Monetary Policy and Bank Profitability in a Low Interest Rate Environment: A Follow-up and a Rejoinder

By Charles Goodhart and Ali Kabiri[1]

One of the features of the years following the Great Financial Crisis (GFC) has been the relatively sluggish growth of bank lending, the broader monetary aggregates and nominal incomes, more so in the Euro-area and Japan, less so in the USA, with the UK roughly in between. This has happened despite the unprecedented monetary expansions occasioned by their central banks, with official short-term interest rates brought down to the zero-lower-bound (ZLB), or beyond (the effective lower bound, ELB), and a massive expansion of the central bank balance sheets and the monetary base.

There are several potential explanations for this dichotomy between the expansionary intent of central bank policy variables and the hesitant growth of broader monetary aggregates. Amongst such possible explanations are that the way in which capital ratio enhancement was introduced, especially in Europe (including the UK), which encouraged commercial banks to delever their balance sheets; and also that the payment of interest on excessive reserves (IOER) encouraged commercial banks to hoard deposits at the central bank, especially in the USA, rather than use such additional (excess?) cash balances to add to their loan or securities portfolios, (see Selgin, *Floored*!, 2018).

But the proposed explanation on which the rest of this paper will focus is that the policy measures of these central banks had (unintended) adverse side-effects of so reducing the net interest margins, and hence the profitability of banks, that they were constrained, both by lack of retained earnings and capital adequacy and, more directly, by relatively low spreads and margins from making loans and expanding their loan books and balance sheets. Of course, in the short run a *cut* in interest rate will have beneficial effects, e.g. via capital gains on existing securities (notably

[1] We thank Carlo Altavilla, Miguel Boucinha, Jose-Luis Peydro and Bill White for their comments. We hope to thrash out such disagreements as remain at a forthcoming joint Conference.

government debt, the 'doom loop', and also depending on accounting procedures), greater economic expansion and fewer non-performing loans (NPLs). But the argument goes that the longer short and long rates were kept at rock-bottom *levels*, the greater would be the likelihood that there would be a counter-productive effect on commercial bank profitability, bank lending and monetary expansion.

This argument has been made in a number of, primarily theoretical, papers, (Brunnermeier and Koby, 2018; Kumhof and Wang, 2018), also see Borio, et al., (2017a and b). But the question of the extent to which, and the timing by which, a persistent low level of (official) short (and long) term interest rates might reduce bank profitability, net interest margins (NIMs) and bank lending must ultimately remain empirical.[2] In a recent paper by Altavilla, Boucinha and Peydro (henceforth ABP), 'Monetary Policy and Bank Profitability in a Low Interest Rate Environment', (initially ECB Working Paper, No. 2105, October 2017; then reproduced in *Economic Policy*, Vol. 96, pp 533-586, October 2018), the authors claim that the above argument has been exaggerated.

Despite the valid warning, (*Economic Policy*, p. 561), that it is "particularly challenging to identify the effects of monetary policy due to endogeneity and simultaneity issues", the authors confidently claim (Abstract),

> "Our results show that a monetary policy easing – a decrease in short-term interest rates and/or a flattening of the yield curve – is not associated with lower bank profits once we control for the endogeneity of the policy measures to expected macroeconomic and financial conditions."

[2] The market seemed to think that, once rates fell close to zero, further cuts were detrimental to bank equity values, see Ampudia and Van den Heuvel (2018), who state in their Abstract that,

> "with rates close to or below zero, further interest rate cust became detrimental for banks' equity values. The composition of banks' balance sheets is important in order to understand these effects. In particular, the change in sensitivity to interest rate surprises as rates drop to low and negative levels is much more pronounced for banks with a high reliance on deposit funding, compared to other banks. We argue that this pattern can be explained by a reluctance of banks to pay negative interest rates on retail deposits."

Again, in the Conclusions, pp 33/34, they report that

> "The results suggest some robust findings. First, monetary policy easing, summarized as either a decrease in short-term interest rates or a flattening of the yield curve, is only associated with lower bank profits if there are no appropriate controls for the endogeneity of monetary policy to bank financial health – especially during the crisis period – as well as to current and expected aggregate economic and financial conditions."

