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## What drives forbearance – evidence from the ECB Comprehensive Assessment

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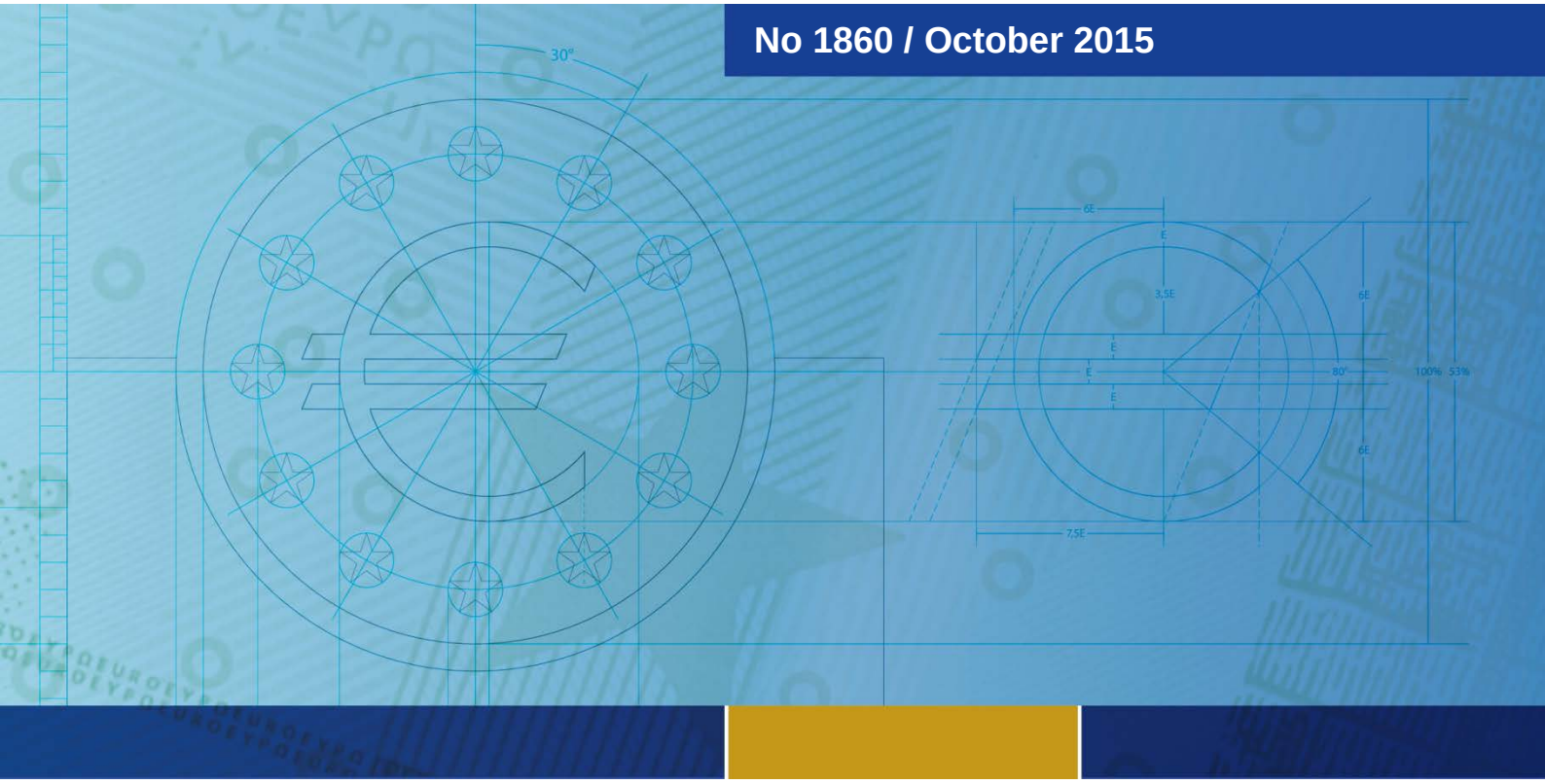

## Abstract

Forbearance is a practice of granting concessions to troubled borrowers, typically in the form of prolongation of maturity of refinancing of the loan. While economically useful in some circumstances, it can be used by banks in order to reduce the need for provisions and conceal potential losses. If forbearance is widespread in the banking system, it may result in systemic risk, increasing uncertainty about the quality of banks' assets and undermining trust in the banking sector's solvency. This paper provides the first empirical analysis of forbearance in Europe, using the adjustment of nonperforming exposures due to the asset quality review (AQR) and the associated increase in required provisions as measures of forbearance. Our results highlight weak macro-economic conditions, lax bank supervision and individual bank weakness as the key factors.

JEL codes: G21, G28

Keywords: forbearance, nonperforming loans, zombie lending, asset quality review.

## Non-technical summary

Forbearance describes the renegotiation of a loan's contract in case a borrower fails or is likely to fail to fulfil her obligations. Forbearance has the advantage of allowing a troubled borrower to recover from temporary, liquidity-related difficulties and at the same time it enables the lender to avoid selling collateral at a depressed price, maintaining long term client relationships. However, if a borrower faces solvency-related difficulties, forbearance might lead the lender to misallocate its resources, inefficiently shifting funds that could have been granted to new profitable loans towards bad borrowers.

As banks have superior information regarding the liquidity and solvency of their clients, they are well placed to decide when to forbear a loan, when to declare that a loan is non-performing and how much to set aside for the related losses.

However, in given circumstances, banks might have an incentive to forbear a loan even when ex ante a borrower faces solvency-related issues. Forbearance effectively enables banks to defer their impairment-related losses, thereby distorting perceptions concerning their own solvency and profitability. Remuneration frameworks, which are linked to banks' profitability, may further amplify this problem.

If banks consistently forbear loans when they should not, this might increase systemic risk. Furthermore this behaviour might hamper economic growth. The lack of empirical studies about forbearance in Europe is likely due to the lack of reliable data on forbearance.

The ECB’s comprehensive assessment contributed to highlighting possible pockets of forbearance. In particular, the AQR adjustment to non-performing loans provides a measure of forbearance and the resulting adjustment to provisions reflects under-provisioning, thus allowing an investigation of the factors that contribute to forbearance.

Regression analysis using these two measures as endogenous variables provides an insight into the main drivers of forbearance and underprovisioning. The explanatory variables can be grouped as macroeconomic variables, indicators for the quality of banking supervision, measures of collateral valuation, measures of bank profitability, balance sheet-based measures of bank weakness and market-based measures of bank weakness. Using this categorisation, the variables are aligned with commonly suspected drivers of underprovisioning and forbearance.

The findings here can provide guidance on where to expect pockets of forbearance based on publicly available information.

## 1. Introduction

A bank can deal with distressed borrowers in a number of ways. It can foreclose a troubled loan and seize the collateral. Alternatively, it may give the borrower concessions in the form of a delay in repayment or by refinancing the loan, which are known as forbearance. If a borrower's problems are liquidity-related, forbearing the loan may be the optimal decision. When the problems are solvency-related, foreclosure or debt restructuring are better options. In particular if a borrower has so much debt that her incentives are distorted, i.e. there is a debt overhang problem (Myers 1977; Admati et al. 2013), restructuring the loan and offering debt relief can maximize the expected repayment.

Nevertheless, a bank may forbear on borrowers with solvency problems to avoid selling collateral at depressed prices or the increase in provisions as a result of recognizing loans as nonperforming exposures. Such forbearance can be seen as a renegotiation failure – the maturity of the loan is extended but the borrower is stuck with too high leverage, which leads to a lower expected repayment than with debt relief. It presents a misallocation of the lender's resources, effectively shifting the funds that could be granted as a new loan to a good borrower towards an inefficient one that is likely to end up bankrupt in the future.

In the extreme case, forbearance enables banks to defer the losses that are associated with nonperforming loans ad infinitum, a practice called evergreening, and thus distort their own reported solvency and profitability (see Watanabe (2010) drawing on evidence from Japan and more generally (Diamond and Rajan 2011)). This is particularly acute in the aftermath of a financial crisis, as illustrated in Huizinga and Laeven (2012). Incentive schemes linked to bank profitability might amplify this problem, as argued by Eisfeldt and Rampini (2008). If this is done systematically by banks in a region, it might result in systemic risk due to lack of confidence in the entire banking sector, with adverse effects on bank funding. Furthermore, it might hamper growth due to a credit squeeze relating to new loans. Japan's lost decade in the aftermath of the severe banking crisis there provides a powerful illustration of the economic consequence of forbearance lending or zombie lending (see Baba (1996), Sekine, Kobayashi, and Saita (2003), Peek and Rosengren (2005) and Caballero, Hoshi, and Kashyap (2008)). Outside Japan, the problem has received little attention: While there exists indirect empirical evidence of forbearance (Brown and Dinc 2009), direct evidence is scarce.

