		-0.0191	0.0318	0.0343	0.0386
SE	t-test	0.0116	0.0129**	0.0076***	0.0050***
z-score	Boehmer	0.6433	3.9248***	6.2002***	8.7389***
t	Kolari	-1.6040	1.1104	2.2525**	2.3545**
Observations		88	88	88	88
Panel B: 12.09.2012			**Presentation of Proposal**		
Mean CAR		0.0788	0.0614	0.0199	0.0249
SE	t-test	0.0130***	0.0101***	0.0065***	0.0052***
z-score	Boehmer	7.7437***	6.8891***	2.6613***	5.2830***
t	Kolari	2.5965**	2.2833**	0.7372	1.6891*
Observations		88	88	88	88
Panel C: 13.12.2012			**Large Banks**		
C1: All Banks					
Mean CAR		0.0156	0.0071	0.0106	0.0013
SE	t-test	0.0097	0.0083	0.0043**	0.0041
z-score	Boehmer	1.8366*	1.1753	1.9668**	0.4339
t	Kolari	0.3057	0.6732	0.3550	-0.2867
Observations		88	88	88	88
C2: Supervised Banks					
Mean CAR		0.0200	0.0111	0.0102	0.0061
SE	t-test	0.0129	0.0116	0.0053*	0.0059
z-score	Boehmer	1.4248	1.0505	1.4340	0.6049
t	Kolari	0.9159	0.5257	0.9195	0.1624
Observations		57	57	57	57
C3: Non-Supervised Banks					
Mean CAR		0.0075	-0.0002	0.0112	-0.0077
SE	t-test	0.0142	0.0101	0.0076	0.0038*
z-score	Boehmer	1.3426	0.5250	1.3880	1.9080*
t	Kolari	1.1542	1.2759	0.7830	-2.3056**
Observations		31	31	31	31

Notes: This table shows the results of tests for mean CAR equals zero for different event days and window sizes. Standard errors are reported in three different ways to account for event-date clustering and event-induced variance (t-test, Boehmer et. al (1991), Kolari and Pynnonen (2011)). Panel C is split into supervised and non-supervised banks as ECB supervision of large banks only was announced on that day. Stars indicate significance levels (*10%, **5%, ***1%).

results of interest for inference.

Inspecting Panel A reveals that announcing the proposal had a positive effect of 3.86 percentage points for the 0-day window, which is the preferred size, assuming no information overflow before the event and underreaction of stock prices afterwards. This impact is significant at the 5% level by the Kolari test. Moreover, the effect turns insignificant for larger windows, suggesting that there is not too much over- and undershooting of stock prices.

Panel B indicates that there were some positive effects on September 12, 2012. The estimate of the 0-day impact is 2.49 percentage points, which is assigned a significance level of 10% by the Kolari test. This leaves the impression of mild positive effects. Possibly, presenting details about the SSM led to convergence of perceptions towards a positive impact. Alternatively, these details may have added more certainty to the entire process. It is conceivable that purpose and function of the SSM were clear upon announcement already and the proposal merely confirmed perceptions.

Panel C shows results for the "large banks only" announcement. Impact values are positive but close to 0 and therefore mostly insignificant, i.e. there seems to have been no impact. Splitting the sample into banks that later turned out to be supervised by the ECB (C2) and those that did not (C3) does not alter these results substantially. The only exception is a small negative effect, for non-supervised banks of -0.77 percentage points at the 0-day window, which is significant at the 5% level. This is in line with the argument that there should be no additional information content for supervised banks. For smaller banks, the expectation should have changed from ECB to national supervision. However, small banks do not appear to have expected big changes in supervision. The aforementioned negative effect of -0.77 percentage points seems economically relatively small. Furthermore, the weak effects can also be the result of anticipation, as discussed in Section 2.

All in all, Table I indicates that investors perceived the introduction of the SSM (June 29, 2012) as a positive event. Its impact on bank stocks is estimated to amount to roughly 3.9 percentage points upon announcement. Presentation of details yields smaller effects of around 2.5 percentage points and announcing that only large banks will be supervised did not have an impact. This is in line with expectations. Investors can assess the effect of the SSM when it is announced and their appraisal will be reflected in stock prices immediately. If no particularly unexpected detail about the implementation of the SSM is added, a more specific proposal should not have a large effect. Therefore, the intuition that June 29, 2012 is the most important event day

is confirmed.

