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Doom loop, trilemma, and moral hazard: Which narrative of the banking union did stock market investors buy?

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Non-technical summary

Research Question

The European banking union arguably constitutes the most fundamental change in the institutional architecture of the euro area since the adoption of the euro. The research question of this paper is what expectations market participants formed about the banking union when it was announced during the crisis in the euro area. We assess market expectations by identifying unusual stock price movements (abnormal returns) of euro area banks around the announcement date. Furthermore, we investigate whether certain characteristics of banks and their home countries can explain such unusual stock price movements.

Contribution

Our paper contributes to the emerging but still small body of empirical literature on the evaluation of the banking union. Our specific contribution is that we consistently derive testable hypotheses which follow from three views on the banking union proposed by policy makers and academics. First, banks' business prospects may become less dependent on the sovereign risk of their home country ("doom loop view"). Second, the banking union may mitigate the problem of underprovision of national public crisis support for pan-European banks ("financial trilemma view"). Third, the banking union may allow the European Central Bank to condition crisis support for banks on the solvency of individual banks ("moral hazard view").

Results

Our results show that the announcement of the banking union on average caused large positive abnormal returns of euro area banks. When explaining differences in abnormal returns between banks, our clearest result is that they stem from differences in the systemic importance of banks. The more systemic a bank is, the higher the abnormal returns. Moreover, abnormal returns of banks vary with sovereign risk. The riskier the sovereign, the higher the abnormal returns. By contrast, abnormal returns are not robustly related to bank risk. These findings reveal market expectations consistent with the view that the banking union makes banks less dependent on their home country's sovereign risk and mitigates a financial trilemma.

Nichttechnische Zusammenfassung

Fragestellung

Die europäische Bankenunion stellt wohl die grundlegendste Veränderung in der institutionellen Architektur des Euroraums seit der Einführung des Euro dar. Die Forschungsfrage dieses Papiers lautet, welche Erwartungen die Marktteilnehmer in Bezug auf die europäische Bankenunion gebildet haben. Wir schätzen Markterwartungen zur Bankenunion ein, indem wir ungewöhnliche Aktienkursbewegungen (abnormale Renditen) von Banken im Euroraum rund um die Ankündigung der Bankenunion ermitteln. Zudem untersuchen wir, ob bestimmte Merkmale der Banken und ihrer Heimatländer solche ungewöhnlichen Aktienkursbewegungen erklären können.

Beitrag

Unsere Arbeit leistet einen Beitrag zur Evaluation der Bankenunion. Unser spezifischer Beitrag zu diesem noch recht kleinen Literaturzweig besteht darin, dass wir testbare Hypothesen aus drei vorherrschenden Sichtweisen politischer Entscheidungsträger und Wissenschaftler zur Bankenunion ableiten. Erstens könnten die Geschäftsaussichten der Banken infolge der Bankenunion weniger stark vom Länderrisiko ihres Sitzlandes abhängen (Sichtweise „Doom Loop"). Zweitens könnte die Bankenunion das Problem unzureichender nationaler öffentlicher Krisenhilfe für länderübergreifend tätige europäische Banken entschärfen (Sichtweise „Finanzielles Trilemma"). Drittens könnte die Bankenunion es der Europäischen Zentralbank ermöglichen, Krisenhilfen für Banken von der Solvenz einzelner Banken abhängig zu machen (Sichtweise „Moral Hazard").

Ergebnisse

Die Ankündigung der Bankenunion führte im Durchschnitt zu hohen positiven abnormalen Renditen der Banken im Euroraum. Unterschiede zwischen den abnormalen Renditen der Banken lassen sich auf Unterschiede in der Systemrelevanz zurückführen: Je ausgeprägter die Systemrelevanz einer Bank, desto höher die abnormalen Renditen. Darüber hinaus variieren die abnormalen Renditen der Banken mit dem Länderrisiko: Je risikoreicher das Sitzland, desto höher die abnormalen Renditen. Im Gegensatz dazu stehen die abnormalen Renditen in keinem robusten Zusammenhang mit dem Bankrisiko. Diese Ergebnisse deuten auf Erwartungen der Marktteilnehmer hin, dass die Bankenunion die Abhängigkeit der Banken vom Länderrisiko des Sitzlandes verringert und ein finanzielles Trilemma abmildert.

Doom Loop, Trilemma, and Moral Hazard: Which Narrative of the Banking Union Did Stock Market Investors Buy?[*]

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Abstract

We analyze the impact of the announcement of the banking union on stock market returns of euro area banks against the backdrop of three commonly held views of the banking union. We document positive individual abnormal returns for most banks. Abnormal returns are large and positive on average, and they vary substantially across banks. The more systemically important a bank is, the higher are the abnormal returns, both in 'crisis countries' and 'non-crisis countries'. Moreover, abnormal returns of banks are positively related to sovereign risk, with Greek banks experiencing extremely high abnormal returns. By contrast, abnormal returns are not robustly related to bank risk. These findings reveal market expectations consistent with the view that the banking union makes banks less dependent on their home country's sovereign strength and mitigates a financial trilemma. However, market participants do not seem to take the view that the banking union reduces a moral hazard problem that may emerge from a common lender of last resort and national responsibilities for banking supervision and resolution.

Keywords: Euro area crisis, banking union, sovereign-bank nexus, systemic risk, event study

JEL classification: G01, G21, G28

1 Introduction

The European banking union arguably constitutes the most fundamental change in the institutional architecture of the euro area since the adoption of the euro. When the heads of state and government announced the banking union on June 29, 2012, they presented the banking union as a means of breaking a vicious circle. This circle, also referred to as a 'deadly embrace' or 'doom loop', is considered a root cause of the crisis in the euro area. It encapsulates feedback loops that emerge from the exposure of banks to their home countries' sovereign debt, high public debt burden, and market expectations of domestic government support for failing banks. This view on the banking union is supported by many policy observers and advisors in the political-academic sphere (Beck, Gros and Schoenmaker, 2012; Bénassy-Quéré, Brunnermeier, Enderlein, Farhi, Fratzscher, Fuest, Gourinchas, Martin, Pisani-Ferry, Rey, Schnabel, Véron, di Mauro and Zettelmeyer, 2018), and the sovereign-bank nexus in the euro area has become a subject of intense research and policy debate.

However, it is not the only view on the banking union. Academic economists and policy advisors have offered two complementary views quite different in flavor. The first of these views is that the banking union mitigates a policy trilemma: domestic policy makers in euro area member states cannot achieve financial integration and financial stability while at the same time maintaining full sovereignty over domestic banking sectors (Schoenmaker, 2011). The second complementary view, meanwhile, suggests that the banking union alleviates moral hazard concerns that emerge from the European Central Bank (ECB) acting as a joint lender of last resort for euro area banks, while national supervisory authorities (and in case of need national fiscal policy makers) are responsible for assessing the solvency of banks and the handling of bank failures (Buch, Körner and Weigert, 2014; German Council of Economic Experts, 2012; Hellwig, 2014).

The contribution of this paper is to assess which view market participants adopted when the banking union was announced for the first time on June 29, 2012. To this end, we estimate abnormal stock returns of euro area banks around the announcement date and explain the heterogeneity of abnormal returns by home country and bank characteristics, such as sovereign risk, bank's systemic importance, and bank risk. In this way, we connect the observed market reactions to the three views of the banking union, and try to infer which view mattered most to market participants.

