

(When) Do Banks React to Anticipated Capital Reliefs?*

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We study how banks react to policy announcements during the representative policy cycle of consultation and policy publication. We use unique data covering the population of all mortgage transactions in the U.K., complemented with regulatory risk assessments of banks and their supervisory interactions. We show that banks likely to benefit from lower capital requirements increase the size of this capital relief by permanently investing into low-risk assets after the publication of the policy. Within this group, those banks with a higher frequency of supervisory interactions already react to the first step of policy development, the publication consultation. We show how these results can be used to estimate a lower bound on the cost of capital for smaller banks, for which such estimates are typically difficult to obtain.

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1. Introduction

While the role of forward guidance in communicating monetary policy is well documented (McKay, Nakamura, and Steinsson 2016; Andrade et al. 2019), a significant gap remains in understanding how banks respond to anticipated regulatory changes communicated at various stages of the policy cycle. Identifying the effect of such announcements is crucial, as changes in minimum capital requirements affect bank lending (Gropp et al. 2019) and the real economy (Fraisse, Lé, and Thesmar 2020). This paper investigates a salient policy change that incentivizes banks to change their asset composition to reduce their capital requirements ahead of its firm-specific implementation, which occurs during their supervisory reviews. We examine whether banks anticipate and respond to potential capital requirement reliefs and identify which policy life-cycle announcements trigger these reactions.

The policy we examine is aimed at reducing minimum capital requirements for certain, eligible small banks that are deemed well-managed while leaving them unchanged for the remaining ones. The size of the reduction depends on the riskiness of their loan portfolios at the time of their supervisory review. In our setup, we follow announcements of the policy during the typical policy cycle: the publication of a consultation paper soliciting industry feedback on the proposed policy, and the publication of the final policy in the form of a policy statement. We also shed light on the role of supervisory oversight by exploring interactions between banks and their appointed supervisors.

We undertake a difference-in-differences analysis with multiple treatment dates in the spirit of Rodnyansky and Darmouni (2017) to study whether banks that were reasonably likely to be eligible reacted to these policy communications. Specifically, we examine whether they invested in low-risk mortgages to increase their expected capital relief, which we refer to as “prepositioning,” relative to other banks that were reasonably certain about their ineligibility. To this end, we use unique data on the population of all mortgage transactions in the United Kingdom between 2016 and 2019. The data come from the Financial Conduct Authority’s (FCA’s) Product Sales Database, which is well-established in the existing literature (Cloyne et al. 2019). We complement these data with bank balance

sheet information to also study banks' broader balance sheet adjustments beyond mortgages. Moreover, we use confidential information on banks' regulatory risk scores and the exact dates of their supervisory reviews combined with unique regulatory data on the frequency of bilateral interactions (i.e., meetings, site visits, and calls) between banks and their supervisors.

Our results suggest that banks that are likely to receive capital reliefs invest in low-risk mortgages prior to the supervisory review, which implements the policy at the bank. In turn, this prepositioning by banks leads to a reduction in the riskiness of their overall mortgage portfolio, which is persistent even after the implementation of the policy. By contrast, we find that banks that are unlikely to be eligible for capital relief tend to move in the opposite direction, increasing their exposure to riskier mortgages. This suggests that the two groups of banks are close competitors.

By the same token, we find evidence of a first-mover advantage in the sense that banks that have more time to adjust their asset composition fail to do so compared with banks that needed to react immediately after the publication of the policy statement. We also find evidence that banks with a high frequency of supervisory interactions already adjust the composition of their mortgage portfolios in response to the issuance of the consultation paper, whereas banks with a comparatively lower frequency of supervisory interaction wait until the publication of the policy statement. These results suggest that a higher frequency of supervisory interactions allows banks to better understand whether they are likely to be within the scope of the proposed policy.

This paper relates to three strands of the literature. First, we extend previous research on the announcement effects of bank regulation. The existing literature examines financial market reactions to new regulation (Schäfer, Schnabel, and di Mauro 2016; Bruno, Onali, and Schaeck 2018), but there is limited evidence on how banks themselves respond. Irani et al (2021) study U.S. banks' reactions to unexpected Basel III capital shortfalls, finding that they reduce their loan exposure, with nonbanks stepping in.¹ While Irani et al.

¹Similarly, Berrospide and Edge (2024) find that U.S. banks subject to stress testing react to the imposition of higher capital buffers by cutting their new

(2021) focus on *unexpected increases* in capital requirements, we analyze banks' reactions to future *reductions* in capital requirements. This distinction is crucial, as banks' responses to these changes may not be symmetric. Moreover, we can examine whether banks *anticipate* the final policy during its uncertain pre-implementation phase. Indeed, we find that eligible banks increase exposure to low-risk assets to secure expected capital reliefs, whereas Irani et al. (2021) document reduced loan exposures *ex post*.

Second, our paper contributes to the scarce literature on how regulatory uncertainty, specifically about the level of capital requirements, affects bank lending. It is well established that banks react to increased uncertainty about their ability to meet minimum capital requirements by holding (costly) voluntary capital buffers as a precaution (e.g., Jokipii and Milne 2008; Stolz and Wedow 2011; Valencia 2016), and that this often results in reduced lending (e.g., Buch et al. 2015; Kara and Yook 2019; Soto 2021).² In this literature, uncertainty entails a downside risk in the form of a costly breach of minimum capital requirements. By contrast, in our case regulatory uncertainty entails an upside risk for banks in the form of a reduction in capital requirements, which comes with lower capital costs. We complement the literature by finding that banks with more frequent supervisory interaction are more responsive when adjusting their asset composition. This behavior is consistent with the goal of maximizing the expected benefit of the policy proposal. It suggests that these banks are more confident about their eventual eligibility once the policy is finalized.

Third, our results are informative for banks' cost of capital considerations (Kisin and Manela 2016). For small banks, which are not listed on stock markets, such estimates typically do not exist. We address this gap by proposing a conceptual framework that showcases how our estimates can be used to gauge a lower bound of the implied cost of regulatory capital for such banks. We find that the

corporate loan originations, although this effect did not appear to affect borrowing firms' overall debt, investment, and employment, suggesting that firms can substitute for the reduction in loans from banks that participate in the stress tests.

²Eckley, Francis, and Mathur (2021) find similar results when the source of uncertainty is, specifically, the future level of capital requirements.

cost of capital for small banks is relatively insensitive to the size of the bank, and is comparable to large banks, at about 11 percent.

The remainder of the paper proceeds as follows. Section 2 sketches the background of the policy. Section 3 describes our data, while Section 4 discusses our empirical methodology. Section 5 presents the main results. Section 6 lays out an application with respect to the estimation of the shadow cost of capital for small banks. Section 7 concludes.

2. Background on the Policy

Under the Basel Committee's pillar 2 framework (BCBS 2001), supervisors can impose bank-specific capital requirements to capture risks that are not adequately, or not at all, captured under the standard pillar 1 minimum capital requirements, under which banks are required to hold capital resources of at least 8 percent of their risk-weighted asset bases. Credit risk typically represents the main component of banks' risk-weighted asset bases. Banks have two options to calculate risk weights: (i) they can estimate their own risk weights under the internal ratings-based (IRB) modeling approach, which is subject to explicit supervisory approval to ensure the integrity of these internal risk assessments; or (ii) they can adopt the standardized approach (SA), where risk weights are set in a standardized manner, supported by external credit assessments. The latter approach is typically adopted by smaller, less established, and less sophisticated banks.

In February 2017, the U.K. Prudential Regulation Authority (PRA), henceforth "the regulator," published a consultation paper proposing refinements to its approach to setting bank-specific capital requirements under the pillar 2 framework (PRA 2017). Specifically, the regulator sought to address concerns over higher risk weights under SA compared to those under IRB models. This was especially the case for residential mortgages with low loan-to-value (LTV) ratios, where SA risk weights can be up to seven times higher than under IRB, as shown in Table 1.

Under the proposals, the regulator would allow supervisors to exercise judgment and reduce bank-specific variable pillar 2A capital requirements for banks and building societies (henceforth, simply "banks") under the SA, where appropriate. In assessing capital

Table 1. IRB versus SA Gap in Risk Weights for Residential Mortgages

LTV Bands	Risk Weights under SA	Risk Weights under IRB
$0\% \leq \text{LTV} < 50\%$	35.0%	5.3%
$50\% \leq \text{LTV} < 60\%$	35.0%	9.1%
$60\% \leq \text{LTV} < 70\%$	35.0%	11.6%
$70\% \leq \text{LTV} < 80\%$	35.0%	16.6%
$80\% \leq \text{LTV} < 90\%$	36.0%	22.4%
$90\% \leq \text{LTV} < 100\%$	43.0%	33.3%

Note: Risk weights under IRB are average risk weights based on exposure amounts. They are calculated based on expected and unexpected losses prior to the implementation of the policy (PRA 2020). Subsequently, the gap between SA and IRB will have changed. Moreover, Basel 3.1 seeks to address that gap by lowering risk weights for low-LTV mortgages capitalized under the SA (Bank of England 2023).

needs, supervisors would consider the greater degree of conservatism that may apply to risk weights derived under the SA (Table 1, column 2) compared with those from IRB models for certain types of exposures, using so-called IRB credit risk benchmarks (Table 1, column 3). These are average risk weights for different types of exposure across banks that use IRB models. The aim of the policy was to address the concern that capital standards are overly prudent for banks using the SA for credit risk exposures. An excessive IRB versus SA gap might disadvantage SA banks in safer low-LTV bands, thus inducing them to increase their exposure in riskier high-LTV bands.