The Japanese experience has often been cited as a warning in Europe, reminding governments and regulators of the costs of inaction against balance sheet opaqueness and weak banks. The stock market valuation of European banks reflected a low level of confidence in the reported book values, with most banks showing price/book ratios far below one. Yet, the extent of forbearance and asset misreporting by European banks was very poorly documented prior to the ECB Comprehensive Assessment, and neglected in the academic discussion beyond policy relevance[1]. Bruche and Llobet (2014) devise an institutional setup based on contract theory inducing banks to reveal problematic loans. The lack of

[1] European banking authority published technical standards (2014), the ESRB Advisory Scientific Committee (2012) and the (Bank of England 2011 and 2013) published a study and a chapter in the financial stability review devoted to the problem of forbearance.

empirical studies is explained by the lack of a reliable proxy for forbearance - by definition misreporting of asset values is not reported.[2]

The ECB Comprehensive Assessment, entailing a careful review of banks' balance sheets aiming to harmonise reporting standards, in particular with respect to the treatment of problematic loans, and a stress test aimed to shed light on bank vulnerability in general. It establishes a common benchmark for pricing assets so that deviations in asset values revealed by the asset quality review (AQR) can be interpreted as mispricing. One of the key differences of the AQR methodology compared to accounting standards is that forbearance measures are defined precisely and used as a trigger to classify an exposure as nonperforming. Therefore the AQR adjustment represents a unique measure of forbearance allowing us to identify the main variables associated with banks misreporting of asset values. Taking the reported corrections to asset valuation in the sample of investigated banks at face value, we try to identify drivers behind forbearance. It is the first study that empirically analyses forbearance across Europe using direct evidence; previously no direct information on this phenomenon was available.

In section 2 we provide some background about the CA, definitions of forbearance and formulate the hypotheses. Section 3 describes the data. We present the results in section 4 and discuss robustness checks in section 5. Section 6 concludes.

## 2. Measuring and explaining forbearance

The ECB comprehensive assessment, carried out in 2014 on 130 Eurozone banks in preparation for common bank supervision, consisted of two parts: an asset quality review (AQR) and a stress test. The AQR was a point-in-time assessment of the accuracy of bank asset carrying values as of 31 December 2013. AQR methodology used to determine adjustments of bank asset values was based on accounting standards and included additional concepts to insure consistency across banks. In cases where more than one approach was consistent with accounting rules, the AQR prescribed a favoured approach based on prudential and economic logic. Banks were required to reflect the adjustments in their accounting statements only if they were in breach of accounting rules. With respect to the treatment of nonperforming exposures (NPE), in particular forborne NPE, the International Financial Reporting Standards (IFRS) allow room for discretion and thus do not insure that banks report forborne loans as NPE. In contrast the AQR definition of NPE captures forborne exposures. In the following paragraphs we provide the definitions of nonperforming and forborne exposures, and explain to what extent results of the AQR can be interpreted as measures of forbearance.

According to International Accounting Standards (IAS 39) an asset is impaired if and only if there is objective evidence of impairment in the form of a "loss event" that has impact on the estimated future cash flows of the asset. Losses expected as a result of future events are not recognized. Objective evidence of a loss event among others includes *"significant financial difficulty of the issuer or obligor*;" and

[2] The most notable investigations on forbearance relied on identifying forbearance via borrower characteristics and information on outstanding loans (from corporate finance data, see (Sekine, Kobayashi, and Saita 2003)) or combining borrower characteristics, lender characteristics and data on loans outstanding to individual firms from individual lenders (Peek and Rosengren 2005), Such a dataset is not available for Europe.

"*the lender, for economic or legal reasons relating to the borrower's financial difficulty, granting to the borrower a concession that the lender would not otherwise consider*"[3]. The former is the main criterion for a loan to be classified as nonperforming; the latter indicates forbearance.

In the AQR a "simplified EBA approach" was used to define nonperforming exposures (NPE). The main difference compared to the accounting standards is that a loss event is not required and that forbearance is defined more precisely. A nonperforming exposure is defined as:[4]

- every material exposure that is 90 days past due even if it is not recognized as defaulted or impaired;
- every exposure that is impaired according to the IFRS or national accounting standards
- every exposure that is in default according to CRR[5]

An exposure is classified as nonperforming if it meets the definition above. Forborne exposures are covered in this definition indirectly. The AQR identified forborne NPE by using the EBA (European Banking Authority) technical standards as an impairment trigger for IAS 39 loss event.[6] Effectively, the very general IAS 39 definition of forbearance was refined by the detailed EBA definition, under which forborne exposures are debt contracts to which forbearance measures have been extended. Forbearance measures are concessions towards a debtor facing financial difficulties and consist of the following[7]:

*(a) a modification of the previous terms and conditions of a contract the debtor is considered unable to comply with due to its financial difficulties ("troubled debt") to allow for sufficient debt service ability, that would not have been granted had the debtor not been in financial difficulties;*

*(b) a total or partial refinancing of a troubled debt contract, that would not have been granted had the debtor not been in financial difficulties.*

Exposures are treated as forborne if a concession has been made irrespective of whether any amount is past-due. Exposures are treated as forborne even if the debtor is not in financial difficulties when:

*(a) a modified contract was classified as non-performing or would in the absence of modification be classified as non-performing;*

*(b) the modification made to a contract involves a total or partial cancellation by write-offs of the debt;*

*(c) the institution approves the use of embedded forbearance clauses for a debtor who is under non-performing status or who would be considered as nonperforming without the use of these clauses;*

*(d) simultaneously with or close in time to the concession of additional debt by the institution, the debtor made payments of principal or interest on another contract with the institution that was non-performing or would in the absence of refinancing be classified as non-performing.*

In addition there is a rebuttable presumption that forbearance has taken place when:

[3] IAS 39, paragraph 59. Parts of IAS that are included in IFRS are still referred to as IAS rather than as IFRS.

[4] See AQR Phase 2 Manual p. 46.

[5] Capital Requirements Regulation (EU) No 575/2013

[6] See AQR Phase 2 Manual p. 115 and EBA/ITS/2013/03/rev1. The EBA technical standards were later (on 9 January 2015) adopted by the European Commission as Regulation (EU) 2015/227, which requires banks to report NPE and forborne exposures to their competent authorities. Regulators will be able to use this data to monitor the extent of forbearance.

[7] We summarize the main points of the definition. For a complete definition see EBA/ITS/2013/03/rev1 or Regulation (EU) 2015/227.

(a) *the modified contract was totally or partially past-due by more than 30 days (without being non-performing) at least once during the three months prior to its modification or would be more than 30 days past-due, totally or partially, without modification;*

(b) *simultaneously with or close in time to the concession of additional debt by the institution, the debtor made payments of principal or interest on another contract with the institution that was totally or partially 30 days past due at least once during the three months prior to its refinancing;*

(c) *the institution approves the use of embedded forbearance clauses for 30 days past-due debtors or debtors who would be 30 days past-due without the exercise of these clauses.*

EBA distinguishes between performing and nonperforming forborne exposures. The AQR focused on nonperforming exposures. For a forborne exposure to be classified as an NPE in the AQR it has to be classified as forborne and as nonperforming according to EBA technical standards, which means it is forborne based on the conditions listed above and it is past-due more than 90 days or *"the debtor is assessed as unlikely to pay its credit obligations in full without realisation of collateral, regardless of the existence of any past-due amount or of the number of days past due."*

To sum up, by using the EBA definition of forborne exposures as an impairment trigger, the AQR adjustment of NPE corrects the NPE reported by banks for forborne exposures so it can be used as a measure of forbearance.