We believe that assessing market views is important, because market expectations on the banking union may have an impact on subsequent policy decisions and the future design of institutions. In particular, market expectations on public support for the banking system may materially shape risk-taking incentives of economic agents in non-crisis times (e.g. Acharya and Yorulmazer, 2007; Farhi and Tirole, 2012). In crisis times, market expectations on public support affects incentives of policy makers to actually grant support. Therefore, understanding market expectations helps to inform the ongoing debate on amending and reforming the banking union. Assessing market views on the banking union is also important from the perspective of scientific policy evaluation. After all, the banking union, the announcement of which was a landmark event, needs careful and thorough assessment of outcomes, both intended and unintended. Assessing market expectations provides indications about the relevance of circulating hypotheses, generates additional hypotheses about the banking union, and thus may help to guide

future evaluation research.

Our results show that the announcement of the banking union on average caused large positive abnormal returns of euro area banks (5.0%). The individual abnormal returns are positive for the vast majority of banks (87%). The heterogeneity of abnormal returns is substantial (standard error of 4.0). When explaining this heterogeneity, our clearest result is that it stems from differences in the systemic importance of banks. The more systemic a bank is, the higher the abnormal returns. This holds for banks in 'crisis countries' and 'non-crisis countries'. Moreover, abnormal returns of banks vary with sovereign risk. The riskier the sovereign, the higher the abnormal returns. Greek banks experienced extremely high abnormal returns (on average 10.3 percentage points higher than in non-crisis countries). With regard to bank risk, some measures of bank risk are positively associated with abnormal returns. However, this association is not robust and often vanishes once we control for systemic importance and sovereign risk.

Our paper contributes to the emerging but still small body of empirical literature on the impact of several aspects of the banking union on outcomes at the bank level. In this strand of the literature, researchers employ market or accounting data of individual banks to assess specific aspects of the banking union. Theses aspects cover the run-up phase of the banking union, the centralisation of supervisory powers at the ECB within the Single Supervisory Mechanism (SSM), and, to lesser extent, the centralization of bank resolution powers within the Single Resolution Mechanism (SRM).

Sahin and de Haan (2016), Carboni, Fiordelisi, Ricci and Lopes (2017) and Fiordelisi, Ricci and Lopes (2017) investigate the run-up phase of the banking union, including the screening of banks by the ECB (comprehensive assessment) before it took over as central supervisor for the euro area. Fiordelisi et al. (2017) focus on the years between the political announcement of the banking union (June 2012) and the assumption of supervisory powers by the ECB (November 2014). They document that banks expected to be directly supervised by the ECB reduced lending and increased their capital ratios. Analyzing stock market reactions of listed banks, Carboni et al. (2017) find that the publication of the results of the comprehensive assessment in October 2014 revealed new information to market participants. By contrast, Sahin and de Haan (2016) do not find any significant reactions by banks' stock prices and CDS spreads.

Avignone, Altunbas, Polizzi and Reghezza (2021), Loipersberger (2018) and Pancotto, ap Gwilym and Williams (2020) empirically examine the centralization of supervisory powers at the ECB within the SSM. Whether the decentralization or centralization of administrative powers matters economically is a question that has concerned researchers for a very long time. With regard to banking supervision, relatively recent evidence for the United States shows that a central (federal level) supervisor might apply the same administrative rules in a different way than a decentralized (state level) supervisor (Agarwal, Lucca, Seru and Trebbi, 2014). In particular, in the period investigated, the federal supervisor acted tougher on banks than state supervisors.

Avignone et al. (2021) compare accounting data of euro area banks before and after the establishment of the ECB as the central supervisory authority. They find that banks directly supervised by the ECB reduced loan loss reserves and loan loss provisions, relative to prior periods and relative to banks directly supervised by national authorities. They interpret their findings as evidence for reduced bank risk due to central supervision. Loipersberger (2018) tracks how the SSM evolves over time, from the announcement in

June 2012 to the approval of the legislative proposal in September 2013. He documents significantly positive abnormal stock returns of listed euro area banks for three out of four event dates. Moreover, he finds higher abnormal returns in countries with weaker institutions. He interprets these findings as being consistent with the hypothesis that the SSM prevents excessive risk-taking of banks. By contrast, Pancotto et al. (2020) focus on ECB press releases on the implementation of the SSM between September 2012 and November 2014. On average, these announcements generated mildly negative abnormal returns (see their Table 9, Panel B). The establishment of the banking union also inspired new theoretical research that goes beyond the question of 'centralized versus decentralized'. Colliard (2019) and Carletti, Dell'Ariccia and Marquez (2021) investigate the optimal allocation of competencies between the central authority and local authorities in a joint supervisory regime such as the SSM.

Lastly, some papers evaluate the introduction of bank resolution regimes in member states of the European Union and the centralization of resolution powers in the euro area. These papers relate to the issues discussed in this paper, because the centralization of bank resolution powers, although not announced in June 2012, soon became an integral part of the banking union. Moreover, bank resolution regimes play a crucial role for the formation of expectations of market participants. Studies based on difference-in-difference estimation around the implementation of bank resolution regimes provide evidence of higher funding costs of banks (Cutura, 2021; Koetter, Krause, Sfrappini and Tonzer, 2022) and a shift of bank funding to deposits (Fiordelisi and Scardozzi, 2022), thus supporting the hypothesis of reduced bail-out expectations. Using event study methods, Fiordelisi, Minnucci, Previati and Ricci (2020) focus on legislative events and Schäfer, Schnabel and Weder di Mauro (2016a) focus on actual bank resolution cases. Both studies document market reactions in line with a reduction of bank bail-out expectations. However, both studies do not find any significant market reactions to the centralization of resolution powers. In this regard, Schäfer et al. (2016a) point out scepticism of market participants towards the commitment to the new rules in crisis times.

Our paper extends the existing literature on the banking union in two ways: First, we explicitly take into account the new role of the European Stability Mechanism (ESM) announced in the June 2012 summit statement. The empirical literature so far views the SSM mostly through the lens of centralized versus decentralized banking supervision. If at all, the literature pays very little attention to the fact that policy makers announced the possibility of recapitalizing failing banks through the ESM, thus shifting the fiscal burden of bank bail-outs partially from the national to the European level. Therefore, our paper also speaks to the theoretical literature which points to an important role of a common financial safety net in the banking union (Goodhart and Schoenmaker, 2009; Foarta, 2018).

Second, we explicitly take into account the fact that the establishment of the banking union not only meant a shift from decentralized to centralized supervisory powers, but also a shift from local supervision to the central monetary policy maker. This is important due to the aforementioned role of the ECB as the lender of last resort. The potential importance of this aspect is also highlighted by the literature that examines the interactions between monetary policy and banking supervision (e.g. Goodhart and Schoenmaker, 1995). Ioannidou (2005) provides evidence that the Federal Reserve System's monetary policy stance in the 1990s affected its behaviour as banking supervisor. His results suggest

that a monetary policy tightening led to less strict banking supervision.