A natural extension of the analysis would be to run these tests for all European countries separately in order to investigate how their national supervisory authorities are perceived compared to the SSM. However, this is not feasible due to the limited sample size. Instead, the sample is split into two parts (above and below the median of the respective split variable) by three different variables. First of all, the Supervisory Power Index (SPI) is employed. This index is constructed from survey data, which are collected from banking supervision and regulation authorities. The SPI is the sum of a certain set of legal rights that are granted to these authorities. The second split variable is the Corruption Perception Index (CPI). The CPI is published by Transparency International and compiled from the views of experts, business people and analysts. Corruption and supervisory power seem reasonable factors in determining the quality of a supervising institution. Splitting the sample along those dimensions should capture some of the heterogeneity in pre-SSM institutions. Furthermore, the sample is split by Debt/GDP, as banks typically own some amount of government bonds of their home country. Slack regulation might result in reduced interest rates, so more government debt could lead to fewer supervisory incentives. The SSM should be an independent institution that eliminates these incentives and establishes more trust in banks. That should be reflected in a higher impact for high Debt/GDP countries. In order to make sure that the sample splits are not too similar to each other and all estimations are essentially identical, the correlation among these indices for euro area countries is measured. The correlation between SPI and CPI is -0.3021, it is -0.1645 between SPI and Debt/GDP and -0.3535 between CPI and Debt/GDP. All of these values seem reasonably distant from 1/-1 in order to justify using all of them for a sample split. For more details, a list of the values of all split variables for euro countries can be found in the Appendix in Table A2.

4.2 Sample Split

Due to the fact that the variables which determine the split were not randomly allocated before the introduction of the SSM, differences in the effects have to be interpreted in a rather descriptive manner. If, for example, the sample is split by SPI, high SPI countries can have an effect different from low SPI countries due to other (omitted) variables that correlate with SPI, i.e. causality cannot be established.[19] In order not to rely on distributional

[19]For example, when large and powerful banks are rather located in low-SPI countries, the difference in the effect of the SSM can also be caused by differences in the size or

Table II: Impact of SSM announcements on stock returns. Sample split by Supervisory Power Index

Window		5 days	3 days	1 day	0 days
Panel A: 29.06.2012			**Euro Area Summit**		
A1: Supervision greater or equal median					
Mean CAR		-0.0226	0.0280	0.0294	0.0309
SE	t-test	0.0164	0.0190	0.0102***	0.0059***
z-score	Boehmer	0.5021	2.3142**	3.5361***	5.7611***
t	Kolari	-2.0509**	0.6754	1.5470	1.8971*
Observations		56	56	56	56
A2: Supervision less than median					
Mean CAR		-0.0130	0.0385	0.0431	0.0520
SE	t-test	0.0139	0.0126***	0.0111***	0.0086***
z-score	Boehmer	1.9984**	3.8037***	6.1504***	7.2120***
t	Kolari	-0.9290	1.5858	3.0446***	2.7517***
Observations		32	32	32	32
A3: Permutation test					
p-value		0.7217	0.7292	0.4295	0.0603*
Panel B: 12.09.2012			**Presentation of Proposal**		
B1: Supervision greater or equal median					
Mean CAR		0.0620	0.0454	0.0110	0.0161
SE	t-test	0.0173***	0.0124***	0.0071	0.0035***
z-score	Boehmer	4.8300***	4.2177***	1.1124	4.2265***
t	Kolari	2.0834**	1.7252*	0.1803	1.5498
Observations		56	56	56	56
B2: Supervision less than median					
Mean CAR		0.1081	0.0894	0.0353	0.0402
SE	t-test	0.0185***	0.0162***	0.0127***	0.0125***
z-score	Boehmer	6.9661***	6.0966***	2.8222***	3.6329***
t	Kolari	2.9466***	2.6888***	1.3440	1.7192*
Observations		32	32	32	32
B3: Permutation test					
p-value		0.1164	0.0508*	0.0962*	0.0340**

Notes: This table shows the results of tests for mean CAR equals zero for different event days and window sizes. Standard errors are reported in three different ways to account for event-date clustering and event-induced variance (t-test, Boehmer et. al (1991), Kolari and Pynnonen (2011)). All Panels are split by the median (with respect to Euro-countries) of the Supervision Power Index (Barth et al., 2013). Banks in countries with above-median supervision are in Panel 1 and in Panel 2 for below-median supervision. Panel 3 contains results of a permutation-based test for differences between the mean impacts (100,000 replications) displayed in Panel 1 and Panel 2. Stars indicate significance levels (*10%, **5%, ***1%).

assumptions, a permutation-based test is performed on the effect difference to check if it can be statistically distinguished from 0. This test permutes a dummy that indicates whether a bank is above or below the split threshold and then calculates the mean impact of the SSM for both subsamples as well as the difference thereof. Repeating that several times yields the distribution of the effect difference under the hypothesis that the dummy is exchangeable and inference can be drawn.