An ideal measure of forbearance would include only forborne exposures. AQR adjustment of NPE, however, also includes the change in NPE that are not forborne based on the definition above. Such exposures are of two types. First, there are exposures that are 90 or more days past-due without a loss event and without forbearance measures. Strictly speaking, these are not forborne exposures. However, loose policies concerning the recognition of nonperforming loans are very similar to the concept of forbearance, although the loan terms are not renegotiated. Effectively, loose policies have the same effect on banks' balance sheets, namely avoidance of provisioning. Secondly, there are exposures less than 90 days past-due that banks did not classify as impaired but are considered NPE based on AQR methodology, which specifies minimum triggers for IAS 39 loss event to harmonise treatment of NPE across banks. We argue that adjustment of such NPE constitutes only a minor part of the AQR adjustment as the triggers for this type of NPE do not differ much from existing definition in IAS 39.[8]

In addition to reviewing NPE, AQR also examined banks' provisioning. The AQR adjustment of provisions includes adjustment of provisions on nonperforming as well as performing exposures. Hence it can be interpreted as the extent of underprovisioning in general, not only due to forbearance. A more precise measure of underprovisioning due to forbearance is available for corporate loans where the AQR reports the imposed coverage ratio on newly classified NPE to corporates. Multiplying the coverage ratio with the adjustment of corporate exposures gives the increase in provisions due to the recognition of (mostly forborne) corporate NPE. The total AQR adjustment consists of the adjustment of provisions on credit exposures and valuation adjustment of other assets as well as the impact of tax, risk protection and insurance that would occur as a result of adjustments in asset values. We use adjustment of NPE,

[8] For some banks (22 out of 130) that use local accounting standards rather than IFRS, harmonization of reporting of NPE that are not forborne could represent a larger part of the adjustment. We address this concern in the robustness checks.

increase in provisions due to newly classified corporate NPE, adjustment of provisions and the aggregate AQR adjustment as proxies for forbearance. The first two measure forbearance more precisely. The latter two are broader.

Forbearance occurs when borrowers have financial difficulties and banks have incentives to forbear the problematic loans instead of foreclosing on them. Thus the extent of forbearance can be explained by two types of factors: (i) those that drive nonperforming loans and (ii) variables capturing bank incentives to forbear on borrowers. The determinants of nonperforming loans have recently been analysed by Messai and Jouini (2013) for banks in Italy, Greece and Spain for the period of 2004 – 2008 and by Louzis, Vouldis, and Metaxas (2012) for banks in Greece. Both studies confirm findings from the literature on NPLs (see Nkusu (2011), Beck, Jakubik, and Piloiu (2013) and Quagliariello (2007) for recent examples) namely that macroeconomic variables, GDP growth rate, unemployment rate, lending rates and public debt level are important drivers. A theoretical foundation for this intuitive finding is offered by Williamson (1987). Furthermore, micro-variables, in particular measures of bank weakness, are likely to capture incentives of banks to forbear. Homar and Van Wijnbergen (2014) provide a model explaining how the level of bank capital affects bank decisions to forbear vs liquidate bad loans.

We examine the following hypotheses:

- *Hypothesis 1: Banks exposed to countries with worse macroeconomic conditions are more likely to engage in forbearance.*
- *Hypothesis 2: Banks are more likely to engage in forbearance where the supervisory environment permits them to do so.* As argued by the ESRB advisory scientific committee and Huizinga and Laeven (2012), forbearance practices are more likely to be found where bank supervisors condone them, thus in a way forbearing banks.
- *Hypothesis 3: Forbearance occurs where collateral values have fallen significantly.* A motive for forbearance is to avoid the losses associated with the sale of the underlying collateral at depressed values, leading to more forbearance when the value of collateral is lower.
- *Hypothesis 4a: Weak banks are more likely to engage in forbearance than strong banks (balance sheet based).*
- *Hypothesis 4b: Weak banks are more likely to engage in forbearance than strong banks (market based).*

## 3. Data and descriptive statistics

Using the outcomes of the AQR as measures of forbearance, we define the following dependent variables:

- **AQR adjustment of nonperforming exposures (NPE) / total credit exposures**: Change in nonperforming exposures ratio due to the outcome of the AQR (ECB communication variable E.D1 – E.A1 or E.B1 + E.C1)[9] is a proxy for the extent of forborne exposures.
- **AQR adjustment of residential real estate (RRE) NPE / RRE exposures**: (ECB communication variable E.D6 – E.A6 or E.B6 + E.C6)
- **AQR adjustment of corporate NPE / corporate exposures**: (ECB communication variable E.D8 – E.A8 or E.B8 + E.C8)
- **AQR adjustment of provisions for credit exposures / risk weighted total credit exposures**: Increase in provisioning for credit exposures due to the outcome of the AQR (ECB communication variable D.F1). It also includes changes in provisioning on existing nonperforming exposures. Therefore it moves away from the original meaning of forbearance, while capturing more accurately the under-provisioning and related weakness in the banking system due to problem loans and zombie lending.
- **AQR adjustment of provisions for RRE exposures / risk weighted RRE exposures**: (ECB communication variable D.F6).
- **AQR adjustment of provisions for SME exposures / risk weighted SME exposures**: (ECB communication variable D.F5).[10]
- **AQR adjustment of provisions for corporate exposures / risk weighted corporate exposures**: (ECB communication variable D.F8).
- **AQR adjustment of corporate NPE multiplied by imposed coverage ratio on corporate NPE** (ECB communication variables E.D1-E.A1)*E.J17) captures the increase in provisioning due to newly classified NPE, assuming constant imposed coverage ratio. It measures the extent of under-provisioning because of forbearance more precisely than the adjustment of provisions as it does not include adjustment of provisions on existing NPE. It is only available for corporate exposures and not for other types or credit exposures in general.
- **AQR adjustment / total risk exposure**: Aggregated adjustments of bank assets due to the outcome of the AQR (ECB communication variable B2) measures the impact of AQR on bank Tier 1 capital. It includes adjustment of provisions for credit exposures, adjustment of values of other exposures e.g. derivatives and takes into account the effects of taxes, insurance and risk protection on the impact on Tier 1 ratio.

The AQR results report adjustments of NPE as ratios computed with balance sheet values of exposures i.e. the book value of nonperforming exposures is divided by the book value of total exposures for each category of exposures. Adjustments of provisions on the other hand are reported nominally. We scale each type of provisions by the applicable risk weighted exposures. We use the risk weighted amounts because AQR results do not report breakdown of exposures in nominal value. Scaling by risk weighted values implies that the adjustment of provisions is expected to be proportionally larger for assets with

[9] The codes refer to the data file accompanying the Aggregate Report on the Comprehensive Assesment.
[10] For SMEs only adjustment of provisions is reported; adjustment of NPE is not available.

higher risk weights. In robustness checks, we scale provisions for credit exposures by gross loans. We cannot do the same for RRE and corporate exposures as for those the data on their nominal amounts was not published together with the AQR results and is not available in other sources for a sufficient number of banks. Similarly as provisions for credit exposures, we scale aggregate AQR adjustment by risk weighted assets in the main analysis and by total assets in robustness checks.

For adjustment of provisions on RRE, SME and corporate exposures, we set the adjustment to missing if a bank does not have any exposure of that type in order to distinguish between banks that have provisioned adequately and those where the adjustment of provisions is equal to zero because they did not have any exposures to a certain asset class.

Next, we briefly discuss the explanatory variables as grouped by hypothesis.

With regard **to hypothesis 1** we use several variables describing **macroeconomic conditions** in countries. For some variables we construct values weighted by exposure of banks to different countries to account for the fact that banks are likely to be affected by macroeconomic conditions not only in the country of their headquarters but also in countries where they have asset exposure – i.e. the effect of macroeconomic conditions in a particular country on a bank is assumed to be proportional to the exposure of the bank to that country relative to the total assets of the bank.[11] The list of macroeconomic variables is the following:

- Real GDP growth, 5 year cumulated and weighted by bank exposures (Source: IMF World Economic Outlook)
- Sovereign bond yield, average of monthly observations for 2013 (Source: Bloomberg)
- Expected default frequency (EDF) of nonfinancial firms, country benchmark, average over firms weighted by total assets, average of monthly observations for 2013, weighted by bank exposures (Source: KMV – Moody's; obtained through ECB Statistical Data Warehouse (SDW))
- Unemployment rate, 3 year average (Source: Eurostat, obtained through ECB SDW)

With regard to **hypothesis 2** we draw on a set of indices describing the quality of bank supervision as constructed by Barth, Caprio, and Levine (2012), based on a survey. Higher index levels imply tighter regulation.

- The bank activities restrictions index describes how much activities of banks are restricted to providing core banking services. The index is higher when banks are for example prohibited from engaging in securities underwriting, brokering or dealing, insurance underwriting, real estate investment or if banks are not allowed to own nonfinancial firms.
- The capital regulatory index is higher the more stringent regulatory requirements for holding capital are. It also measures how narrowly capital is defined.

[11] For details about weighting macroeconomic variables by bank exposures see Appendix.

