Economic support during the COVID crisis. Quantitative Easing and Lending Support Schemes in the UK

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Abstract

We investigate how UK bank business lending responded to the simultaneous use of quantitative easing, leverage ratio capital requirements, and government COVID lending support schemes. We find no evidence that the Brexit wave increased lending to nonfinancial businesses, compared to the previous waves, except for QE-banks subject to the UK leverage ratio, suggesting that the ratio incentivised QE-banks to lend to businesses. The government schemes helped expand lending especially to SMEs post the COVID wave, indicating that complementing QE with other credit easing programmes can reinforce its impact on lending to the real economy. During COVID-stress, changes to the UK leverage ratio supported better market-making in securities markets, and additional QE liquidity boosted stronger repo market intermediation.

Key words: Monetary policy, quantitative easing, bank lending.
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1. Introduction

The early waves of the Bank of England's (BOE) asset purchase programme (APP) appear to have had little impact on bank lending to nonfinancial businesses (NFBs), as we find in our earlier work (Giansante, Fatouh, and Ongena, 2020). We attributed this finding to the undercapitalisation of banks (Joyce and Spaltro, 2014) and the lower demand for bank loans by nonfinancial corporates (NFCs) due to the quantitative easing (QE)-driven lower yields on corporate bonds (Butt et al. 2014, and Fatouh, Markose, and Giansante, 2019). Optimising their regulatory capital, banks that received additional liquidity through APP purchases shifted their assets mix towards high-yield sovereigns, incentivised by the low risk weights these sovereigns attract.

In the second half of 2010s, while capitalisation levels of banks improved considerably (Figure 1), APP had two new rounds, one post-Brexit vote (£65bn), and the other one during the COVID-19 stress period (£450bn). This overlapped with the introduction of the UK *leverage ratio* (LR) capital requirements, and the *business lending schemes* the UK government introduced in response to COVID. The interaction of both (LR and lending schemes) with APP can have strong implications for banks' behaviour, and hence for the impact of these two recent APP waves. The LR was introduced as a risk-insensitive measure to guard-rail the risk-based requirements and address some of its drawbacks (such as the model risk). As it treats different assets similarly, we argue LR reduces banks' incentives to invest in high-yield sovereigns, as seen after the earlier QE waves. The UK LR saw two modifications during the COVID stress that might have impacted bank behaviour during the COVID APP wave, the introduction of a more lenient treatment of pending settlement and the exemption of loans granted under the government Business Bounce-back Lending Scheme (BBLS). In addition to BBLS, the government also introduced the Coronavirus Business Interruption Lending Scheme (CIBLS).[1] The two schemes aimed to help NFBs, especially small and medium-sized enterprises (SMEs), to get access to funding to deal with the pressures caused by COVID. More specifically, the schemes result in

[1] There is a third scheme, the COVID Corporate Financing Facility (CCFF), which is operated by the BOE.

considerable reduction in the capital requirements arising from loans granted under the schemes. Hence, we expect the schemes to boost lending to NFBs.

As Figure 1 shows, business lending witnessed a clear fall after 2014, except for a temporary increase of 13.5% in the first half of 2016, and the 14.7% rise in lending to SME after the 2020 Q1. The opposite can be seen for government bonds (almost doubled) and total securities (rose 19%) between 2014 and 2020. This paper assesses the impact of the latest APP waves on lending to the real economy, investigating the role played by LR and the government schemes.

<Figure 1 here>

Following the empirical setup of Giansante, Fatouh, and Ongena (2020), we test how the lending (and other exposures) of banks that received reserves injections fared compared to banks that did not during the last two waves of APP, controlling for the interaction with recent lending support schemes. The remainder of the paper is as follows. Section 2 describes the data and methodology; Section 3 discusses the results; and Section 4 concludes.

2. Data and methodology

2.1. Data

We use the BOE's confidential data on APP to identify banks that received reserves injections via QE operations,[2] providing the ideal research design for a difference-in-differences exercise (Giansante, Fatouh, and Ongena, 2020). Data on lending and other exposures is collected from confidential regulatory returns banks submitted to the BOE on a quarterly basis between 2014 Q1 and 2020 Q4. Our sample includes 173 banks, 17 of which received reserves injections via APP (henceforth, QE-

[2] The dataset includes information on the size of all purchases done by APF, and the banks which received proceedings of the sale on behalf of the seller. We use the values of the sales BOE paid directly to the sellers' banks. Therefore securities are not held by banks, rather banks received the value of the sale.

banks). We identify the banks that participated in CIBLS and BBLS schemes based on information from the British Business Bank plc. Table 1 provides an overview of the data.