Consequently, when we build our hypotheses, we consider all relevant elements of the landmark summit statement from June 2012. We fully acknowledge that the statement not only envisages new banking supervision powers at the European level, but also a financial safety net for the banking union. Moreover, we take into account that the very same institution was entrusted with supervisory powers which, as a monetary policy maker, was already in effect a crucial part of the financial safety net for euro area banks. However, despite of this more encompassing view of the announcement of the banking union, our study does not take into account other important design features of the banking union. In particular, the event we study does not cover the introduction of bank resolution regimes in member states of the European Union, the centralization of resolution powers in the euro area, the harmonization of deposit guarantee schemes and ongoing policy discussions about a joint European deposit guarantee scheme.

We proceed as follows: In Section 2, we provide some background on the banking union and describe in detail the announcement event. Section 3 presents the general methodology and the data. Section 4.1 provides results on abnormal stock returns of euro area banks, using non-euro area banks in member states of the European Union as a control group. Section 4.2 forms the heart of our empirical analysis. Guided by the three prevailing views on the banking union, we build hypotheses of how characteristics of banks and their home countries should influence banks' abnormal returns. We use sample splits and regression analyses to describe the association between abnormal returns, sovereign risk, bank systemic importance, and bank risk. Section 5 concludes.

2 Background on the Banking Union and Description of the Event

On June 29, 2012, the heads of state and government of the euro area published the following statement:

> *We affirm that it is imperative to break the vicious circle between banks and sovereigns. The Commission will present Proposals on the basis of Article 127(6) for a single supervisory mechanism shortly. We ask the Council to consider these Proposals as a matter of urgency by the end of 2012. When an effective single supervisory mechanism is established, involving the ECB, for banks in the euro area the ESM could, following a regular decision, have the possibility to recapitalize banks directly. This would rely on appropriate conditionality, including compliance with state aid rules, which should be institution-specific, sector-specific or economy-wide and would be formalised in a Memorandum of Understanding. (...)*

This statement formed the starting point for the European banking union: a set of institutional arrangements for supervised banks in the euro area that combines elements of centralized oversight with mechanisms of public and private sector risk sharing across member states in the event of banking crises. The banking union is part of the policy responses to the crisis in the euro area. It needs to be viewed against the background of financial assistance programs for individual member states, reforms of the fiscal and

governance framework of the euro area, and the policy measures of the ECB. Member states and the International Monetary Fund provided financial assistance to governments in Greece (2010–2018), Ireland (2010–2013), Portugal (2011–2014), Spain (2012–2013) and Cyprus (2013–2016), conditional on reforms conducted at the national level.[1] In addition to the banking union, the institutional reforms altered the fiscal and governance framework of the euro area (fiscal rules, surveillance mechanisms, and sanctioning powers of the European Commission) and established the ESM as a permanent common crisis management mechanism.

Probably the most important goal of the banking union is to mitigate the financial stability risks from the close linkages between banks and sovereigns in individual member states. In fact, by the time the summit statement was released, the "vicious circle between banks and sovereigns" had become a central concern by both policy makers (e.g., President of the European Council, 2012; Van Rompuy, 2012) and academics (e.g., Brunnermeier, Garciano, Lane, Pagano, Reis, Santos, Thesmar, van Nieuwerburgh and Vayanos, 2011; Acharya, Schnabl and Drechsler, 2012; Beck et al., 2012). In particular, alleviating the sovereign-bank nexus was central to the agreement between the Spanish government and euro area finance ministers of June 9, 2012 on a EUR 100 billion loan for the recapitalization and restructuring of the Spanish banking sector.[2]

The summit statement of June 29 expresses clearly the political will of the euro area heads of state and government to change the institutional framework for oversight and control over the banking sector with regard to three essential aspects: First, banking supervision powers will be shifted from national authorities to the European level. Second, the ECB will be a central actor in the new system of banking supervision, meaning a shift from banking supervisory authorities to an authority also responsible for monetary policy. Third, resources of the ESM will be made available for the purpose of recapitalizing banks directly, meaning a partial shift of fiscal responsibility for the banking sector from the national to the European level.

As a political statement by top-level decision makers, the summit statement is silent about the details of the new institutional arrangements. It just marked the starting point of political negotiations which turned out to be very controversial and time consuming (Howarth and Quaglia, 2013). Media reports suggest that some contentious issues already became public information on June 29, 2012.[3] For instance, it was already clear that policy makers held differing views on whether the ECB would become supervisor of all euro area banks or only of banks considered systemically important. Another politically thorny issue was the question of whether, in addition to supervisory powers, resolution powers for failing banks should also be shifted to the European level.

Eventually, under the SSM, the ECB's supervisory powers became effective on November 4, 2014. The ECB became responsible for the overall functioning of the SSM and for direct supervision of the largest banks (assets of more than EUR 30 billion or more than 20% of the home country's GDP), whereas national authorities continued to super-

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[1]The time spans refer to the official approval and conclusion of financial assistance programs published on the website of the ESM.

[2]See press release, June 9, 2012, *"Eurogroup statement on Spain"* and Financial Times, European Edition, June 11, 2012, *"Doubt hangs over Spain bailout"*. The details of the loan to the Spanish government were concluded in the memorandum of understanding from 20 July, 2012.

[3]See FT.com, June 29, 2012, *"Eurozone off on journey to central control"*.

vise the smaller banks.[4] With regard to bank resolution powers, European legislators opted for a separate solution. The SRM includes centralized decision-making powers at a newly established European agency (Single Resolution Board, SRB) and financial resources (Single Resolution Fund, SRF) to be used in resolution proceedings. It became operational on January 1, 2016.[5]

The possibility of using ESM funds to recapitalize banks directly came into effect on December 8, 2014. Direct recapitalization means that member states requesting financial assistance from the ESM do not apply for a loan and thus do not have to commit to a reform program. Instead, under specific conditions, the ESM may use up to EUR 60 billion of its funds to acquire ownership and other financial instruments of troubled banks considered systemically important (European Stability Mechanism, 2014). In December 2018, the finance ministers of the euro area agreed on further amendments to the ESM to be implemented until the year 2024 (Eurogroup, 2018a). According to the agreement, the direct recapitalization instrument is to be replaced by a "common backstop on behalf of the euro area, in the form of a revolving credit line to the Single Resolution Fund (SRF)" (Eurogroup, 2018b). The basic idea is that the ESM may grant a loan to the SRF if its financial resources do not suffice to back up resolution proceedings of the SRM.

Although the three elements of the banking union, the SSM, the SRM, and amendments to the ESM are closely intertwined, they were negotiated separately and consecutively. At the early stages of the banking union, the policy makers' focus on the SSM was a direct consequence of the summit statement of June 29, 2012, which declared it "a matter of urgency", to be considered by the Council "by the end of 2012". Moreover, given obvious time constraints, starting with the SSM was a natural choice, because it was deemed the precondition for direct bank recapitalization. Separate treatment of the three elements of the banking union may also be explained by different legislative procedures. While both the SSM and the SRM went through the ordinary legislative procedure of the European Union, the SRM had to be built on the Bank Recovery and Resolution Directive, which was only adopted by the European Parliament in May 2014. The ESM is not a matter of the ordinary legislative procedure, but of intergovernmental decision-making. Thus, negotiations of the ESM amendment were mostly between euro area member states, with only limited involvement of European institutions.