Repullo and Suarez (2004) argue that the IRB versus SA gap in risk weights could induce lenders to specialize in segments where they benefit from a comparative advantage (or, where the comparative disadvantage is reduced; see also Rime 2005; Ruthenberg and Landskroner 2008; Gropp, Hakenes, and Schnabel 2011). In this respect, Benetton et al. (2021) find that the gap in risk weights for U.K. residential mortgages between banks on IRB versus SA allows the former to undercut the latter, pushing SA banks to increase their exposure in riskier high-LTV segments. Building on this theoretical foundation and evidence base, the proposals were designed not only to mitigate competition distortions caused by the IRB versus SA

gap but also to address prudential risks posed by less sophisticated lenders increasing their exposure to higher-risk assets.

In October 2017, the regulator finalized this policy by publishing a policy statement, with an implementation date of January 1, 2018 (PRA 2017). Subsequently, this new approach was implemented as part of the Supervisory Review and Evaluation Process (SREP) reviews under the pillar 2 framework. Specifically, whereas the largest systemic banks are subject to this review process annually and simultaneously, smaller ones (i.e., those targeted by this policy) are reviewed on a rolling two- or three-year cycle (from 2018 to 2020), which is staggered over time. This proportionate approach also takes into consideration the limited supervisory resources available to oversee a large population of smaller banks.³

Under the SREP framework, banks are required to first undertake an internal capital adequacy assessment process (ICAAP) to assess on an ongoing basis their own capital adequacy depending on the level and nature of the risks to which they are or might be exposed. The regulator will then review the submitted ICAAP as part of the SREP. The ICAAP is based on the latest available annualized financial statement data, typically from the end of the year that precedes the SREP.

The calculation of the reduction in the pillar 2A capital framework does not follow mechanically from the comparison with IRB benchmarks. Supervisors maintain full discretion informed by a business model analysis, including consideration of whether the benchmark is representative of bank-specific risk profiles. Banks considered to be relatively low-risk and well-managed would be considered eligible for capital reliefs. By contrast, banks that do not ensure sound management and coverage of their risks or that have concentrated exposures to asset classes for which the regulator does not have sufficient data to produce a reliable IRB benchmark would be considered ineligible. In addition, the published eligibility criteria of the policy were left relatively flexible to allow scope for supervisory judgment. As a result, banks on the SA faced uncertainty as to whether they were eligible.

³It is worth noting that the PRA expects banks to publicly disclose the amount of total capital requirements (given by the sum of pillar 1 and pillar 2 requirements) which apply to them. See PRA (2019).

In conclusion, one aim of this policy was to incentivize SA banks to rebalance their portfolio from riskier high-LTV residential mortgages toward safer low-LTV ones. This was deemed to be beneficial not only in terms of competition, by leveling the playing field between IRB and SA banks (Benetton et al. 2021), but also with regard to the safety and soundness of these relatively less sophisticated SA banks.

Given that the calculation of the reduction in capital requirements was based on the portfolio allocation reported by banks as part of their ICAAP preceding the SREP, banks had the opportunity to increase their exposure to low-LTV residential mortgages before the actual policy implementation (a behavior we label as “prepositioning”) in order to increase not only the potential benefits from the implementation in terms of capital requirements, but also the likelihood of being considered eligible in the first place. This possible change in viewpoint is because the resulting safer portfolio allocation would in turn ameliorate the overall risk profile of the bank in question, which is one of the eligibility criteria outlined in the consultation paper and confirmed in the policy statement.

For example, the SREP of a bank in May 2019 would have used balance sheet information from its ICAAP based on data typically from the end of the previous year. Therefore, the bank would have had the opportunity to increase its exposure to low-LTV mortgages during 2018. In doing so, however, the bank would have had to depart from what it considered to be the best portfolio allocation given the current capital requirements. As lower-LTV mortgages are typically priced at lower rates than high-LTV mortgages, prepositioning in low-LTV mortgages would entail an opportunity cost, arising from adjusting the current allocation to that which would maximize the expected benefit from the policy implementation. This benefit is a function of the probability of being eligible and the magnitude of capital relief.

3. Data

3.1 Bank Eligibility Criteria

Both the consultation paper and the policy statement highlight the criteria that determine whether or not a bank is eligible for capital

relief under the policy. Specifically, the consultation paper mentions three criteria that are relevant for banks' eligibility considerations: (i) banks should have sound management, (ii) they should have a low risk profile, and (iii) they should have no concentrated exposure to asset classes for which the regulator does not have an IRB benchmark.⁴ In addition, banks that use the IRB approach to capitalize credit risk are not eligible. We translate these criteria into metrics that allow us to build a list of banks that are likely to consider themselves as eligible.

Criterion 1: Sound management. We use the list of banks with a risk management and governance (RM&G) scalar to incorporate these criteria.⁵ We assume that a bank will consider itself as having sound management if the regulator did not flag its risk management practice as bad. In other words, the baseline assumption of our approach is that all banks have sound management. Supervisors may flag significantly weak RM&G for banks whose capital requirements are increased as a result via an RM&G scalar.⁶ Hence, we argue that banks that have an RM&G scalar will consider themselves as not eligible for the policy.

Criterion 2: Low risk profile. Supervisors rank banks over a cardinal scale based on several risk drivers (i.e., from low- to high-risk).⁷ Those risk scores are for internal purposes only and, thus, are not communicated to banks. However, banks have regular communication with their supervisors, which culminates in a holistic assessment of their specific risk profile. This feedback can help banks understand how risky their supervisors perceive them to be and, thus, whether they are likely to be eligible. The idea is that a bank below a certain threshold should consider itself as being perceived as a low-risk bank by its supervisors. Specifically, using risk

⁴The policy applied to all asset categories that could give rise to a gap in risk weights between SA and IRB, although by far the most prominent of these was residential mortgages, which is the focus of our analysis.

⁵Under the European Banking Authority's SREP guidelines, competent authorities should set additional own-funds requirements to cover risks posed by RM&G weaknesses where appropriate as an interim measure, while the deficiencies are addressed; see EBA (2014).

⁶For more details on the methodology adopted, see PRA (2023, paragraphs 60–64).

⁷For more details on the internal risk scoring methodology, see PRA (2018a, Chapter 3) and also Bholat et al. (2017).

scores from June 2017, we build two proxies for the true criterion to construct the list of eligible banks: (i) no risk score above two-thirds of the maximum score, and (ii) an average risk score less than one-half of the maximum score.

Both proxies rely on the idea that the safest banks can gauge whether they are considered as relatively low-risk. However, the first proxy is more precise and, arguably, less demanding for banks to be able to infer their eligibility, in the sense that in the absence of supervisory feedback focused on specific issues they can infer themselves to be considered low-risk. Indeed, the number of eligible banks falls from nine under criterion (i) to three under criterion (ii), so that only the most conservative banks are considered eligible under the latter proxy.

Supervisors provide both formal and informal communication to banks, which helps them gauge their eventual eligibility. To determine if banks with at least one high risk score are likely aware of their risk and eligibility, we also reviewed a sample of formal letters which supervisors sent to banks at the end of their SREP. We examined if the tone of the letter regarding a specific risk area changed once supervisors had given a high score. We then compared the tone of these letters with letters from banks that are not considered to be high-risk in the same areas. Our analysis found that letters to banks with high risk scores clearly signal supervisors' concerns about the specific area in question.⁸ Accordingly, we adopt the first criterion based on no risk score above two-thirds of the maximum score as our main approach. Additionally, we retain the second approach, which is based on a low average risk score, as an alternative proxy for robustness analysis.

Criterion 3: Exposure to assets with no IRB benchmark.

We do not capture this criterion explicitly, as we restrict our analysis to banks that only have some material exposures to residential mortgages; that is, with no fewer than 500 mortgages originated

⁸Table A.1 in the Appendix illustrates these differences in wording. Letters to banks with low risk scores tend to have a more positive tone (suggesting ways to improve), while banks with high risk scores have a more direct tone in their letter, pointing out the area they must improve upon. See Bholat et al. (2017) for a more in-depth analysis of the semantic content of those supervisory letters.

over the sample period.⁹ The consultation paper includes a list of asset classes of credit risk IRB benchmarks. We focus our analysis on residential mortgages, which are differentiated by LTV. We do this for two reasons: first, residential mortgages constitute the most material asset class for most retail banks; second, this is the asset class for which the gap in risk weights between the SA and the IRB approach is the widest.

Criterion 4: No IRB modeling. We restrict our sample to banks using the SA. The target of the policy is to reduce the gap in risk weights between banks using the SA and banks using IRB models. Banks that have an IRB license could be eligible for the policy if they use the SA for a fraction of their portfolio. However, it is unlikely that banks with an IRB license use SA for their mortgage portfolio given that risk weights are notably higher under SA. Therefore, we consider that banks that have an IRB license (at the entity level or at the group level) always use the IRB approach for their mortgage portfolio and will not deem themselves eligible. In addition, we also exclude these IRB banks from the control group of ineligible banks. This is because, compared to the type of banks likely to be eligible, banks using IRB models tend to be very large and with a significant competitive advantage in terms of cost of funding (FCA 2018). Therefore, for the sake of comparability, we restrict both our treatment and control groups to banks under the SA.

Table 2 summarizes the eligibility criteria set out in the consultation paper and confirmed with the policy statement, and how we take them into account in our analyses. Out of 47 banks in our sample, we classify 30 as being eligible based on our first approach to proxy for the risk profile of banks, while only 8 satisfied the alternative approach based on the average risk score criterion.