<Table 1 here>

2.2. Empirical Design

We assess the treatment effect on bank lending after APP waves following the Brexit referendum (*QE_Brexit*) and COVID crisis (*QE_Covid*), using a difference-in-differences (DiD) methodology. The choice of QE-banks is most likely not random and reflects specific bank characteristics, like bank size and business model. We mitigate this by creating a control group via a propensity score matching approach. Table 2 shows the correlations of the treatment with the main bank characteristics at the end of 2015, just before the last two QE waves.

<Table 2 here>

The variable *Treated* equals one for QE-banks and zero for the non-QE-Banks. Following Rodnyansky and Darmouni (2015) and Gropp et al. (2019), bank characteristics are chosen to capture size, capitalisation and business model. On average, QE-banks are bigger and hold more securities than non-QE-banks from model (1) pre-matching. Due to the small size of the treatment group, we match each treated bank with four non-treated banks with replacement (matching ratio of 1:4). Table 2 model (2) shows the effect of matching in eliminating average differences between the two groups. The χ^2 test also confirms that we cannot reject the hypothesis that all coefficients are equal to zero in the post-matching models as reported by the p value = 0.795. The main DiD regression is as follows:

$$\begin{aligned}\log(Y_{i,t}) = \beta_i + \delta_1(Treated_i\ \boldsymbol{QE}_t) + \ \delta_2(Treated_i\ LRD_i\ \boldsymbol{QE}_t) \\ + \delta_2(Treated_i\ Cibls_i\ QE_{Covid,t}) + \gamma_1 \boldsymbol{QE}_t + \gamma_2 \boldsymbol{QE}_t\ LRD_i + \gamma_3 \boldsymbol{QE}_t Cibls_i \\ + \ \theta X_{i,t} + \varsigma(X_{i,t}\ \boldsymbol{QE}_t) + \ \upsilon_{i,t}\end{aligned} \quad \textbf{(1)}$$

Where, $Y_{i,t}$: the log of lending or exposures (e.g., SME loans, total securities, etc.); β_i: bank fixed effect; $Treated_i$: treatment dummy (1 for QE-banks and 0 otherwise); $\boldsymbol{QE}_t = [QE_{Brexit,t}, QE_{Covid,t}]$:

treatment time dummies (0 before the start of the APP wave and 1 afterwards. *QE_Brexit* starts in 2016Q2 and *QE_Covid* starts in 2020Q1); LRD_i: LR dummy (1 for banks subject to the UK LR requirements and 0 otherwise); $Cibls_i$: CIBLS scheme dummy (1 for banks participating in the scheme and 0 otherwise),[3] which we use only for regressions of lending to NFBs; $Treated_i * \boldsymbol{QE}_t$: interaction term of treatment and the QE episodes; $Treated_i\ LRD_i\ \boldsymbol{QE}_t$: (triple) interaction term of treatment, the UK LR and the QE episodes; $Treated_i\ Cibls_i\ QE_{Covid,t}$: interaction term of treatment, CIBLS scheme and the QE COVID episode; $X_{i,t}$: a matrix of controls; $X_{i,t} * \boldsymbol{QE}_t$: interaction terms to test for possible heterogeneous responses to the intervention by banks of different natures. All standard errors are clustered at the bank level to allow for serial correlation across time.

3. Results

Figure 2 plots the average group trends reported in natural logs of the two groups across different lending and other exposures variables.

<Figure 2 here>

3.1. Lending to the real economy

Table 3 reports that QE-banks' lending to NFBs was about 29% lower than the control group after *QE_Brexit*. This indicates that the Brexit wave was not more successful in increasing NFBs loans than the proceeding two waves. Giansante, Fatouh, and Ongena (2020) find no evidence of stronger lending to NFBs by QE-banks, which rather invested more in government securities. However, lending to NFBs by QE-banks subject to LR was 86% higher than non-QE-banks. This was countered by a stronger impact in the opposite direction by QE-banks not constrained by the LR. We argue that the presence of LR incentivised QE-banks to lend to NFBs. As it does not include assigning different risk weights to

[3] Banks participating in BBLS are a subgroup of those participating in CIBLS, so a BBLS dummy would be collinear with that of CIBLS.