To sum up, the announcement covered here is the only event that generated substantial new and largely unanticipated information about the establishment of the SSM and the amendment of the ESM. In particular, it is the only event that covers two central aspects of the banking union simultaneously: centralized control and the common safety net.

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[4]More precisely, the criteria for direct supervision under the SSM Regulation are: the total value of assets exceeds EUR 30 billion or, unless the total value of assets is below EUR 5 billion, exceeds 20% of national GDP; the bank is one of the three most significant credit institutions established in a member state; it is a recipient of direct assistance from the ESM; the total value of a bank's assets exceeds EUR 5 billion and the ratio of cross-border assets/liabilities in more than one other participating member state to its total assets/liabilities is above 20%.

[5]See, e.g., Buch et al. (2014) for an overview of the legal framework and governance structures of the SSM and the SRM.

3   Empirical Approach

The basic aim of this study is to empirically assess stock market expectations on the banking union. In particular, we aim to assess expectations on centralized control and the common safety net. To this end, we estimate the impact of the summit statement of June 29, 2012 on stock prices of publicly listed banks in member states of the euro area, using banks in non-euro area member states of the European Union as a control group.

We proceed in two steps: First, we calculate individual and average abnormal returns for both groups to check whether the announcement had any sizeable and significant impact on banks' market valuations (Section 4.1). Second, we exploit the heterogeneity of abnormal returns of euro area banks to test which aspects of the announcement of the banking union mattered most to market participants, and which ones are likely to be negligible (Section 4.2). Before presenting and discussing the results, we outline the event study design for common events (Section 3.1), our sample of banks and our data (Section 3.2).

3.1   Event Study Design for Common Events

The basis for our empirical analysis is the market model. It describes the return R_{it} of an asset i in relation to the return of the market portfolio R_{Mt} at time t. In our context, we estimate abnormal stock returns of banks $i = 1, ..., n$ by regressing banks' individual daily stock returns R_{it} on a constant α_i, the return of a market index R_{Mt}, and a dummy variable D_t equal to 1 during the event window and zero otherwise. The coefficient estimates of γ_i deliver estimates of abnormal stock returns for banks $i = 1, ..., n$.

$$R_{1t} = \alpha_1 + \beta_1 R_{Mt} + \gamma_1 D_t + \epsilon_{1t} \tag{1}$$
$$\dots$$
$$R_{it} = \alpha_i + \beta_i R_{Mt} + \gamma_i D_t + \epsilon_{it}$$
$$\dots$$
$$R_{nt} = \alpha_n + \beta_n R_{Mt} + \gamma_n D_t + \epsilon_{nt}$$

We use a 150-trading day estimation window that ends two days before the event. To keep the estimation windows synchronous for all banks in the sample, we treat holidays, which may differ across countries, as non-trading days for every bank in the sample. To this end, we drop the TARGET2 holidays for euro area countries, and additional national holidays for other European Union member states. Our main specifications rely on a one-day event window. As a robustness exercise, we also include event dummies for the pre-event trading day ((-1,0) event window) and the trading day after the event ((0,1) event window). The pre-event dummy accounts for potential anticipation effects, while the after-event dummy accounts for the possibility that market participants did not fully digest the news content of the event at the event date.

Because the event is the same for all banks, cross-sectional dependence of error terms is likely. Therefore, we do not estimate the regression equations for each bank individually, but as a system of equations in a seemingly unrelated regression (SUR) framework (Zellner, 1962). The advantages of this approach have been stressed in the literature deal-

ing with regulatory events which affect many firms at the same time (e.g. Binder, 1985; Doidge and Dyck, 2015; Schäfer, Schnabel and Weder di Mauro, 2016b). In particular, the SUR framework enables the efficient estimation of the variance-covariance matrix of error terms, allowing for contemporaneous correlations of error terms across equations. Moreover, using SUR estimates of coefficients and of the variance-covariance matrix, it is possible to implement hypothesis tests involving linear combinations of coefficients from different equations.[6]

To test whether average abnormal returns for certain subsamples J of banks are statistically different from zero, we run hypothesis tests of the kind:

$$H_0 : \frac{1}{|J|} \sum\nolimits_{j \in J} \gamma_j = 0 \tag{2}$$

Moreover, to explore differences between euro area and non-euro area banks and differences with respect to bank and country characteristics, we test whether average abnormal returns differ statistically between subsamples J and K:

$$H_0 : \frac{1}{|J|} \sum\nolimits_{j \in J} \gamma_j - \frac{1}{|K|} \sum\nolimits_{k \in K} \gamma_k = 0 \tag{3}$$

To examine further the heterogeneity of individual abnormal returns and to allow for the inclusion of control variables, we relate estimates of banks' abnormal returns $\hat{\gamma}_i$ to a vector of bank variables $\mathbf{x}_i^{bank}$ and a vector of characteristics of the banks' home countries $\mathbf{x}_i^{country}$ in simple regression models:

$$\hat{\gamma}_i = \alpha + \boldsymbol{\beta} \cdot \mathbf{x}_i^{bank} + \boldsymbol{\delta} \cdot \mathbf{x}_i^{country} + \epsilon_i \tag{4}$$

3.2 Sample and Data

The starting point for the construction of our sample of 'banks' is the definition of a credit institution according to European Union legislation. A credit institution is an institution that "takes deposits or other repayable funds from the public and grants credits for its own account".[7] Thus, we collect from Bankfocus, a commercial database, all financial institutions that are chartered in a member state of the European Union, that had customer deposits and loans outstanding in the year 2012, and that are listed on a stock exchange.

In a second step, we merge the preliminary sample with stock price information from Bloomberg. Some banks drop out, because no price information is available at all or at the event date. To facilitate SUR estimation, we require the remaining banks to be almost continuously traded during the estimation window. This is due to the fact that an excessively large number of days with missing stock prices and no trades (the latter leading to zero stock returns) renders the variance-covariance matrix of error terms singular. Hence, we drop banks with more than 10 days of missing stock price information

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[6]Note that SUR estimates of the coefficients α_i, β_i and γ_i do not differ from the coefficient estimates of equation-by-equation OLS, since the regressors are the same in each equation. Hence, the modeling choice is relevant for hypothesis testing and statistical significance, but does not affect the economic significance of the results.

[7]See Article 4, Capital Requirements Regulation.

during the estimation window. Furthermore, we drop banks for which no stock price change occurs on more than 10 days during the estimation window. Our final sample consists of 90 banks. 61 banks fall within the scope of the banking union, and 29 banks are from non-euro area member states of the European Union. The variables and data sources of our analysis are summarized in Table 1.