- The supervisory power index measures whether supervisory authorities have the power to prevent and correct problems. For example, the index is higher if authorities can restructure and reorganise troubled banks or declare a deeply troubled bank insolvent.
- The private monitoring index is high when financial statements issued by a bank have to be audited, when a large share of the 10 largest banks in a country is rated by international rating agencies, when there is no explicit deposit insurance scheme and if bank accounting fulfils certain requirements.
- The moral hazard mitigation index is based on Demirguc-Kunt and Detragiache (2002), who use principal components analysis on quantified features of explicit deposit insurance systems. These features include: foreign currency deposits covered, interbank deposits covered, type of funding, source of funding, management, membership and the level of explicit coverage.

**Hypothesis 3** is tested with a measure of the size of the shock to collateral values:

- Peak to trough drop in residential house prices, computed over a 5-year period (Source: ECB).

**Hypothesis 4a** is analysed by drawing on bank balance sheet information. Some variables come from the data published together with the report about the Comprehensive Assessment (ECB 2014a). Additional variables are from SNL and BankScope. SNL and BankScope are only used simultaneously for a bank when total assets in both datasets do not differ by more than 10%.

- Book leverage ratio: book value of equity divided by total assets (Source: CA report).
- Tier 1 ratio (Source: CA report).
- Impaired loans ratio: impaired loans over gross loans (Source: SNL, BankScope)

As control variables we use:

- ROA (Return on average assets) (Source: SNL, BankScope).
- Bank size, measured as the logarithm of total assets (CA report).
- RWA to total assets ratio (CA report).

**Hypothesis 4b** is examined using market data:

- Bank 5 year CDS spreads, average over end-of-month observations in 2013 (Source: Bloomberg).
- Bank stock returns for the period 2011-2013 (Source: Bloomberg)[12].
- Bank stock 4-factor alpha: average daily abnormal return over the period 2011-2013, computed as the intercept from the Carhart (1997) four factor asset pricing model, which builds on the Fama-French (1993) three factor model and augments it with another factor capturing the momentum effect. We use the return on Eurstoxx50 as a proxy for market return and the

[12] For variables based on stock returns, only stocks are considered that that have zero returns on less than 50% of the trading days. Stocks that have zero returns on more days may have been suspended from trading or are highly illiquid and thus not suitable for analysis.

German 5-year government bond yield as the risk free rate. The other three factors are taken from Andrea Frazzini's data library[13].

**Table 1: Descriptive statistics**

| Variable | Mean | St. dev. | Min | Median | Max | N | Coverage of bank assets [%] | R2: Adj. NPE | R2: Adj. prov. |
|---|---|---|---|---|---|---|---|---|---|
| *Dependent variables* | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| AQR adjustment | 0.6609 | 0.9388 | 0.0000 | 0.3086 | 5.8013 | 130 | 100.00 | | |
| AQR adj. NPE | 1.8832 | 2.6471 | -4.4730 | 1.1414 | 13.84 | 119 | 96.18 | | |
| AQR adj. RRE NPE | 0.3572 | 2.1344 | -10.53 | 0.0815 | 7.7850 | 80 | 78.56 | | |
| AQR adj. corp. NPE | 3.1973 | 3.8848 | -3.4109 | 1.9416 | 17.85 | 114 | 94.78 | | |
| AQR adj. credit prov. | 0.8458 | 1.2252 | 0.0000 | 0.3307 | 6.2705 | 130 | 100.00 | | |
| AQR adj. RRE credit prov. | 0.7593 | 2.2457 | 0.0000 | 0.0000 | 18.67 | 105 | 92.79 | | |
| AQR adj. SME credit prov. | 1.1724 | 2.9429 | 0.0000 | 0.0000 | 15.83 | 98 | 87.78 | | |
| AQR adj. corp credit prov. | 1.3187 | 2.0698 | -0.0000 | 0.4955 | 12.84 | 128 | 99.52 | | |
| AQR adj. corp. NPE * coverage | 0.0048 | 0.0101 | -0.0252 | 0.0024 | 0.0794 | 107 | 92.55 | | |
| *Macroeconomic variables* | | | | | | | | | |
| GDP growth, 5 year | 0.0354 | 0.0632 | -0.1979 | 0.0437 | 0.1801 | 129 | 99.99 | 0.0030 | 0.0997 |
| Govt. bond yield | 0.0220 | 0.0199 | 0.0063 | 0.0116 | 0.0990 | 111 | 98.89 | 0.1399 | 0.3501 |
| EDF nonfin. sector | 0.0114 | 0.0188 | 0.0016 | 0.0064 | 0.1088 | 117 | 99.52 | 0.0480 | 0.0902 |
| Unemployment, 3 year av. | 0.1123 | 0.0567 | 0.0481 | 0.0975 | 0.2411 | 121 | 90.02 | 0.0038 | 0.0205 |
| House prices, peak to trough ch. | 0.0921 | 0.0863 | 0.0000 | 0.0622 | 0.2627 | 128 | 99.82 | 0.0030 | 0.0407 |
| *Quality of bank supervision* | | | | | | | | | |
| Bank activity restr. ind. | 5.7264 | 1.1502 | 4.5000 | 5.2500 | 7.7500 | 127 | 99.93 | 0.0237 | 0.1560 |
| Capital regulatory ind. | 6.5787 | 1.0428 | 4.8500 | 6.7500 | 8.7500 | 127 | 99.93 | 0.0111 | 0.0829 |
| Supervisory power ind. | 9.9372 | 1.6327 | 7.0000 | 9.5000 | 13.50 | 127 | 99.93 | 0.1145 | 0.0136 |
| Private monitoring ind. | 7.7992 | 0.7203 | 6.5000 | 7.5000 | 10.00 | 127 | 99.93 | 0.0000 | 0.0173 |
| Moral hazard mitigation ind. | 1.7241 | 0.6427 | 0.5000 | 2.0000 | 2.7500 | 127 | 99.93 | 0.0581 | 0.0196 |
| *Bank balance sheet variables* | | | | | | | | | |
| IFRS | 0.8268 | 0.3799 | 0.0000 | 1.0000 | 1.0000 | 127 | 99.90 | 0.0047 | 0.0739 |
| Total assets | 169 | 303 | 0.5670 | 54.18 | 1,640 | 130 | 100.00 | 0.0417 | 0.0205 |
| Tier 1 ratio | 0.1367 | 0.0561 | -0.0370 | 0.1225 | 0.3728 | 127 | 98.57 | 0.0174 | 0.0101 |
| Common equity/ TA | 0.0648 | 0.0721 | 0.0000 | 0.0522 | 0.7870 | 130 | 100.00 | 0.0424 | 0.0002 |
| ROA | -0.0026 | 0.0190 | -0.0788 | 0.0017 | 0.0264 | 126 | 99.73 | 0.0386 | 0.0741 |
| ROE | -0.0818 | 0.4285 | -2.3920 | 0.0302 | 0.3189 | 126 | 99.73 | 0.0402 | 0.0796 |
| Gross loans/ TA | 0.5866 | 0.2088 | 0.0215 | 0.6326 | 0.9691 | 122 | 98.21 | 0.0004 | 0.0918 |
| RWA/ TA | 0.4529 | 0.1995 | 0.0014 | 0.4502 | 1.0991 | 130 | 100.00 | 0.0293 | 0.1081 |
| Net interest income/ RWA | 0.0307 | 0.0161 | 0.0038 | 0.0269 | 0.0853 | 109 | 71.41 | 0.0349 | 0.0003 |
| Cost to income ratio | 0.7002 | 0.3823 | 0.1327 | 0.6176 | 2.2674 | 114 | 78.25 | 0.0040 | 0.0000 |
| Impaired loans ratio | 0.1078 | 0.1069 | 0.0000 | 0.0741 | 0.4081 | 108 | 92.15 | 0.1727 | 0.1733 |
| Loan loss prov. ratio | 0.0100 | 0.0193 | -0.0077 | 0.0040 | 0.0973 | 121 | 96.53 | 0.1133 | 0.0218 |
| *Market based variables* | | | | | | | | | |
| Bank CDS spread | 2.7075 | 2.5590 | 0.7068 | 1.6791 | 11.73 | 54 | 67.78 | 0.2703 | 0.4746 |
| Bank stock return 2011-13 | 19.29 | 52.38 | -92.31 | 17.15 | 147 | 41 | 48.63 | 0.1005 | 0.2584 |
| Bank stock 4-factor alpha | 0.0418 | 0.1609 | -0.5481 | 0.0646 | 0.4818 | 41 | 48.63 | 0.1746 | 0.2606 |
| P/B ratio | 0.7870 | 0.4029 | 0.0224 | 0.7255 | 1.7939 | 42 | 48.32 | 0.0133 | 0.0173 |

The table reports descriptive statistics of variables used in regressions and a selection of other variables. Dependent variables are reported in percentage points. IFRS is an indicator of whether a bank reports according to IFRS or national accounting standards. Total assets are in millions of EUR. Column (7) and column (8) report R squared of univariate regressions of AQR adjustment of NPE and adjustment of provisions on explanatory variables.