Split by Supervisory Power

Table II shows results when splitting the sample by the median of SPI, which amounts to 11. For the purpose of parsimony, only results of the two most significant dates (June 29, 2012 and September 12, 2012) are reported. The effects on December 13, 2012 in Table I are rather small and insignificant. Therefore, the event seems irrelevant and it is dropped from any further analysis. First of all, it can be inferred from the table that the impact remains positive for both types of banks. Secondly, the impact of the SSM is higher for banks in regimes with low supervisory power. Both observations hold for both event days.

In more detail, Panel A deals with June 29, 2012. Panel A1 shows mean CARs for banks in countries that have an SPI greater or equal to median SPI. In the 0-day window, there is an impact of 3.09 percentage points, which is found to be significant at the 10% level by the Kolari test. Panel A2 mirrors Panel A1 for banks with low SPI. Here, the effect becomes significant at the 1% level and amounts to 5.2 percentage points. The difference between effects of Panel A1 and A2 is presented in A3 by performing the permutation test. Here, the 0-day window is significant at the 10% level. All in all, Panel A suggests that the positive effect of the Euro Area Summit on bank returns was primarily driven by banks in low supervision countries.

The same procedure is repeated for the 12^{th} of September 2012. Here, the effect of closely monitored banks (Panel B1) is 1.16 percentage points and insignificant for the 0-day window. Higher effects can be observed for banks in regimes with low SPI (Panel B2). Here, the 0-day window impact amounts to 4.02 percentage points, which is significant at the 10% level according to the Kolari test. Furthermore, results of the permutation test (Panel B3) indicate that the impacts are significantly different for banks in low and high SPI countries at the 5% level. Overall, a picture similar to Panel A

power of banks.

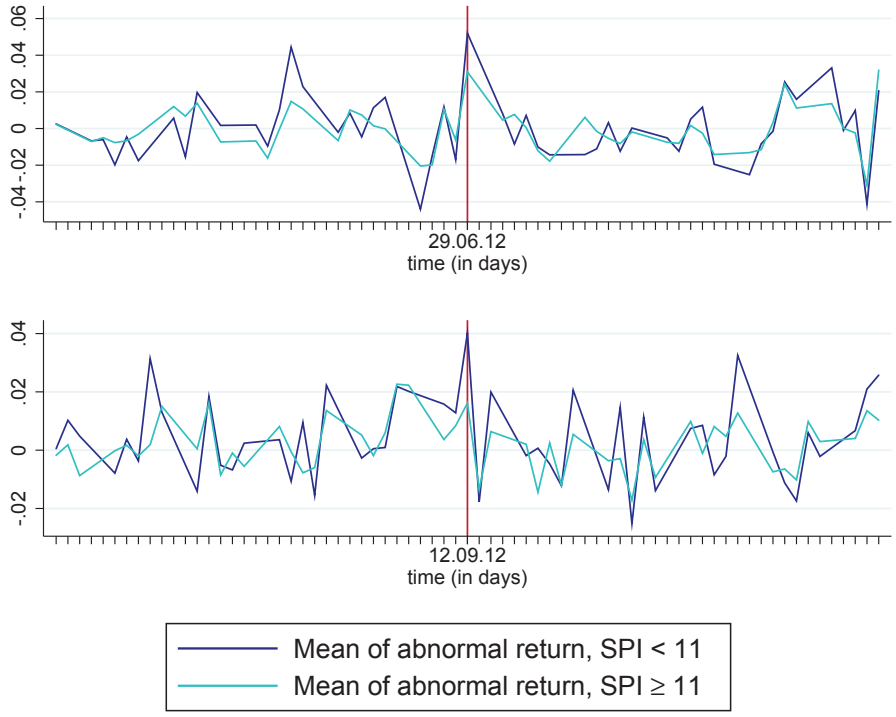

Figure 3: Mean abnormal returns of listed banks in the euro area split by median Supervision Power Index (SPI)

emerges. Effects are mostly positive and higher for banks in countries with low supervision. Figure 3 displays these results graphically.

All in all, the findings from Table II support the excessive risk hypothesis. It is possible that investors expected that the SSM prohibits bank CEOs from exposing the bank's balance sheet to exceedingly volatile assets. The higher effects for countries with low SPI further support this idea. Weakly legally backed supervisors could face difficulties when trying to reorganize the risk structure of a bank. So from an investor's point of view, the SSM seems to have resulted in some improvement, even more so for banks in countries that had a low power of supervision prior to the SSM.