TABLE 1

VARIABLE DEFINITIONS AND DATA SOURCES

Variable	Description	Data source
A. Stock returns		
Stock return R_{it}	Bank stock returns, daily	Bloomberg
Market return R_{Mt}	Return of Stoxx Global Total Market Index, daily	Bloomberg
B. Sovereign risk		
Sovereign rating	Average country rating of bank's home country. For all countries the ratings of three rating agencies serve as input data. To make the ratings of different rating agencies comparable, we rely on the mapping referred to in Art. 136 CRR which is used by European supervisory authorities and maps each rating into one of six categories ranging from 1 (highest credit quality) to 6 (lowest credit quality).	Fitch Ratings, S&P Gobal Ratings, Moody's
High sovereign risk	Dummy variable indicating that the variable "sovereign rating" is below the median in the sample of euro area banks	Fitch Ratings, S&P Gobal Ratings, Moody's
Sovereign rating category	Dummy variables indicating which category of the variable "sovereign rating" (rounded) a bank's home country belongs to	Fitch Ratings, S&P Gobal Ratings, Moody's
C. Bank systemic risk		
Total assets or log total assets	Bank total assets (used in sample splits) or the logarithm of total assets (used in regression analyses)	Bankfocus
Total assets to GDP	Bank total assets divided by the GDP of the bank's home country	Bankfocus, Eurostat
Significant institution	Dummy variable indicating total assets larger than 30 billion euro or total assets to GDP larger than 20 percent, thus indicating that the significance criterion of the SSM Regulation is fulfilled	Bankfocus, Eurostat
D. Bank risk		
Equity ratio	Bank equity in relation to total assets	Bankfocus
Tier 1 capital ratio	Regulatory capital ratio that relates a regulatory measure of capital (Tier 1) to a regulatory measure of risk exposure (risk-weighted assets)	Bankfocus
Risk-weighted assets to total assets	Regulatory measure of risk exposure in relation to total assets	Bankfocus

4 Empirical Results

4.1 Abnormal Stock Returns Around the Announcement of the Banking Union

Our baseline results in Table 2 show that banks in euro area member states on average experienced substantial positive and statistically significant abnormal returns around the announcement of the banking union. For euro area banks, abnormal returns amounted to 5.0%. By contrast, abnormal returns for banks in non-euro area member states of the European Union are estimated much smaller, and they are not statistically significant. In particular, this is true of banks in UK and Sweden, (former) member states which are not obliged to enter the euro area and could not be expected to give up control over domestic banking sectors and join the banking union. It is also true of banks in other non-euro area member states which might be considered more likely to join the banking union. The difference of average abnormal returns of euro area banks and banks in both control groups is statistically significant and amounts to 3.8 (UK and Sweden) and 3.5 percentage points (other EU members).

TABLE 2

MEAN ABNORMAL STOCK RETURNS AROUND THE ANNOUNCEMENT OF THE BANKING UNION

A. Means	Mean	p-value	Obs.
(1) Euro area banks	5.02	0.004	61
(2) EU non-euro area banks	1.35	0.218	29
(3) UK and Swedish banks	1.20	0.355	15
(4) EU non-euro area banks, without UK, Sweden	1.52	0.170	14
B. Differences in means	Difference	p-value	Obs.
(1)-(2)	3.66	0.001	90
(1)-(3)	3.82	0.001	76
(1)-(4)	3.49	0.008	75

Notes: Panel A shows the results from testing the hypothesis that mean abnormal stock returns of banks in the respective subsamples are statistically different from zero. Panel B shows the results from testing the hypothesis that the difference in means of the respective subsamples does not differ from zero. Estimates and test statistics are obtained from a SUR framework (see Section 3.1). Variable definitions and data sources are provided in Table 1.

These results are generally in line with Loipersberger (2018) who also reports sizeable and statistically significant effects for euro area banks, but small and insignificant effects for non-euro area banks. However, our results are larger for euro area banks and smaller for non-euro area banks, such that the difference between the groups reported by Loipersberger (2018) is smaller (1.5 percentage points; statistical significance at the 5% level; one-day event window). These differences might be explained by different samples. For instance, the sample of non-euro area banks used by Loipersberger (2018) comprises all European listed banks and thus also includes banks in countries outside the European Union. We, by contrast, restrict our data set to European Union members, because we believe that these countries form the most meaningful control groups.

When looking at abnormal returns of individual banks (Table 3), two facts stand out: First, the vast majority of euro area banks experienced positive abnormal returns (87%, or 53 out of 61 sample banks). Second, the heterogeneity of abnormal returns is substantial, ranging from -1.8% to 15.1%, with a standard deviation of 4.0.

TABLE 3

DESCRIPTIVE STATISTICS OF INDIVIDUAL ABNORMAL STOCK RETURNS OF EUROPEAN BANKS

	Mean	St. D.	Median	Share positive	Min	Max	Obs.
Euro area banks	5.02	4.00	5.05	0.87	−1.76	15.10	61
EU non-euro area banks	1.35	1.76	1.36	0.79	−3.80	4.13	29

Notes: The table shows descriptive statistics of the estimates of individual abnormal stock returns of banks. 'Share positive' indicates the share of banks with positive abnormal returns in the respective subsample. Estimates and test statistics are obtained from a SUR framework (see Section 3.1). Variable definitions and data sources are provided in Table 1.

As a robustness check, we extend the one-day event window by one day prior to the event and by one day after the event. The results are reported in the Appendix section, Table 6 and Table 7, respectively. From Table 6 it can be seen that the coefficients of the pre-event day dummy are negative on average, such that the mean cumulative returns are smaller than the abnormal returns in our baseline results. Hence, it seems that market participants did not anticipate the positive news from June 29. The substantial negative mean cumulative abnormal returns for UK and Sweden banks are largely driven by extremely large negative abnormal returns of two UK banks on the pre-event day, Barclays and Royal Bank of Scotland. These results are most likely related to revelations on the involvement of Barclays in the LIBOR scandal.[8] The results including the post-event day dummy (see Table 7) do not differ substantially from our baseline results. This indicates that market participants already fully priced in the news content of the event on the event day itself. Overall, these results confirm that a one-day event window is most appropriate when analyzing the announcement of the banking union.

As a further robustness check, we employ an alternative method to deal with potential cross-sectional dependence of error terms. Instead of estimating abnormal returns in a system of equations, we estimate abnormal returns equation by equation and apply the generalized rank test proposed by Kolari and Pynnonen (2011). This is to check whether our preferred modeling choice critically influences the statistical significance of our results. The p-values of mean abnormal returns in all country groups become smaller (results not reported). Hence, our preferred approach estimates standard errors of abnormal returns more conservatively.

4.2 Explaining Heterogeneity of Abnormal Stock Returns

While summarizing the effect of the announcement of centralized control and the common safety net on bank valuations is informative, it tells us little about the underlying mechanisms. By exploiting the heterogeneity of individual abnormal returns, we hope to

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[8]See the front pages of the Financial Times UK edition and the Financial Times European edition from June 29, 2012, *"Barclays' firestorm rages"*.

at least partially uncover the mechanisms that drive the positive overall effects. We build our hypotheses on three views of the banking union suggested by the literature.

Sovereign-bank-nexus view. The first and arguably most prominent view of the banking union is that it should mitigate the sovereign-bank nexus. This view implies that individual banks' business prospects and solvency risks in times of crisis become less dependent on the financial strength of the banks' home countries. Specifically, the common safety net established by the banking union may facilitate public sector support for likely-to-fail banks even in financially constrained countries.

Consequently, if market participants adopted this view, they would adjust their expectations on future profitability of banks and their perceptions on the riskiness of banks. Abnormal returns of banks in financially constrained countries would be higher relative to abnormal returns of banks in other countries. Moreover, banks in financially constrained countries that are systemically important for their home country and are more likely to fail would benefit most, due to a higher likelihood of receiving public support.