We complement this information with the exact date of the supervisory review (SREP) for each of the banks we include in our sample. Banks differ in the year of their initial SREP and in the length of the cycle until their next SREP: while most banks in our

⁹ Accordingly, we excluded three banks with fewer than 500 residential mortgage originations over the sample period. The inclusion of these small lenders in the sample does not alter the results.

Table 2. Eligibility Criteria—Consultation Paper

Eligibility Criteria from CP	Our Proxy
Sound Management	Banks with an RM&G scalar are not eligible
Low Risk Profile	Banks with no risk score above two-thirds of the maximum score are eligible (alternative criterion: an average risk score less than one-half of the maximum score)
No Concentrated Exposure to Assets w/o Benchmark	We restrict our analysis to banks with substantial mortgage exposure as a robustness test
Using the Standardized Approach	Banks using the internal ratings-based approach are not eligible

sample are on a three-year cycle, there are a few that are on a two-year or one-year cycle. To create clearly defined cohorts of banks, we reattribute the latter to the following SREP cohorts: e.g., a bank on a two-year cycle with a SREP in 2018 is also added to the 2020 cohort.

In our empirical analyses, we focus on the sample of 34 banks which had their SREP in 2019 and 2020, and not on the previous cohorts.¹⁰ Regarding the cohort of banks with a SREP in 2018, the publication of the policy statement in the fourth quarter of 2017 was too late for them to properly preposition by the end of the same year (i.e., the cutoff date for the collection of annual data to be used in the ICAAP submission). In summary, there are 13 banks that had their SREP in 2019, of which 9 were deemed to be eligible (under the criterion that the bank has no risk score above two-thirds of the maximum score);¹¹ and 21 had their SREP in 2020, with 10 eligible. Nevertheless, as explained in Section 5.4, our main empirical analyses and results are focused on the cohort of banks with a SREP in 2019.

¹⁰Therefore, we drop 13 banks on a three-year cycle with a SREP in 2018. The remaining banks in the 2018 cohort and all the banks with a SREP in 2017 are reallocated to the 2019 and 2020 cohorts according to the length of their respective cycles.

¹¹Under the alternative criterion (average risk score), there are 13 banks that had their SREP in 2019, of which 3 were deemed to be eligible; and 21 with a SREP in 2020, 2 of which were eligible.

Table 3. Differences in Bank Characteristics (SREP in 2019)

Variable	Eligible	Not Eligible	Difference	ND
LTV (%)	55.74	64.99	−9.24	−0.96
Mortgages (% of Total Assets)	68.47	55.12	13.35	0.48
Deposits (% of Total Assets)	84.01	79.70	4.30	0.24
Capital (% of RWA)	18.27	21.85	−3.58	0.37
Total Assets (£m)	1,741.27	1,264.02	477.24	0.25

Note: This table shows mean differences in key bank characteristics at the beginning of 2017 for banks with SREPs in 2019, by eligibility status. The third column shows the mean differences, and the last column presents normalized differences (NDs). ND measures the standardized difference between groups, with a critical threshold of 0.25 suggesting substantial differences. The data come from an updated version of the Bank of England’s HBRD database as described in de Ramon, Francis, and Milonas (2017), except for the LTV data, which are from the FCA’s Product Sales Database.

In Table 3, we compare the characteristics of 2019 SREP banks deemed eligible relative to banks classified as ineligible in the spirit of Gropp et al. (2019). Specifically, the table shows key bank characteristics before the publication of the consultation paper, and it calculates differences and normalized differences between these two groups.

The analysis reveals that eligible and ineligible banks are similar in size and deposit reliance. Eligible banks had larger total assets (mean of GBP 1.7 billion) compared to ineligible banks (mean of GBP 1.3 billion), with a normalized difference (ND) of around 0.25, which is right at the critical threshold of 0.25 suggested by Imbens and Rubin (2015) and Imbens and Wooldridge (2009). They also had a slightly higher deposit ratio (84 percent versus 80 percent), with an ND of 0.24, indicating a notable, though moderate, difference in their funding structures. Differences between these two groups are more pronounced in terms of mortgage portfolios and capital adequacy. Eligible banks hold a higher percentage of mortgages than ineligible ones (68 percent versus 55 percent) and have a lower average LTV ratio of new mortgages (56 percent versus 65 percent), with NDs of 0.48 and −0.96, respectively. Additionally, eligible banks have a lower capital ratio than ineligible ones

Table 4. Summary Statistics

	Mean	St. Dev.	Min.	Max.	Observations
LTV					
LTV	66.43	24.65	6.33	95.00	62,977
LTV (<80%)	0.60	0.49	0.00	1.00	62,977
LTV (<60%)	0.34	0.47	0.00	1.00	62,977
LTV (<50%)	0.26	0.44	0.00	1.00	62,977
Control Variables					
Refinancing	0.43	0.50	0.00	1.00	62,977
Fixed Rate	0.86	0.35	0.00	1.00	62,977
Short Incentive Period	0.42	0.49	0.00	1.00	62,977
Note: This table shows the summary statistics of the variables displayed in the regression tables. The sample includes observations from 2016:Q1 through 2019:Q4. LTV is winsorized at 1 percent and 99 percent to account for outliers.					

(18 percent versus 22 percent) with an ND of 0.37, reflecting significant differences in both risk profiles and capital strength.

3.2 Mortgage Transactions

For each of the 13 banks with a SREP in 2019, we match mortgage transactions of all mortgages granted from the first quarter of 2016 until the fourth quarter of 2019. These data come from the FCA's Product Sales Database. In this data set, we observe new mortgages and mortgages refinanced with a new bank ("switchers"). It includes the exact quarter of each of these transactions as well as further mortgage and borrower characteristics. Table 4 shows these characteristics in our sample. We exclude the two quarters of the publication of the consultation paper and policy statement, as these quarters are not clearly attributable to the time before publication or after. Our final sample consists of 62,977 mortgage transactions.

Most importantly for our analyses, our sample includes the LTV ratio of each mortgage, which is 66 percent on average (Table 4, column 1, row 1).¹² We use this variable to create a dummy variable

¹²The distribution of LTV is winsorized at 1 percent and 99 percent to account for outliers.

denoting whether a mortgage is below a certain LTV threshold or not. In our main analyses, we classify mortgages with an LTV below 60 percent as being at low LTV. Below this threshold, IRB risk weights are less than one-third of the corresponding weights under SA (Table 1). Thus, they entail a material disadvantage for banks using SA. This threshold also identifies the lowest pricing band conventionally used by banks (i.e., to qualify for the lowest available rates). About one-third of all mortgage transactions display an LTV of less than 60 percent (Table 4, column 1, row 3). We also adopt two alternative thresholds: (i) LTV below 80 percent, which is more conservative; and (ii) LTV below 50 percent, where the gap in risk weights is at its widest (Table 1, row 1). About 60 percent of all mortgages show LTVs of below 80 percent (Table 4, column 1, row 2); about one-fourth have an LTV below 50 percent (Table 4, column 1, row 4).

The Product Sales Database also provides a set of other relevant mortgage contract terms. Regarding the purpose of the mortgage transaction, on average about 43 percent of all mortgages are taken by refinancers (Table 4, column 1). Most mortgages in our sample are priced at a fixed rate (86 percent—Table 4, column 1, penultimate row). Finally, with respect to the length of the initial incentive period,¹³ 42 percent of all mortgage transactions have incentive periods of two years or shorter (Table 4, column 1, last row).

3.3 Frequency of Bilateral Supervisory Interaction

We complement this data set with information on the number of interactions between banks and their supervisors. As the number of interactions can vary substantially across banks and years, we do not use the absolute number of bank-supervisor interactions. Instead, we employ a measure of deviation from the median number of interactions within the four supervisory categories of banks. For each of these categories, we then estimate the median of the number of interactions in 2018 or 2019.¹⁴ We use the median instead

¹³In the U.K., mortgages are on a teaser rate, which typically lasts two years. After this period, the mortgage rate reverts to a relatively higher standard variable rate (SVR).

¹⁴We use the average of the median only for 2018 and 2019 given that 2017 is incomplete.

of the mean as it is robust to outliers of banks with very frequent interactions.

We consider a bank to have a high number of supervisory interactions if it met with its supervisor more than 1.5 times the median for its bank category. We chose the threshold of 1.5 times the median to capture only banks that had significantly more interactions with their supervisors than the remaining banks of their category. We create a dummy variable that assigns the value of one for banks with high supervisory interactions (and zero otherwise). In our sample of 13 banks with a supervisory review in 2019, we observe that 5 banks have a high number of supervisory interactions.

4. Empirical Strategy

Our empirical strategy follows Rodnyansky and Darmouni (2017). They use a difference-in-differences setup with multiple treatment dates to examine the effects of quantitative easing on bank lending behavior. In our main specification, we estimate the following regression model using ordinary least squares (OLS):

$$\begin{aligned} \text{Low } LTV_{i,b,t} = & \beta_1 \times \text{Eligible}_b \times \text{Post } PS_t + \beta_2 \times \text{Eligible}_b \\ & \times \text{Post } CP_t + \beta_3 \times \text{Post } PS_t + \beta_4 \times \text{Post } CP_t + \gamma_b + X_{i,b,t} + \varepsilon_{i,b,t}, \end{aligned}$$

where $\text{Low } LTV_{i,b,t}$ is an indicator variable which equals one if the mortgage i by bank b at point in quarter t has an LTV ratio of less than 60 percent and zero otherwise. In other specifications, we use alternative thresholds and contrast them with a continuous measure of LTV. The comparison with a continuous measure of LTV is especially relevant from a policy evaluation perspective, in that it would be an unintended policy consequence if eligible banks increased their exposure at very high LTV (i.e., where interest rates are higher) to compensate for the increase at low LTV (i.e., polarized portfolio allocation), which might leave the average LTV unchanged. Therefore, the result desired from a policy perspective would be an increase at low LTV alongside a reduction in the continuous measure of LTV.