Split by Corruption Perception

The SPI is a measure of legal rights. It incorporates neither enforcement of those rights nor compliance with the law. In the next step, the previous

Table III: Impact of SSM announcements on stock returns. Sample split by Corruption Perception Index

Window		5 days	3 days	1 day	0 days
Panel A: 29.06.2012			**Euro Area Summit**		
A1: CPI greater or equal median					
Mean CAR		-0.0006	0.0321	0.0329	0.0261
SE	t-test	0.0199	0.0233	0.0127**	0.0064***
z-score	Boehmer	1.7415*	2.7388***	3.9137***	5.3044***
t	Kolari	-0.3063	0.4751	1.5652	1.9081*
Observations		44	44	44	44
A2: CPI less than median					
Mean CAR		-0.0376	0.0315	0.0358	0.0511
SE	t-test	0.0114***	0.0113***	0.0086***	0.0072***
z-score	Boehmer	-1.2034	2.8493***	5.0176***	7.1296***
t	Kolari	2.5731**	1.5601	2.5846**	2.4428**
Observations		44	44	44	44
A3: Permutation test					
p-value		0.1086	0.9840	0.8529	0.0124**
Panel B: 12.09.2012			**Presentation of Proposal**		
B1: CPI greater or equal median					
Mean CAR		0.0711	0.0534	0.0116	0.0134
SE	t-test	0.0192***	0.0132***	0.0078	0.0041***
z-score	Boehmer	6.2589***	5.9106***	1.7624*	3.2454***
t	Kolari	3.2157***	3.0895***	0.8269	1.3701
Observations		44	44	44	44
B2: CPI less than median					
Mean CAR		0.0865	0.0693	0.0282	0.0364
SE	t-test	0.0178***	0.0152***	0.0104***	0.0093***
z-score	Boehmer	4.6756***	3.8997***	1.9860**	4.2263***
t	Kolari	1.8907*	1.4293	0.5647	1.6332
Observations		44	44	44	44
B3: Permutation test					
p-value		0.5647	0.4359	0.2125	0.0225**

Notes: This table shows the results of tests for mean CAR equals zero for different event days and window sizes. Standard errors are reported in three different ways to account for event-date clustering and event-induced variance (t-test, Boehmer et. al (1991), Kolari and Pynnonen (2011)). All Panels are split by the median (with respect to Euro-countries) of the Corruption Perception Index (CPI, Barth et al., 2013). Banks in countries with above-median corruption are in Panel 1 and in Panel 2 for below-median corruption. This index is constructed in a way that a high CPI is associated with low perceived corruption. Panel 3 contains a permutation-based test for differences between the impacts displayed in Panel 1 and Panel 2. Stars indicate significance levels (*10%, **5%, ***1%).

estimation procedure is repeated with corruption to capture heterogeneity in pre-SSM institutions along that dimension. The sample is split by median CPI (65.5) in Table III. It is important to note that high corruption perception corresponds to a low CPI value and vice versa. Hence, the split in Table III has to be interpreted accordingly: Countries with CPI greater or equal than median exhibit rather low corruption perception. Again, positive effects can be sustained, regardless of regime and event day. Furthermore, the impact of the SSM is slightly higher for banks in countries with higher perceived corruption.

More explicitly, Panel A displays results for June 29, 2012. The impact amounts to 2.61 percentage points for the low corruption countries in Panel A1. The Kolari test rejects the null hypothesis at the 10% level. The impact in high corruption countries in Panel A2 is almost twice as large (5.11 percentage points) and significant at the 5% level. Performing the permutation test for the difference between Panel A1 and A2 reveals that the two groups are differently affected by the SSM at the 5% significance level for the 0-day window.

Panel B inspects impacts on the 12$^{\text{th}}$ of September 2012. The effect size for the 0-day window is an insignificant 1.34 percentage points for banks in low corruption countries (B1). Banks in high corruption countries in Panel B2 experienced an insignificant impact of 3.64 percentage points. Again, the permutation test is performed and yields the same result as in Panel A: There are significant differences for the 0-day window at the 5% level. The results of Table III point in the same direction as the results of Table II: Effects are mostly positive and larger for banks in countries where corruption is more prevalent. Thus, there seems to be some evidence that the SSM had a bigger impact on banks in countries with higher corruption perception. Investors might put more trust in the European institution. Graphically, the impacts look similar to Figure 3 and can be found in the Appendix in Figure A1.