Financial-trilemma view. The second view on the banking union is that it should mitigate the financial trilemma. As outlined by Schoenmaker (2011), the financial trilemma states that financial stability, financial integration and national financial policies are incompatible. According to this view, in an Europe-wide integrated financial system with substantial cross-border banking, policy makers wishing to achieve financial stability would necessarily have to give up on national financial policies, and would have to establish European-level competencies for banking supervision and crisis management. The basic logic of the trilemma is that financial stability is a European public good. National governments have only limited incentives to support domestic likely-to-fail banks if a substantial part of their business occurs abroad. This may lead to an underprovision of domestic public sector support for banks from a social-planner perspective.

If market participants adopted this view, they would adjust their expectations and risk perceptions specifically for banks that are systemically important for the euro area. Hence, the magnitude of abnormal returns would depend on the systemic importance of banks for the euro area. However, a priori, it is not clear whether abnormal returns would be positively or negatively related to systemic importance. A higher probability of public support for systemic banks would imply higher abnormal returns for these banks. However, if the centralized banking supervisor of the banking union was better able to internalize the externalities of cross-border banking failures, centralizing control at the European level could result in stricter regulation for euro area systemic banks. For example, a centralized supervisor could impose stricter capital requirements on these banks which in turn would negatively impact on bank profitability.[9] Hence, these banks would experience lower abnormal returns than banks considered not systemically important for the euro area. Note that these arguments also imply a correlation between abnormal returns and bank risk, which can be positive or negative: positive, because more risky systemically important banks may have a higher likelihood to receive public support; negative, because more risky systemically important banks may be more likely to be confronted with stricter regulatory requirements.

Moral-hazard view. The third view on the banking union is that, if properly

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[9]After all, one clearly expressed goal of banking supervision after the global financial crisis was to impose stricter regulation and supervision on banks considered systemically important, see, e.g. Financial Stability Board (2010).

designed, it would put the ECB in a better position to act as a lender of last resort for the banking system (Wyplosz, 2012). During the crisis in the euro area, the ECB implemented various measures to support monetary and financial stability. Some of these measures may be interpreted as lender-of-last-resort measures for the banking system. In particular, in the years 2011 and 2012, the ECB provided long-term funding to banks in the euro area through its long-term refinancing operations. However, as argued by Hellwig (2014), the funding may not only have benefited healthy banks with liquidity problems, but also banks whose solvency was doubtful. A combination of crisis funding provided by the ECB on the one hand, and banking supervision and resolution powers left at the national level on the other, may create incentives for national governments and supervisors to label potential solvency problems in their banking systems as liquidity problems, in order to avoid politically and fiscally costly interventions in domestic banks (Buch et al., 2014; German Council of Economic Experts, 2012; Hellwig, 2014). Centralizing control at the European level, if properly designed, could reduce this moral-hazard problem. Weak banks would then be more likely to be confronted with supervisory corrective action measures, and insolvent banks would be more likely to be restructured or resolved.

If market participants adopted this view on the banking union, the abnormal returns generated by the announcement of the banking union should be lower for weak banks. In particular, abnormal returns would be lower for weak non-systemic banks, because in the event of insolvency, these banks might be expected to be cut off from central bank funding, ESM funds, and domestic government support.

In order to assess whether market participants adopted these views on the banking union, we generate three testable hypotheses following from these views:

Hypothesis 1: Abnormal returns are negatively related the financial strength of the banks' home countries.

Hypothesis 2: The magnitude of abnormal returns depends on the systemic importance of banks. A priori, the correlation between systemic importance and abnormal returns could be positive or negative, depending on which view market participants adopted.

Hypothesis 3: The magnitude of abnormal returns depends on the solvency risk of banks. A priori, the correlation between solvency and abnormal returns could be positive or negative, depending on which view market participants adopted.

4.2.1 Average Abnormal Stock Returns in Split Samples

Our first approach to test the hypotheses rests on split samples. We measure the financial strength of the banks' home countries by sovereign ratings of leading rating agencies. We measure systemic importance by a bank's total assets and the ratio of the assets to the GDP of its home country. As a measure of banks' solvency risk we employ the ratio of equity to assets. The results are displayed in Table 4. First, the average abnormal return of banks from low-rated countries (above the median of sovereign ratings) is 6.2%, whereas the average abnormal returns of banks from high-rated countries (below the median of sovereign ratings) is 3.3%.[10] The difference of 2.9 percentage points is economically large and statistically significant. Second, the abnormal returns of banks vary

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[10]The group of countries below the median matches the group of countries most affected by the crisis in the euro area. This group is often referred to as 'crisis countries' or 'vulnerable countries', and consists of Greece, Cyprus, Ireland, Italy, Portugal, and Spain. Note, however, that our sample does not contain

with systemic importance of banks. Splitting the sample of euro area banks by banks' total assets and the ratio of assets to GDP indicates that systemically important banks' experienced substantially larger positive abnormal returns. The difference is statistically significant. Third, riskier banks (lower ratio of equity to assets) experienced on average higher abnormal returns than less riskier banks (higher ratio of equity to assets). The differences is economically meaningful, but not statistically significant.

To be sure that differences in abnormal returns of these groups were not driven by confounding events not related to the banking union announcement, we also ran tests on split samples of banks in non-euro area member states of the European Union. These placebo-type tests do not show any significant differences between groups of non-euro area banks at the event date.

In conclusion, the analysis of sub-samples supports hypothesis 1 and hypothesis 2. We interpret these findings as evidence that, at the time of the announcement of the banking union, market participants took the sovereign-bank-nexus view (consistent with hypothesis 1) and the financial-trilemma view (consistent with hypothesis 2). With regard to the latter, market participants did not seem to expect stricter supervision of systemically important banks. We do not find convincing support of hypothesis 3. Hence, market participant did not seem to take the moral-hazard view of the banking union.

Although the split-sample analysis seems informative for investigating market views on the banking union, the results need to be treated with caution. Comparing averages across sub-samples reveals only an uncontrolled difference. This usually leaves room for many alternative interpretations. In our context, for example, an uncontrolled difference between banks in high-rated and low-rated countries might also incorporate a difference between strong and weak banks, when the strength of the country is correlated with the strength of the banks that it hosts. Thus, it is hard to say whether the larger abnormal returns originate from country vulnerability (supporting the sovereign-bank-nexus view) or in the weakness of banks (which would neither contradict nor support the sovereign-bank nexus view). Therefore, in the next section, we turn to an investigation of abnormal returns using regression models. In this way, we are better able to further differentiate between the three commonly held views on the banking union.

4.2.2 Determinants of Individual Abnormal Stock Returns

In a first step, we regress the individual abnormal returns on the measures of country financial strength, bank solvency risk, and bank systemic importance used in the split-sample analysis. Since country ratings form a categorial variable, we use a dummy variable indicating a rating below the median of euro area countries ('High sovereign risk'). Since the other two variables are not categorial, we exploit the full variability of the data and avoid the somewhat arbitrary split at the median.