The authors reach this conclusion by two main routes. First, they regress the Return on Assets (RoA) for a cross-section of European banks on a lagged dependent variable, and two measures of policy-related variables, a short-term rate, and the slope of the yield curve. As shown later here, Table 2 below, they find, as might have been expected, positive and significant coefficients on both these latter policy-related variables, Col. 1. Since some bank deposits are non-interest-bearing, especially at the ZLB or ELB (on which more later), one might expect bank profits to be a positive function of interest rates. Similarly, since banks do maturity transformation, one might expect bank profits to be a positive function of the yield curve, defined as long minus short rates.[3]

However, the authors then add a variety of other macro -area variables. As they add some current macro variables, Vix, Real GDP growth and inflation (Col. 2), the coefficients on the two policy-related variables become smaller, but remain positive and significant. But, when they add three expected variables, for the year ahead, for GDP growth, inflation and default frequency, (Col. 4), these latter variables become quite highly significant *and* the two policy-related variables become totally insignificant, though in most cases just positive.

The second line of argument that the authors present is to use their (proprietary) ECB data to provide

> "evidence from both a panel data model that uses individual bank balance sheet data and a dynamic macro model that uses more aggregate data, suggest that following a monetary policy shock, the various components of bank profitability react asymmetrically. More specifically, since the impact on loan loss provisions largely offsets the one on net interest income, the overall effects of monetary policy on bank profitability are muted. Importantly, our analysis suggests that keeping interest rates low for long might have negative consequences for bank profitability. However, our results suggest that it takes a long period of time for monetary policy to exert a substantial adverse effect on bank profitability as a

[3] Authors finding such positive relationships are listed in Arce, et al., (2018), p. 3.

> result of looser policies, as accommodative monetary conditions support real economic activity which, in turn, has a positive impact on bank profitability, thereby offsetting the adverse impact." (Conclusions, p. 34).

So, the overall conclusion of this paper was that the expansionary monetary policy measures of central banks has, as yet, borne no responsibility for reduced commercial bank profitability, and hence for slower bank loan and monetary growth (at least via this route). The sluggish growth of bank loans and broad money is just the result of a weak conjuncture. In so far as central bank expansionary policies strengthen the macro-economy, it would by the same token lead to more bank lending and monetary growth. In so far as central banks had been subject to this line of criticism, they were to be released from the dock without any stain on their character or competence.

We found this analysis challenging, particularly the first main component, for a number of reasons. First, our predilection had been to believe that continued exceptionally low and persistent interest rates *would* reduce bank profitability and thereby curtail bank lending significantly. Second, while we tend to accept the general view that the overall strength of the economy is, most likely, more important for bank profitability than the accompanying level of nominal interest rates, we would have expected the current macro-conjuncture to be more salient than expectations of future real growth. Third, the authors' finding of the greater impact of the latter is primarily just a statistical artefact from their regression equations. Their sole attempt at explanation is, p. 12/13, that

> "the logic behind this result is that a better expected macroeconomic outlook could increase current loan demand by stimulating investment which, in the area, is largely funded via bank intermediation. On the supply side, banks might be induced to increase their lending to the non-financial private sector as the improved economic outlook will translate into increased company and household income, and hence lower credit risk."

We do not find this convincing. Fixed investment tends to lag a recovery in growth, waiting until spare capacity is exhausted. While credit lines, and additional borrowing limits, may well be negotiated in advance, at an early planning stage, such lines of credit will only get drawn at the later stage when the investment expenditures are actually made. So, their proposed explanation seems to us to have wrong timing. As for their supply-side explanation, would a prudent banker put more weight on uncertain forecasts than on actual current experience? Fourth, the relationship between official short-term interest rates and the macro-economy was markedly

distorted, from end-2008 for several years, by hitting the ZLB (or ELB). One might have expected any study of the relationships between monetary policy variables and broader bank outcomes during this period to focus closely on such potential distortions. Yet, remarkably, there is no mention anywhere in the paper of the ZLB (ELB) and its implications.

For all such reasons we were disinclined to take their results at face value. Since the authors were using, in several instances, proprietary ECB data, we could not attempt to replicate their regression results exactly. So what we did, first, was to find as closely equivalent data as we could to replicate Columns 1, 2 and 4 in the authors' Table 2, p. 545, for our available -area data, and for the USA and the UK. Were the authors' findings specific to the Euro-area, (during this relatively short span of time), or did they hold more widely?