$\text{Post } CP_t$ is a time dummy variable which indicates whether the mortgage transaction was made in the quarters following the consultation paper publication, i.e., in the second quarter of 2017 or

later (the variable equals zero otherwise). $Post\ PS_t$ is an indicator of whether the mortgage transaction was made in the quarters after the policy statement publication, i.e., in the first quarter of 2018 or later (zero otherwise). The coefficient of this variable can be interpreted as the marginal effect of the publication of the policy statement net of the effect of the publication of the consultation paper. We exclude the quarters of the two treatment dates, consultation paper (2017:Q1) and policy statement (2017:Q4), as these quarters include days before as well as days after the publications. We interact the time dummy variables with $Eligible_b$, which indicates whether a 2019 SREP bank b was deemed eligible, using our “no risk score above two-thirds” criterion in our baseline analyses. γ_b is the vector of bank fixed effects which controls for time-invariant bank characteristics. This dummy variable absorbs the main effect of $Eligible_b$, which does not appear in our regression equation. $X_{i,b,t}$ is a vector of contract characteristics of mortgage transaction i (incentive period as well as the type of interest rate, i.e., fixed rate). It also includes dummy variables to account for the geographic variation in the 12 U.K. regions included in our sample. We also interact these regional fixed effects with time.¹⁵

In addition, in an alternative specification, we interact the time dummy variables and the eligibility dummy variables with a third dummy variable, denoted as $Supervision(high)_b$. It indicates whether bank b was subject to a high frequency of bilateral supervisory interaction. The aim of this triple-interacted term is to uncover whether eligible banks with a higher degree of supervisory interaction responded more promptly to the publications of the consultation paper and the policy statement (especially the former) than eligible banks with a lower degree of supervisory interaction.¹⁶

Given the level of administration of the assessed policy, we cluster standard errors at the region and time level. Our sample includes observations in the four years from 2016:Q1 through 2019:Q4. Hence,

¹⁵In unreported robustness checks, we also control for refinancing $\times$ time fixed effects. We conduct two tests, both replacing the region $\times$ time fixed effects and adding to the region $\times$ time fixed effects. The results stay qualitatively very similar.

¹⁶We limit the estimation of this alternative specification to the cohort of banks with SREPs in 2019, as those in the 2020 cohort did not face the same degree of urgency to preposition in response to the consultation paper.

our estimated coefficients for the consultation paper ($Post\ CP_t$) and its interactions with $Eligible_b$ and $Supervision(high)_b$ can be interpreted as the treatment effects relative to the pre-event period from 2016:Q1 through 2016:Q4. Similarly, our estimated coefficients for the policy statement ($Post\ PS_t$) and its interactions with $Eligible_b$ and $Supervision(high)_b$ can be interpreted as additional treatment effects relative to the effect of the consultation paper.

Like Rodnyansky and Darmouni (2017), we also estimate the effect of each of the time quarters included in our sample relative to 2016:Q1 through 2016:Q3. Undertaking these quarter-by-quarter analyses is relevant for two reasons. First, it allows us to examine the validity of the parallel trends assumption of our difference-in-differences design. Specifically, we can examine whether eligible banks had started prepositioning before the publication of the consultation paper. Second, it allows us to examine the persistence of the effects over time. This is important from a policy evaluation perspective, in that a reversal of the prepositioning effect after the date relevant to the submission of the ICAAP (i.e., at the end of 2018 for the cohort of banks with a SREP in 2019) would raise suspicions of “window-dressing.” By contrast, the persistence of the prepositioning effect would be in line with the aim of the policy. Regarding the second reason, there might be a preexisting trend in our data with eligible banks investing in low-LTV mortgages prior to the announcement of the policy. This would invalidate the parallel trends assumption in our difference-in-differences design. Formally, we estimate the following regression model using OLS:

$$\begin{aligned} Low\ LTV_{i,b,t} = & \sum_{t=-1}^T \beta_t \times Eligible_b \times Time_t + \sum_{t=-1}^T \gamma_t \times Time_t \\ & + \gamma_b + X_{i,b,t} + \varepsilon_{i,b,t}, \end{aligned}$$

where $Time_t$ is an indicator of whether the observation is in quarter t (zero otherwise). For example, $Time_{t-1}$ indicates whether the mortgage transaction was done in 2016:Q4, the quarter before the publication of the consultation paper (zero otherwise). In the absence of prepositioning before the publication of the consultation paper, we expect the estimate of β_{-1} not to be statistically significantly different from zero. If it was negative, there might be evidence of

Table 5. Difference in Average LTV across Eligibility and over Time

	Before (1)	Post (CP) (2)	Post (PS) (3)	Difference (4)
Eligible	66.743	69.029	61.744	−4.999***
Noneligible	64.498	63.494	73.728	9.229***
Note: This table shows the results of mean LTV across bank eligibility and time. It shows the results for banks that had their SREP in 2019 as well as banks with SREPs in 2017 on a one-/two-year cycle and banks with SREPs in 2018 on a one-year cycle. The first column shows average LTV in the period before the CP was published. The second column shows average LTV in the period after the CP was published and before the PS was published. The third column shows average LTV in the period after the PS was published. The last column tests differences in mean LTV between the first and the third column. ***, **, * denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively.				

prepositioning. Compared to the previous regression equation, we now include the quarters of the two treatment dates, consultation paper (2017:Q1) and policy statement (2017:Q4). All coefficients are estimated relative to 2016:Q1, as it allows us to estimate the effect of the three last quarters before the publication, from 2016:Q2 through 2016:Q4.

5. Results

5.1 The Effect of Capital Reliefs on Prepositioning

In Table 5, we examine whether banks with a SREP review in 2019 prepositioned in low LTV after the two event dates, i.e., the publication of the consultation paper (CP) in February 2017 and the publication of the policy statement (PS) in October 2017. The table presents simple differences in mean LTV, where column 1 shows average LTV before the publication of the CP, column 2 shows average LTV after the publication of the CP and before the publication of the PS, and column 3 shows average LTV after the publication of the PS. Column 4 tests the mean differences between LTV averages before any publication and mean LTV after the publication of the PS. In summary, starting from broadly similar levels, eligible banks reduced their average LTV after the publication of the PS, whereas

noneligible banks moved in the opposite direction. Both results are statistically significant at the 1 percent level.

To further explore this apparent incongruency, Table 6 presents the results of a linear regression model as outlined above. In columns 1–2, the dependent variable is banks' propensity to grant a low-LTV mortgage with an LTV of less than 60 percent (conditional on granting a mortgage). In columns 3–4, we show the effects by changing the dependent variable to a continuous measure of LTV (again conditional on granting a mortgage). Explanatory variables are indicators of bank eligibility (using the “below two-thirds” criterion) as well as two time dummy variables, which correspond to the quarters following the two policy publications.

The prepositioning effect is pronounced in the aftermath of the publication of the PS. In fact, following the publication of the PS, eligible banks increased their propensity to invest in a low-LTV mortgage (<60 percent) by almost 14 percentage points relative to ineligible banks, and this result is statistically significant at the 1 percent significance level (column 1). This estimated effect decreases slightly (by 1 percentage point) once we control for region $\times$ time fixed effects, but it remains statistically significant at the 1 percent significance level (column 2).

Results in columns 3–4 suggest that not only did the share of low-LTV mortgages increase, but also the overall LTV composition of new mortgages decreased. That is, banks did not offset lending into low-LTV mortgages by simultaneously increasing the share of lending to very high-LTV borrowers. In fact, following the publication of the PS, eligible banks decreased the average LTV of new mortgages by 7 percentage points relative to ineligible banks. These estimated effects are statistically significant at the 1 percent significance level. This result is consistent with the aim of the policy, as eligible banks also materially reduced the LTV level across their residential mortgage books.

The sharpness of these results is strengthened because the coefficient of the noninteracted term, *Post (PS)*, which captures the reaction of ineligible banks, is statistically significant at the 5 percent significance level (columns 1 and 3), but with an opposite sign. This contrast indicates that ineligible banks reacted to the prepositioning of eligible banks following the publication of the PS by adjusting their portfolios in the opposite direction, thus suggesting

Table 6. The Average Effect of Capital Reliefs on Prepositioning

Dependent Variable	LTV (<60 percent)		LTV	
	(1)	(2)	(3)	(4)
Eligible × Post (CP)	−0.056 (0.028)	−0.031 (0.015)	2.168 (1.211)	1.643 (0.789)
Eligible × Post (PS)	0.138*** (0.009)	0.127*** (0.008)	−7.227*** (0.503)	−7.076*** (0.424)
Post (CP)	0.066 (0.036)		−2.305 (1.602)	
Post (PS)	−0.122** (0.015)		5.702** (0.636)	
Bank FE	YES	YES	YES	YES
Region FE	YES	NO	YES	NO
Region × Time FE	NO	YES	NO	YES
Contract Variables	YES	YES	YES	YES
Observations	62,977	62,977	62,977	62,977
Number of Banks	13	13	13	13
Eligible Banks	9	9	9	9
Mean of Dep. Variable	0.344	0.344	66.433	66.433
R2	0.269	0.271	0.380	0.382
Clustered SE	YES	YES	YES	YES
Method	OLS	OLS	OLS	OLS

Note: This table shows the results of a linear regression model estimated using OLS on the mortgage transaction level. In columns 1 and 2, the dependent variable is the propensity to grant a low-LTV loan (below 60 percent). In columns 3 and 4, the dependent variable is the continuous variable, LTV. In all columns, this table shows the results for banks that had their SREP in 2019 as well as banks with SREPs in 2017 on a one-/two-year cycle and banks with SREPs in 2018 on a one-year cycle. Explanatory variables are a time dummy variable as well as its interaction with bank eligibility. In all columns, we control for contract variables and bank fixed effects. In columns 1 and 3, we include region fixed effects. In columns 2 and 4, we include region × time fixed effects. Contract variables include fixed rate, incentive period, and refinancing. Standard errors are clustered on the region and time level. ***, **, * denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

that the two sets of banks are close competitors in the sense that ineligible banks are forced to accommodate the expansion of eligible banks in low-LTV segments by repositioning toward higher-LTV segments. This “crowding-out” effect could be an unintended consequence of the policy in question, given that two of the eligibility criteria are that banks should have sound management and have a low risk profile. In this sense, it is interesting to note that these effects are strongly reminiscent of what was theorized by Repullo and Suarez (2004) and corroborated by Benetton et al. (2021) with respect to the IRB versus SA gap.