Split by Debt/GDP

In the last step, the same analysis is performed for the median of the debt-to-GDP ratio (80.5) of all euro area countries. The results are displayed in Table IV. The table indicates that the effect of the SSM on banks in countries with low indebtedness is negligible. In contrast, financial institutions in countries with high government debt mostly contribute to the positive effects of Table I. Again, Panel A addresses the 29$^{\text{th}}$ of June 2012. The effect size for banks in highly indebted countries (A1) amounts to 5.29 percentage points. The Kolari test can sustain a significance level of

Table IV: Impact of SSM announcements on stock returns. Sample split by debt-to-GDP ratio

Window		5 days	3 days	1 day	0 days
Panel A: 29.06.2012			**Euro Area Summit**		
A1: Debt/GDP greater or equal median					
Mean CAR		-0.0113	0.0581	0.0567	0.0529
SE	t-test	0.0151	0.0165***	0.0089***	0.0059***
z-score	Boehmer	1.3402	4.6907***	9.0333***	10.1930***
t	Kolari	-0.8393	1.6891*	2.6430***	2.4727**
Observations		60	60	60	60
A2: Debt/GDP less than median					
Mean CAR		-0.0351	-0.0244	-0.0135	0.0078
SE	t-test	0.0166**	0.0154	0.0097	0.0060
z-score	Boehmer	-1.6631*	-0.6477	-0.8173	1.8319*
t	Kolari	-4.5567***	-2.2590**	-0.5095	0.6447
Observations		28	28	28	28
A3: Permutation test					
p-value		0.5342	0.0894*	0.0161**	0.0161**
Panel B: 12.09.2012			**Presentation of Proposal**		
B1: Debt/GDP greater or equal median					
Mean CAR		0.1025	0.0768	0.0277	0.0301
SE	t-test	0.0125***	0.0107***	0.0078***	0.0070***
z-score	Boehmer	9.2120***	7.2995***	3.0204***	5.1611***
t	Kolari	2.7564***	2.4891**	1.1322	1.8024*
Observations		60	60	60	60
B2: Debt/GDP less than median					
Mean CAR		0.0281	0.0284	0.0031	0.0139
SE	t-test	0.0293	0.0206	0.0115	0.0058**
z-score	Boehmer	1.8880*	2.0424**	0.2098	1.6951*
t	Kolari	0.8774	0.3957	-1.6286	0.0293
Observations		28	28	28	28
B3: Permutation test					
p-value		0.1271	0.1975	0.3084	0.3972

Notes: This table shows the results of tests for mean CAR equals zero for different event days and window sizes. Standard errors are reported in three different ways to account for event-date clustering and event-induced variance (t-test, Boehmer et. al (1991), Kolari and Pynnonen (2011)). All Panels are split by the median (with respect to Euro-countries) of Debt/GDP. Banks in countries with above-median Debt/GDP are in Panel 1 and in Panel 2 for below-median Debt/GDP. Panel 3 contains a permutation-based test for differences between the impacts displayed in Panel 1 and Panel 2. Stars indicate significance levels (*10%, **5%, ***1%).

5%. For banks in less indebted countries (A2), the effect is rather low (0.78 percentage points) and insignificant. Moreover, the permutation test (A3) indicates that A1 and A2 are significantly different (5% level) for the 0-day window.

For the 12th of September 2012 (Panel B), the impact in highly indebted countries (B1) amounts to 3.01 percentage points for the 0-day window. Employing the Kolari test, significance can be sustained at the 10% level. In countries with lower debt-to-GDP ratios (B2), the impact of the 0-day window is 1.39 percentage points and insignificant. For the same window, the permutation test cannot reject the hypothesis that both effects are equal at conventional levels. Summarizing these results, Table IV gives the overall impression that the positive effects are mainly driven by banks in countries with high debt-over-GDP ratios. This speaks in favor of the idea that governments with more debt have fewer incentives to supervise in a strict manner. As domestic banks often hold a large amount of government debt, less strict supervision might result in lower interest rates. A graph of the impact can be found in the Appendix in Figure A2.

4.3 Euro vs. Non-Euro Banks

Resulting from spillover effects, it is possible that the SSM also has an impact on non-euro area banks in Europe. While spillovers are possible for euro area banks as well, the SSM should have a direct impact on these banks in addition. Therefore, I add non-euro European banks to the dataset so that it now contains the entirety of European listed banks. The sample is then split between euro and non-euro countries. Under the restrictive assumption that spillovers are the same for euro and non-euro banks (as well as the assumption that there were no other shocks on non-euro banks on the event day), the effects can be disentangled. If the assumption is not fulfilled, the sample split shows in a descriptive manner whether these two groups of banks were affected differently. Table V contains the results of the split with the extended sample.

