DRESSING UP FOR THE REGULATORS: EVIDENCE FROM THE LARGEST-EVER SUPERVISORY REVIEW*

PURIYA ABBASSI RAJKAMAL IYER JOSÉ-LUIS PEYDRÓ PAUL E. SOTO

ABSTRACT

Government regulation requires effective supervision, but regulated entities may window-dress to supervisors. For empirical identification, we analyze banks exploiting a quasi-natural experiment —ECB's 2014 asset quality review (AQR)— in conjunction with the security and credit registers. After the AQR announcement, reviewed banks decrease the share of riskier securities and loans, and level of overall securities and credit supply. After AQR compliance, reviewed banks reload riskier securities, but not riskier credit. Effects are stronger for banks with higher trading expertise. Finally, this behavior induces spillovers on asset prices and firm level credit availability. Results suggest banks' window-dressing for supervisory audits, especially on liquid securities that are easier to trade, and hold important implications for supervision.

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KEYWORDS: Asset quality review, regulation, supervision, window-dressing, risk-masking, safe assets, stress tests.

* This version is from March 2018. Puriya Abbassi: Deutsche Bundesbank, Frankfurt am Main, Germany, puriya.abbassi@bundesbank.de; Rajkamal Iyer: Imperial College London, United Kingdom; riyer@ic.ac.uk; José-Luis Peydró (corresponding author): ICREA-Universitat Pompeu Fabra, Imperial College London, CREI, Barcelona GSE, CEPR, Barcelona, Spain, jose.peydro@upf.edu; Paul E. Soto: Universitat Pompeu Fabra, Barcelona, Spain, Paul.Soto@upf.edu. We are thankful for comments and suggestions from Elena Carletti, Bob DeYoung, Xavier Freixas, Itay Goldstein, Ross Levine, Christoph Memmel, Steven Ongena, Marco Pagano, Michael Papageorgiou, José Scheinkman, Javier Suarez, Jeremy Stein, Raghuram Rajan, Hélène Rey, Alexander Schulz, Andrei Shleifer, Ernst-Ludwig von Thadden, and Benjamin Weigert and to seminar participants at UPF, Bundesbank, INSEAD and at the European Systemic Risk Board's Advisory Scientific Committee and the 2017 Spanish Finance Conference. Peydró acknowledges financial support from both the Spanish Ministry of Economics and Competitiveness Feder EU (project ECO2015-68136-P) and from the European Research Council Grant (project 648398). The views expressed in the paper are solely those of the authors and do not necessarily represent the views of the institution, to which the authors are affiliated.

"*Identifying regulatory arbitrage […] likely a reflection of incentives that banks have to "window-dress" their balance sheets at period-ends by downsizing their balance sheets, or improving their composition.*"
William Coen, Secretary General of the Basel Committee on Banking Supervision, London, May 2017

I. INTRODUCTION

Government regulation is widespread in modern societies, with governments prevalently intervening throughout the marketplace (Stigler, 1971; Tirole, 2014; White House, 2015). However, effective supervision is challenging, as it requires a policy framework that does not allow regulated entities to behave differently from what supervisors aim for (Laffont and Tirole, 1993). From the perspective of designing effective supervisory practices, it is important to understand window-dressing behavior by regulated entities to supervisors.

In this paper we analyze window-dressing behavior to supervisors in the banking sector. Analyzing this question in the context of the banking sector not only helps us with empirical identification, but it is also important given the difficulties associated with banking supervision. Supervision of banks is substantially more challenging than that of other industries (Dewatripont and Tirole, 1994), not only due to assets of banks being more opaque (Morgan, 2002), but also because banks hold a sizeable part of their portfolio in liquid assets, the riskiness of which can be changed quickly (Myers and Rajan, 1998). The financial crisis highlighted the difficulty in supervision as banks, despite existing stringent regulatory supervision, took excessive risk, thus deviating from the supervisor's original intention to build a resilient financial system. From a financial stability perspective, understanding the effectiveness of supervisory practices to regulate the banking system is therefore of crucial importance.

We focus on an important new policy tool that has emerged as a major component of the supervisory toolkit —stress testing (see e.g. Bernanke, 2013). For stress testing to be effective, a correct risk assessment of the assets of banks is a necessary condition —an asset quality review (ECB, 2013). There is however considerable debate as to whether banks choose assets that perform well in the test and then quickly liquidate them after passing (see e.g., Tarullo, 2014; Goldstein and Sapra, 2014; Coen, 2017). For example, there have been several instances of banks that have passed the stress tests and then failed within a short period time thereafter.[1]

[1] For example Dexia, the Franco-Belgian bank passed the European Banking Authority (EBA)'s stress tests in the summer of 2011 (it came 12th out of 91 banks scrutinized by the EBA), but three months later, in October, required a bail-out from the government ("Dexia poses setback for EBA stress tests", *Financial Times*, 5th October 2011).

We analyze whether banks dress up for the regulators by changing the risk composition of their portfolio before the largest-ever supervisory exercise, i.e. the European Central Bank (ECB)'s 2014 comprehensive bank assessment including an asset quality review (AQR), where EUR 22 trillion bank assets were reviewed. Moreover, we examine whether banks undo this change in the risk composition of their portfolio after the culmination of the asset quality review. In doing so, we also analyze whether banks alter specific type of assets (e.g., liquid securities versus illiquid loans) and whether banks also change their overall level of assets (securities holdings and the supply of credit to the real sector), i.e. whether banks overall downsize.

The ECB announced on October 23rd 2013 that it would undertake an asset quality review,[2] where bank assets were going to be reviewed in the form of a point-in-time assessment —December 31, 2013— for a pre-identified list of 130 (reviewed) banks within the Euro Area. These banks had to report their assets, in particular loans and securities.[3] Note that —for reviewed banks— the assets held as on *December 31, 2013*, played an important role as they were assessed by the Eurosystem. After a period of compliance (between January and June 2014), which was used by supervisors to consult reviewed banks to give them an opportunity to provide comments, the AQR was concluded in July 2014, and the subsequent stress tests based on each bank's AQR were presented in October 2014 (ECB, 2013 and 2014).

In consequence, the announcement of the AQR with a pre-determined reference date for the asset quality review presents a quasi-natural experiment to examine whether banks try to game the supervisory exercise, and in turn reduce the effectiveness of stress tests as a regulatory tool. Furthermore, we also shed light on whether —as a side-effect of the asset quality review— there is a reduction in the supply of credit to the firms in the real sector, as well as a reduction in overall securities holdings. That is, we analyze Coen (2017)'s conjecture that –to minimize regulatory constraints– banks have incentives to window-dress their balance sheets at period-ends by downsizing their balance sheets or improving their risk composition.

We exploit a unique proprietary dataset from the Bundesbank, which is –together with the German federal financial supervisory authority 'BaFin'– the macroprudential and microprudential bank supervisor in Germany. The supervisory data provides detailed, granular

[2] https://www.ecb.europa.eu/press/pr/date/2013/html/pr131023.en.html.
[3] "*An asset quality review, as elaborated below, examining the asset side of bank balance sheets as at 31 December 2013. This assessment will be broad and inclusive, comprising credit and market exposures.*" (See ECB, 2013).

information at the security-level (at monthly frequency) and at the loan-level (at quarterly frequency) for each bank in Germany —a bank dominated economy— covering the period before and after the ECB's AQR.

We match each security that a bank holds with security-level information on rating, issuer, yield and maturity. The exhaustive detail on security-level holdings of each bank allows us to examine the risk characteristics of the securities traded by banks and also the timing of the trades. Importantly, not only do we have the security-level holdings of each bank, but also the credit register containing information on the individual loans made by banks, including the ex-ante risk of each loan. The security and credit registers are matched with comprehensive bank balance sheet information.[4]

Under the hypothesis that banks try to window-dress during the supervisory exercise, the main testable hypotheses that we examine are: (i) between the ECB's announcement of the supervisory exercise (23rd October 2013) and the day that banks have to report their securities and loans to the ECB (31st December 2013), banks will accumulate safer assets, especially those that the ECB considers to be of highest quality (e.g. securities with ratings from AAA to AA- or loans with low risk weights, see ECB (2005; 2014));[5] (ii) after the asset quality review is concluded (July 2014), banks will liquidate these safer assets and will invest back in assets with a relatively higher risk.

To test these hypotheses, we first analyze the securities holdings and the loans of banks before and after the AQR announcement. We exploit the fact that the ECB required banks to report their assets as on December 31, 2013 (point-in-time assessment) and examine the evolution of security holdings and loans of reviewed and non-reviewed banks based on this cut-off date. In particular, we examine whether reviewed banks increase their holdings of safe assets during this period (as well as reduce the overall security holdings and supply of credit). Second, we analyze whether, after the AQR is concluded in July 2014, the reviewed banks increase their risk back to the level similar to that before the ECB announcement in October 2013.

[4] Abbassi, Iyer, Peydró and Tous (2016) describe in detail the security and credit registers, as well as the bank level data (see also Section 3). As far as we know, only Germany, Portugal and Italy contain security and credit registers for all banks.

[5] See also for example https://www.eba.europa.eu/documents/10180/16166/4+Ausust+2006_Mapping.pdf and https://www.bankingsupervision.europa.eu/ecb/pub/pdf/assetqualityreviewphase2manual201403en.pdf. According to the standardized approach of capital adequacy under Basel II and III, this rating bucket has the lowest risk weight (http://www.bis.org/bcbs/publ/d347.pdf).

To study the heterogeneity in risk behavior across different securities and across different loans, and to identify our main hypotheses, we analyze securities holdings at the *bank-security-month* level and loans at the *bank-firm(borrower)-quarter* level. For our two main hypotheses, in a difference-in-difference setting, we analyze *before* and *after* each main event (either the ECB announcement in October 2013, or the conclusion of the AQR in July 2014) whether, for the *same* security or for the *same* firm (for lending), *reviewed* versus *non-reviewed* banks change their holdings depending on the ex-ante security or firm (loan) *risk*.[6] As the size of a bank in Germany primarily determines whether or not a given institution is being reviewed, (i) for the comparison group of non-reviewed banks, we either analyze all of the non-reviewed banks or only the largest (with respect to their size) non-reviewed banks; (ii) we analyze whether reviewed or non-reviewed banks differ in other end-of-year periods (placebo tests); (iii) we only analyze very few reviewed and non-reviewed banks with very similar size (around the EUR 30 billion cut-off to be reviewed); (iv) we analyze unconditionally the behavior of only reviewed banks before and after each of the two main events; (v) we control for heterogeneity across banks with different sets of bank (or even bank-security and bank-firm) fixed effects.

We find that, after the announcement of the AQR, reviewed banks differentially increase the share of their safe securities, which are the bonds with the top-tier credit rating for the ECB and thus lowest regulatory risk weights. For reviewed banks, unconditionally (without any controls), the share of safe securities increases during the short-time period of the AQR relative to the period before the announcement. More formally, using a regression framework with controls, we find that between September and December 2013, reviewed banks as compared to non-reviewed banks buy on average between 2.4% and 3.4% more of the securities with top-tier rating.[7]

The results are robust to the inclusion of controls for security fixed effects to analyze the same security before and after the AQR and for bank-security fixed effects to account for unobserved matching between characteristics of banks and securities. We also find similar results when we limit the sample of reviewed and non-reviewed banks to those with more comparable sizes, or

[6] We similarly analyze overall changes in security holdings and credit supply. In a difference-in-difference setting, we analyze before and after each main event whether, for the same security or for the same firm, reviewed versus non-reviewed banks change their securities holdings or lending.