The sample of banks subject to the CA initially consists of the 130 banks; we remove four banks[14] where we have no observations on the explanatory variables in the most basic setup. The descriptive statistics

[13] Available at https://www.aqr.com/library/data-sets/the-devil-in-hmls-details-factors-daily (Asness and Frazzini 2013)

[14] Deutsche Bank (Malta), AB SEB Bankas, Latvia, AB DNB Bankas, Latvia and Swedbank AB, Latvia, jointly representing 0.01% of sample assets.

of the full sample are displayed in Table 1. Most explanatory variables are available for at least 120 banks, which represent 96% or more of total assets of banks that were analysed in the CA. For variables based on market data the coverage is more limited and includes about 40 banks, which account for 50% to 67% of total banking assets. To provide some indication of the explanatory power of the variables later used in regressions, Table 1 also reports R squared of univariate regressions where AQR adjustment of nonperforming exposures and adjustment of provisions for credit exposures are dependent variables and explanatory variables are included into regressions individually.

The mean value of AQR adjustment of nonperforming exposures is 1.88% of risk weighted credit exposures. The variation across banks is substantial; the adjustment ranges from a reduction of -3.5% to an increase of 13.8%.[15] For 3 banks there were no changes in NPE; for 10 banks NPE were adjusted downwards during the AQR. The average adjustment of provisions for credit exposures due to the AQR is equal to 0.84% of credit exposures, with 18 banks displaying no adjustment. For adjustment of corporate and real estate NPE and provisions the number of banks with non-missing data is lower as we set adjustments to zero if a bank does not report any exposures to the relevant sector. Univariate regressions highlight the importance of a few variables with a particularly high explanatory power. Among the variables describing macroeconomic conditions, government bond yield stands out with the highest R squared. When looking at bank characteristics ROA and impaired loans ratio exhibit relatively high univariate R squared ratio. Looking at market based measures, CDS spreads and abnormal returns on bank stocks are very strong predictors of forbearance, in particular the adjustment in provisions for credit exposures.

## 4. Results

This section presents results of regressions explaining forbearance with macroeconomic conditions, quality of banking supervision and measures of bank weakness. **Table 2** displays regressions of AQR adjustment of NPE. GDP growth, government bond yields, expected default frequency (EDF) of nonfinancial firms and unemployment rate are included in three different setups in columns (1) to (3). They are not included simultaneously as they are highly correlated – they are all proxies for adverse macroeconomic conditions. The effect of government bond yields is the most significant. The higher the yield on government bonds, the more loans banks forbear and the higher the AQR adjustment of NPE. From five possible measures of quality of bank supervision, we include indices that measure stringency of capital regulation, effectiveness of private monitoring by auditing firms and credit rating agencies, and moral hazard mitigation in deposit insurance. The other two measures of banking supervision do not contribute much when combined with other explanatory variables. Consistent with hypothesis 2, negative coefficients indicate that stricter regulation leads to less forbearance. Looking at bank-level variables, larger banks tend to have lower adjustment of NPE. The level of Tier 1 ratio does not seem to be related to the extent of forbearance revealed by the AQR, while more profitable banks have less forborne loans.

[15] We exclude an outlier, Merrill Lynch International, Ireland. Credit exposures of Merrill Lynch represent only 7% of its RWA and their adjustment equal to 31% is an outlier compared to other banks in the sample. We also change the value of Tier 1 ratio to missing for three banks with Tier 1 capital above 50% of RWA. These are Banque Centrale de Compensation, Deutsche Bank (Malta) Ltd and Nederlandse Waterschapsbank N.V.

**Table 2: AQR adjustment of nonperforming exposures.**

| | AQR adj. NPE (1) | AQR adj. NPE (2) | AQR adj. NPE (3) | AQR adj. NPE (4) | AQR adj. NPE (5) | AQR adj. NPE (6) |
|---|---|---|---|---|---|---|
| GDP growth, 5 year | -3.1282 | | | 5.2448 | | -10.8501 |
| | (-0.50) | | | (0.78) | | (-1.39) |
| Govt. bond yield | | 28.3081** | | | | |
| | | (2.90) | | | | |
| EDF nonfin. sector | | | 8.8941 | | | |
| | | | (0.35) | | | |
| Unemployment, 3 year av. | | | -6.8590 | | | |
| | | | (-0.89) | | | |
| Capital regulatory ind. | -0.3442 | -0.2783 | -0.3200 | -0.3520** | -0.1925 | 0.0279 |
| | (-1.58) | (-1.12) | (-1.24) | (-2.21) | (-0.97) | (0.13) |
| Private monitoring ind. | -0.2318 | -0.3432 | -0.0717 | -0.4656 | 0.0322 | 0.1058 |
| | (-0.99) | (-1.45) | (-0.22) | (-1.57) | (0.09) | (0.26) |
| Moral hazard mitigation ind. | -0.8861*** | -0.7888** | -1.5733*** | -0.4473 | -0.2152 | 0.1145 |
| | (-3.20) | (-2.36) | (-5.81) | (-1.58) | (-0.55) | (0.14) |
| Size | -0.6040*** | -0.4776** | -0.4465** | -0.4418** | -0.1970 | -0.3229 |
| | (-3.01) | (-2.53) | (-2.49) | (-2.84) | (-1.19) | (-1.44) |
| Tier 1 ratio | 4.6306 | 2.5908 | 2.5111 | 3.2038 | -0.8525 | 3.0903 |
| | (0.71) | (0.45) | (0.52) | (0.51) | (-0.05) | (0.33) |
| ROA | -22.9323*** | -26.8908*** | -33.5323** | 3.3328 | -15.7395 | -28.4450 |
| | (-3.90) | (-3.61) | (-2.75) | (0.33) | (-0.80) | (-1.17) |
| Impaired loans ratio | | | | 11.6963** | | |
| | | | | (2.28) | | |
| Bank CDS spread | | | | | 0.3300*** | |
| | | | | | (3.20) | |
| Bank stock 4-factor alpha | | | | | | -2.6282 |
| | | | | | | (-0.62) |
| N of observations | 114 | 104 | 99 | 104 | 49 | 41 |
| Coverage of bank assets [%] | 95.89 | 95.07 | 85.90 | 92.02 | 66.32 | 48.63 |
| Adjusted R2 | 0.1914 | 0.2400 | 0.2469 | 0.2688 | 0.2481 | 0.1700 |

Regressions are estimated with standard errors clustered at country level. In parentheses are t-statistics. Significance levels of 0.10, 0.05 and 0.01 are denoted by *, **, ***, respectively.

In column (4) to (6) we add additional measures of bank weakness as explanatory variables. The reason why we do not include them already in previous specifications is to perform baseline estimations in columns (1) to (3) on the largest possible sample. Adjustment of NPE is available for 119 banks. Specification (1) includes only 5 less. Including impaired loans ratio in column (4) reduces the number of observations by 10 banks. Using CDS spread or abnormal return on bank stock further limits the sample. The accounting measure of impaired loans is positively related to AQR adjustment of NPE. More recognized impaired loans point at additional forborne exposures not reported in accounting statements but identified by the AQR. Bank CDS level is a particularly strong predictor of NPE adjustment. Abnormal stock return, however, does not appear to be informative. Adjusted R squared ratio shows that the independent variables explain about 25% of variation in adjustment of NPE. The results confirm our hypotheses 1, 2, 4a and 4b.[16] Adverse macroeconomic conditions, low quality of bank supervision and weak banks are positively related to the extent of forbearance.

Regressions in **Table 3** explain the adjustment of provisions for credit exposures with the same set of independent variables as used in regressions in Table 2. The estimated effects on adjustment of

[16] We test hypothesis 3 about the importance of collateral values only on a subsample of banks with exposures to real estate loans.

provisions are similar to those on the adjustment of NPE, only more significant. GDP growth as well as unemployment rate are significant with expected signs. The effects of capital regulatory index and private monitoring index are more significant. The ratio of explained variance increases up to almost 0.50. It is particularly high in specification (5) with bank CDS spread. These results suggest the room for discretion in provisioning is larger than in recognition of NPE. The same factors that explain a part of the variation in underreporting of (forborne) NPE predict an even larger effect on under-provisioning. The number of observations is slightly higher as adjustment of provisions is reported also for some banks with no adjustment of NPE.