As can be concluded from the table, there is also a positive and significant impact on non-euro banks. This effect is considerably smaller than the effect on euro banks. Hence, it seems that the direct impact is stronger than spillover effects. Taking a closer look at the 29th of June 2012, there was an impact on non-euro banks of 1.60 percentage points for the 0-day window, significant at the 1% level by the Kolari test. This number is compared to the impact on euro banks in Table I (3.86 percentage points).

Table V: Impact of SSM announcements on stock returns. Euro vs. non-euro European banks

Window		5 days	3 days	1 day	0 days
Panel A: 29.06.2012			**Euro Area Summit**		
A1: Mean impact on non-euro banks					
Mean CAR		0.0101	0.0195	0.0189	0.0160
SE	t-test	0.0052*	0.0056***	0.0037***	0.0027***
z-score	Boehmer	4.7228***	6.7747***	6.2582***	8.3939***
t	Kolari	0.8879	2.1116**	2.5483**	2.6829***
Observations		161	161	161	161
A2: Permutation test Difference euro vs non-euro					
Difference of mean impacts		-0.0292	0.0123	0.0154	0.0226
p-value		0.0075	0.3175	0.0426**	0.0000***
Panel B: 12.09.2012			**Presentation of Proposal**		
B1: Mean impact on non-euro banks					
Mean CAR		0.0280	0.0250	0.0070	0.0050
SE	t-test	0.0052***	0.0042***	0.0026***	0.0014***
z-score	Boehmer	7.0463***	7.4690***	1.9070*	4.3061***
t	Kolari	1.9264*	2.2493**	-0.0257	1.7326*
Observations		161	161	161	161
B2: Permutation test Difference euro vs non-euro					
Difference of mean impacts		0.0508	0.0363	0.0128	0.0199
p-value		0.0000***	0.0001***	0.0315**	0.0000***

Notes: This table shows the results of tests for mean CAR equals zero for different event days and window sizes for European banks that are not part of the euro area. Standard errors are reported in three different ways to account for event-date clustering and event-induced variance (t-test, Boehmer et. al (1991), Kolari and Pynnonen (2011)). Panel 2 contains a permutation-based test for differences between the impact of the SSM on euro area banks displayed in Table I and the impacts displayed in Panel 1. Stars indicate significance levels (*10%, **5%, ***1%).

The permutation-based test can sustain a significance level of 1% for the difference of impacts. A similar picture arises for the 12th of September 2012. Again, the impact on non-euro banks is positive but close to 0 for the 0-day window. The difference between euro and non-euro countries now amounts to 1.99 percentage points. Like the difference in Panel A1, it is significant at the 1% level. In line with expectations, these results indicate that the SSM had a higher effect on euro banks on that event day, as well. Figure A3 in the Appendix shows these results graphically.

5 Discussion and Conclusion

In this paper, I have investigated whether the SSM changed investor perceptions about bank profitability. Overall, the empirical results provide a uniform picture. Pooling all banks, announcing the SSM had a positive impact on stock returns of banks in euro area countries. The same applies to the presentation of a more detailed proposal. Splitting the sample by various country-specific measures (SPI, CPI, Debt/GDP) reveals that the positive effect of the SSM on abnormal returns is more pronounced for banks that are located in institutionally weaker countries. Lastly, comparing euro to non-euro European banks results in stronger effects for euro banks. Still, there is a small positive impact on non-euro banks. All results represent averages. Therefore, I cannot conclude that the SSM did not have any negative effects. I can, however, infer that positive aspects outweigh.

For these reasons, the findings of this event study are consistent with the hypothesis that the SSM prevents banks from taking excessive risks and stabilizes them. In particular, the fact that the impact is found to be more pronounced in countries with weaker institutions points in that direction. When banks in these countries can be considered ex ante as less stable, the SSM could be able to increase stability more than in other countries. Moreover, the positive effects for non-euro area banks support the spillover hypothesis. Both ideas are not mutually exclusive. Instead, it is conceivable that less excessive risk of one bank also decreases bankruptcy probabilities of other financial institutions due to network effects. My results indicate that these spillover effects are smaller in size on average than direct effects.