There is no statistically significant effect in response to the publication of the CP in February 2017. This is somewhat remarkable as it was very likely that the policy proposal consulted upon would be ultimately confirmed and thus implemented in January 2018. This is because the U.K. regulator had already signaled its commitment to reduce the IRB versus SA gap in risk weights for residential mortgages in 2016 by reviewing the methodology for setting pillar 2A capital requirements.¹⁷ Therefore, this suggests that regulated banks wait for the finalization of a policy before reacting to it, no matter how well-anticipated the policy in question may be. Another factor that could explain this delayed reaction from banks is the uncertainty regarding their eventual eligibility under the proposed scoping criteria.

¹⁷On October 28, 2016, Sam Woods (Deputy Governor, Prudential Regulation and Chief Executive Officer, Prudential Regulation Authority), said: “I have long been troubled, as I know have members of the Treasury Committee, by the gap in risk-weights for low-LTV mortgages between banks who use models to calculate them and (typically smaller) banks who use a standardised, and therefore relatively crude, weighting provided by regulators. Now of course the leverage ratio is an essential complement to the risk-weighted framework which mitigates the effect of such disparities. Nevertheless they still bother me both in light of our secondary competition objective, given the risk of an un-level playing field, but importantly also in light of our safety and soundness objective because of the economic incentive it provides for standardised banks to concentrate on higher-LTV lending. [...] I intend that we will bring forward proposals under our Pillar 2 regime which should also reduce the risk that our capital standards are overly prudent for smaller banks using the standardised approach to credit risk to calculate their requirements – essentially by looking at capital requirements in the round rather than assuming that a simple “sum of the parts” approach will necessarily deliver the right answer.” (Woods 2016, p. 8)

5.2 *The Persistence of Effects of Capital Reliefs on Prepositioning*

In this section, we analyze the persistence of prepositioning by eligible banks. By doing so, we examine the validity of the parallel trends assumption of our difference-in-differences design. To that end, we estimate the effect of each of the time quarters included in our sample relative to the period from 2016:Q1 through 2016:Q3, following the approach of Rodnyansky and Darmouni (2017).

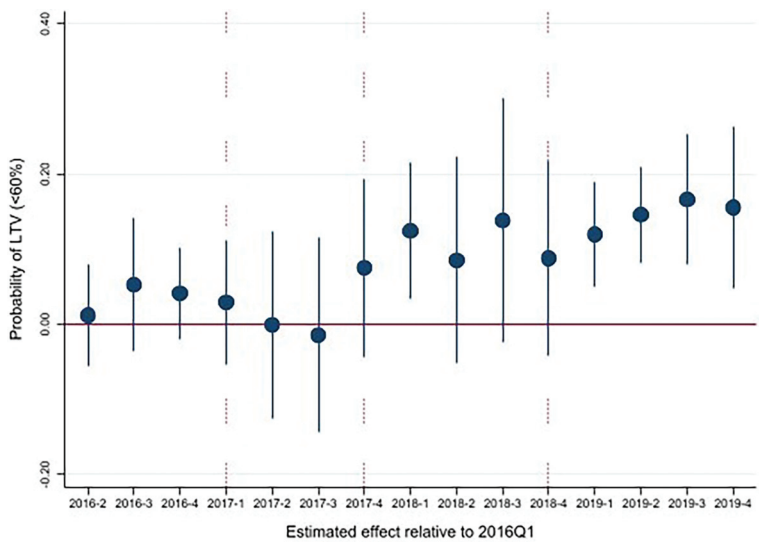
In Figure 1, we display the estimated quarterly coefficients and 95 percent confidence intervals using LTV (<60 percent) as our dependent variable. The estimated coefficient in 2016:Q4 is close to zero and statistically insignificant. This indicates that there is no evidence that eligible banks prepositioned in the quarter before the publication of the CP. In line with our previous results, we do not see evidence of prepositioning in the quarters following the publication of the CP in 2017:Q1. However, banks start prepositioning in the quarter following the publication of the PS, 2018:Q1. Interestingly, the effects appear to be persistent over time. This provides important evidence from a policy evaluation perspective, as the persistence of prepositioning is in line with the intention of the policy.

In Figure 2, we replicate our analyses on the estimated quarterly coefficients where the continuous measure, LTV, is our dependent variable. Again, the estimated coefficient in 2016:Q4 is close to zero and statistically insignificant. This further confirms that there is no evidence of a violation of the parallel trends assumption. Moreover, the estimated effects remain persistent over time. In other words, the overall LTV composition of new mortgage lending decreased permanently following the publication of the policy statement.

5.3 *The Role of Supervisory Interactions*

Our findings on prepositioning may mask heterogeneity among the group of eligible banks driven by the frequency of their supervisory interactions. It seems plausible that a bank with a higher number of supervisory interactions shall face a lower degree of uncertainty regarding its eligibility status one way or the other. For example, while more interaction may be due to a period of closer scrutiny to address specific concerns raised by supervisors, the affected bank

Figure 1. Prepositioning into Low LTV (<60 percent)

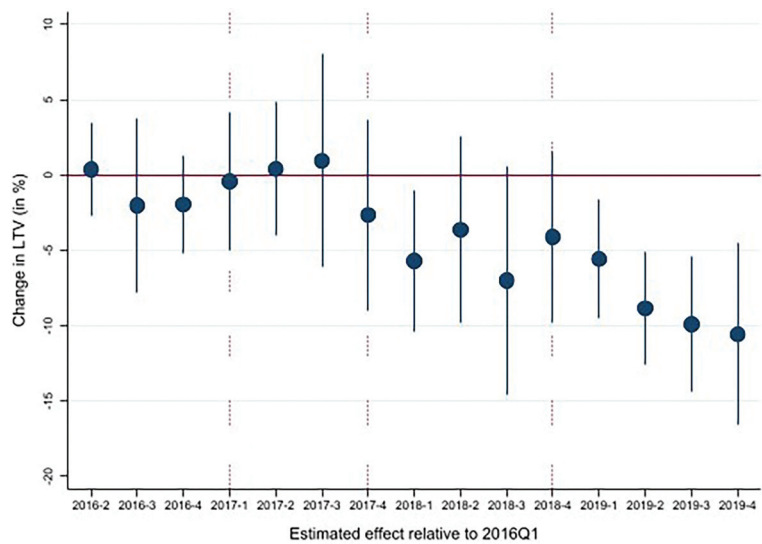


Note: Figure 1 shows the results of a linear regression model estimated using OLS on the mortgage transaction level. The dependent variable is the propensity to grant a low-LTV loan below 60 percent. The coefficients displayed are the time dummy variables interacted with bank eligibility (“below two-thirds” criterion). This figure shows the coefficients for banks that had their SREP in 2019 incl. banks with SREPs in 2017 on a one-/two-year cycle and banks with SREPs in 2018 on a one-year cycle. The first dotted vertical line relates to the quarter of the publication of the CP, 2017:Q1. The second dotted vertical line relates to the quarter of the publication of the PS, 2017:Q4. The third dotted vertical line relates to the last quarter of the year before banks had their SREP assessments, 2018:Q4. The horizontal line illustrates no effect relative to 2016:Q1. Two-way standard errors are clustered on the region and time level. The figure shows 95 percent confidence intervals.

may gain a better understanding of what concrete mitigating steps could be taken to secure eligibility.¹⁸ To further investigate the impact of interaction with supervisors, we utilize unique regulatory data on the bilateral interaction between banks and their supervisors.

¹⁸It is worth pointing out that the two key determinants of ineligibility are supervisory concerns in terms of governance and riskiness of the business model.

Figure 2. Prepositioning into LTV (continuous measure)



Note: Figure 2 shows the results of a linear regression model estimated using OLS on the mortgage transaction level. The dependent variable is the continuous variable, LTV. The coefficients displayed are the time dummy variables interacted with bank eligibility (“below two-thirds” criterion). This figure shows the coefficients for banks that had their SREP in 2019 incl. banks with SREPs in 2017 on a one-/two-year cycle and banks with SREPs in 2018 on a one-year cycle. The first dotted vertical line relates to the quarter of the publication of the CP, 2017:Q1. The second dotted vertical line relates to the quarter of the publication of the PS, 2017:Q4. The third dotted vertical line relates to the last quarter of the year before banks had their SREP assessments, 2018:Q4. The horizontal line illustrates no effect relative to 2016:Q1. Two-way standard errors are clustered on the region and time level. The figure shows 95 percent confidence intervals.