[7] We find similar results if we analyze other risk measures as securities with high yield, from GIIPS-country headquartered borrowers, long-term maturity or long-term maturity non-safe securities, or find similar results if we do not saturate the econometric model with any fixed effect (though identification in this case is weaker).

when we run the estimation *within* the subset of only reviewed banks examining the risk differences in security holdings before and after the announcement among reviewed banks.

We also examine how reviewed banks respond to the AQR in terms of their lending behavior. Comparing the period after the announcement of the AQR versus before, and within the same firm and bank, we find that reviewed banks increase their share of supply of credit to safer firms relative to non-reviewed banks (where safer firm is classified as those with below average firm risk based on ex-ante probabilities of defaults).[8] We perform similar robustness tests as in the case of securities and find similar results, with an increase between 1.7% and 4.5% of the supply of safer loans for reviewed banks after the ECB announcement.

Interestingly, reviewed banks also cut the overall supply of credit to firms in the real sector and reduce their overall level of security holdings (irrespectively of risk). That is, not only do reviewed banks increase their share of safer loans and securities, but also overall they downsize their balance sheets by reducing their supply of credit and security holdings.

Economically, the average increase in safe securities corresponds to EUR 11.80 billion for all reviewed banks and the average increase in the share of credit exposures to safe firms amounts to EUR 42.02 billion for all reviewed banks after the announcement of the AQR as compared to non-reviewed banks. This increase of EUR 53.82 billion worth of safe assets is economically large given the very short period of time (basically two months between announcement and compliance) and accounts for 29% of reviewed banks' overall equity. Importantly, the results are not due to a general end-of-year effect, but only related to the 2013 last quarter's ECB supervisory audit, as we do not find (neither statistical nor economic) significant effects in the last quarter of 2012 or of 2014 (which we use as placebo tests). Finally, we find that this behavior induces spillovers on asset prices and firm level credit availability.

The results above suggest that banks actively shift their portfolio to safer assets in response to the AQR announcement. However, an important question that arises (our second testable hypothesis) is whether this shift is temporary or permanent. Thus, to understand the effectiveness of the supervisory exercise, it is necessary to also examine the response of banks in the post-

[8] The median default rate within this group of firms equals 0.2%, which corresponds to default rates observed for investment-grade firms worldwide (see e.g., Standard and Poor's Ratings Services, 2012). This coincides also with the Eurosystem's credit quality requirements as laid down in Article 108 (a) (ECB/2014/60) and the mapping exercise carried out by the Joint Committee of the European Supervisory Authorities (2014). Our results are robust to altering the cut-offs of the ex-ante default rate and to using the ex-ante continuous default rate.

AQR period. In the post-AQR period (after July 2014), we find that reviewed banks (as compared to non-reviewed banks) partly reload their risk back to the pre-ECB announcement levels. In particular, reviewed banks fully reload on riskier securities; however, this is not the case for riskier credit.

We further examine heterogeneous effects across reviewed banks in their dialing up and down into safer securities and credit. In particular, we examine whether there are differences in the investment behavior based on other key bank characteristics. We find that in general results on dialing up and down are stronger for reviewed banks with higher trading expertise (trading banks). In particular, trading banks that are reviewed reduce risk as the others in securities after the ECB announcement of AQR, but increase it more than other banks during the post-AQR period, whereas in lending, trading banks stay at the same level during the post-AQR period than before.[9]

In sum, on the first hypothesis, our results suggest that, after the announcement of the AQR, reviewed banks relatively increase their share in safer securities and reduce riskier loans. Moreover, reviewed banks not only change their risk composition of their assets but also downsize their securities holdings and credit supply. For our second hypothesis, in the period after the AQR, we find that reviewed banks reduce their share of safer securities. With respect to their lending behavior, however, we find that reviewed banks do not increase their riskier lending back to the pre-ECB announcement level. Results are overall more pronounced for banks with higher trading expertise. Our results suggest that banks window-dress in supervisory exercises, especially in terms of altering the risk composition of their liquid assets that are easy to trade. Loans tend to be more illiquid and banks need lending opportunities to occur (it is more difficult to dial up risk on the credit portfolio), while it is easier to change the riskiness of the securities portfolio due to its tradability.

The results hold important policy implications for stress-testing in particular, and for supervision in general. These results suggest that banks change the composition of their assets before a supervisory exercise in favor of safer assets. However, they partly undo this after the supervisory exercise, primarily in their securities portfolio. The results suggest that pre-defining the timing and structure of a supervisory exercise might increase gaming behavior of banks.

[9] In addition, we do not find any further heterogeneity in investment behavior among reviewed banks based on size, equity capitalization or regulatory capital ratio.

Thus, it might be necessary to have an element of surprise in the stress testing exercise, both in the timing of the audits (either more continuous or random in time) and also in the transparency of the specific risks assessed.[10] The results also indicate that it is easier for banks to change the composition of liquid assets (securities trading) than illiquid assets (loans to firms). Thus, the results also point to the notion that regulation of banks with substantial volume of tradable assets poses significant problems to supervision and to financial stability.[11]

The paper contributes to the theoretical literature that examines the optimal form of regulation (Stigler, 1971; Posner, 1975; Glaeser and Shleifer, 2001; Becker and Opp, 2013). The paper also contributes to window-dressing in banking (Allen and Saunders, 1992; Kotomin and Winters, 2006) by analyzing window-dressing to bank supervisors and by using supervisory securities and credit registers rather than aggregate bank-level data.[12] Goldstein and Sapra (2014) analyze the optimal public disclosure of stress test results, and also discuss the potential incentives of window-dressing by banks. The results also contribute to the growing literature that examines the incentives of banks to arbitrage regulation, where the bulk of the empirical work focuses on bank liabilities (Hellwig, 2010; Demirguc-Kunt et al., 2013; Acharya et al., 2014), whereas we analyze the asset side. Finally, the paper also relates to the theoretical work that examines the risk-taking incentives associated with liquid assets (Myers and Rajan, 1998). The evidence we find is consistent with the notion that it is easier to change riskiness of a banks' portfolio by changing the composition of liquid assets (securities) in contrast to illiquid assets (loans).

[10] For example, a daily average of bank risks rather than point-in-time estimates such as Bank of England wants to pursue (see e.g. "BoE sticks with anti "window dressing" rule for bank leverage ratio", *Reuters*, December 7, 2015), or not-fully transparent stress tests, as the Federal Reserve currently follows (Bernanke, 2013; Tarullo, 2014), which however may be eliminated by Donald Trump's then nominee to head the Federal Reserve's regulatory wing (see e.g. "Fed banking watchdog nominee plans more 'transparency' in stress tests", *Financial Times*, July 27, 2017).

[11] Securities holdings are around 20% of bank assets in the US and Europe, and recent policy initiatives aim at limiting security trading by banks (US' Volker Rule in Dodd-Frank, EU's Likaanen Report and UK's Vickers' Report).

[12] Papers that analyze window-dressing in banking, differently from us, do not analyze supervision and regulation and use bank-level rather than security and credit register data. Allen and Saunders (1992) analyzing bank-level data argues about window-dressing of total assets, where money market instruments are the key liabilities facilitating temporary upward movements in total assets. However, results in Kotomin and Winters (2006) using bank-level data suggest that window dressing is customer- rather than bank-driven. Both studies focus on the rationales behind window dressing of total assets, whereas Owens and Wu (2015) analyze specifically possible window dressing channels in the liability accounts that afford banks the most discretion, such as repo and federal funds. In non-banks, there is evidence that fund managers and institutional investors dress up their quarter-end or year-end portfolio holdings by selling losing stocks and buying winning stocks (e.g., Lakonishok et al., 1991; Musto, 1999; He et al., 2004; Ng and Wang, 2004). However, banks suffer substantially more regulation and supervision (the question of our paper) than non-banks.

The remainder of the paper is structured as follows. In section II, we elaborate on the ECB's asset quality review. In Section III, we present our data. Section IV presents our empirical strategy and results, and Section V concludes.

II. ECB'S ASSET QUALITY REVIEW

On October 23rd, 2013, the European Central Bank (ECB) officially announced Europe's most comprehensive asset quality review (AQR) of the banking sector in order "to foster transparency, to repair and to build confidence". The timing and the criteria of the AQR came by surprise;[13] banks were informed that the central bank, along with national competent authorities (NCAs) responsible for banking supervision, would review the carrying value of assets on the banks' balance sheets as of December 31, 2013.[14] The AQR was thus a point-in-time assessment.

The banks that were selected to participate in this exercise ('reviewed banks', hereafter) were identified based on the following criteria: (i) total value of the bank's assets exceeded EUR 30 billion, (ii) the ratio of the bank's total assets to GDP of its country of establishment exceeded 20%, unless the total value of their assets was below EUR 5 billion, and (iii) the institution was among the three largest credit institutions in a participating member state, regardless of size. A bank was included if any of these criteria applied. In the end, the ECB identified a list of 130 credit institutions (25 of which were German banks), financial holding companies or mixed

[13] The surprise in the content of the announcement is reflected in the stock market reaction on the day of the AQR announcement, as bank share prices fell after the ECB unveiled its plans ("ECB unveils checks in step to banking union; Eurozone crisis", *Financial Times*, October 23, 2013; "Eurozone bank shares sink after ECB outlines health check plan", *Financial Times*, October 23, 2013; "European shares snap winning run as banks hit by ECB review", *Reuters*, October 23, 2013). For instance, Italian bank stocks fell by as much as 3 per cent in early trading and most other leading banks in Spain, France and Germany saw share prices fall about 2 per cent (see e.g., "Draghi says bank tests need failures for credibility; ECB probe", *Financial Times*, October 24, 2013). Moreover, as of September, 24, 2013, it was unclear when the process would start or how long it would take, although it would be completed before the ECB took over full supervisory responsibility in October 2014 ("Consultants who praised defunct bank to advise on ECB review", *Financial Times*, September 24, 2013). On October 15, 2013, the ECB had yet to give banks guidance on how assets will be examined, whether half or full-year results will matter, and what types of loans will be examined ("AQR and stress tests could threaten European banks", *Reuters*, October 15, 2013).

[14] The execution of this exercise involved several parties. While NCAs were responsible for all national project management activities, NCAs appointed so-called NCA bank teams comprising of NCA staff and external auditors, property appraisers and valuation advisors providing their expertise, know-how and independence. In total, the complete exercise spanned over 6,000 experts.

financial holding companies from 18 European Union member states that had total assets of around EUR 22 trillion.[15]

The detailed asset-level review covered all types of assets including securities and credit exposures.[16] The review, in general though, intended to check the most risky portfolios on banks' balance sheets; therefore, for banks with large trading books, reviewers paid stronger attention.[17] After banks' reporting ("bottom-up") as of December 31, 2013, NCAs drew on the provided data and executed the AQR following the ECB's AQR manuals and guidance. In a next step, NCAs and the ECB engaged in quality assurances until the summer of 2014 to ensure the reported data was consistent and accurate. While the final report of the entire comprehensive assessment was published on October 26, 2014, the ECB published the bank-level disclosure template on July 17, 2014 comprising detailed AQR results (identical to the EBA's disclosure template),[18] and the subsequent stress tests based on each bank's AQR were presented in October 2014 (ECB, 2013 and 2014).