In contrast, the results are less in line with the idea that investors expected a central European supervision authority to be laxer than the average European predecessor. On the one hand, this hypothesis also predicts positive effects on stock prices as investors expect banks to be able to act more in their self-interest. On the other hand, inconsistencies arise when looking

at the results from splitting the sample by SPI. If the positive average effect of the SSM on bank profits was the result of a lax European supervisory regime, a stronger positive impact should be observable in countries with strict ex ante supervision. After all, these banks were already exposed to weak supervisors before the regime change. Hence, compared to banks in countries with high SPI values, ex ante supervision is closer to the new standard for these types of banks. As a consequence, they should be less affected. Table II demonstrates the opposite. Considering these arguments, it is most likely that the SSM improved bank stability by increasing the standards of supervision.

All in all, this event study suggests that the introduction of the SSM was regarded as positive by investors in European banks. When it comes to welfare implications of the SSM, additional dimensions need to be taken into account. In particular, this paper does not consider bank customers, bank employees and tax payers. Analyzing government bond risk premia for different countries, for example, could shed light on the effect of harmonized supervision on the last of these groups.

Appendix

Tables

Table A1: Impact of SSM announcements on stock returns on the 12th of September, 2013 (Approval of Proposal)

Window		5 days	3 days	1 day	0 days
Mean CAR		0.0277	0.0164	0.0031	0.0021
SE	t-test	0.0130**	0.0070**	0.0040	0.0018
z-score	Boehmer	1.9336**	1.9534**	1.4591	-0.3165
t	Kolari	1.2894	1.0427	0.5425	-0.8795
Obervations		88	88	88	88

Notes: This table shows the results of tests for mean CAR equals zero on the 12.09.2013 for different window sizes. Standard errors are reported in three different ways to account for event-date clustering and event-induced variance (t-test, Boehmer et. al (1991), Kolari and Pynnonen (2011)). Panel C is split into supervised and non-supervised banks as ECB supervision of large banks only was announced on that day. Stars indicate significance levels (*10%, **5%, ***1%).

Table A2: Values of split variables

Country	SPI	CPI	Debt/GDP[1]
Austria	12	69	81.540
Belgium	11	75	103.865
Cyprus	11	66	79.495
Finland	5	90	52.888
France	10	71	89.404
Germany	11	79	79.311
Greece	8	36	156.494
Ireland	6	69	120.242
Italy	13	42	123.142
Lithuania	11	54	39.818
Malta	12	57	67.638
Netherlands	11	84	66.106
Portugal	12	63	125.764
Slovakia	11	46	52.107
Slovenia	14	61	53.362
Spain	9	65	84.440

[1] in % and in 2012.

Figures

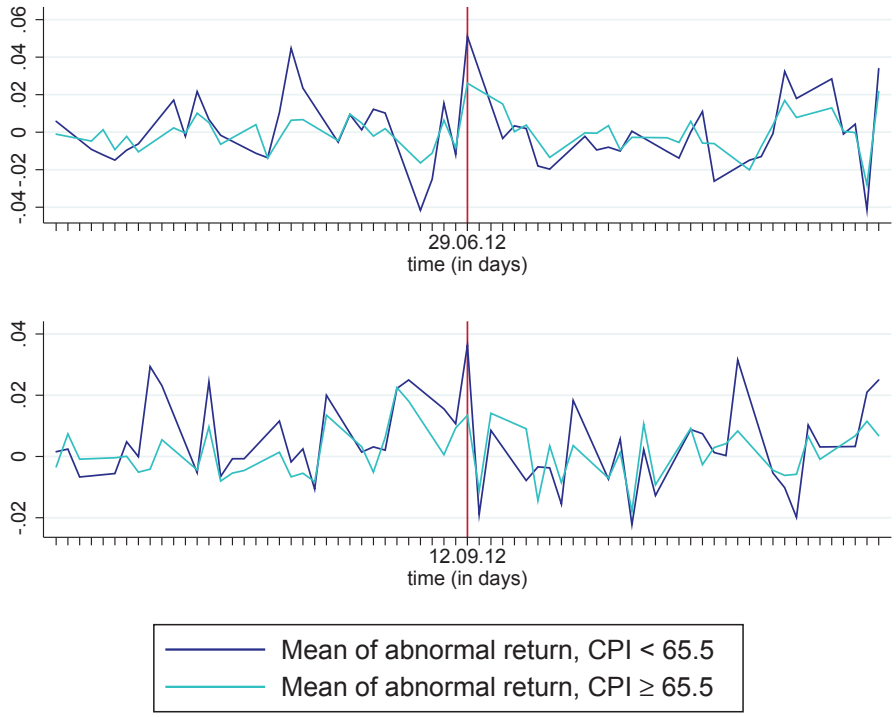

Figure A1: Mean abnormal returns of listed banks in the euro area split by median Corruption Perception Index (CPI)