**Table 3: AQR adjustment of credit provisioning.**

| | AQR adj. credit prov. (1) | AQR adj. credit prov. (2) | AQR adj. credit prov. (3) | AQR adj. credit prov. (4) | AQR adj. credit prov. (5) | AQR adj. credit prov. (6) |
|---|---|---|---|---|---|---|
| GDP growth, 5 year | -5.9820* | | | -2.6855 | | -10.2562*** |
| | (-1.92) | | | (-0.82) | | (-7.12) |
| Govt. bond yield | | 29.0558*** | | | | |
| | | (8.59) | | | | |
| EDF nonfin. sector | | | -4.1703 | | | |
| | | | (-0.40) | | | |
| Unemployment, 3 year av. | | | 8.7974** | | | |
| | | | (2.64) | | | |
| Capital regulatory ind. | -0.4032*** | -0.3053*** | -0.6137*** | -0.4402*** | -0.3840*** | -0.2013 |
| | (-4.13) | (-6.63) | (-4.02) | (-5.22) | (-4.76) | (-1.67) |
| Private monitoring ind. | -0.2997** | -0.3833*** | -0.5434*** | -0.3703 | -0.1903 | -0.2565** |
| | (-2.80) | (-6.03) | (-4.27) | (-1.74) | (-1.69) | (-2.58) |
| Moral hazard mitigation ind. | -0.4960* | -0.3901*** | -0.6701** | -0.4956** | -0.1458 | -0.2378 |
| | (-2.11) | (-3.52) | (-2.97) | (-2.29) | (-1.16) | (-0.81) |
| Size | -0.1793* | -0.0111 | -0.1113 | -0.1154 | -0.0557 | -0.0028 |
| | (-1.95) | (-0.26) | (-0.91) | (-1.26) | (-0.51) | (-0.02) |
| Tier 1 ratio | -1.0129 | -1.5938 | -0.4126 | -0.2845 | -8.4129* | -2.5836 |
| | (-0.71) | (-1.48) | (-0.41) | (-0.18) | (-2.14) | (-0.81) |
| ROA | -7.3845 | -10.3829** | -17.0333** | 2.4944 | 5.8207 | 0.4085 |
| | (-1.19) | (-2.22) | (-2.42) | (0.39) | (1.12) | (0.05) |
| Impaired loans ratio | | | | 4.1037** | | |
| | | | | (2.21) | | |
| Bank CDS spread | | | | | 0.3310*** | |
| | | | | | (6.07) | |
| Bank stock 4-factor alpha | | | | | | -4.1015* |
| | | | | | | (-2.08) |
| N of observations | 121 | 108 | 106 | 105 | 51 | 41 |
| Coverage of bank assets [%] | 98.24 | 97.27 | 88.25 | 92.08 | 67.71 | 48.63 |
| Adjusted R2 | 0.2928 | 0.4697 | 0.3481 | 0.3341 | 0.4970 | 0.4443 |

Regressions are estimated with standard errors clustered at country level. In parentheses are t-statistics. Significance levels of 0.10, 0.05 and 0.01 are denoted by *, **, ***, respectively.

In **Table 4** we investigate the effects on adjustment of NPE and provisions separately by the type of exposures: retail real estate, SME and corporate, which on average account for 27%, 4% and 46% of bank credit exposure, respectively in risk weighted terms. Exposures to sovereigns amount to only 3% in risk weighted terms – high rated exposures to sovereigns have a zero risk weight. The remainder are exposures to institutions (13%), other retail exposures (8%) and other assets (7%). We use the set of explanatory variables as in specification (1) in the previous two tables in order to allow for the maximum number of observations. The number of observations is limited as not all banks have exposure to all types of assets. We test hypothesis 3 about the effect of a drop in collateral value in regressions of adjustment

of residential real estate NPE and provisions for RRE. The effects for corporate exposures are very similar as in Table 2 and Table 3, which is reasonable given that they represent the largest share of credit exposures. The estimated coefficients for RRE and SME exposures have the expected signs where significant but the adjusted R squared in those regressions is very low. Contrary to hypothesis 3 that banks are more likely to forbear loans when the value of collateral has dropped more, the peak to trough drop in house prices does not have a significant effect on adjustment of NPE RRE exposures.[17] The effects on additional provisioning for newly classified corporate NPE in specification (6) are very similar to the effects on provisioning for corporate exposures in general.

**Table 4: AQR adjustment of NPE and credit provisioning by exposure type.**

| | AQR adj. RRE NPE (1) | AQR adj. corp. NPE (2) | AQR adj. RRE credit prov. (3) | AQR adj. SME credit prov. (4) | AQR adj. corp credit prov. (5) | AQR adj. corp. NPE * coverage (6) |
|---|---|---|---|---|---|---|
| GDP growth, 5 year | -0.0926 | -0.8532 | -4.9309 | -9.0048*** | -7.3505 | 0.0175 |
| | (-0.01) | (-0.07) | (-1.11) | (-3.43) | (-1.35) | (0.47) |
| House prices, peak to trough ch. | 0.0187 | | 0.0336 | | | |
| | (0.69) | | (0.53) | | | |
| Capital regulatory ind. | -0.4167*** | -0.7063* | -0.3038 | -0.5022* | -0.5724*** | -0.0023** |
| | (-3.47) | (-1.88) | (-0.60) | (-2.06) | (-3.12) | (-2.33) |
| Private monitoring ind. | -0.0115 | -0.0859 | -0.7246 | -0.1668 | -0.3092** | -0.0005 |
| | (-0.06) | (-0.19) | (-1.23) | (-0.73) | (-2.22) | (-0.56) |
| Moral hazard mitigation ind. | 0.1040 | -1.7709*** | -0.5185 | -0.3697 | -0.7796* | -0.0047* |
| | (0.33) | (-4.11) | (-1.25) | (-0.86) | (-1.77) | (-2.01) |
| Size | 0.0608 | -0.9458*** | -0.0612 | -0.0415 | -0.3645* | -0.0021* |
| | (0.49) | (-3.23) | (-0.57) | (-0.31) | (-1.90) | (-1.82) |
| Tier 1 ratio | 4.8885 | -2.9913 | -0.1858 | -6.0348 | -1.0493 | 0.0072 |
| | (1.07) | (-0.33) | (-0.04) | (-0.87) | (-0.34) | (0.42) |
| ROA | -15.0552* | -25.4208 | 3.7250 | 22.3618 | -17.7561 | -0.0876 |
| | (-1.88) | (-0.86) | (0.19) | (1.32) | (-1.31) | (-1.17) |
| N of observations | 75 | 109 | 99 | 93 | 119 | 102 |
| Coverage of bank assets [%] | 78.26 | 94.48 | 92.32 | 87.49 | 97.75 | 92.25 |
| Adjusted R2 | -0.0305 | 0.2291 | 0.0314 | 0.0073 | 0.2426 | 0.2139 |

Regressions are estimated with standard errors clustered at country level. In parentheses are t-statistics. Significance levels of 0.10, 0.05 and 0.01 are denoted by *, **, ***, respectively.

Finally, in **Table 5** we perform estimations with aggregate AQR adjustment as dependent variable, which includes adjustments of other assets and tax effect of the adjustments. Overall, the results are similar as for the adjustment of credit provisions, which are for most banks the largest component of the aggregate adjustment. The share of explained variance is higher than in other regressions, reaching up to 60%. Macroeconomic conditions, quality of bank supervision and measures of bank weakness have significant effects and are consistent with other results on forbearance.

[17] We run regressions (not reported) also with other proxies for real estate prices but neither of them has a significant effect.