Figure 1 illustrates the timeline of the ECB's AQR, which highlights its four key periods. The period before October 2013 denotes the period before the AQR-announcement ("pre-AQR"), while October, November and December 2013 are the months in the run-up to the AQR reporting due-date as of December 31, 2013, which is why we refer to it as the "AQR" period. We define the period between January 2014 and June 2014 as the "AQR-compliance" period, which was used by supervisors to consult reviewed banks so as to give them an opportunity to provide comments and suggestions. The period from July 2014 onwards describes the "post-AQR" period. Our analysis ends just before the results on the stress tests were released and the European single supervisory mechanism became effective. To ensure a symmetry around the AQR, we choose our sample in such a way that we have nine months before the AQR announcement and nine months after the AQR due date, yielding a sample of 21 months from January 2013 through September 2014. As explained in detail in the empirical strategy, we also

[15] It should be noted that while these banks are the biggest banks in the euro area, they are not the same 'significant credit institutions' that are currently supervised by the ECB's single supervisory mechanism (SSM). The list of the reviewed banks can be found in Table 11 of the final report https://www.ecb.europa.eu/pub/pdf/other/aggregatereportonthecomprehensiveassessment201410.en.pdf.

[16] The assessment was a prudential rather than accounting exercise implying that the outcomes of the review were not necessarily reflected directly in the banks' accounts following the exercise.

[17] The ECB applied a risk-based approach while determining the portfolios that were reviewed in the AQR. That is, for each bank, "at least 50% of credit risk-weighted assets and half of the material portfolios" were selected.

[18] See https://www.bankingsupervision.europa.eu/ecb/pub/pdf/notecomprehensiveassessment201407en.pdf.

analyze the data only around the AQR announcement in October 2013, comparing the AQR reporting due-date as of December 31, 2013 to just before the AQR announcement.

III. DATA

For our analysis, we use proprietary security and credit register data that we obtained from the Deutsche Bundesbank, which –together with the German federal financial supervisory authority 'BaFin'– is the macroprudential and microprudential bank supervisor in Germany. We have access to the micro data on securities investments of banks (negotiable bonds and debt securities, equities, and mutual fund shares) at the security-level for each bank in each month. The data comprise of investments of German banks at the security-level on a monthly frequency from January 2013 through September 2014.[19] For each security, banks report the nominal value at the end of each month they hold (stock at the end of each month).[20] We use the unique International Security Identification Number (ISIN) associated with every security to merge the data on security investments with security-level information on rating and yield from FactSet, and on the issuer from the Eurosystem's CSDB.

We also obtain data on individual loans made by banks from the German credit register maintained by the Deutsche Bundesbank. The credit register provides information on the amount of loans outstanding at the borrower level for each bank. In addition, it also provides for selected banks borrower-level information on estimated probability of default (PD) for a loan, and the date of a given default (where applicable).[21] For the credit register banks had to report, on a quarterly frequency, all borrowers whose overall credit exposure exceeds EUR 1.5 million; however, the credit register covered nearly 70% of the total credit volume in Germany.[22]

[19] Note that the reporting requirement specifies that securities holdings, which are passed on or acquired as part of a repo contract, are not double-counted in the securities database. Thus, the transactions we capture in analysis are not a mechanical artifact of repo transactions. For more information, see Amann, Baltzer, and Schrape (2012).
[20] While we know the security holdings of the banks, we do not know whether they are classified as trading book assets, available for sale or held to maturity.
[21] The credit register, however, does not record the maturity and interest rate associated with the loans.
[22] From 2014 onwards though, this threshold was lowered to EUR 1.0 million. Note however, that this does not affect our analysis of our main (first) hypothesis on whether banks window-dress after the AQR announcement as compared

We append the security and credit register data to confidential supervisory monthly balance-sheet statistics at the bank level. As most securities held by banks are bonds (81 %), and we also analyze loans (the other key component on bank assets), we only analyze bonds within bank securities.[23] In particular, we collect monthly balance sheet items such as each bank's equity, total assets, and total loans. Moreover, we follow the ECB's AQR procedure and focus primarily on credit exposures to non-monetary financial institutions, including large non-financial corporates. Also, we restrict ourselves to banks with a credit exposure to a firm for which we observe a value on its probability of default (PDs). We have this information for 93 distinct banks.[24] Note that this restriction on the availability of borrower PDs reduces the set of banks to those with the most economically meaningful credit portfolios as only those banks provide the PDs for their borrowers. Both restrictions are necessary to explore banks' securities investments and credit supply depending on the ex-ante security and borrower risk type (safer versus riskier).

IV. EMPIRICAL STRATEGY AND RESULTS

In this section, we will discuss the empirical identification strategy to study the change in the portfolio holdings of reviewed banks, as compared to non-reviewed banks, both before and after the ECB's AQR and the AQR compliance. In particular, we analyze the following testable predictions under the hypothesis that banks try to window-dress before the supervisory exercise: (i) between the ECB announcement of the supervisory exercise (23rd October 2013) and the day that banks have to report their securities and loans (31st December 2013) to the ECB, banks will accumulate safer assets, especially those that the ECB considers to be of high quality; (ii) after

to the pre-AQR announcement (a comparison between 31st of December and 23rd of October of 2013). Moreover, on our second hypothesis on risk increase after the AQR compliance, we restrict ourselves to borrowers that were in the credit register at least once also in 2013, i.e., before the reporting level was reduced from EUR 1.5 million to EUR 1.0 million in 2014. This restriction ensures that results are not biased by new borrowers appearing in 2014 as a result of the change in the threshold. However, outstanding credit positions below the 2013's threshold of EUR 1.5 million might still show up in the 2014 data for a given borrower if the exposure exceeds the threshold of EUR 1 million. Moreover, our results (see next section and Table 3, column (4) to (6)) show that there are no statistical differences in results between end of December 2013 and end of July 2014 (not even after the AQR after July); therefore, the credit changes between reviewed and non-reviewed banks before and after the threshold change are not different.

[23] For example, if we analyzed the stock of shares, the risk measures would be very different between securities and credit, and moreover, this type of security covers a small share of banks' investments (less than 4% of total assets). Therefore, for the sake of comparison between securities and loans, and for the sake of quantitative importance, we restrict our analysis to bonds.

[24] We replace each borrower's PD with its cross-sectional average PD across all banks that assigned a PD to that borrower. This ensures that the number of bank-borrower observations increases and that a bank's individual PD-reporting does not drive our results.

the asset quality review is concluded (July 2014), banks will liquidate these safer assets and will invest back in assets with a relatively higher risk.[25]

To test for these hypotheses, we first analyze the securities holdings and the loans of banks before and after the AQR. We exploit the fact that the ECB required banks to report their assets as on December 31, 2013 (point-in-time assessment) and examine the evolution of security holdings and loans of reviewed banks and non-reviewed banks based on this cut-off date. In particular, we examine whether banks increase their holdings of safe assets during this period (as well as reduce the overall security holdings and supply of credit). Second, we analyze whether after July 2014 the reviewed (versus non-reviewed) banks increase their risk back to the levels similar to that before the ECB announcement in October 2013. For the first hypothesis we analyze the period of three months around the ECB announcement, whereas for the second hypothesis we use all the data.

To study heterogeneity in risk behavior across different securities and across different loans, and to identify the two hypotheses, we analyze securities holdings at the *bank-security-month* level and loans at the *bank-firm(borrower)-quarter* level. For our two main hypotheses, in a difference-in-difference setting, we analyze *before* and *after* each main event (either the ECB announcement in October 2013, or the completion of the AQR in July 2014) whether, for the *same* security or for the *same* firm (in the case of lending), *reviewed* versus *non-reviewed* banks change their holdings depending on the ex-ante security or firm (loan) *risk*. As the size of a bank in Germany primarily determines whether or not a given institution is being reviewed, (i) we either analyze all of the non-reviewed banks or only the largest (with respect to their size) non-reviewed banks, for the comparison group of non-reviewed banks;[26] (ii) we analyze whether reviewed or non-reviewed banks differ in other-end-of–year periods (placebo tests); (iii) we only analyze very few reviewed and non-reviewed banks with very similar size (around the cut-off of EUR 30 billion); (iv) we analyze unconditionally the behavior of only reviewed banks before

[25] Our null hypothesis in the regressions is no change, and the alternative is a change (that is, the coefficient is different from 0).

[26] Reviewed banks are larger than non-reviewed institutions (with e.g. differences in bank sizes of EUR 182 billion vs. EUR 2 billion on average), but with rather similar levels of securities holdings (19.48% vs. 21.84% of total assets) and safe credit (77.45% vs. 73.77%), though some differences in the level of credit (44.32% vs. 58.92%) and safe securities (39.36% vs. 26.47%).

and after each of the two main events;[27] (v) we control for heterogeneity across banks with different sets of bank (or even bank-security and bank-firm) fixed effects. We provide summary statistics on the main variables in the Appendix Table A2, where Table A1 contains the definitions of the variables used in the paper.

IV.1 DIALING-UP OF SAFE ASSETS IN THE RUN-UP TO THE AQR

The first testable hypothesis, which we examine in this paper, is that –after the announcement of the supervisory exercise– banks will accumulate safer assets, especially those with a better rating that would perform well in the supervisory test.[28] To examine this statement, we start by studying the securities holdings of reviewed banks versus non-reviewed banks at the *bank-security-month* level using the following econometric model:

$$\text{Log}(securities\ holdings)_{b,s,t} = \beta\left(Safe_{s,t-1} \cdot AQR_t \cdot Reviewed_b\right) + \alpha_b + \alpha_s + \alpha_t + \delta' controls + \varepsilon_{b.s.t} \quad (1)$$

where the dependent variable is the logarithm of nominal holdings of security s by bank b at month t. Our sample is constructed symmetrically around the AQR announcement, i.e. 3 months before the announcement (i.e., end of July, August, and September 2013) versus 3 months after the announcement (i.e., end of October, November, and December 2013).[29] AQR_t is a (post) dummy variable that equals the value of one during the months following the AQR announcement in October 2013, i.e. during October, November and December 2013, and zero before. We follow the Eurosystem's harmonized rating scale for the definition of safe assets and define a security as safe when the security has a rating between AAA to AA-.[30] That is, 'Safe' is

[27] Our results are robust to banks close to the EUR 30 billion threshold, though we lose most banks and observations (including the very interesting largest banks) or are robust to only analyzing reviewed banks. Moreover, as our placebo tests presented in the next section show, we do not find a differential effect between reviewed and non-reviewed banks in the last quarter of the year before the AQR (i.e., in 2012) or in the last quarter of the year after the AQR (i.e., in 2014); therefore the differences in changes in securities and credit between the two group of banks are due to the AQR. Note that our sample of reviewed banks close to the EUR 30 billion threshold are also interesting to the extent that they have no foreign subsidiary in Europe (but, our results are also significant in the overall sample if we restrict the sample to these type of banks).

[28] We also analyze other risk measures as part of our robustness checks, for example yield, maturity or whether the borrower is headquartered in a GIIPS country. To penalize risk inherent to bank assets, the Eurosystem primarily relies on ratings rather than yields and the origin of issuance (e.g., GIIPS, and there is substantially more penalization in ratings than in maturity (see ECB (2005, 2013 and 2014)). Note also that to judge on the riskiness of loans, we use the ex-ante probability of default, which is comparable to the ex-ante rating in securities, and normally not available in credit registers in other countries (note that we have no information on the credit maturity).