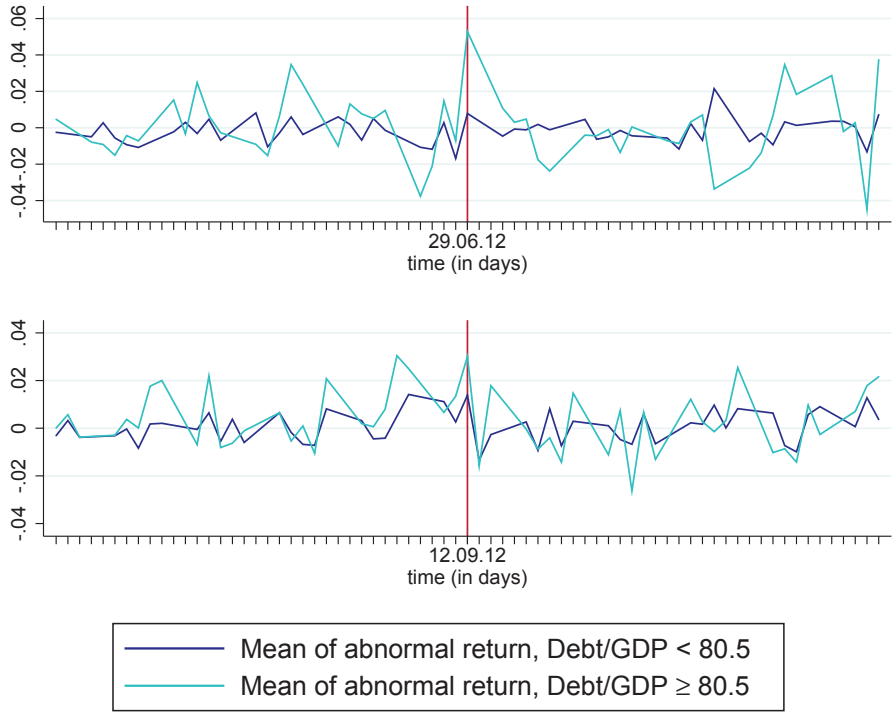

Figure A2: Mean abnormal returns of listed banks in the euro area split by median debt-to-GDP ratio

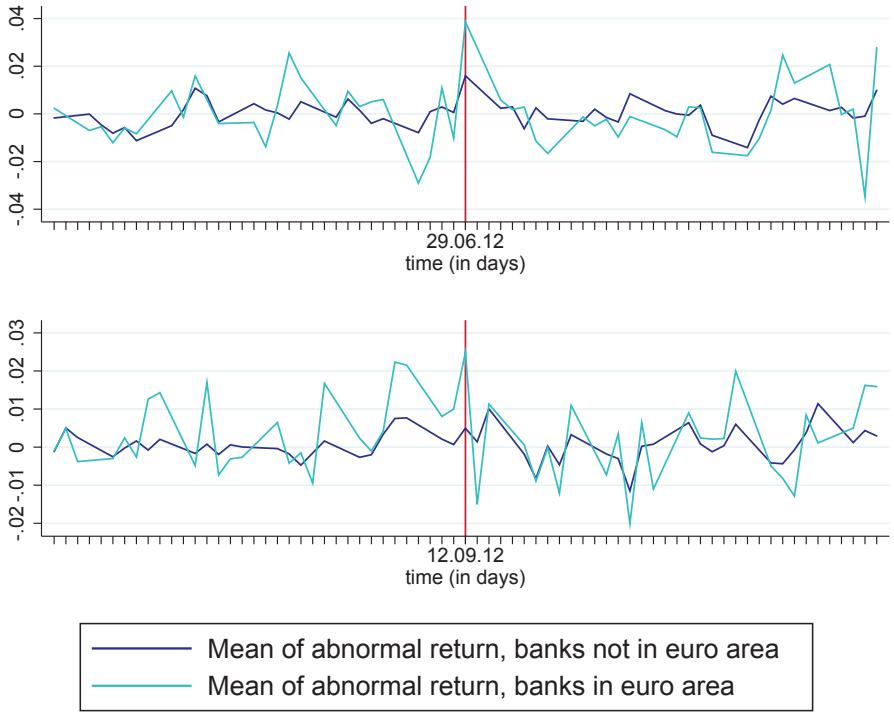

Figure A3: Mean abnormal returns of listed banks in the euro area and European banks in non-euro countries

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