The results are displayed in column (1) of Table 5. Confirming the results of the split-sample analysis, banks hosted by low-rated countries and banks of greater systemic importance experienced significantly higher abnormal returns. By contrast, the impact of bank solvency on abnormal returns vanishes. The results for the first two variables are economically important. Similar to the results in Table 4, banks hosted by low-rated countries show an abnormal return that is 3 percentage points higher than banks

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any banks from Ireland.

TABLE 4

MEAN ABNORMAL STOCK RETURNS IN SPLIT SAMPLES

	Euro area banks			EU non-euro area banks		
	Mean	p-value	Obs.	Mean	p-value	Obs.
	Difference			Difference		
A. Sovereign risk						
Sovereign rating						
(1) low (above median)	6.19	0.003	36	2.88	0.042	4
(2) high (below median)	3.34	0.027	25	1.11	0.338	25
Difference (2)-(1)	2.85	0.043	61	1.77	0.195	29
B. Bank systemic risk						
Total assets						
(1) below median	3.03	0.010	30	1.27	0.193	19
(2) above median	6.94	0.004	31	1.51	0.339	10
Difference (2)-(1)	3.91	0.010	61	0.24	0.829	29
Total assets to GDP						
(1) below median	3.26	0.007	30	1.16	0.226	13
(2) above median	6.72	0.005	31	1.51	0.140	16
Difference (2)-(1)	3.46	0.031	61	0.36	0.740	29
C. Bank solvency risk						
Equity ratio						
(1) below median	5.68	0.013	30	1.74	0.252	11
(2) above median	4.37	0.002	31	1.12	0.254	18
Difference (1)-(2)	1.31	0.393	61	0.62	0.555	29

Notes: The table shows the results from testing the hypothesis that mean abnormal stock returns of banks in the respective subsamples are statistically different from zero (rows marked with (1) and (2)), and from testing the hypothesis that the difference in means of the respective subsamples does not differ from zero (rows marked with 'Difference'). For each category, sovereign risk, bank systemic risk and bank solvency risk, subsamples are generated by splitting the sample of euro area banks (left part of the table) and EU non-euro area banks (right part of the table) according to the median of euro area banks. Estimates and test statistics are obtained from a SUR framework (see Section 3.1). Variable definitions and data sources are provided in Table 1.

from other countries. With regard to systemic importance, a comparison of large banks (75 percent quantile, 43.0 percent of total assets to GDP) and small banks (25 percent quantile, 0.8 percent of total assets to GDP) suggests that the abnormal return of large banks is 1.5 percentage points higher.

A more detailed analysis using additional rating categories reveals that there is a strong country heterogeneity of abnormal returns (column (2)). Banks from countries in the second category (Italy and Spain) saw larger abnormal returns, while banks from countries in the third category (Cyprus and Portugal) did not. Greek banks (fourth category), saw extremely high abnormal returns. Compared to banks from non-crisis countries, their average abnormal return is about 10.3 percentage points higher. To account for this 'Greece effect', we include a dummy variable indicating a Greek bank in column (3) and also in some other specifications of Table 5.

Specifications in columns (4) to (7) provide additional insights about the association

TABLE 5
DETERMINANTS OF INDIVIDUAL ABNORMAL STOCK RETURNS OF EURO AREA BANKS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
High sovereign risk	3.008*** (0.909)		2.101** (0.853)	3.181*** (0.818)	2.319*** (0.777)	2.380*** (0.729)	1.396* (0.699)	1.089 (1.455)	1.807* (1.029)	1.309 (1.292)	0.831 (0.937)
Sovereign rating cat. 2		2.397*** (0.896)									
Sovereign rating cat. 3		0.489 (2.074)									
Sovereign rating cat. 4		10.280*** (0.908)									
Greece			8.143*** (0.754)			9.601*** (0.784)	8.286*** (0.847)			6.640*** (1.366)	7.714*** (0.856)
Total assets to GDP	0.035*** (0.010)	0.038*** (0.010)	0.034*** (0.008)					0.025* (0.014)	0.028** (0.014)	0.031*** (0.011)	0.027*** (0.010)
Log total assets				0.781*** (0.245)		1.082*** (0.174)					
Significant institution					4.108*** (1.040)		4.200*** (0.762)				
Equity ratio	−0.003 (0.036)	0.021 (0.026)	0.018 (0.026)	0.081 (0.054)	0.029 (0.031)	0.151*** (0.035)	0.053*** (0.019)	−0.411*** (0.107)		−0.153 (0.130)	
Risk-weighted assets to total assets								0.064* (0.034)		0.021 (0.034)	
Tier 1 capital ratio									−0.209** (0.096)		−0.154* (0.081)
Constant	2.337** (0.909)	1.819** (0.888)	1.988** (0.848)	−16.695** (6.659)	0.724 (1.018)	−25.035*** (4.773)	0.284 (0.797)	3.235** (1.507)	5.991*** (1.771)	2.890** (1.357)	5.292*** (1.533)
R^2 adjusted	0.21	0.51	0.51	0.21	0.29	0.62	0.60	0.35	0.18	0.52	0.53
Observations	61	61	61	61	61	61	61	48	50	48	50

Notes: The table shows the results from a regression of estimated bank abnormal stock returns on bank variables and characteristics of the banks' home countries. Estimates of bank stock returns are obtained from a SUR framework (see Section 3.1). Robust standard errors are given in parentheses. *, **, and *** denote significance at the 10, 5, and 1 percent level, respectively. Variable definitions and data sources are provided in Table 1.

of banks' abnormal returns and banks' systemic importance. We include two alternative measures of systemic importance. The first one, banks' log total assets, reflects systemic importance without referring to a country's GDP. This measure accounts for the possibility that not only country-specific systemic importance may matter, but also systemic importance for the euro area as a whole. Based on results from column (6), a comparison of large banks (75 percent quantile of log total assets) and small banks (25 percent quantile) reveals that the abnormal return of large banks is 3.4 percentage points higher. The second additional measure of systemic importance, 'significant institution', indicates banks with total assets larger than EUR 30 billion or more than 20% of the home country's GDP. This is motivated by the fact that the final SSM Regulation qualifies banks as a 'significant institution' or 'less significant institution' based on these criteria. Note that, at the time of announcement of the banking union, the significance criteria of the final SSM Regulation were not known to market participants, and the regulation includes additional significance criteria (see Section 2). Therefore, the indicator 'significant institution' is not our preferred measure of systemic importance. The indicator is highly statistically significant and economically large. Significant institutions experienced abnormal returns 4.1 to 4.2 percentage points higher than less significant institutions (columns (5) and (7), respectively). Overall, these results clearly support the positive association between banks' abnormal returns and their systemic importance. Moreover, the association between sovereign financial strength and banks' abnormal returns proves to be robust. Bank solvency is either not (columns (4) and (5)) or positively linked to banks' abnormal returns (columns (6) and (7)).

To further investigate the link between bank risk and abnormal returns, we include additional, regulatory measures of bank risk. To control for the riskiness of banks' assets, we include risk-weighted assets to total assets (columns (8) and (10)). Furthermore, we use a combined measure of bank capitalization and asset risk, namely the Tier 1 capital ratio (columns (9) and (11)). The advantage is that by inclusion of these measures we might gain a more complete picture of the overall riskiness of a bank. The disadvantage is that regulatory data are only available for a smaller sample. In three out of four specifications measures of bank risk prove to be statistically significant. Riskier banks tend to experience higher abnormal returns (a higher Tier 1 capital ratio implies a lower risk). At the same time, the sovereign-risk indicator becomes much smaller and, in three out of four specifications, statistically insignificant. This seems plausible. Given the sovereign-bank nexus, measures of banks' asset risk will also reflect sovereign risk. The results show how difficult it is to empirically disentangle bank risk and sovereign risk.