[29] In robustness regressions, we show that comparing end of September to end of December 2013 yields very similar results, see Table A3 of the appendix.

[30] For the standardized approach maps the ECAI's credit assessments to credit quality steps, see for example, https://www.eba.europa.eu/documents/10180/16166/4+Ausust+2006_Mapping.pdf and https://www.bankingsupervision.europa.eu/ecb/pub/pdf/assetqualityreviewphase2manual201403en.pdf. Moreover,

a dummy variable that equals the value of one whenever the security has a rating between AAA and AA-, and zero otherwise. 'Reviewed' is a binary variable that equals the value of one for any bank reviewed under the AQR, and zero otherwise. The estimated coefficient β then measures the differential securities holdings of safe (versus risky) securities by reviewed banks versus non-reviewed banks before versus after the AQR announcement. We cluster standard errors at the bank and security level. For identification, in addition to time fixed effects to control for overall macro shocks, we include controls for security fixed effects to analyze the same security before and after the AQR, bank fixed effects to account for time-invariant heterogeneity in bank characteristics.[31] In some regressions we also include bank*security fixed effects to account for unobserved matching between characteristics of banks and securities. 'Controls' includes all relevant levels and interactions between 'Safe', 'AQR' and 'Reviewed' that are not absorbed by the fixed effects.

Based on Figure 2 –unconditionally, before imposing any control such as those in equation (1)– we find that, after the announcement of the AQR, reviewed banks increase the share of their safe securities on average by more than 2% during the short time period of the AQR relative to the period before the announcement. Note that we find similar results if we analyze only the reviewed banks or we compare reviewed versus non-reviewed banks.

More formally, estimating equation (1), we find in column 1 of Table 1 that, after the AQR announcement, reviewed banks increase their share of safe securities by 2.36% as compared to non-reviewed banks. In column 2, we add bank*security fixed effects and find that our main result remains very similar in terms of significance and magnitude, despite that the R2 increases by more than 30 percentage points.[32] Column 3 and 4 replicate the estimation of column 1 and 2 but restrict the sample of non-reviewed banks to the largest ones with respect to total assets to ensure that our results are not affected by the comparison of large reviewed banks and small non-reviewed banks (we use the same number of non-reviewed banks to have an equal set of reviewed and non-reviewed banks). The results remain qualitatively similar, yet stronger in magnitude. We find that reviewed banks increase their safe securities holdings by 3.37% during

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according to the standardized approach of capital adequacy under Basel II and III, this rating bucket has the lowest risk weight.

[31] We find similar results if we do not saturate the econometric model with any fixed effect (though identification in this case is weaker).

[32] Following Altonji et al (2005), this implies that our main variable is exogenous to a large set of unobserved security and bank characteristics.

the AQR period. Economically, this suggests that reviewed banks together increase their safe securities holdings by EUR 11.80 billion in the period after the AQR announcement.[33] Moreover, there is also a significant reduction in the overall security holdings of reviewed banks (as indicated by the coefficient on AQR*Reviewed), i.e. reviewed banks not only relatively cut the riskier securities, but also downsize their level of securities holdings in general.[34]

In a robustness regression, we also restrict the sample of both reviewed and non-reviewed banks to those whose total value of total assets lies within the range of plus/minus EUR 10 billion around the EUR 30 billion threshold, i.e., one of the three criteria used to select the reviewed banks as explained in Section II (and the only one applied in Germany). Our results remain qualitatively similar but larger in magnitude (see Table A5 of the Appendix). This suggests that our results are neither driven by very large reviewed banks nor by small non-reviewed banks.

In addition, in columns 5 and 6 of Table 1, we restrict ourselves to reviewed banks only. We find that all reviewed banks on average increase their safe securities holdings by 2.25% after the AQR announcement (note that in column 6 we control for security*bank fixed effects). As a robustness check, we also show that comparing end of September to end of December 2013 yields very similar results (see columns 1 to 3 of Table A3 of the appendix).[35] All in all, these results suggest that reviewed banks increase their safe securities holding after the announcement of the AQR.[36]

As credit was a major part of the ECB's AQR, in a next step we examine the response in the lending behavior of banks during the AQR. To that aim, we exploit the data at the *borrower-bank-quarter* level and use the following estimation equation:

$$\text{Log}(credit)_{b,j,t} = \beta\left(Safe_{j,t-1} \cdot AQR_t \cdot Reviewed_b\right) + \alpha_b + \alpha_j + \alpha_t + \delta' controls + \varepsilon_{b.j.t} \qquad (2)$$

where the dependent variable is the logarithm of the loan amount by bank b to firm j during

[33] The sum of all safe securities holdings of all reviewed banks amounts to a total of EUR 350 billion as at end of September 2013. Using the estimated coefficient on Safe*AQR*Reviewed from Table 1 column 4, results suggest an increase by EUR 11.80 billion, i.e., 3.37%*EUR 350 billion.

[34] If we just run the double interaction *AQR*Reviewed* without the triple with *Safe*, we also find that overall reviewed (vs. Non-reviewed) banks cut on their assets.

[35] We also show in Table A3 of the Appendix that banks decrease the share of riskier securities measured by (i) high-yield securities (columns 3 and 4), (ii) securities whose issuer is headquartered in GIIPS countries (columns 5 and 6), (iii) long-term securities (columns 7 and 8), and (iv) long-term non-safe securities (columns 9 and 10).

[36] A question that we cannot analyze is who buys the riskier securities sold by the reviewed banks, as our data are securities holdings by each bank, and hence it is not transaction level data with buyer and seller identity.

quarter *t*. In analogy to Table 1, we use the same symmetric sample around the AQR announcement, i.e., July, August, and September 2013 vs. October, November, and December 2013.[37] Our binary variables 'AQR' and 'Reviewed' are constructed as before.

To assess the riskiness of a given borrower, we resort to the ex-ante probability of default (PD) that any bank assigns to its borrower. Since only a subset of banks (relatively large banks) provide these PDs, this restricts us to only analyzing those banks and borrowers for which we have a PD. That is, once we observe a PD for a given firm in a given time, we will use this information to assess this firm's riskiness across all of its credit relationships.[38] We then define the binary variable "Safe", which equals the value of one for all borrowers whose PD is below the cross-sectional mean, and zero otherwise.[39] The median PD in this group equals 0.2% and corresponds to PDs observed globally for investment-grade firms that have the lowest risk weights (e.g., Standard and Poor's 2012; Joint Committee of the European Supervisory Authorities, 2014).[40] In comparison, the median PD in the group of riskier firms (i.e., when 'Safe' equals the value of zero) is 4.3%, which refers to PDs observed for below-investment-grade firms.

For identification, we include firm fixed effects to control for the borrower characteristics (thus proxying demand as in e.g. Khwaja and Mian, 2008) or firm*bank fixed effects to control for any firm-bank specific match such as geographical distance (Degryse and Ongena, 2005) and relationship lending (Petersen and Rajan, 1995). Thus, we compare the level of credit for the same borrower across reviewed and non-reviewed banks depending on the ex-ante risk of the borrower. We cluster standard errors at the bank and firm level.

In column 1 of Table 2, we find that reviewed banks, as compared to non-reviewed banks, increase their share of supply of credit to safer firms by 2.84% after the AQR announcement. In column 2, we include firm*bank fixed effects and find that our estimated coefficient on

[37] Recall that our credit data has a quarterly frequency. Therefore, our credit regressions for the sample +/- 3 months around the AQR announcement already compare September 2013, i.e., before the AQR announcement, to December 2013, i.e., the AQR due date.

[38] In case we observe multiple PDs assigned to the same borrower at the same time by different banks, we use the cross-sectional average of all observed PDs for a given borrower and use the average PD to assess this firm's risk profile. Note that the PDs are computed for the default of the given borrower during the next year and thus are independent of the maturity and type of the credit contract at hand.

[39] In Table A4 of the Appendix, we show that our results are robust to the application of different cut-offs to the ex-ante probability of default and to using the ex-ante continuous probability of default.

[40] This credit quality complies with the Eurosystem's credit quality requirements for non-marketable assets as laid down in Article 108 (a) (ECB/2014/60).

Safe*AQR*Reviewed bank remains statistically significant, qualitatively similar but somewhat quantitatively lower. In column 3 and 4, we replicate our security analysis of Table 1 and restrict our sample of non-reviewed banks to the largest institutions in terms of total assets to ensure that our results are not driven by smaller non-reviewed banks.[41] Similar to our security analysis, we find that our results remain qualitatively similar, yet become stronger in magnitude. From column 4, we can see that reviewed banks increase their share of supply of credit to safer firms by 2.68% after the AQR announcement when compared to the largest non-reviewed banks. Economically, this corresponds to an increase of credit supply to safer borrowers in the amount of EUR 42.02 billion in total for all reviewed banks in the period after the AQR announcement.[42] In columns 5 and 6, we restrict ourselves to reviewed banks only and find that on average reviewed banks increased credit to safer firms by 2.81% (with firm fixed effects) and 2.74% (with firm*bank fixed effects) after the AQR announcement (Figure 3 also shows similar results without any control).

As a robustness check, we also restrict the sample of both reviewed and non-reviewed banks to those whose total value of total assets lies within the range of plus/minus EUR 10 billion around the EUR 30 billion threshold. Our results remain qualitatively similar but somewhat larger in magnitude (see Table A5 of the Appendix). In addition, there is also a significant reduction in the overall supply of credit by reviewed banks to firms (coefficient on 'AQR*Reviewed' in Table 2), i.e. reviewed banks not only cut the supply of riskier credit, but also downsize credit supply in general.

In sum, the results (stemming from Figure 2 and 3 without controls, from Table 1 and 2 with controls and from the Appendix) suggest that, after the announcement of the AQR, reviewed banks increase their share of safe assets, both bonds and loans. Economically, we find for all reviewed banks there is an increase of safe securities by EUR 11.80 billion and an increase of credit supply to safer firms by EUR 42.02 billion, together amounting to an average increase in safe assets (both securities and credit) of EUR 53.82 billion, which is high given the very short period of time (basically two months between announcement and compliance) and accounts for 29% of reviewed banks' overall common equity capital. Finally, results are not due to a general

[41] Recall that our credit regressions rely already on a subset of non-reviewed banks as not all non-reviewed banks have borrowers with reported PDs.

[42] The sum of all credit to safer firms of all reviewed banks amounts to a total of EUR 1,568 billion as at end of September 2013. Using the estimated coefficient on Safe*AQR*Reviewed from Table 2 column 4, results suggest an increase by EUR 42.02 billion, i.e., 2.68%*EUR 1,568 billion.

end-of-year effect, but only related to the 2013 last quarter's ECB supervisory audit, as we do not find (statistical or economic) significant effects in the last quarter of 2012 or of 2014 (see Table A6 of the Appendix).

IV.2 DIALING-DOWN OF SAFE ASSETS AFTER THE AQR

The second testable hypothesis that we examine in this paper is that –after the AQR compliance exercise is concluded– banks will liquidate the previously acquired safer assets and invest in holdings with a relatively higher risk. To examine this mechanism, we extend our security and credit analysis from the previous section (Equations (1) and (2) respectively) by just adding all the different AQR time periods (following Figure 1), with identical dependent variables and identical asset risk (*safe*) and bank (*reviewed*) variables. We extend our sample but maintain a symmetric window around the AQR period, i.e. nine months before the AQR announcement and nine months after the AQR due date, yielding a total sample of 21 months covering the period from January 2013 to September 2014 (recall that our sample ends in October 2014, i.e. before the comprehensive stress test results are released and the ECB becomes the European banking supervisor). This allows us to estimate the differential effects across the different periods related to the overall AQR exercise as depicted in Figure 1.