different types of assets, LR resembles imposing an effective floor on risk weights of different assets, and can hence change the amount of capital required to support these assets. While it would likely not affect the capital required to support lending to NFBs (which attracts risk weights that are significantly higher than the floor), the effective floor increases the capital required to support assets with low risk weights (such as sovereigns). This reflects on the effective (capital-adjusted) returns on these assets, making them less attractive relative to other assets than pre-LR introduction. This is supported by results in Table 4 Model 2, which shows a reduction in sovereign exposures by QE-banks subject to LR. Meanwhile, QE-banks' SME lending was about 291% higher than non-QE-banks during *QE_Covid*. This is largely driven by QE-banks participating in the government support schemes, whose lending to SMEs was 11 times (1090%) higher than the control group. These banks also exhibit statistically significant higher levels of lending to NFCs and to NFBs (375% and 264% higher than the control group). The negative coefficient on *QE_Covid* in model 1(c) indicates that the increase by participating QE-banks was countered by a larger reduction in SME lending by non-participating QE-banks, relative to the control group. Non-participating banks do not benefit from the reduction in capital requirements arising from the schemes (especially BBLS), and are likely to have faced a strong drop in demand for SME loans, given the circumstances brought in by COVID and the availability of easier (and probably cheaper) source of funding through the schemes. This indicates not only that the government schemes were effective, but also that the impact of QE on lending to real economy can be boosted, when it is complemented with other credit easing programmes (Giansante, Fatouh, and Ongena, 2020). QE-banks subject to the LR had higher SME lending but lower NFCs lending (and total NFBs lending), likely due to the exemption of BBLS loans from LR during the COVID stress. By design, the BBLS scheme aims to enable SMEs to access funding to deal with COVID implications. The exemption of loans granted from LR reduces the capital banks have to hold to support these loans significantly, increasing their effective return and making them more attractive. Meanwhile, due to the effective risk-weight floor LR results, the capital required to support loans granted under CBILS

(which are not exempt from LR) would be higher for banks subject to LR compared to banks not subject to it. This likely explains the patterns seen above.

<Table 3 here>

3.2. Securities and other exposures

We look here at loans to *non-banks* financial corporates (FCs), sovereign exposures, and total securities, derivatives,[4] and SFTs exposures (Table 4).[5] Relative to the control group, QE-banks' lending to FCs rose after *QE_Brexit*, then fell sharply after *QE_Covid*. The fall post *QE_Covid* is likely to be demand driven, due to the size of the APP wave. By design, APP targets gilts holdings of FCs, meaning they received large sums during *QE_Covid*, and might have been induced to pay-off some of their bank loans. QE-banks' gilts holdings did not differ from those of the control group, except for QE-banks subject to LR post *QE_Brexit*, as mentioned earlier. Meanwhile, total securities holdings of QE-banks were lower after *QE_Brexit*, but showed no difference relative to the control group after *QE_Covid*. Yet, when accounting for LR, QE-banks' total securities post *QE_Covid* appear to fall compared to the control group. The fall is driven by QE-banks out of LR scope. Those subject to LR had 29.4% more in securities exposures than the control group, indicating that introducing LR treatment of pending settlements helped facilitate market-making in securities markets.[6] QE-banks scaled back SFTs exposures after *QE_Brexit*, but kept them fixed post *QE_Covid*, compared to non-QE-banks. However, the DiD results show evidence that SFTs exposure of QE banks increase post *QE_Covid*, when

[4] Derivatives exposures refer to the exposures to derivatives positions from regulatory perspective, calculated using current exposure method (CEM), not derivatives assets.

[5] Securities financing transactions (SFTs) exposures are the regulatory exposures, not on-balance-sheet assets, arising from reverse repos and similar transactions.

[6] The new treatment reflects only the UK LR exposures, and not LR exposures calculated under European regulation which we use in our analysis. The impact would disappear if we used UK LR exposures, confirming our conclusion about the effectiveness of the change in UK LR.

controlling for LR. This suggests that APP reserves injections improved liquidity in the repo market during COVID-stress.

<Table 4 here>

Results are consistent under several robustness check, including a placebo test where QE-banks are excluded, by varying matching ratios and treatment dummy overlaps (see Giansante, Fatouh, and Ongena, 2020).[7]

4. Conclusions

We assess the effects of the interaction of leverage ratio (LR) requirements and government lending support schemes with the Brexit and COVID waves of the Bank of England`s asset purchase programme. We find that the Brexit wave was not more successful than previous waves in increasing lending to (non-financial) businesses, except for those QE affected banks that are subject to LR, for which LR may have provided incentives to lend to businesses. The government lending support schemes, did help expand lending to businesses (especially SMEs) post the COVID wave, indicating that complementing QE with other credit easing programmes may improve its impact on lending to the real economy. We also find evidence that, during the COVID-stress period, changes to LR supported better market-making in securities markets, and that additional QE injections supported liquidity in the repo market.