**Table 5: Aggregate AQR adjustment.**

| | AQR adjustment (1) | AQR adjustment (2) | AQR adjustment (3) | AQR adjustment (4) | AQR adjustment (5) | AQR adjustment (6) |
|---|---|---|---|---|---|---|
| GDP growth, 5 year | -3.9319 | | | -1.6571 | | -7.4299*** |
| | (-1.47) | | | (-0.63) | | (-5.80) |
| Govt. bond yield | | 20.6380*** | | | | |
| | | (7.49) | | | | |
| EDF nonfin. sector | | | -1.7939 | | | |
| | | | (-0.19) | | | |
| Unemployment, 3 year av. | | | 5.5243* | | | |
| | | | (1.93) | | | |
| Capital regulatory ind. | -0.2710*** | -0.1940*** | -0.3941** | -0.2757*** | -0.2385*** | -0.0633 |
| | (-3.03) | (-3.78) | (-2.81) | (-3.55) | (-5.24) | (-0.55) |
| Private monitoring ind. | -0.1929** | -0.2615*** | -0.3422*** | -0.2700* | -0.0920 | -0.1761* |
| | (-2.74) | (-7.15) | (-3.49) | (-2.02) | (-1.59) | (-1.98) |
| Moral hazard mitigation ind. | -0.4451** | -0.3552*** | -0.5212** | -0.4146** | -0.1132* | -0.1413 |
| | (-2.51) | (-5.48) | (-2.90) | (-2.43) | (-1.87) | (-0.59) |
| Size | -0.1674* | -0.0228 | -0.1299 | -0.1425* | -0.0179 | -0.0383 |
| | (-2.05) | (-0.62) | (-1.03) | (-1.74) | (-0.20) | (-0.45) |
| Tier 1 ratio | 0.7954 | 1.0493 | 0.9177 | 0.8525 | 1.3217 | 3.4283 |
| | (0.62) | (1.03) | (1.06) | (0.65) | (0.47) | (1.12) |
| ROA | -6.3263 | -7.8462 | -12.1708 | 0.0130 | 7.1349*** | -1.7174 |
| | (-1.20) | (-1.55) | (-1.76) | (0.00) | (3.27) | (-0.25) |
| Impaired loans ratio | | | | 2.6880** | | |
| | | | | (2.33) | | |
| Bank CDS spread | | | | | 0.2540*** | |
| | | | | | (9.14) | |
| Bank stock 4-factor alpha | | | | | | -3.3928** |
| | | | | | | (-2.31) |
| N of observations | 121 | 108 | 106 | 105 | 51 | 41 |
| Coverage of bank assets [%] | 98.24 | 97.27 | 88.25 | 92.08 | 67.71 | 48.63 |
| Adjusted R2 | 0.2959 | 0.5255 | 0.3408 | 0.3309 | 0.6279 | 0.5825 |

Regressions are estimated with standard errors clustered at country level. In parentheses are t-statistics. Significance levels of 0.10, 0.05 and 0.01 are denoted by *, **, ***, respectively.

## 5. Robustness checks

In the robustness checks we scale the adjustment of provisions for credit exposures by gross loans instead of by risk weighted credit exposure, and the aggregate adjustment by total assets. Scaling by risk weighted value of exposures is reasonable when adjustments of provisions for assets with higher risk weights are expected to be larger than on assets with lower risk weights. If risk weighting does not properly capture this, scaling by nominal amounts could be better. Table 6 in Annex 2: reports results of regressions with adjustment of provisions for credit exposures scaled by gross loans. The explanatory variables are the same as in Table 2 with the only difference that we use leverage ratio (common equity over total assets) instead of Tier 1 capital ratio and include risk weighted asset ratio as an explanatory variable to capture the effect of riskier assets leading to larger provisions. The results are very similar. All significant coefficients have the same signs in both tables. Leverage ratio does not have a significant effect. The effect of RWA ratio is marginally significant in one specification. The adjusted R squared ratio is higher in all specifications, suggesting that adjustments of provisions are more informative when scaled by the nominal amount of exposures than by the risk weighted. The reason why we report the results with provisions scaled by risk weighted exposures in the main results and the non-risk weighted here in the robustness section and not vice versa is that the results for total credit exposures can then be easily

compared to those for real estate, corporate and SME exposures, which can only be scaled by risk weighted amounts. The results on the aggregate adjustment scaled by total assets, reported in Table 7 in Annex 2: are similar to those on the aggregate adjustment scaled by risk weighted assets in Table 5, with the only difference that adjusted R squared ratios are higher, reaching up to 0.70.

Most banks use IFRS. A limited number, 22 out of 130 banks, representing 8% of total banking assets, report according to national accounting standards. To check whether the harmonisation of reporting by banks that use national accounting standards matters for our results we rerun the regressions on a subsample excluding the banks that do not use IFRS. Table 8 in Annex 2: reports the regressions for adjustment of NPE. The results are very similar to those on the full sample in line with our presumption that different treatment of forborne exposures was the main part of the adjustment of NPE rather than harmonisation in other aspects of accounting standards. We also run regressions of the adjustment of provisions and aggregate adjustment on the subsample, but do not report them as they are almost identical to those on the full sample.

## 6. Conclusion

In this paper we investigate what drives forbearance, the practice of offering distressed borrowers concessions that effectively delay loan repayment and allow banks to make less provisions for loan losses. We exploit the results of the AQR, a comprehensive review of asset values of 130 Eurozone banks performed in 2014, to construct measures of forbearance. In contrast to accounting standards that do not clearly define forbearance and hence do not require banks to recognize forborne exposures as nonperforming, AQR uses a precise definition of forbearance measures and applies it as an impairment trigger in the context of existing account standards. This allows us to use the AQR adjustment of NPE and the associated increase of provisions as measures of forbearance. Following the related literature, we formulate hypotheses and investigate to what extent cross-sectional variation in forbearance across banks can be explained by macroeconomic conditions, quality of bank supervision, bank balance sheet variables and market based measures.

We find that adverse macroeconomic conditions, lax bank supervision and measures of bank weakness are significantly related to the extent of forbearance. These measures explain about 25% of variation in the AQR adjustment of NPE across banks and up to 50% of variation in adjustment of provisions. In particular bank CDS spreads are a strong predictor of underprovisioning.

While our analysis provides suggestive evidence for economically plausible relationships, we cannot identify the precise channels through which the factors influence forbearance – for instance the effect of government bond yield could hint at weak macro environment in which bank borrowers are facing financial difficulties, but on the other hand it could also point at incentives of regulators and governments to allow forbearance. If government yields are excessively high, the states cannot effectively support banks that need to be recapitalised, therefore the local supervisors in such countries might have an incentive to allow banks to conceal losses and continue operating as zombie banks, as they themselves cannot save them nor allow an uncontrolled insolvency.

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## Annex 1: Weighting scheme

We use data on bank exposures to 67 different countries to weight variables describing macroeconomic conditions. These data are from ECB and have a few limitations that need to be addressed. Firstly, total exposures are not always equal to total assets. However, in most cases, more than 90% of assets are covered. Secondly, data on some exposures are missing for 30 banks in the AQR sample. We scale up other exposures of these banks so that they sum up to 100% of total assets. Then we assume that the banks, for which exposure data is missing completely, are only exposed to the country they are headquartered in. Given that the covered banks have an average exposure of 73% to their home country, this is a reasonable approximation. Lastly, macroeconomic data is not available for all countries banks can have exposures to. We deal with this problem as follows: If for example government bond yield data for Luxemburg is missing, for the specific purpose of calculating the weighted government bond yield, the exposure of all banks towards Luxemburg is dropped and the remaining exposures are scaled up to sum to 100%. However, this procedure is only applied if the macroeconomic variable is available for the country the financial institution is headquartered in. If not, the macroeconomic variable is treated as missing for such a bank. This rule implies that in our particular dataset, the macroeconomic variables need to be available for at least 55% of exposures of a bank; otherwise the macroeconomic variable is reported as missing.