Table 3 presents the results. 'AQR' is constructed as before and thus equals the value of one only for the months October, November, December 2013, and zero otherwise. 'AQR-Compliance' is a binary variable that equals the value of one for the months January to June 2014, and zero otherwise. 'Post-AQR' refers to a dummy variable that equals the value of one for the months from July 2014 onwards, and zero otherwise. This leaves the period before the AQR announcement as the benchmark period. That is, the three estimated coefficients in Table 3 (of the triple interactions of the three different time periods with asset risk and reviewed bank) measure the differential effect during each individual sub-period relative to the period before the AQR announcement. If reviewed banks indeed dial down on safe assets after the AQR compliance exercise is concluded, we expect the coefficient associated to 'Post-AQR' to be insignificant, i.e. suggesting that the differential holdings of safe securities (or safer credit) after the AQR compliance period do not statistically differ from the levels held before the AQR announcement.

In Table 3, column 1, we find that the increase of safe securities during the AQR period

persists during the AQR-compliance period. In the period after the AQR compliance exercise though, the coefficient on Safe*Post-AQR*Reviewed is negative and significant, though it becomes insignificant by restricting the sample of non-reviewed banks to the largest ones (see column 2) and to within reviewed banks only (column 3). That is, the holdings of safe securities after the overall AQR exercise are back to the levels held before the AQR announcement. This suggests that reviewed banks indeed reduce safe securities after temporarily increasing them during the AQR period (see also Figure 2, which graphically illustrates this behavior).

In columns 4 to 6, we mimic the security analysis and examine the differential effect on credit supply by reviewed banks versus non-reviewed banks during the AQR cycle. Similar to our security regressions, we find that –during the AQR-compliance period– reviewed banks' credit supply to safer firms remain at elevated levels as compared to the period before the AQR announcement. However, in contrast to the security analysis, in the period after the AQR compliance period we find that these levels continue to be elevated similar to the levels observed during the AQR period (columns 5 and 6) (see also Figure 3 without controls, which graphically illustrates this behavior).[43] This result is intuitive as the credit portfolio is more difficult to be adapted on short notice in the same way as for instance the (traded) security portfolio, as banks need to have opportunities to lend to riskier borrowers.

As discussed in Section II, the AQR intended to focus especially on the most risky portfolios on the banks' balance sheets and thus gave special attention to banks with significant trading books. Banks with a larger trading book may therefore feel more pressured to adjust their asset portfolio for the AQR exercise than other banks. Moreover, Abbassi, Iyer, Peydró, and Tous (2016) show a positive relationship between banks' trading expertise and the change in their securities investments: banks that rely more on trading will have more expertise in security trading on short notice;[44] therefore, in a next step we use the same proxy as in that paper and examine whether the investment behavior after the AQR announcement differs even within the

[43] It is statistically insignificant in column 4 but not in column 5 and 6.

[44] To proxy for active presence and expertise in securities markets, Abbassi, Iyer, Peydró, and Tous (2016) use the notion that banks that generally engage in trading activities and thus have expertise will have a trading desk in place and the necessary infrastructure, such as direct membership to the trading platforms to facilitate trading activities. Using this line of reasoning, they proxy for trading expertise by direct membership of banks to the largest, fixed-income trading platform in Germany (Eurex Exchange). Supporting this classification, Abbassi, Iyer, Peydró, and Tous (2016) find that the amount of securities traded (as a fraction of total assets) are consistently larger for banks with trading expertise, across all the periods. They also find this measure to be highly correlated with the fraction of trading income to net income (in the pre-crisis period), with a correlation coefficient of 60%. Thus, the trading expertise dummy is highly correlated with banks that have a higher fraction of income generated from trading activities.

group of reviewed banks based on their trading expertise.

In Table 4, we interact our main variable 'Safe*AQR' with the binary variable 'Trading bank', which equals the value of one if the reviewed bank has membership to the largest fixed-income platform in Germany (Eurex Exchange), and zero otherwise. In column 1 of Table 4, we find that during the AQR period there is no additional differential effect for securities holdings within the group of reviewed banks depending on trading expertise (i.e., during the AQR period reviewed banks increase safe securities holdings irrespective of further bank-specific characteristics).[45] However, after the AQR overall exercise, we find that reviewed banks with trading expertise reduce their safe assets to levels below that observed before the AQR period (i.e., the estimated coefficient of 'Safe*Post-AQR*Trading bank' is negative and significant).

In column 2, we find that reviewed banks with trading expertise increase credit to safer firms more than other reviewed banks after the AQR announcement. During the post-AQR period though, we find that both reviewed banks with and without trading specialization remain at roughly similar elevated levels of safe credit as observed during the AQR period. All in all, trading banks that are reviewed reduce risk as the others in securities but increase it more than other banks during the post-AQR period, whereas in lending, trading banks stay at the same level during the post-AQR period than before.

V. CONCLUSIONS

Government regulation requires effective supervision, but regulated entities may window-dress to supervisors. For empirical identification, we analyze the banking sector exploiting a quasi-natural experiment —ECB's 2014 asset quality review (AQR)— in conjunction with the security and credit registers. The banking sector is interesting, not only for empirical identification of window-dressing to supervisors, but also for the difficulties in supervision, as banks hold more liquid assets, which are easy to change relatively fast, and also hold assets that are more opaque than in other industries. Moreover, there has been a substantial increase in banking regulation after the financial crisis of 2008.

[45] In unreported robustness regressions, we have also tried other bank-specific variables such as the bank's leverage ratio, its Tier-1 capital adequacy ratio, its size, or the share of non-performing loans. Yet, we do not find any further differential heterogeneity at the bank level.

We examine how banks behave before and after the largest-ever supervisory exercise, i.e., the European Central Bank's 2014 AQR, by examining the change in the portfolio holdings of German banks that were reviewed as a part of the AQR. For identification, we exploit the fact that the AQR was based on the portfolio holdings of banks at a single point in time. Thus, we test whether, after the announcement of the AQR, reviewed (versus non-reviewed) banks rebalance their assets by buying more safe assets and then unload them after the culmination of the supervisory exercise (i.e., whether reviewed banks window-dress for supervisory audits).

We find that, after the ECB's announcement of the AQR, reviewed banks increase their share of securities that have top-tier rating and reduce their share of supply of credit to riskier firms. In the period after the AQR compliance though, we find that reviewed banks fully reload back on riskier securities (similar to the pre-ECB announcement level); however, this is not the case for riskier credit. Results are more pronounced for banks with higher trading expertise; in particular, trading banks that are reviewed reduce risk as the others in securities after the ECB announcement of AQR, but increase it more than other banks during the post-AQR period; whereas in lending, the trading banks stay at the same level during the post-AQR period than before. The results suggest that banks change the composition of their assets before a supervisory exercise in favor of safer assets and undo this after the exercise.

The results hold important policy implications for stress-testing in particular, and for the design of supervision in general. The results suggest that pre-defining the timing and structure of a supervisory exercise incentivizes window-dressing behavior of banks, as it is optimal from a bank's perspective (see e.g., Tarullo, 2014; Goldstein and Sapra, 2014; Coen, 2017). Thus, it might be necessary to have an element of surprise in the supervisory exercise, both in the timing of the audits (either more continuous or random in time) and also in the transparency of the specific process (i.e., methods and models used, and assets and type of risks assessed). The results also indicate that it is easier for banks to change the composition of liquid assets (securities trading) than illiquid assets (loans to firms). Thus, the results also point to the notion that regulation of banks with substantial volume of marketable assets may pose significant challenges for supervision.

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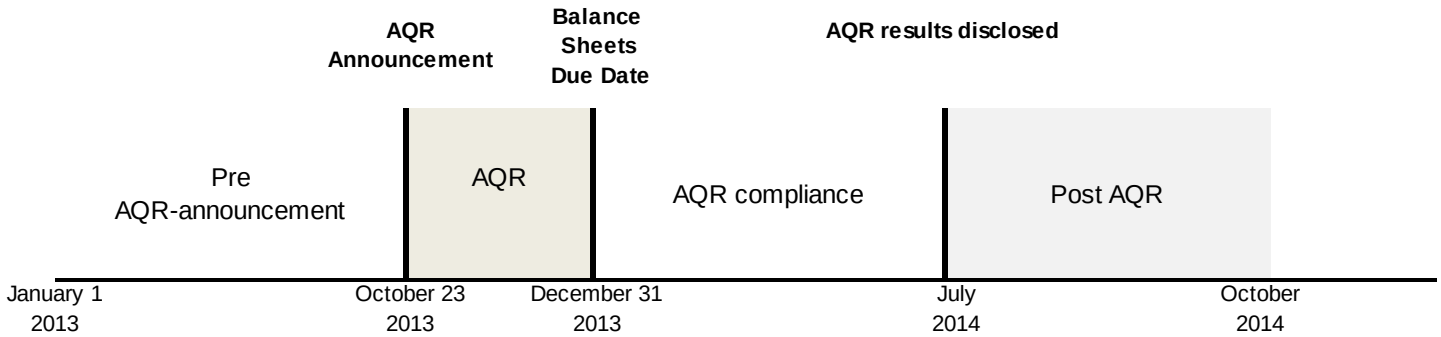
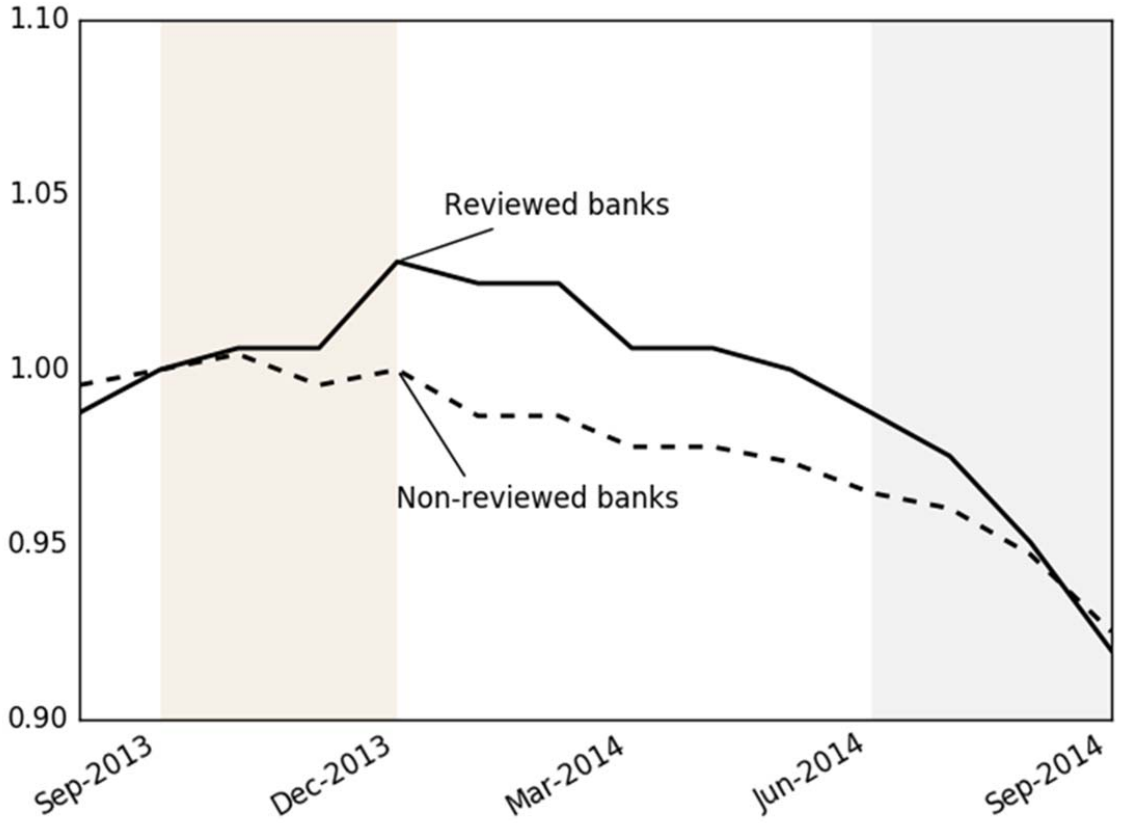
FIGURE 1: TIMELINE OF THE ASSET QUALITY REVIEW