We hypothesize that *eligible* banks with a comparatively high frequency of supervisory interaction are more certain about their eligibility status and, therefore, more likely to be responsive to the publication of the CP, although at the consultation stage banks could have been uncertain about the likelihood of the proposal being confirmed or the likelihood of being eligible. However, as outlined in Section 5.1, the PRA had clearly signaled its firm intention to implement the proposal well in advance of the publication of the CP. Therefore, the only residual source of uncertainty faced by banks

was arguably around their eventual eligibility under the proposed scoping criteria.

In Table 7, we replicate our main analyses for our two dependent variables *LTV (<60 percent)* and *LTV*, in columns 1 and 3, respectively. In the specifications shown in columns 2 and 4, we then add a triple-interacted term combining the time, eligibility, and high supervisory interaction dummy variables (as set out in Section 3.3). We acknowledge that supervisory intensity is not randomly assigned and that banks receiving higher levels of supervision likely differ in relevant ways from those with lower supervision.¹⁹ We address these differences by controlling for time-invariant bank characteristics using bank fixed effects in all columns.

The specification in column 2 shows coefficients of 21 percentage points on the triple interaction term *Eligible* $\times$ *Post (CP)* $\times$ *Supervision (high)* and of -7 percentage points on the double-interacted term *Eligible* $\times$ *Post (CP)*, both at the 5 percent significance level. The specification in column 4, where continuous LTV is our dependent variable, shows similar results. These results suggest that eligible banks with a high frequency of bilateral supervisory interactions responded to the publication of the CP by prepositioning into low-LTV segments, in contrast to the conduct of eligible banks without a high frequency of bilateral interaction.²⁰

Once more, the importance of this result is amplified because the double-interacted term *Post (CP)* $\times$ *Supervision (high)* is of similar magnitude but opposite sign, meaning that noneligible banks with a high frequency of interaction with their supervisors also reacted earlier in response to the publication of the CP, but in an opposite direction to that of eligible banks. Intuitively, this seems sensible. Finally, it is also to be expected that the triple- and double-interacted coefficients with respect to the publication of the PS reverse the estimated effect of the CP publication, given the comparatively later

¹⁹Indeed, while similar in size, banks with high supervisory contact tend to have riskier mortgages, more deposit funding, and lower capital ratios than other banks. These differences in “business risk” align with the rationale that heightened supervisory attention is typically directed toward banks with greater risk exposure.

²⁰We note that the triple interaction term *Eligible* $\times$ *Post (PS)* $\times$ *Supervision (high)* is insignificant though the estimate is almost three times the standard error. This could be because of the way we cluster standard errors.

**Table 7. The Heterogeneous
Role of Supervisory Interactions**

Dependent Variable	LTV (<60 percent)		LTV	
	(1)	(2)	(3)	(4)
Eligible × Post (CP)	−0.031 (0.015)	−0.072** (0.016)	1.643 (2.586)	1.395** (0.259)
Eligible × Post (PS)	0.127*** (0.008)	0.116** (0.019)	−7.076*** (2.261)	−5.657** (0.904)
Eligible × Post (CP) × Supervision (High)		0.211** (0.027)		−6.174*** (0.555)
Eligible × Post (PS) × Supervision (High)		−0.148* (0.035)		5.251 (1.876)
Post (CP) × Supervision (High)		−0.191*** (0.014)		8.523*** (0.494)
Post (PS) × Supervision (High)		0.223*** (0.022)		−10.076** (1.390)
Bank FE	YES	YES	YES	YES
Region FE	NO	NO	NO	NO
Region × Time FE	YES	YES	YES	YES
Contract Variables	YES	YES	YES	YES
Observations	62,977	62,977	62,977	62,977
Number of Banks	13	13	13	13
Eligible Banks	9	9	9	9
Supervision (High)	5	5	5	5
Mean of Dep. Variable	0.344	0.344	66.433	66.433
R2	0.271	0.272	0.382	0.383
Clustered SE	YES	YES	YES	YES
Method	OLS	OLS	OLS	OLS

Note: This table shows the results of a linear regression model estimated using OLS on the mortgage transaction level. In columns 1 and 2, the dependent variable is the propensity to grant a low-LTV loan below 60 percent. In columns 3 and 4, the dependent variable is the continuous variable, LTV. In all columns, this table shows the results for banks that had their SREP in 2019 (or in 2017 on a one-/two-year cycle or in 2018 on a one-year cycle). Explanatory variables are a time dummy variable as well as its interaction with lender eligibility. In all columns, we control for contract variables and bank fixed effects. In columns 1 and 3, we include region fixed effects. In columns 2 and 4, we include region × time fixed effects and triple interaction terms with supervision (high). Contract variables include fixed rate, incentive period, and refinancing. Standard errors are clustered on the region and time level. ***, **, * denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

response of both eligible and noneligible banks with lower degrees of supervisory interaction, as reported in the previous section.

5.4 *The Timing of Policy Implementation via SREP Cycles*

The fact that the prepositioning of banks with a SREP in 2019 persists throughout 2019 may have weakened the ability of the subsequent cohort of eligible banks, those with a SREP in 2020, to do the same. In our main analyses in Table 5, we had shown that the sign, magnitude, and significance of the noninteracted time dummies for the publication of the CP and PS indicated that the prepositioning of eligible banks crowded out, to some extent, noneligible banks within the 2019 SREP cohort. By the same token, the persistence of prepositioning for the 2019 SREP cohort may have prevented eligible banks in the 2020 SREP cohort from doing likewise. This is indeed what we observe when we replicate our main specification comparing eligible and noneligible banks in the 2020 SREP cohort.

To investigate this further, we compare the two groups of eligible banks in the 2019 and 2020 cohorts over the eight consecutive quarters in 2018 and 2019. Compared with Table 5, we replace the control group (banks that had their SREP in 2019 but were ineligible) with banks having their SREP in 2020 but considered eligible. We then compare their prepositioning with banks that had their SREP in 2019 and were considered eligible.

Table 8 shows these results. The coefficient of the interaction term *Eligible* $\times$ *Post (PS)* is positive at the 1 percent significance level across all specifications. This indicates that eligible banks in the 2019 SREP cohort began prepositioning relative to the subsequent cohort of eligible banks, those with a SREP in 2020. In addition, the noninteracted *Post (PS)* time dummy variable has a negative coefficient, albeit of lower magnitude, at the 5 percent significance level in specification (1). These results suggest that eligible banks in the 2020 SREP cohort moved in the opposite direction, although to a lesser extent, supporting the existence of crowding-out effects.

5.5 *Refinements of Our Main Analyses*

In this subsection, we conduct two refinements of our main analyses. First, we present our main results using two alternative thresholds

Table 8. The Impact on Other SREP Cohorts

Dependent Variable	LTV (<60 percent)		LTV	
	(1)	(2)	(3)	(4)
Eligible × Post (CP)	−0.023 (0.010)	0.004 (0.005)	0.598 (0.315)	0.139 (0.211)
Eligible × Post (PS)	0.103*** (0.007)	0.101*** (0.007)	−3.999*** (0.341)	−4.262*** (0.315)
Post (CP)	0.025** (0.006)		−0.175 (0.130)	
Post (PS)	−0.078** (0.011)		1.871** (0.355)	
Bank FE	YES	YES	YES	YES
Region FE	YES	NO	YES	NO
Region × Time FE	NO	YES	NO	YES
Contract Variables	YES	YES	YES	YES
Observations	82,012	82,012	82,012	82,012
Number of Banks	18	18	18	18
SREP 2020 & Eligible Banks	10	10	10	10
SREP 2019 & Eligible Banks	8	8	8	8
Mean of Dep. Variable	0.307	0.307	68.720	68.720
R2	0.261	0.261	0.376	0.376
Clustered SE	YES	YES	YES	YES
Method	OLS	OLS	OLS	OLS

Note: This table shows the results of a linear regression model estimated using OLS on the mortgage transaction level using the subsample. In columns 1 and 2, the dependent variable is the propensity to grant a low-LTV loan (below 60 percent). In columns 3 and 4, the dependent variable is the continuous variable, LTV. In all columns, this table shows the results for banks that had their SREP in 2019 (or in 2017 on a two-year cycle or in 2018 on a one-year cycle) and were ineligible as well as banks that had their SREP in 2020 (or 2018 on a two-year cycle) and were eligible. One bank that had SREPs both in 2019 and in 2020 was left out. Explanatory variables are a time dummy variable as well as its interaction with bank eligibility. In all columns, we control for contract variables and bank fixed effects. In columns 1 and 3, we include region fixed effects. In columns 2 and 4, we include region × time fixed effects. Contract variables include fixed rate, incentive period, and refinancing. Standard errors are clustered on the region and time level. ***, **, * denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

for low LTV in Table 9: below 50 percent in columns 1 and 2, and below 80 percent in columns 3 and 4. When examining LTV below 50 percent, compared to LTV below 60 percent as shown in

**Table 9. The Average Effect of Capital Reliefs on
Prepositioning (alternative dependent variables)**

Dependent Variable	LTV (<50 percent)		LTV (<80 percent)	
	(1)	(2)	(3)	(4)
Eligible $\times$ Post (CP)	−0.022 (0.016)	−0.008 (0.011)	−0.086 (0.036)	−0.079 (0.033)
Eligible $\times$ Post (PS)	0.077** (0.011)	0.075** (0.010)	0.191*** (0.012)	0.196*** (0.010)
Post (CP)	0.037 (0.024)		0.066 (0.036)	
Post (PS)	−0.068** (0.013)		−0.148** (0.018)	
Bank FE	YES	YES	YES	YES
Region FE	YES	NO	YES	NO
Region $\times$ Time FE	NO	YES	NO	YES
Contract Variables	YES	YES	YES	YES
Observations	62,977	62,977	62,977	62,977
Number of Banks	13	13	13	13
Eligible Banks	9	9	9	9
Mean of Dep. Variable	0.257	0.257	0.596	0.596
R2	0.253	0.254	0.307	0.308
Clustered SE	YES	YES	YES	YES
Method	OLS	OLS	OLS	OLS