## Annex 2: Robustness checks

**Table 6: AQR adjustment of credit provisioning, scaled by gross loans.**

| | AQR adj. credit prov./ loans (1) | AQR adj. credit prov./ loans (2) | AQR adj. credit prov./ loans (3) | AQR adj. credit prov./ loans (4) | AQR adj. credit prov./ loans (5) | AQR adj. credit prov./ loans (6) |
|---|---|---|---|---|---|---|
| GDP growth, 5 year | -3.1185 | | | 0.6154 | | -8.5210*** |
| | (-1.23) | | | (0.24) | | (-7.00) |
| Govt. bond yield | | 20.2486*** | | | | |
| | | (5.32) | | | | |
| EDF nonfin. sector | | | -4.6522 | | | |
| | | | (-0.55) | | | |
| Unemployment, 3 year av. | | | 4.1819 | | | |
| | | | (1.40) | | | |
| Capital regulatory ind. | -0.2212*** | -0.1830*** | -0.3868** | -0.2790*** | -0.1844** | -0.1208 |
| | (-2.93) | (-3.55) | (-3.01) | (-6.06) | (-3.04) | (-1.23) |
| Private monitoring ind. | -0.3321*** | -0.3865*** | -0.4696*** | -0.4475*** | -0.1757** | -0.1912** |
| | (-4.83) | (-4.38) | (-4.61) | (-3.45) | (-2.29) | (-2.98) |
| Moral hazard mitigation ind. | -0.4326** | -0.3515** | -0.6780*** | -0.4407*** | -0.0669 | -0.1855 |
| | (-2.63) | (-2.56) | (-3.56) | (-3.09) | (-0.72) | (-1.10) |
| Size | -0.1544** | -0.0675 | -0.1159 | -0.1106* | -0.0458 | -0.1004* |
| | (-2.22) | (-1.30) | (-1.15) | (-1.79) | (-0.45) | (-2.15) |
| Common equity/ TA | -0.0186 | -1.4635 | 2.2947 | -1.8449 | 3.6899 | -5.7053 |
| | (-0.01) | (-0.72) | (1.10) | (-0.74) | (0.78) | (-0.89) |
| RWA/ TA | 1.2324* | 0.3754 | 0.2720 | 0.7471 | -0.3714 | -0.9465 |
| | (1.75) | (0.82) | (0.50) | (1.16) | (-0.86) | (-0.88) |
| ROA | -5.1317 | -7.2860* | -11.4712* | 5.9412 | 2.5784 | 1.0120 |
| | (-1.12) | (-1.84) | (-2.12) | (1.39) | (0.44) | (0.21) |
| Impaired loans ratio | | | | 5.0457*** | | |
| | | | | (3.97) | | |
| Bank CDS spread | | | | | 0.2379*** | |
| | | | | | (7.29) | |
| Bank stock 4-factor alpha | | | | | | -3.8854*** |
| | | | | | | (-4.00) |
| N of observations | 119 | 108 | 103 | 105 | 50 | 41 |
| Coverage of bank assets [%] | 98.14 | 97.36 | 87.82 | 92.08 | 67.66 | 48.63 |
| Adjusted R2 | 0.3651 | 0.4999 | 0.3709 | 0.4624 | 0.5653 | 0.6710 |

Regressions are estimated with standard errors clustered at country level. In parentheses are t-statistics. Significance levels of 0.10, 0.05 and 0.01 are denoted by *, **, ***, respectively.

**Table 7: Aggregate AQR adjustment, scaled by total assets.**

| | AQR adjustment/ TA (1) | AQR adjustment/ TA (2) | AQR adjustment/ TA (3) | AQR adjustment/ TA (4) | AQR adjustment/ TA (5) | AQR adjustment/ TA (6) |
|---|---|---|---|---|---|---|
| GDP growth, 5 year | -1.5635 | | | -0.4851 | | -5.2032*** |
| | (-0.79) | | | (-0.24) | | (-7.17) |
| Govt. bond yield | | 12.9428*** | | | | |
| | | (6.95) | | | | |
| EDF nonfin. sector | | | -3.2724 | | | |
| | | | (-0.56) | | | |
| Unemployment, 3 year av. | | | 3.3893 | | | |
| | | | (1.71) | | | |
| Capital regulatory ind. | -0.1348** | -0.0952*** | -0.2368** | -0.1545*** | -0.1105*** | -0.0225 |
| | (-2.41) | (-3.15) | (-2.54) | (-3.05) | (-4.14) | (-0.28) |
| Private monitoring ind. | -0.1260** | -0.1626*** | -0.2267*** | -0.1618 | -0.0846*** | -0.1056* |
| | (-2.19) | (-5.63) | (-3.08) | (-1.70) | (-3.02) | (-2.02) |
| Moral hazard mitigation ind. | -0.2448** | -0.1546*** | -0.3163** | -0.2765** | -0.0677** | -0.0596 |
| | (-2.13) | (-3.36) | (-2.32) | (-2.14) | (-2.20) | (-0.56) |
| Size | -0.1051** | -0.0331 | -0.1084 | -0.1001* | -0.0109 | -0.0645 |
| | (-2.25) | (-1.39) | (-1.18) | (-1.95) | (-0.22) | (-1.69) |
| Common equity/ TA | 1.0089 | -0.5601 | 2.6620 | 0.6129 | 3.7195** | -1.8189 |
| | (0.54) | (-0.74) | (1.48) | (0.32) | (2.18) | (-0.36) |
| RWA/ TA | 0.7599 | 0.1361 | 0.1251 | 0.6072 | -0.1751 | -0.3838 |
| | (1.74) | (0.82) | (0.41) | (1.19) | (-0.62) | (-0.46) |
| ROA | -3.2444 | -4.5778 | -6.5652 | -0.1983 | 3.7337* | -0.6523 |
| | (-0.98) | (-1.41) | (-1.57) | (-0.05) | (2.06) | (-0.23) |
| Impaired loans ratio | | | | 1.3410 | | |
| | | | | (1.71) | | |
| Bank CDS spread | | | | | 0.1473*** | |
| | | | | | (8.10) | |
| Bank stock 4-factor alpha | | | | | | -2.3974*** |
| | | | | | | (-3.41) |
| N of observations | 123 | 110 | 107 | 105 | 51 | 41 |
| Coverage of bank assets [%] | 99.65 | 98.69 | 89.33 | 92.08 | 67.71 | 48.63 |
| Adjusted R2 | 0.3246 | 0.6119 | 0.3503 | 0.3248 | 0.6996 | 0.6684 |

Regressions are estimated with standard errors clustered at country level. In parentheses are t-statistics. Significance levels of 0.10, 0.05 and 0.01 are denoted by *, **, ***, respectively.

**Table 8: AQR adjustment of NPE, only banks that report according to IFRS.**

| | AQR adj. NPE/ loans (1) | AQR adj. NPE/ loans (2) | AQR adj. NPE/ loans (3) | AQR adj. NPE/ loans (4) | AQR adj. NPE/ loans (5) | AQR adj. NPE/ loans (6) |
|---|---|---|---|---|---|---|
| GDP growth, 5 year | -0.5722 | | | 13.5949* | | -8.5825 |
| | (-0.08) | | | (1.90) | | (-1.39) |
| Govt. bond yield | | 21.8423 | | | | |
| | | (1.49) | | | | |
| EDF nonfin. sector | | | 6.6009 | | | |
| | | | (0.23) | | | |
| Unemployment, 3 year av. | | | -12.5315 | | | |
| | | | (-1.05) | | | |
| Capital regulatory ind. | -0.1679 | -0.1713 | -0.0589 | -0.3431* | -0.0826 | -0.1511 |
| | (-0.55) | (-0.52) | (-0.16) | (-1.84) | (-0.59) | (-0.88) |
| Private monitoring ind. | -0.5958 | -0.6591 | -0.3473 | -0.9643** | -0.0188 | 0.1886 |
| | (-1.42) | (-1.42) | (-0.69) | (-2.47) | (-0.08) | (0.50) |
| Moral hazard mitigation ind. | -1.1178** | -1.1959* | -1.9321*** | -0.9099*** | -0.2424 | -0.3007 |
| | (-2.50) | (-2.03) | (-3.45) | (-2.94) | (-0.78) | (-0.52) |
| Size | -0.7863** | -0.7357* | -0.5791 | -0.3931* | -0.2379* | -0.3473 |
| | (-2.34) | (-1.91) | (-1.72) | (-1.85) | (-1.88) | (-1.46) |
| Tier 1 ratio | -1.5977 | 3.8105 | -3.0177 | -0.9471 | 3.2575 | 13.6860 |
| | (-0.26) | (0.53) | (-0.48) | (-0.15) | (0.33) | (1.62) |
| ROA | -15.0930 | -16.9119 | -24.5000 | 29.3009 | -19.3026 | -21.3377 |
| | (-1.44) | (-1.11) | (-1.23) | (1.09) | (-1.09) | (-1.01) |
| Impaired loans ratio | | | | 19.4916** | | |
| | | | | (2.23) | | |
| Bank CDS spread | | | | | 0.2682** | |
| | | | | | (3.05) | |
| Bank stock 4-factor alpha | | | | | | -2.2085 |
| | | | | | | (-0.64) |
| N of observations | 92 | 83 | 81 | 89 | 45 | 38 |
| Coverage of bank assets [%] | 81.79 | 81.12 | 74.01 | 80.61 | 59.00 | 42.23 |
| Adjusted R2 | 0.1777 | 0.2095 | 0.2157 | 0.3577 | 0.3265 | 0.2031 |

Banks that use national accounting standard are not included in this sample. Regressions are estimated with standard errors clustered at country level. In parentheses are t-statistics. Significance levels of 0.10, 0.05 and 0.01 are denoted by *, **, ***, respectively.

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