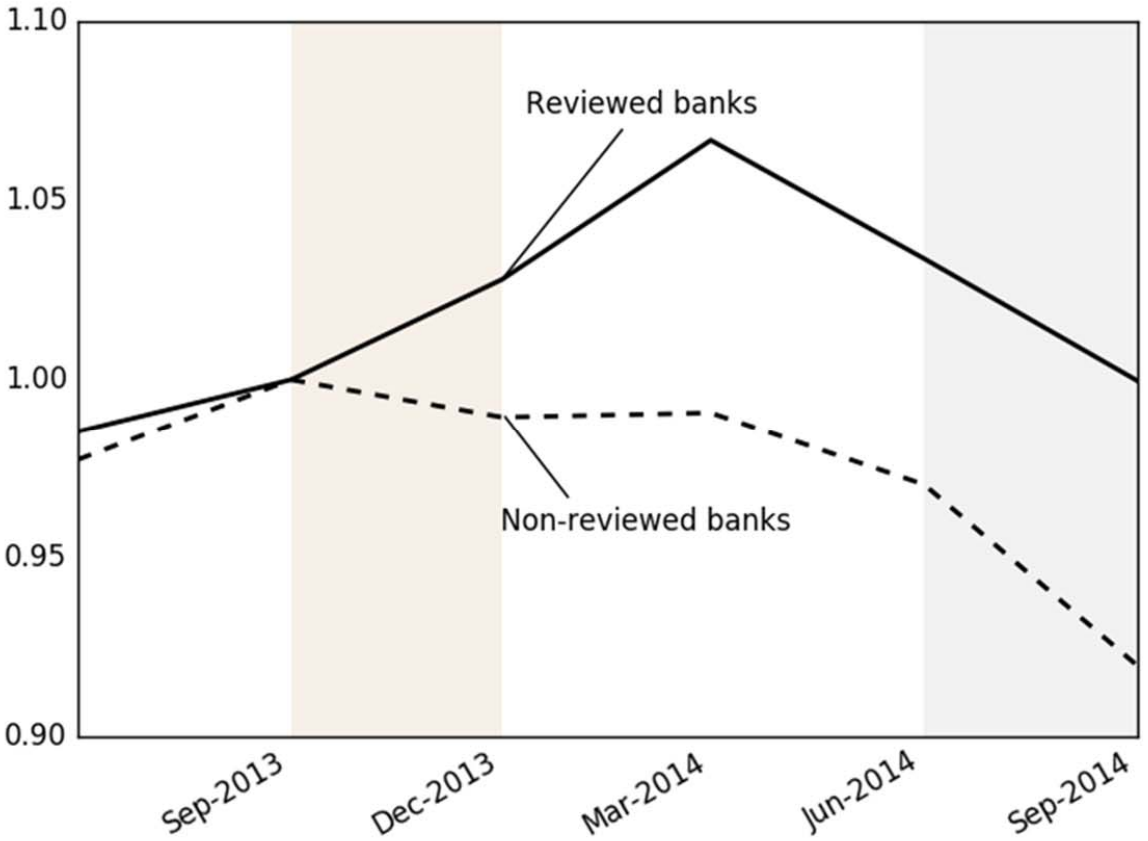
This figure displays the timeline of the comprehensive asset quality review (AQR) by the European Central Bank (ECB). For more information, please refer to Section 2 and https://www.bankingsupervision.europa.eu/banking/comprehensive/2014/html/index.en.html.

FIGURE 2: FRACTION OF SAFE SECURITIES BEFORE AND AFTER THE AQR



This figure shows the level of safe securities as a fraction of total assets by reviewed and non-reviewed banks during the period of the ECB's AQR cycle (normalized to September 2013). We define a security as safe when the security has a rating between AAA to AA-, which corresponds to the Eurosystem's harmonized rating scale for the definition of safe assets. 'Reviewed banks' refers to all banks that were reviewed under the AQR by the ECB. 'Non-reviewed banks' defines all banks that were not reviewed by the ECB under the AQR. The first shaded area refers to the period after the AQR announcement in October 2013 until the AQR due date, i.e., end of December 2013, and the second shaded area denotes the period after the AQR concluded in July 2014 until the end of our sample, end of September 2014.

FIGURE 3: FRACTION OF SAFE CREDITORS BEFORE AND AFTER THE AQR



This figure shows the level of safe creditors as a fraction of total assets by reviewed and non-reviewed banks during the period of the ECB's AQR cycle (normalized to September 2013). We define a creditor as safe when the borrower has a lower one-year probability of default (PD) than the cross-sectional mean of all borrowers' PDs. 'Reviewed banks' refers to all banks that were reviewed under the AQR by the ECB. 'Non-reviewed banks' defines all banks that were not reviewed by the ECB under the AQR. The first shaded area refers to the period after the AQR announcement in October 2013 until the AQR due date, i.e., end of December 2013, and the second shaded area denotes the period after the AQR concluded in July 2014 until the end of our sample, end of September 2014.

TABLE 1: DIALING UP OF SAFE SECURITIES AFTER THE AQR ANNOUNCEMENT

+/- 3 MONTHS AROUND AQR ANNOUNCEMENT

	Dependent variable:					
	Log(securities holdings)					
	Reviewed vs. non-reviewed		Reviewed vs. largest non-reviewed		Within reviewed banks	
	(1)	(2)	(3)	(4)	(5)	(6)
Safe*AQR*Reviewed	0.0236***	0.0264***	0.0314***	0.0337***	0.0190***	0.0225***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Safe*AQR	-0.0092***	-0.0039***	-0.0149***	-0.0113***		
	(0.00)	(0.00)	(0.01)	(0.00)		
Safe	0.1580***	0.0034	-0.0311	-0.0303		
	(0.03)	(0.01)	(0.05)	(0.04)		
AQR*Reviewed	-0.0394***	-0.0377***	-0.0333***	-0.0426***		
	(0.00)	(0.00)	(0.01)	(0.00)		
Safe*Reviewed	-0.3651***	0.0139	0.0792**	0.0484	0.0376	0.0193
	(0.03)	(0.05)	(0.03)	(0.06)	(0.05)	(0.04)
Security FE	Y	-	Y	-	Y	-
Bank FE	Y	-	Y	-	Y	-
Security*Bank FE	N	Y	N	Y	N	Y
Time FE	Y	Y	Y	Y	Y	Y
Observations	1,546,778	1,546,778	323,290	323,290	192,071	192,071
R-squared	0.687	0.996	0.615	0.987	0.553	0.978

The dependent variable is the logarithm of securities nominal holdings by each bank b of security s during month t in the period July 2013 to December 2013, i.e., +/- three months around the AQR announcement. 'Safe' is a dummy variable that equals the value of one whenever the security has a rating between AAA and AA-, and zero otherwise. 'AQR' is a dummy variable that equals the value of one during the months following the AQR announcement in October 2013 (post), i.e. end of October, November and December 2013, and zero before. We classify a bank as 'Reviewed' if it was reviewed under the AQR by the ECB. In columns 5 and 6, we restrict our sample to reviewed banks only, i.e., when 'Reviewed' equals the value of one for all banks. Fixed effects are either included ('Y'), not included ('N'), or spanned by another set of fixed effects ('-'). The definition of the main variables can be found in Appendix Table A1. A constant is included, but its coefficient is left unreported. Standard errors are clustered at bank and security level and reported in parentheses. ***: Significant at 1% level; **: Significant at 5% level; *: Significant at 10% level.

TABLE 2: DIALING UP OF SAFE CREDITORS AFTER THE AQR ANNOUNCEMENT

+/- 3 MONTHS AROUND AQR ANNOUNCEMENT

	Dependent variable:					
	Log(credit)					
	Reviewed vs. non-reviewed		Reviewed vs. largest non-reviewed		Within reviewed banks	
	(1)	(2)	(3)	(4)	(5)	(6)
Safe*AQR*Reviewed	0.0284**	0.0189*	0.0426***	0.0268**	0.0281***	0.0274***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)
Safe*AQR	0.0013	0.0085	-0.0126	0.0006		
	(0.01)	(0.01)	(0.01)	(0.01)		
Safe	0.0419	0.0131	0.0018	0.0041		
	(0.04)	(0.01)	(0.05)	(0.02)		
AQR*Reviewed	-0.0350***	-0.0283***	-0.0489***	-0.0368***		
	(0.01)	(0.01)	(0.01)	(0.01)		
Safe*Reviewed	-0.0787	-0.0362**	-0.0304	-0.0272	-0.0283	-0.0231**
	(0.05)	(0.02)	(0.06)	(0.02)	(0.02)	(0.01)
Firm FE	Y	-	Y	-	Y	-
Bank FE	Y	-	Y	-	Y	-
Firm*Bank FE	N	Y	N	Y	N	Y
Time FE	Y	Y	Y	Y	Y	Y
Observations	166,208	166,208	161,328	161,328	142,436	142,436
R-squared	0.901	0.978	0.904	0.978	0.908	0.977

The dependent variable is the logarithm of loan amount by each bank b to borrower j during quarter t in the period September 2013 to December 2013, i.e., +/- three months around the AQR announcement. 'Safe' is a dummy variable that equals the value of one if loan j has a probability of default (PD) below the cross-sectional mean PD of all borrowers' PDs in time t-1. 'AQR' is a dummy variable that equals the value of one during the months following the AQR announcement in October 2013 (post), i.e. end of December 2013, and zero before. We classify a bank as 'Reviewed' if it was reviewed under the AQR by the ECB. In columns 5 and 6, we restrict our sample to reviewed banks only, i.e., when 'Reviewed' equals the value of one for all banks. Fixed effects are either included ('Y'), not included ('N'), or spanned by another set of fixed effects ('-'). The definition of the main variables can be found in Appendix Table A1. A constant is included, but its coefficient is left unreported. Standard errors are clustered at bank and firm level and reported in parentheses. ***: Significant at 1% level; **: Significant at 5% level; *: Significant at 10% level.