[7] Tables are omitted for conciseness and available from the authors upon request.

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5. Online Appendix:

5.1. Variable Definitions

Reported balance sheet variables definitions are:

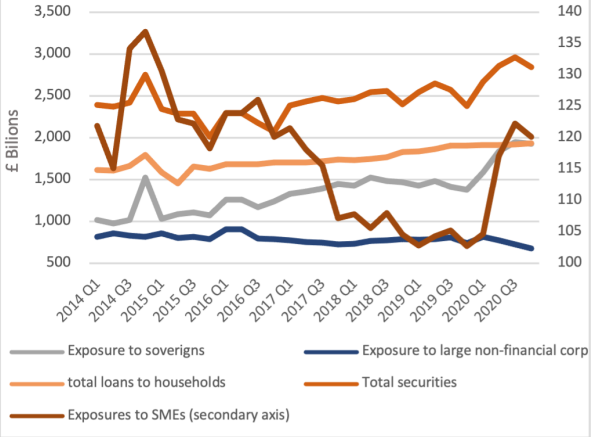
- **Treated** – Dummy variable that equals to 1 for QE-banks and 0 for non-QE-banks
- **Size** – log of total leverage ratio exposures
- **SME Loans** – total exposures to SMEs according to European Capital Requirements Regulation (CRR)
- **Non-Financial Corporate Loans** –corporate exposures to non-financial business other than SME
- **Total Non-Financial Business Loans –** sum of exposures to SMEs and nonfinancial corporates
- **Retail Loans** – retail exposures as defined in CRR
- **Financial Corporate Loans** – total exposures to financial corporates as defined in CRR
- **Sovereign Exposures** – exposures to sovereigns as defined in CRR
- **Total Securities** – some of exposures to sovereigns and other securities exposures
- **Derivative Exposures** – derivatives leverage ratio exposures as defined in CRR

- **SFTs Exposures** – securities financing transactions leverage ratio exposures as defined in CRR
- **Off-balance sheet exposures** – off-balance sheet leverage ratio exposures as defined in CRR
- **Tier 1 capital ratio –** Tier 1 capital divided by risk weighted assets
- **Leverage ratio** – Tier 1 capital divided by total leverage ratio exposures
- **Deposits** – Customer deposit current + customer deposit savings + customer deposits term

Figures and Tables

Figure 1: Lending to the real economy, securities exposures and capital ratios of UK banks

Panel (a) – Aggregate exposures



Panel (b) – Ratios

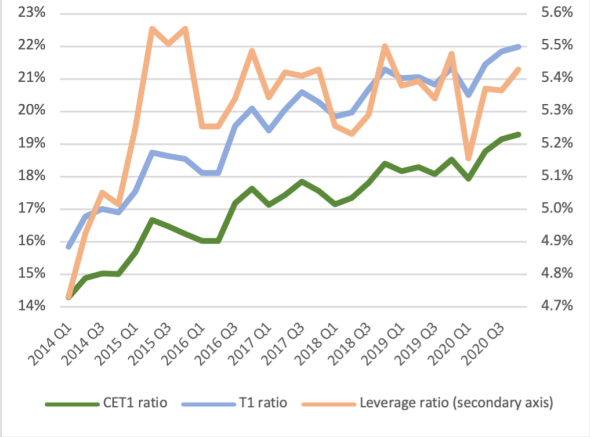
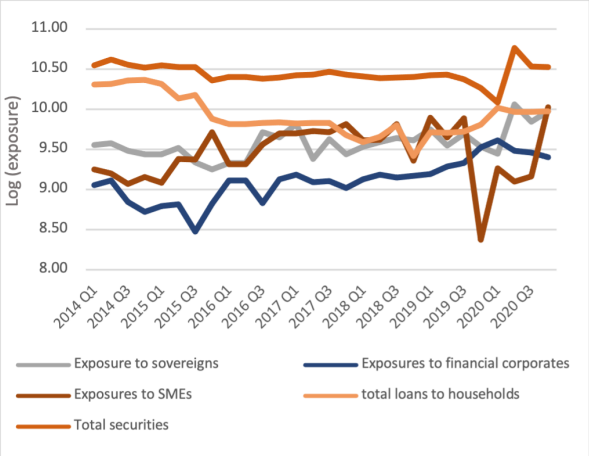