Overall, these findings lend further support to hypothesis 1 and hypothesis 2. The findings are consistent with market participants taking the sovereign-bank-nexus view. The adoption of this view by stock market investors implies higher abnormal returns of banks from financially constrained countries. The findings are also in line with market participants taking the financial-trilemma view of the banking union. The adoption of this view by investors implies that abnormal returns should vary with banks' systemic importance. By contrast, the findings do not support hypothesis 3. Thus, we do not find evidence in favor of the adoption of the moral-hazard view. If stock market investors adopted this view, lower capitalized banks would have experienced lower abnormal returns.

More generally, these results seem to indicate that stock market participants did not

expect stricter banking supervision and resolution measures for banks. Since weak banks would be most likely confronted with stricter measures, one would expect lower abnormal returns of weak banks relative to strong banks. Moreover, banking reforms after the global financial crisis aimed to impose stricter supervision and resolution regimes on banks considered systemically important. If the ECB, as central supervisor, was expected by investors to enforce better a stricter regime of this kind, one would expect lower abnormal returns at large banks relative to small banks.

5   Conclusion

We analyzed the impact of the announcement of the banking union on June 29, 2012 on stock market returns of euro area banks. The event in question is the only event that provided substantial new information to stock market investors with regard to three essential elements of the banking union. These elements comprise: First, a shift of banking supervision powers from national authorities to the European level. Second, a shift from national authorities to a central monetary policy authority. Third, a partial shift of fiscal responsibility for the banking sector from the national to the European level. However, the event does not cover the shift of bank resolution powers to the European level, which is also an essential part of the banking union. Nor does the event include ongoing policy discussions about a common European deposit insurance scheme.

We document positive individual abnormal returns for most listed euro area banks. Abnormal returns are large on average and vary substantially across banks. Abnormal returns are positively related to the systemic importance of banks, and positively related to sovereign risk. Greek banks experienced exceptionally high abnormal returns. Abnormal returns are not robustly related to bank risk.

We interpret these findings against the backdrop of three commonly held views on the banking union. Our results indicate that stock market investors took the view that the banking union makes banks less dependent on their home country's sovereign strength and mitigates the financial trilemma. However, market participants did not seem to take the view that the banking union reduces the moral hazard problem that stems from national banking supervision and a European common lender of last resort.

Needless to say, the stock market reactions we document reflect the views on the banking union at the time of its announcement. Since then, the banking union has evolved and market participants most likely have updated their expectations on the banking union. Empirical evidence on policy announcements and legal implementation of bank recovery and resolution proceedings for banks in the European Union points to reduced bail-out expectations (Schäfer et al., 2016a; Fiordelisi et al., 2020; Cutura, 2021; Fiordelisi and Scardozzi, 2022; Koetter et al., 2022). It seems likely that these changes have a bearing on how investors judge the banking union as a whole.

A limitation of our research design is that we cannot rule out alternative interpretations of our findings. A positive effect of euro area-wide systemic importance on abnormal returns is also consistent with the expectation of lower costs for banks. Large, internationally active banks may face lower lobbying expenses and compliance costs when they have to deal with just one central instead of several local supervisory authorities. However, the positive effect of sovereign risk on abnormal returns clearly show that supervision-related costs cannot be the only factor that matters.

Moreover, the fact that most banks experienced positive abnormal returns may indicate system-wide effects. For example, the positive size effect on abnormal returns that was also evident at non-crisis country banks may reflect the fact that large banks are more connected internationally and thus more exposed to negative spill-overs from crisis countries. Relief for crisis country banks and sovereigns would also mean relief for international banks. Such effects cannot be analyzed with the methods and data used in our study.

With regard to the ongoing policy discussions on reforming and amending the banking union, our results suggest that it is warranted to keep potential unintended side effects of the banking union in mind. At the time of the announcement of the banking union, investors clearly expected advantages for banks considered systemically important. To the extent that these expectations were grounded in elevated bail-out expectations due to a common financial safety net, a credible resolution regime is key to limit such expectations. In this regard, policy advisors have regularly pointed out the potential shortcomings of the current set-up (Bénassy-Quéré et al., 2018; Dewatripont, Reichlin and Sapir, 2021; German Council of Economic Experts, 2014; Schnabel, 2020).

In our view, more research is needed to evaluate the banking union. Perhaps the clearest research question that emerges from our results is, whether the banking union has created advantages for systemically important banks. With regard to the three commonly held views of the banking union our research is no more than a starting point. Future research needs to tackle the question if and how the banking union influenced the sovereign-bank nexus, apart from altering investors expectations. In this regard, evaluating the impact of the banking union on banks' domestic sovereign exposures seems of particular importance. The trilemma view seems empirically relevant, but the extent to which the banking union actually has fostered financial integration and financial stability is an open empirical question. Lastly, the apparent irrelevance of the moral hazard view to investors raises the question of whether issues of regulatory forbearance have been an empirically relevant phenomenon.

Appendix: Supplementary Tables

TABLE 6
MEAN CUMULATIVE ABNORMAL STOCK RETURNS, (-1,0) EVENT WINDOW

A. Means	Mean	p-value	Obs.
(1) Euro area banks	3.75	0.127	61
(2) EU non-euro area banks	−0.78	0.618	29
(3) UK and Swedish banks	−2.42	0.187	15
(4) EU non-euro area banks, without UK, Sweden	0.98	0.533	14
B. Differences in means	Difference	p-value	Obs.
(1)-(2)	4.53	0.005	90
(1)-(3)	6.17	0.000	76
(1)-(4)	2.77	0.140	75

Notes: Panel A shows the results from testing the hypothesis that mean abnormal stock returns of banks in the respective subsamples are statistically different from zero. Panel B shows the results from testing the hypothesis that the difference in means of the respective subsamples does not differ from zero. Estimates and test statistics are obtained from a SUR framework (see Section 3.1). Variable definitions and data sources are provided in Table 1.

TABLE 7
MEAN CUMULATIVE ABNORMAL STOCK RETURNS, (0,1) EVENT WINDOW

A. Means	Mean	p-value	Obs.
(1) Euro area banks	4.54	0.067	61
(2) EU non-euro area banks	0.60	0.704	29
(3) UK and Swedish banks	0.83	0.652	15
(4) EU non-euro area banks, without UK, Sweden	0.35	0.827	14
B. Differences in means	Difference	p-value	Obs.
(1)-(2)	3.94	0.015	90
(1)-(3)	3.71	0.024	76
(1)-(4)	4.19	0.027	75

Notes: Panel A shows the results from testing the hypothesis that mean abnormal stock returns of banks in the respective subsamples are statistically different from zero. Panel B shows the results from testing the hypothesis that the difference in means of the respective subsamples does not differ from zero. Estimates and test statistics are obtained from a SUR framework (see Section 3.1). Variable definitions and data sources are provided in Table 1.

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