TABLE 3: DIALING DOWN OF SAFE ASSETS AFTER THE AQR OVERALL EXERCISE

+ / - 9 MONTHS AROUND AQR ANNOUNCEMENT

	Dependent variable:					
	Log(securities holdings)			Log(credit)		
	Reviewed vs. non-reviewed	Reviewed vs. largest non-reviewed	Within reviewed banks	Reviewed vs. non-reviewed	Reviewed vs. largest non-reviewed	Within reviewed banks
	(1)	(2)	(3)	(4)	(5)	(6)
Safe*AQR*Reviewed	0.0212***	0.0132***	0.0160***	0.0185*	0.0305***	0.0346***
	(0.00)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)
Safe*AQR-Compliance*Reviewed	0.0083**	0.0155***	0.0113***	0.0289***	0.0469***	0.0563***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
Safe*Post-AQR*Reviewed	-0.0208***	-0.0058	-0.0061	0.0146	0.0375***	0.0572***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Safe*AQR	-0.0053***	0.0027		0.0159*	0.0040	
	(0.00)	(0.00)		(0.01)	(0.01)	
Safe*AQR-Compliance	0.0029***	-0.0043		0.0271***	0.0092	
	(0.00)	(0.00)		(0.01)	(0.01)	
Safe*Post-AQR	0.0144***	-0.0004		0.0422***	0.0192*	
	(0.00)	(0.00)		(0.01)	(0.01)	
Safe	-0.0060	-0.0233		0.0035	-0.0136	
	(0.01)	(0.02)		(0.01)	(0.01)	
AQR*Reviewed	-0.0417***	-0.0435***		-0.0339***	-0.0474***	
	(0.00)	(0.00)		(0.01)	(0.01)	
Safe*Reviewed	-0.0018	0.0143	-0.0124	-0.0313***	-0.0142	-0.0273***
	(0.02)	(0.03)	(0.02)	(0.01)	(0.01)	(0.00)
AQR-Compliance*Reviewed	-0.0629***	-0.0734***		-0.0463***	-0.0746***	
	(0.00)	(0.00)		(0.01)	(0.01)	
Post-AQR*Reviewed	-0.0991***	-0.1021***		-0.0329***	-0.0662***	
	(0.00)	(0.00)		(0.01)	(0.01)	
Security*Bank FE	Y	Y	Y	-	-	-
Firm*Bank FE	-	-	-	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y
Observations	5,306,169	1,118,632	663,380	614,236	592,800	524,731
R-squared	0.987	0.963	0.940	0.949	0.948	0.946

The dependent variable in column 1 to 3 is the logarithm of securities nominal holdings by each bank b of security s during month t in the period January 2013 to September 2014, i.e., +/- nine months around the AQR. The dependent variable in column 4 to 6 is the logarithm of loan amount by each bank b to borrower j during quarter t in the period January 2013 to September 2014, i.e., +/- nine months around the AQR. 'AQR' equals the value of one for the months October, November, December 2013, and zero otherwise; 'AQR-Compliance' equals the value of one for the months January to June 2014, and zero otherwise; 'Post-AQR' equals the value of one for the months from July 2014 onwards, and zero otherwise, which leaves the period before the AQR announcement as the benchmark period (i.e., each estimated coefficient measures the differential effect during each individual sub-period relative to the period before the AQR announcement). Note that our data on securities holdings is available at monthly frequency whereas our data on credit is available at quarterly frequency. We classify a bank as 'Reviewed' if it was reviewed under the AQR by the ECB. In columns 3 and 6, we restrict our sample to reviewed banks only, i.e., when 'Reviewed' equals the value of one for all banks. Fixed effects are either included ('Y') or spanned by another set of fixed effects ('-'). The definition of the main variables can be found in Appendix Table A1. A constant is included, but its coefficient is left unreported. Standard errors are clustered at bank and asset level (security or firm, respectively) and reported in parentheses. ***: Significant at 1% level; **: Significant at 5% level; *: Significant at 10% level.

TABLE 4: DIALING DOWN OF SAFE ASSETS AFTER THE AQR DEPENDING ON TRADING EXPERTISE

+ / - 9 MONTHS AROUND AQR

	Within reviewed banks	
	Dependent variable:	
	Log(securities holdings)	Log(credit)
	(1)	(2)
Safe*AQR	0.0280**	0.0171**
	(0.01)	(0.01)
Safe*AQR*Trading bank	-0.0176	0.0255**
	(0.02)	(0.01)
Safe*AQR-Compliance	0.0366*	0.0307***
	(0.02)	(0.01)
Safe*AQR-Compliance*Trading bank	-0.0344	0.0323***
	(0.02)	(0.01)
Safe*Post-AQR	0.0309	0.0273**
	(0.02)	(0.01)
Safe*Post-AQR*Trading bank	-0.0463*	0.0348**
	(0.03)	(0.01)
Safe	0.0349	0.0229***
	(0.07)	(0.01)
AQR*Trading bank	0.0175*	-0.0477***
	(0.01)	(0.01)
Safe*Trading bank	-0.0407	-0.0634***
	(0.08)	(0.01)
AQR-Compliance*Trading bank	0.0032	-0.0254***
	(0.01)	(0.01)
Post-AQR*Trading bank	-0.1100***	-0.0006
	(0.01)	(0.01)
Securities*Bank FE	Y	-
Firm*Bank FE	-	Y
Time FE	Y	Y
Observations	662,249	524,731
R-squared	0.941	0.947

The dependent variable in column 1 is the logarithm of securities nominal holdings by each bank b of security s during month t in the period January 2013 to September 2014, i.e., +/- nine months around the AQR. The dependent variable in column 2 is the logarithm of loan amount by each bank b to borrower j during quarter t in the period January 2013 to September 2014, i.e., +/- nine months around the AQR. 'AQR' equals the value of one for the months October, November, December 2013, and zero otherwise; 'AQR-Compliance' equals the value of one for the months January to June 2014, and zero otherwise; 'Post-AQR' equals the value of one for the months from July 2014 onwards, and zero otherwise, which leaves the period before the AQR announcement as the benchmark period (i.e., each estimated coefficient measures the differential effect during each individual sub-period relative to the period before the AQR announcement). Note that our data on securities holdings is available at monthly frequency whereas our data on credit is available at quarterly frequency. We restrict our sample to reviewed banks only, i.e., when 'Reviewed' equals the value of one. 'Trading bank' is a binary variable that equals one when the reviewed bank has membership to the largest-fixed income platform in Germany (Eurex Exchange), and zero otherwise, which proxies for banks with higher trading expertise. We classify a bank as 'Reviewed' if it was reviewed under the AQR by the ECB, i.e., when 'Reviewed' equals the value of one. Fixed effects are either included ('Y') or spanned by another set of fixed effects ('-'). The definition of the main variables can be found in Appendix Table A1. A constant is included, but its coefficient is left unreported. Standard errors are clustered at bank and asset level (security or firm, respectively) and reported in parentheses. ***: Significant at 1% level; **: Significant at 5% level; *: Significant at 10% level.

TABLE 5: SPILLOVERS

	Dependent variable:	
	Price	Credit
	(1)	(2)
Non-Safe*AQR*Reviewed	-1.1171***	-0.0204***
	(0.32)	(0.01)
Non-Safe*AQR	Yes	Yes
Non-Safe	Yes	Yes
AQR*Reviewed	Yes	Yes
Non-Safe*Reviewed	Yes	Yes
Securities FE	Yes	-
Firm FE	-	Yes
Time FE	Yes	Yes
Observations	9,618	133,336
R-squared	0.987	0.981

The dependent variable in column 1 is the price of security s during month t in the period September 2013 and December 2013, i.e., before and after the AQR announcement. 'Non-Safe' is a dummy variable that equals the value of one whenever the security has a below-investment-grade issuer rating, and zero otherwise. 'Reviewed' is a binary variable that equals one when the security is primarily held (i.e., more than 50th percentile) by reviewed banks as at September 2013, and zero otherwise.
The dependent variable in column 2 is the logarithm of loan amount borrowed by firm j during quarter t in the period September 2013 and December2013. 'Non-Safe' is a dummy variable that equals the value of one if loan j has a probability of default (PD) above the cross-sectional mean PD of all borrowers' PDs in time t-1, and zero otherwise. 'Reviewed' is a binary variable that equals one when the firm's total credit is exclusively (i.e., more than 50th percentile) provided by reviewed banks as at September 2013, and zero otherwise. 'AQR' equals the value of one for the month December 2013, and zero otherwise; this leaves the period before the AQR announcement as the benchmark period. Fixed effects are either included ('Y') or spanned by another set of fixed effects ('-'). Standard errors are clustered at bank and asset level (security or firm, respectively) and reported in parentheses. ***: Significant at 1% level; **: Significant at 5% level; *: Significant at 10% level.

APPENDIX

TABLE A1: VARIABLE DEFINITION

Variable name	Definition
Log(securities holdings)	Logarithm of nominal holdings of security s by bank b at month t.
Log(credit)	Logarithm of the loan amount by bank b to firm j during quarter t.
Reviewed	Binary variable that equals the value of one if the bank is a financial institution reviewed as part of the Asset Quality Review (AQR), and zero otherwise.
AQR	Binary variable that equals the value of one for the months October, November, and December 2013, and zero otherwise.
AQR-Compliance	Binary variable that equals the value of one for the months January to June 2014, and zero otherwise.
Post-AQR	Binary variable that equals the value of one for the months July to September 2014, and zero otherwise.
Safe	For securities analysis: binary variable that equals the value of one if the security s has a rating of AAA to AA- in t-1, and zero otherwise. For credit analysis: binary variable that equals the value of one if loan j has a probability of default below the cross-sectional average probability of default of all loans in time t-1.
Trading bank	Binary variable that equals the value of one if bank *b* has membership to the largest fixed-income platform in Germany (Eurex Exchange), and zero otherwise.

TABLE A2: SUMMARY STATISTICS

Panel A: +/- 3 months around AQR announcement

	Mean	Std.	Obs.
Securities holdings:			
Log(securities holdings) [in € th.]	11.61	2.87	1,546,778
Securities/TA	0.21	0.13	1,546,778
Safe	0.29	0.45	1,546,778
Reviewed	0.12	0.33	1,546,778
Trading bank	0.10	0.30	1,546,778
AQR	0.50	0.50	1,546,778
Credit:			
Log(credit) [in € th.]	7.73	2.06	166,208
Credit/TA	0.43	0.19	166,208
Safe	0.76	0.42	166,208
Reviewed	0.86	0.35	166,208
Trading bank	0.74	0.44	166,208
AQR	0.50	0.50	166,208

Panel B: +/- 9 months around AQR period

	Mean	Std.	Obs.
Securities holdings:			
Log(securities holdings) [in € th.]	11.61	2.89	5,306,169
Securities/TA	0.21	0.13	5,306,169
Safe	0.29	0.45	5,306,169
Reviewed	0.13	0.33	5,306,169
Trading bank	0.10	0.30	5,306,169
AQR	0.15	0.36	5,306,169
AQR-Compliance	0.28	0.45	5,306,169
Post-AQR	0.16	0.37	5,306,169
Credit:			
Log(credit) [in € th.]	7.70	2.09	615,016
Credit/TA	0.44	0.19	615,016
Safe	0.75	0.43	615,016
Reviewed	0.85	0.35	615,016
Trading bank	0.73	0.45	615,016
AQR	0.14	0.35	615,016
AQR-Compliance	0.28	0.45	615,016
Post-AQR	0.13	0.34	615,016

This table reports the summary statistics of the main variables used in the paper. In Panel A, the variables refer to the regressions from Table 1 and 2, respectively, covering the period +/- 3 months before and after the AQR announcement in October 2013, i.e., end of July, August, September, October, November, and December. Panel B reflects the sample for our estimations presented in Table 3 (and 4) using the sample +/- 9 months before and after the AQR period, i.e. from January 2013 to September 2014. 'Log(securities holdings) is the logarithm of the notional security holdings (in EUR thousands) by a bank in a given month. 'Log(credit)' refers the logarithm of the loan amount (in EUR thousands) to a borrower by a bank in a given quarter. Note that our data on securities holdings is available at monthly frequency whereas our data on credit is available at quarterly frequency. 'Safe' for securities measures the percentage share of 'safe' securities to all securities. 'Securities/TA' measures the total investment in securities as a fraction of total assets. 'Safe' for credit measures the percentage share of 'safe' borrowers to all creditors. 'Credit/TA' measures the total loan amount as a fraction of total assets.