Figure 2: Average trends of QE-banks and non-QE-banks

Panel (a) – QE-banks



Panel (b) – non-QE-banks

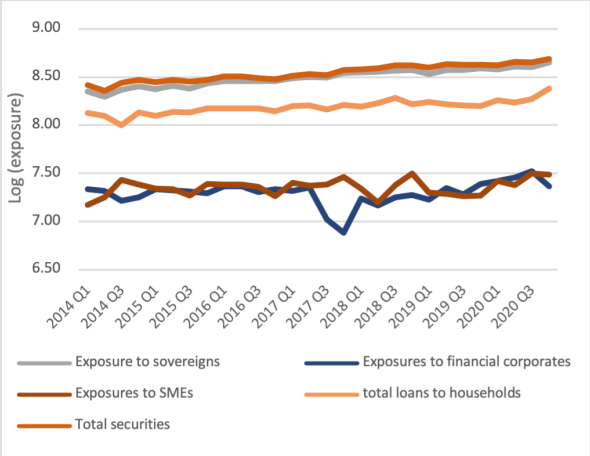


Table 1 – Descriptive Statistics of Financial Reports

Variable	Obs.	Mean	Std. Dev.	Min	Max
Size	4,547	21.36154	2.399701	12.89247	28.45957
Tier 1	4,280	.2615657	0.1613739	0.064902	0.99849
Off Balance Sheet exp	4,547	0.038931	0.055067	0	1
RWA	4,547	0.997386	28.84276	0	1383.945
Log(Sovereign exp)	4,378	19.8593	2.298147	6.726273	26.94187
Log(FC loans)	1,653	17.71663	3.408081	-2.52573	24.55176
Log(NFC loans)	2,704	18.37555	3.546489	-2.90048	26.88868
Log(SME loans)	1,907	17.445	3.610036	-4.81713	24.34852
Log(NFB loans)	3,212	18.29939	3.550228	-2.90048	26.90185
Log(Retail loans)	3,013	16.44291	3.83905	2.873565	25.7537
Log(Tot Securities exp)	4,440	20.18247	2.495096	6.726273	27.15941
Log(Derivatives exp)	2,914	16.91337	4.149628	2.70805	26.36517
Log(SFTs)	1,099	20.61596	3.893152	-4.60517	26.13937

Source: Bank of England. Descriptive statistics are based on confidential regulatory returns banks submitted to Bank of England on a quarterly basis between 2014 Q1 and 2020 Q4.

Table 2 – Propensity Score Matching

	(1)	(2)
VARIABLES	*Treated*	
Size	**0.385****	0.258
	(0.153)	(0.206)
RWA	0.523	2.098
	(1.736)	(2.033)
Tier 1	-0.466	1.377
	(1.158)	(2.939)
Tot Securities	**2.313*****	0.095
	(0.688)	(1.058)
Off Balance Sheet exp	**4.820****	0.896
	(1.934)	(3.174)
Matching	-pre	-post
Adj. R-squared	0.595	0.128
p-value	0.000	**0.795**
N	157	85

Probit regression of the treatment on bank characteristics in 2015Q4. The dependent variable is the bank treatment status. The independent variables are size measured as the log of total leverage exposure, risk weighted assets over total leverage exposure, tier 1 capital over risk weighted assets, total securities over total leverage exposure and off-balance sheet exposure over total leverage exposure. Model (1) reports the pre-matching results while model (2) reports the post matching results with a matching ratio of 1:4. Coefficients and standard errors are reported for each variable. Standard errors are clustered at the bank level and reported between parentheses, * p<0.10 ** p<0.05 *** p<0.01.