Note: This table shows the results of a linear regression model estimated using OLS on the mortgage transaction level. In columns 1 and 2, the dependent variable is the propensity to grant a low-LTV loan below 50 percent. In columns 3 and 4, the dependent variable is the propensity to grant a loan with an LTV below 80 percent. In all columns, this table shows the results for banks that had their SREP in 2019. Explanatory variables are a time dummy variable as well as its interaction with bank eligibility. In all columns, we control for contract variables and bank fixed effects. In columns 1 and 3, we include region fixed effects. In columns 2 and 4, we include region $\times$ time fixed effects. Contract variables include fixed rate, incentive period, and refinancing. Standard errors are clustered on the region and time level. ***, **, * denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

columns 1 and 2 of Table 6, the prepositioning effect is nearly half the size and significant only at the 5 percent significance level. By contrast, columns 3 and 4 of Table 9 show that the effect is much stronger in magnitude and statistically significant at the 1 percent level once we employ the more conservative criterion of LTV below 80 percent.

These results are intuitive. The gaps in risk weights between IRB and SA, which drive the expected benefits in terms of capital relief from the policy implementation, are already material at LTV levels below 80 percent, as shown in Table 1. Therefore, we expect to observe the prepositioning effect across all LTV bands below 80 percent. As the treatment LTV threshold is lowered, the prepositioning effect appears weaker because some observations within LTV levels with an IRB versus SA risk weight difference are reclassified from low LTV to high LTV. For example, as shown in Table 4, 34 percent of mortgage originations are between 50 percent and 80 percent, as opposed to 26 percent at LTV below 50 percent. This distribution implies that eligible banks must rely on relatively higher LTV bands as part of their prepositioning adjustments.

In summary, the results presented in Table 9 confirm that banks that prepositioned did so across the entire spectrum of low LTV bands where a gap in risk weights between SA and IRB exists, rather than just at the very low LTV end.

Second, we replicate our main analyses using an alternative (more conservative) eligibility criterion defining a bank to be eligible if it has an average risk score less than one-half of the maximum risk score. This adjustment reduces the number of eligible banks from nine to three, as shown in Table 10. Looking at the results, both the prepositioning in low LTV and the reduction of the overall LTV level are statistically significant. They are slightly stronger in magnitude compared to the results presented in Table 6 once we control for the interacted region $\times$ time fixed effect (columns 2 and 4). This stronger effect is expected, as the three remaining eligible banks are among the most conservative, meaning they likely faced the least uncertainty regarding their eligibility for capital relief. With greater confidence in the benefits of prepositioning, these banks were more proactive in adjusting their balance sheets, which explains the observed larger effects on lending behavior.

While the number of eligible banks is reduced to three, the fact that the results move in the expected direction—showing a stronger

**Table 10. The Average Effect of Capital Reliefs on
Positioning (alternative eligibility criterion)**

Dependent Variable	LTV (<60%)		LTV	
	(1)	(2)	(3)	(4)
Eligible (Avg. Risk) × Post (CP)	0.008 (0.017)	−0.027 (0.012)	0.856 (0.383)	1.948* (0.604)
Eligible (Avg. Risk) × Post (PS)	0.088** (0.020)	0.138** (0.014)	−5.628** (1.114)	−8.121** (0.883)
Post (CP)	0.034 (0.026)		−1.629 (0.662)	
Post (PS)	−0.057 (0.021)		2.513 (1.026)	
Bank FE	YES	YES	YES	YES
Region FE	YES	NO	YES	NO
Region × Time FE	NO	YES	NO	YES
Contract Variables	YES	YES	YES	YES
Observations	62,977	62,977	62,977	62,977
Number of Banks	13	13	13	13
Eligible Banks	3	3	3	3
Mean of Dep. Variable	0.344	0.344	66.433	66.433
R2	0.280	0.283	0.405	0.407
Clustered SE	YES	YES	YES	YES
Method	OLS	OLS	OLS	OLS
Note: This table shows the results of a linear regression model estimated using OLS on the mortgage transaction level. In columns 1 and 2, the dependent variable is the propensity to grant a low-LTV loan below 60 percent. In columns 3 and 4, the dependent variable is the continuous variable, LTV. In all columns, this table shows the results for banks that had their SREP in 2019. Explanatory variables are a time dummy variable as well as its interaction with lender eligibility. In all columns, we control for contract variables and bank fixed effects. In columns 1 and 3, we include region fixed effects. In columns 2 and 4, we include region × time fixed effects. Contract variables include fixed rate, incentive period, refinancing, and first-time buyer. Standard errors are clustered on the region and time level. ***, **, * denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively.				

response from more conservative banks—supports the robustness of our findings. The prepositioning effect is less strong in the specification with just the regional fixed effect (column 1) but the overall pattern remains consistent with our expectations.

5.6 *Bank Balance Sheet Adjustments*

Building on our previous analysis, we extend our analyses to assess the broader impact of the policy change on bank behavior. A capital relief in one asset class can affect the overall portfolio, as banks adjust their allocation to maximize risk-adjusted returns. Considering this, we examine both the composition of the asset side of banks' balance sheets and changes in total assets.

To that end, we use an updated version of the Bank of England's Historical Banking Regulatory Database (HBRD), which is described by de Ramon, Francis, and Milonas (2017). The HBRD includes detailed bank balance sheet and regulatory data for all PRA-regulated banks in the U.K., offering a more comprehensive view of financial firms, particularly of smaller banks, than other data sets. It provides data on various asset classes, including corporate loans, SME loans, credit card loans, mortgages, and total assets. We use the regression framework outlined in Section 4 to estimate the impact of the PS and CP on banks' adjustments of assets. Our specification includes bank and time fixed effects to control for some unobserved time-invariant heterogeneity. However, we no longer include regional or contract-level fixed effects, as we now use bank balance sheet observations which are at the bank $\times$ time level, whereas previously our data were at the mortgage transaction level.

Table 11 presents our results. The policy resulted in an overall expansion of banks' balance sheets, with eligible banks increasing their total assets by approximately GBP 129 million compared to ineligible banks—a notable rise relative to the sample average of GBP 1.8 billion (column 1). We also observe significant changes in the composition of banks' balance sheets. While corporate loans remained unaffected, eligible banks increased their investments in both SME loans and mortgages. Specifically, eligible banks raised their SME lending by 2.6 percentage points (column 3) and expanded their mortgage portfolio share by 4.2 percentage points

Table 11. The Average Effect of Capital Reliefs on Balance Sheet Adjustments

Dependent Variable	Total Assets (GBP m)	Corporate Loans (% of Total Assets)	SME Loans (% of Total Assets)	Card Loans (% of Total Assets)	Mortgages (% of Total Assets)
	(1)	(2)	(3)	(4)	(5)
Eligible × Post (CP)	120.289 (78.105)	−0.436 (0.411)	0.140 (1.147)	−0.007 (0.008)	3.204 (2.448)
Eligible × Post (PS)	129.444** (53.073)	−0.417 (0.382)	2.636*** (0.958)	−0.016*** (0.006)	4.234*** (1.457)
Bank FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES
Observations	167	167	167	167	167
Number of Banks	12	12	12	12	12
Eligible Banks	9	9	9	9	9
Mean of Dep. Variable	1,821.289	5.835	2.580	0.039	69.612
R2	0.993	0.981	0.777	0.965	0.882
Robust SE	YES	YES	YES	YES	YES
Method	OLS	OLS	OLS	OLS	OLS
Note: This table shows the results of a linear regression model estimated using OLS on the bank balance sheet level. In all columns, this table shows the results for banks that had their SREP in 2019 as well as banks with SREPs in 2017 on a one-/two-year cycle and banks with SREPs in 2018 on a one-year cycle. In all columns, we control for year-quarter and bank fixed effects. In all columns, one bank is left out due to data quality concerns. In column 1, we show total assets in nominal terms. In columns 2–5, we standardize by total assets. Standard errors are heteroskedasticity-robust. ***, **, * denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively.					

(column 5), both relative to ineligible banks. Conversely, we observe a slight (0.02 percentage point) reduction in credit card loan exposure (column 4).

Our results reveal banks' dual strategy in response to the capital relief. They increased investments in riskier, higher-return SME loans while simultaneously expanding their holdings in safer, lower-return mortgages, alongside an overall increase in total assets. At the same time, they avoided the highest-risk asset class—credit card loans. These findings reinforce our analysis of the policy change's significant impact on both the composition and size of banks' balance sheets.

6. Application: Estimating the Shadow Cost of Capital for Small Banks

This section discusses how our estimates of the adjustment in the portfolio allocation ahead of the SREP can be used to quantify a lower bound for the shadow cost of small banks' regulatory equity capital requirements. This is because the portfolio adjustment incurs costs, as it entails a departure from what must have been the optimal portfolio allocation under the existing regulatory treatment.²¹ Thus, the cost of prepositioning is expected to be lower than the benefits from the expected capital relief that could be accrued by the bank because of the following supervisory review. Regarding the cost of prepositioning, the determining factor is the cost of equity capital, which is typically unobservable for small and unsophisticated banks targeted by this policy, as they usually do not raise equity capital externally. In this section, we propose a way to gauge the minimum (unobservable) cost of equity capital faced by these opaque banks using the (observable) cost of prepositioning, which we estimate.