TABLE A3: DIALING UP OF SAFE SECURITIES AFTER THE AQR ANNOUNCEMENT

ROBUSTNESS: SEPTEMBER 2013 VS DECEMBER 2013 AND OTHER RISK MEASURES

	Dependent variable: Log(securities holdings)									
Variable:	Safe		High Yield		GIIPS		Long-Term		Long-Term Non-Safe	
	Reviewed vs. largest non-reviewed	Within reviewed banks	Reviewed vs. largest non-reviewed	Within reviewed banks	Reviewed vs. largest non-reviewed	Within reviewed banks	Reviewed vs. largest non-reviewed	Within reviewed banks	Reviewed vs. largest non-reviewed	Within reviewed banks
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variable *AQR*Reviewed	0.0204**	0.0132*	-0.0660***	-0.0552***	-0.0375***	-0.0194*	-0.0434***	-0.0419***	-0.2590***	-0.3259***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.06)	(0.06)
Variable *AQR	-0.0072		0.0108		0.0181**		0.0015		-0.0669***	
	(0.01)		(0.01)		(0.01)		(0.01)		(0.01)	
Variable	-0.0132		-0.0335***				-0.3178***		-0.1455	
	(0.05)		(0.01)				(0.08)		(0.11)	
AQR*Reviewed	-0.0388***		-0.0315***		-0.0253***		-0.0262***		-0.0277***	
	(0.01)		(0.01)		(0.00)		(0.00)		(0.00)	
Variable *Reviewed	-0.0005	-0.0138	0.0298	-0.0037			0.1452	-0.1726**	0.3717**	0.2263**
	(0.08)	(0.06)	(0.02)	(0.02)			(0.11)	(0.08)	(0.15)	(0.09)
Security*Bank FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	106,952	63,414	78,526	45,044	106,952	63,414	106,952	63,414	106,952	63,414
R-squared	0.989	0.982	0.988	0.979	0.989	0.982	0.989	0.983	0.989	0.983

This table replicates Table 1, but restricts the sample to September 2013 and December 2013. The dependent variable is the logarithm of securities nominal holdings by each bank b of security s during month t. 'Safe' is a dummy variable that equals the value of one whenever the security has a rating between AAA and AA-, and zero otherwise. 'High Yield' is a dummy variable that equals the value of one whenever the security has a higher yield than the cross-sectional mean of all yields in t-1, and zero otherwise. 'GIIPS' is a dummy variable that equals the value of one whenever the issuer of the security is headquartered in Greece, Ireland, Italy, Portugal, or Spain, and zero otherwise. 'Long-Term' is a dummy variable that equals the value of one whenever the security has a residual maturity of higher than 10 years, and zero otherwise. 'Long-Term Non-Safe' is a dummy variable that equals the value of one whenever the security has a below-investment-grade issuer rating *and* a residual maturity of higher than 10 years, and zero otherwise. 'AQR' is a dummy variable that equals the value of one during the months following the AQR announcement in October 2013 (post), i.e. end of December 2013, and zero before. We classify a bank as 'Reviewed' if it was reviewed under the AQR by the ECB. In columns 2, 4, 6, 8, and 10 we restrict our sample to reviewed banks only, i.e., when 'Reviewed' equals the value of one for all banks. Fixed effects are included ('Y'). The definition of the main variables can be found in Appendix Table A1. A constant is included, but its coefficient is left unreported. Standard errors are clustered at bank and security level and reported in parentheses. ***: Significant at 1% level; **: Significant at 5% level; *: Significant at 10% level.

TABLE A4: DIALING UP OF SAFE CREDITORS AFTER THE AQR ANNOUNCEMENT

ROBUSTNESS: OTHER CUT-OFFS

	Dependent variable:							
	Log(credit)							
Variable:	Median		75%		90%		Continuous	
	Reviewed vs. largest non-reviewed	Within reviewed banks	Reviewed vs. largest non-reviewed	Within reviewed banks	Reviewed vs. largest non-reviewed	Within reviewed banks	Reviewed vs. largest non-reviewed	Within reviewed banks
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable *AQR*Reviewed	0.0172[a]	0.0248***	0.0231**	0.0262***	0.0279**	0.0287***	0.0393**	0.0447***
	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)
Variable *AQR	0.0076		0.0031		0.0008		0.0054	
	(0.01)		(0.01)		(0.01)		(0.01)	
Variable	0.0091		0.0259		0.0329		-0.0137	
	(0.03)		(0.02)		(0.02)		(0.03)	
AQR*Reviewed	-0.0248***		-0.0329***		-0.0401***		-0.0132**	
	(0.00)		(0.00)		(0.01)		(0.00)	
Variable *Reviewed	-0.0135	-0.0044	-0.0575**	-0.0315***	-0.0414	-0.0085	-0.0345	-0.0483*
	(0.03)	(0.01)	(0.02)	(0.01)	(0.03)	(0.01)	(0.04)	(0.02)
Firm*Bank FE	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	161,328	142,436	161,328	142,436	161,328	142,436	161,328	142,436
R-squared	0.978	0.977	0.978	0.977	0.978	0.977	0.978	0.977

This table replicates Table 2, but uses different cut-offs to compute 'safe' creditors. The dependent variable is the logarithm of loan amount by each bank b to borrower j during quarter t in the period September 2013 to December 2013, i.e., +/- three months around the AQR announcement. 'Median' ('75%' and '90%', respectively) is a dummy variable that equals the value of one if loan j has a probability of default (PD) below the cross-sectional median (75th percentile and 90th percentile, respectively) PD of all borrowers' PDs in time t-1. 'Continuous' equals the probability of default (PD) of borrower j in time t-1. For the sake of convenient presentation, we multiplied in columns 7 and 8 each coefficient that involves 'Continuous' with (-1). 'AQR' is a dummy variable that equals the value of one during the months following the AQR announcement in October 2013 (post), i.e. end of December 2013, and zero before. We classify a bank as 'Reviewed' if it was reviewed under the AQR by the ECB. In columns 2, 4, 6, and 8, we restrict our sample to reviewed banks only, i.e., when 'Reviewed' equals the value of one for all banks. Fixed effects are included ('Y'). The definition of the main variables can be found in Appendix Table A1. A constant is included, but its coefficient is left unreported. Standard errors are clustered at bank and firm level and reported in parentheses. ***: Significant at 1% level; **: Significant at 5% level; *: Significant at 10% level; [a]: Significant at 12% level.

TABLE A5: DIALING UP OF SAFE SECURITIES AFTER THE AQR ANNOUNCEMENT

ROBUSTNESS: COMPARING BANKS OF SIMILAR ASSET SIZE

	20bn ≤ total assets≤ 40bn	
	Dependent variable:	
	Log(securities holdings)	Log(credit)
	(1)	(2)
Safe*AQR*Reviewed	0.1124***	0.0484**
	(0.03)	(0.02)
Safe*AQR	-0.0205**	-0.0083
	(0.01)	(0.01)
Safe	0.0032	0.0091
	(0.02)	(0.02)
AQR*Reviewed	-0.1200***	-0.0552***
	(0.02)	(0.02)
Safe*Reviewed	-0.0522	-0.0724
	(0.05)	(0.05)
Security*Bank FE	Y	-
Firm*Bank FE	-	Y
Time FE	Y	Y
Observations	45,647	25,216
R-squared	0.984	0.988

This table replicates column 2 of Table 1 and 2, respectively, but restricts the sample to all banks (both reviewed and non-reviewed) with a total asset size of +/- EUR 10 billion around the EUR 30 billion threshold that the ECB imposed to select the reviewed banks. In column 1 the dependent variable is the logarithm of securities nominal holdings by each bank b of security s during month t in the period July 2013 to December 2013. In column 2 the dependent variable is the logarithm of loan amount by each bank b to borrower j during quarter t in the period July 2013 to December 2013. In column 1 'Safe' is a dummy variable that equals the value of one whenever the security has a rating between AAA and AA-, and zero otherwise. In column 2 'Safe' is a dummy variable that equals the value of one if loan j has a probability of default (PD) below the cross-sectional mean PD of all borrowers' PDs in time t-1. 'AQR' is a dummy variable that equals the value of one during the months following the AQR announcement in October 2013 (post), i.e. end of October, November December 2013, and zero before. Note that our data on securities holdings is available at monthly frequency whereas our data on credit is available at quarterly frequency. We classify a bank as 'Reviewed' if it was reviewed under the AQR by the ECB. Fixed effects are either included ('Y') or spanned by another set of fixed effects ('-'). The definition of the main variables can be found in Appendix Table A1. A constant is included, but its coefficient is left unreported. Standard errors are clustered at bank and asset level (security or firm, respectively) and reported in parentheses. ***: Significant at 1% level; **: Significant at 5% level; *: Significant at 10% level.

TABLE A6: PLACEBO TEST

PLACEBO TEST: 2012 AND 2014

	Reviewed vs. non-reviewed			
Placebo:	*Sept 2012 vs. Dec 2012*		*Sept 2014 vs. Dec 2014*	
	Dependent variable:			
	Log(securities holdings)	Log(credit)	Log(securities holdings)	Log(credit)
	(1)	(2)	(3)	(4)
Safe**Placebo* *Reviewed	-0.0080	-0.0031	-0.0031	0.0042
	(0.02)	(0.01)	(0.01)	(0.01)
Safe**Placebo*	Y	Y	Y	Y
Safe	Y	Y	Y	Y
Placebo *Reviewed	Y	Y	Y	Y
Safe*Reviewed	Y	Y	Y	Y
Security*Bank FE	Y	-	Y	-
Firm*Bank FE	-	Y	-	Y
Time FE	Y	Y	Y	Y
Observations	168,380	190,376	400,972	150,530
R-squared	0.982	0.978	0.997	0.977

This table replicates our estimation for 2012 and 2014, respectively. The dependent variable in columns 1 and 3 is the logarithm of securities nominal holdings by each bank b of security s during month t. The dependent variable in column 2 and 4 is the logarithm of loan amount by each bank b of borrower j during quarter t. Note that our data on securities holdings is available at monthly frequency whereas our data on credit is available at quarterly frequency. 'Placebo' is a dummy variable that equals the value of one for December 2012 (or 2014), and zero otherwise. We classify a bank as 'Reviewed' if it was reviewed under the AQR by the ECB. Fixed effects are either included ('Y') or spanned by another set of fixed effects ('-'). The definition of the main variables can be found in Appendix Table A1. A constant is included, but its coefficient is left unreported. Standard errors are clustered at bank and asset level (security or firm, respectively) and reported in parentheses. ***: Significant at 1% level; **: Significant at 5% level; *: Significant at 10% level.