Table 3 – The Bank Lending Channel

VARIABLES	(1a)	(1b)	(1c)	(2a)	(2b)	(2c)	(3a)	(3b)	(3c)	(4a)	(4b)
	Log(SME loans)			Log(NFC loans)			Log(Tot NF Business loans)			Log(Retail loans)	
$Treated * QE_{Brexit,t}$	-0.480	-2.589	-2.684	-0.271	**-0.469****	**-0.470****	**-0.287***	**-0.511*****	**-0.510*****	-0.0940	0.960
	(0.421)	(2.495)	(2.432)	(0.165)	(0.177)	(0.175)	(0.150)	(0.156)	(0.156)	(0.216)	(0.591)
$Treated * QE_{Covid,t}$	**2.906*****	**-7.483***	**-6.897****	-0.142	-0.232	-0.246	-0.150	-0.256	-0.227	0.0415	0.369
	(0.858)	(4.005)	(2.499)	(0.215)	(0.222)	(0.232)	(0.196)	(0.211)	(0.234)	(0.204)	(0.296)
$Treated * QE_{Brexit,t} * LRD_t$		2.394	2.491		**0.800*****	**0.773*****		**0.854*****	**0.827*****		**-1.570****
		(2.617)	(2.557)		(0.254)	(0.249)		(0.240)	(0.237)		(0.740)
$Treated * QE_{Covid,t} * LRD_t$		**8.762****	-5.517		0.0943	**-2.476*****		0.199	**-2.053*****		-0.166
		(3.483)	(3.800)		(0.346)	(0.534)		(0.316)	(0.549)		(0.464)
$Treated * QE_{Covid,t} * Cibls_t$			**10.89*****			**3.749*****			**2.641*****		
			(1.624)			(0.662)			(0.692)		
Observations	673	673	673	1,749	1,749	1,749	1,780	1,780	1,780	715	715
R-squared	0.522	0.555	0.572	0.304	0.321	0.336	0.302	0.320	0.329	0.388	0.463
QE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
QE * LRD	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
QE_{Covid} * Cibls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls ∗ **QE**	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Coefficient estimates of quarterly regulatory exposures of banks from 2014Q1 to 2020Q4 using a 1:4 matching ratio. Treatment status $Treated_i$ equals to 1 for QE-banks and 0 for non-QE-banks. Controls are size measured as the log of total leverage exposure, Tier1 ratio, risk weighted assets, securities over total leverage exposure and off-balance sheet over total leverage exposure to control for the business models of the banks. Standard errors are clustered at the bank level and reported between parentheses, * p<0.10 ** p<0.05 *** p<0.01.

Table 4 – Liquidity Channel

VARIABLES	(1a) Log(FC loans)	(1b) Log(FC loans)	(2a) Log(Sovereign exp)	(2b) Log(Sovereign exp)	(3a) Log(Tot Securities)	(3b) Log(Tot Securities)	(4a) Log(Derivatives exp)	(4b) Log(Derivatives exp)	(5a) Log(SFTs exp)	(5b) Log(SFTs exp)
$Treated * QE_{Brexit,t}$	**1.247*****	0.875	0.333	1.212	**-0.426*****	**-0.392****	**0.642*****	**0.741*****	**-1.522****	**-2.318*****
	(0.389)	(0.757)	(0.688)	(0.926)	(0.0919)	(0.164)	(0.232)	(0.208)	(0.622)	(0.710)
$Treated * QE_{Covid,t}$	**-4.804*****	**-5.853*****	0.0748	0.0466	-0.0762	**-0.159***	-0.126	-0.201	0.152	**0.330***
	(1.351)	(1.247)	(0.210)	(0.296)	(0.0755)	(0.0819)	(0.138)	(0.168)	(0.171)	(0.190)
$Treated * QE_{Brexit,t} * LRD_t$		0.281		**-2.143****		-0.106		0.000489		0.519
		(1.015)		(0.875)		(0.237)		(0.602)		(0.995)
$Treated * QE_{Covid,t} * LRD_t$		1.541		-0.353		**0.294****		-0.0380		0.255
		(1.573)		(0.551)		(0.130)		(0.220)		(0.329)
Observations	1,782	1,782	2,260	2,260	2,299	2,299	2,277	2,277	2,102	2,102
R-squared	0.463	0.516	0.339	0.365	0.556	0.558	0.637	0.652	0.642	0.655
QE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
QE * LRD	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls ∗ **QE**	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Coefficient estimates of quarterly regulatory exposures of banks from 2014Q1 to 2020Q4 using a 1:4 matching ratio. Treatment status $Treated_i$ equals to 1 for QE-banks and 0 for non-QE-banks. Controls are size measured as the log of total leverage exposure, Tier1 ratio, risk weighted assets, securities over total leverage exposure and off-balance sheet over total leverage exposure to control for the business models of the banks. Standard errors are clustered at the bank level and reported between parentheses, * p<0.10 ** p<0.05 *** p<0.01.