To estimate this, we assume that during prepositioning eligible banks increase their lending by raising more liabilities (i.e., typically in the form of retail deposits) because lending at lower LTV requires less regulatory capital. This assumption is supported by our evidence on banks' balance sheet expansion presented in the previous section.

²¹We are implicitly assuming that the current optimal portfolio allocation is constant over the prepositioning period.

Moreover, we assume that banks' changes in their portfolio allocations are restricted to the mortgage book. However, this assumption is conservative and leads to a lower bound estimate of the cost of capital considering the finding presented in the previous section. We showed that eligible banks increased SME lending, presumably to mitigate the reduction in profitability caused by prepositioning. We also implicitly assume that banks can raise additional liabilities to fund the lending expansion at the same marginal cost. However, we expect small banks to offer higher rates to raise deposits, which suggests that the cost of funding the lending expansion thereof is increasing. Indeed, the finding that eligible banks increased SME lending, which is subject to high risk weights, is consistent with the view that banks find it costly to raise extra funding to support lending expansion. As these latter assumptions tend to offset each other, we believe that our simplification is defensible. Accordingly, under the SA, the risk weight for low-LTV residential mortgages is slightly lower than the one at high LTV: $RW_{SA}^H > RW_{SA}^L$. This means that for any unit of lending at high LTV, they can invest $\frac{RW_{SA}^H}{RW_{SA}^L} > 1$ units at low LTV.

From the previous paragraph it follows that an eligible bank incurs the cost of prepositioning in the initial period between the announcement of the policy and its SREP and it is driven by the opportunity cost of investing in a high-risk asset as compared to a low-risk asset. The opportunity cost is due to a lower return for low-LTV mortgages (i.e., $r_L < r_H$).²² However, this is partly offset by a slightly higher nominal amount of the loan, as the risk weight for low-LTV mortgages is lower (i.e., $RW_{SA}^L < RW_{SA}^H$). Accordingly, the cost of prepositioning can be formulated as follows:

$$\text{Cost of prepositioning} = \Delta\theta_l \left(r_H * \frac{RW_{SA}^L}{RW_{SA}^H} - r_L \right),$$

where $\Delta\theta_l$ is the degree of prepositioning (i.e., the change in the share of lending to low-risk assets), r_H is the return on high-risk

²²In this respect, we implicitly assume that the reduction in interest rate is not at least partly compensated by correspondingly lower provisions for expected losses. We believe that this is a defensible assumption given that, as shown in Table 3, the average LTV for eligible banks before prepositioning was already lower than 60 percent.

assets, and r_L is the return on low-risk assets. We assume that banks that preposition by expanding their exposure at low LTV maintain that allocation until the following supervisory review (i.e., in line with the aim of the policy).

Eligible banks benefit from a capital relief at the time of the supervisory review which happens after the announcement of the policy. For capital budgeting purposes, we assume that these banks can reinvest the extra amount of equity resources at the corresponding cost of equity capital, r_E , until the following supervisory review. Therefore, both the cost of prepositioning and the expected benefits from it are subject to the same time frame corresponding to the three-year SREP cycle. This simplification allows us to ignore discounting on both sides. Therefore, we arrive at the following inequality:²³

$$\Delta\theta_l \left(r_H * \frac{RW_{SA}^L}{RW_{SA}^H} - r_L \right) \leq E[Capital\ relief] * r_E.$$

6.1 Numerical Example

In this subsection, we provide a numerical example of the cost of capital calculation. To derive both the ratio $\frac{RW_{SA}^L}{RW_{SA}^H}$ and the expected capital relief, we rely on the table published by the regulator comparing risk weights between SA and IRB, as shown in Table 1.

RW_{SA}^L is equal to 35 percent. To calculate RW_{SA}^H , we simply take the average of the SA risk weights for the four LTV bands above 60 percent, which results in an average risk weight of 37.25 percent and a ratio of 0.94.²⁴

Regarding the expected capital relief, we rely on an indication provided by the regulator in its 2018 Annual Competition Report that “on average, we anticipate these [banks]’ minimum capital requirements will reduce by 10%–15%” (PRA 2018b). Assuming a total capital requirement of 10 percent and a risk-weighted asset

²³This approach rests on the underlying simplifying assumption that banks are monoline mortgage banks, i.e., they only invest in mortgage loans.

²⁴We ignore the residual band with $LTV \geq 100$ percent due to a low number of mortgages in the sample period.

density of 36.5 percent,²⁵ the expected capital relief is estimated to be 0.36 to 0.55 percent of total assets, which is directly comparable with the cost of prepositioning, also expressed as a percentage figure out of total assets.

For illustrative purposes, we assume that “Bank A” has the following return on assets: $r_H = 3.6$ percent and $r_L = 3.1$ percent. Its expected capital relief is 0.50 percent and its degree of prepositioning is 12 percent. This would yield a lower bound of the cost of capital r_E of 6.8 percent:

$$r_E \geq \frac{12\% * \left(3.6\% * \frac{35\%}{37.25\%} - 3.1\% \right)}{0.50\%} = 6.8\%.$$

6.2 *Estimates of Bank-Specific Lower Bound of Capital Cost*

We then estimate the bank-specific cost of capital for the subset of banks with SREPs in 2019 that were eligible. To do so, we estimate multiple regressions by comparing the degree of prepositioning bank-by-bank relative to all banks in the control group. We use the 60 percent LTV threshold because this LTV band combines both a wide IRB versus SA gap (i.e., expected benefits) and the largest differential in interest rates (i.e., profit sacrifice). We observe that the degree of prepositioning ranges from 10 percent to 21 percent, with an average of 15 percent.²⁶ Similarly, we obtain bank-specific estimates of capital reliefs from internal policy impact assessments ahead of the publication of the policy statement. They range from 0 percent of total assets to 0.9 percent of total assets. To proxy the return on high-LTV and low-LTV mortgages, we use the average rates of two-year fixed mortgages in the year 2016 for mortgages below 60 percent LTV and those with at least 60 percent LTV. We find that these shadow costs of capital differ across banks, ranging from 7 percent to 16 percent, with an average of 11 percent and a median of 11 percent.²⁷ It is worth noting that this estimate is

²⁵This figure is the average of the SA risk weights across the six LTV bands as shown in Table 1. This approach is in line with the assumption that the relevant banks are monoline mortgage banks.

²⁶We exclude two outliers with no prepositioning at all.

²⁷We also conduct several sensitivity analyses with the average cost of 13 percent, calculated by equally weighting the mortgage rates charged by each bank;

only marginally above the estimates for the cost of capital for large banks.²⁸

7. Conclusions

We study a salient change in policy that creates an incentive for banks to change their asset composition to benefit from a reduction of their capital requirements. We examine whether banks react to anticipated reliefs of capital requirements and to which of the announcements in the policy life cycle they react.

Using a novel data set of the population of all residential mortgages and supervisory risk scores, we demonstrate that banks likely to receive capital relief increased their benefit by investing in low-risk assets (i.e., low-LTV mortgages) following the publication of the policy. In addition, using unique data on the frequency of bank-supervisor interaction, we show that likely eligible banks with a higher number of supervisory interactions reacted earlier, in response to the publication of the consultation paper. We interpret this as indicative evidence that the bilateral communication between regulated banks and their supervisors allowed the former to better gauge whether they were likely to be in scope of, and thus benefit from, the policy in question.

From a policy evaluation perspective, we find not only that the initial response of eligible banks, increasing their exposure to lower-risk assets, aligns with the direction intended by the policy, but also that the response persists beyond its implementation. Such persistence rules out opportunistic gaming that would have been problematic from a prudential perspective. However, we detect the opposite effect for ineligible banks, namely reducing their exposure to lower-risk assets. Similarly, we find that eligible banks with more time to change their asset composition did not invest in low-risk assets once those in the previous cohort had already repositioned.

this reduces to 5.5 percent when considering five-year fixed mortgages in the year 2016.

²⁸For example, the latest survey by the European Banking Authority estimates banks' cost of equity to be in the range of 8 to 10 percent; see EBA (2019).

Table A.1. Examples of Wording in Supervisory Review Letters

Low Risk	• <i>It would be helpful in future iterations of its ICAAP if the bank explained how this figure, and the calibration of the trigger for action, were arrived at.</i> • <i>We encourage the bank to consider how the risk function will develop to provide proactive challenge and take full ownership of the bank's risk framework.</i> • <i>The bank's credit risk appetite should be better articulated.</i>
Medium Risk	• <i>Further evolution of MI is however required, with appropriate commentary to facilitate Board discussion.</i> • <i>Progress has been made on the development of the Risk Management Framework (RMF). (...) The bank recognized that while the new RMF is materially embedded, it cannot be fully so until all the new executive hires are in place and the ongoing cultural changes embedded.</i> • <i>Whilst the continued commitment of the NEDs has been critical in achieving progress, we believe that this arrangement is likely to be unsustainable in the medium to longer term and that it may – if continued – compromise their independence.</i> • <i>We ask that the scope of their remit is widened to include a review of the bank's pricing model, in addition to other financial models too, in line with good practice and governance.</i>
High Risk	• <i>The focus of our supervisory strategy for the next 12 months will therefore continue to be the bank's development of a long-term strategy to accrete capital resources and the ongoing management of the risks of its loan book.</i> • <i>We would therefore ask you to review your approach to hedging FX risk as a matter of urgency and provide us with the output of your analysis by the end of October.</i>

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