Our data set is reported, and compared and contrasted with that of the authors, in Section II. We then describe the results of running similar regressions to those in the authors' Table 2 on this different and expanded data set in Section III. We agree that bank profitability and their Return on Assets has held up better than might have been expected under the circumstances of the GFC and the subsequent condition of low short rates and flat yield curves, but our assessment of that in Section IV suggests that the steps banks took to protect their profitability then may well also have had an adverse effect on bank intermediation, and on the growth of deposits and credit. Section V concludes.

Section II

Our Data Set

We gather data on Return on Assets (ROA) for the UK, USA and Euro-area from Bloomberg and Thomson Reuters Datastream. The slope of the yield curve is derived from 10 year – 2 year Government bond yields from Thomson Reuters Datastream. Stock market volatility (VIX) and 1 year forecasts of expected default frequency for non-financial firms are from Bloomberg. These data use a sample of firms and calculates the mean default frequency for each country. Macroeconomic data on actual and 1-year ahead forecasts of, Real GDP growth and Inflation are sourced from Global Insight/IHS Markit. All data are at a quarterly frequency.

First, we show charts for the ROA[4], short rates, and yield curve slope for the USA, Euro-area and UK (Figs. 1-3). There are several points to note. First, our data for the USA and the Euro-area are quite close to that shown in Figure 1, in ABP, p. 539. Second, all three regions have a roughly similar historical experience for ROA; this is that there was a relatively high but fairly stable level of profitability between the beginning of 2000 and 2007, followed by a very sharp decline, and then some recovery, but to a much lower level. In a sense, therefore, there are just three phases in each region in this period. So, although in each region there are thousands of observations, it is equally true that it is a very short period, with just three separate phases, which indicates that one does need to be cautious about interpreting the econometric results.[5] Again, the short rate is normally much more variable than the long rate, so there is almost an exact inverse relationship between the slope and the short rate, at least until 2008, after which the short rate is held almost constant in all three countries, so that the slope trends downwards in line with the declining long rate. Again, short rates tend to decline in each region after the tech bubble in 2000 to a low point in 2001/2 before rising again up to 2007, fall precipitously in 2008 and then remain nearly constant; so, again, there is a commonality among these regions in behaviour, not surprisingly.

We also show a chart comparing the time paths of ROA, real GDP growth and expected GDP growth (Figs. 4-6). In this case what stands out is that expected growth tends to be a smoothed version of actual growth, the latter being considerably more variable than the former. In the Figures 1-6 below we show the median ROA for each dataset in the same manner as ABP (2018) do for their Euro-area dataset and for the USA.

It is perhaps worth noting that there are a number of inherent problems in estimating the ROA series. These problems include the fact that we do not treat the data to account for any effects of bailouts, which masks the potential downside effects on ROA values and hence the effects of short term interest rates. Furthermore, for a minor number of Euro-area banks (<5%), semi-annual data on ROA appear for some time periods in the dataset, and are already adjusted to appear as quarterly data by the data vendors. Our primary approach when constructing the dataset aims to maximize the number of banks used so that the data are as representative as possible. [6]

[4] We use the median ROA of all banks in the respective datasets as per ABP(2018)

[5] ABP argue that their use of differing methodologies and datasets strengthen their conclusions. But if the problem is that the dataset is short, and not a little peculiar, then no econometric robustness can save you.

[6] When we use a restricted dataset with only quarterly data, we obtain qualitatively similar results.

Another key issue of note is the basis on which banks are included in each of the datasets for the USA, Euro-area and UK. In the case of the USA we use only US banks, and hence exclude foreign banks, as we aim only to investigate banks affected by the Central Bank rate of the home country. Hence in the case of the USA we cannot account for a UK bank operating in the USA. For the Euro-zone we use only Euro-area banks headquartered in countries in the Euro-area and hence we would, for example, exclude a Japanese bank operating in the Euro-area. In the case of the UK we are restricted by the data available and use banks operating in the UK, whether they are headquartered in the UK or otherwise, and hence the results should be considered in light of the manner of construction.

Fig 1; USA

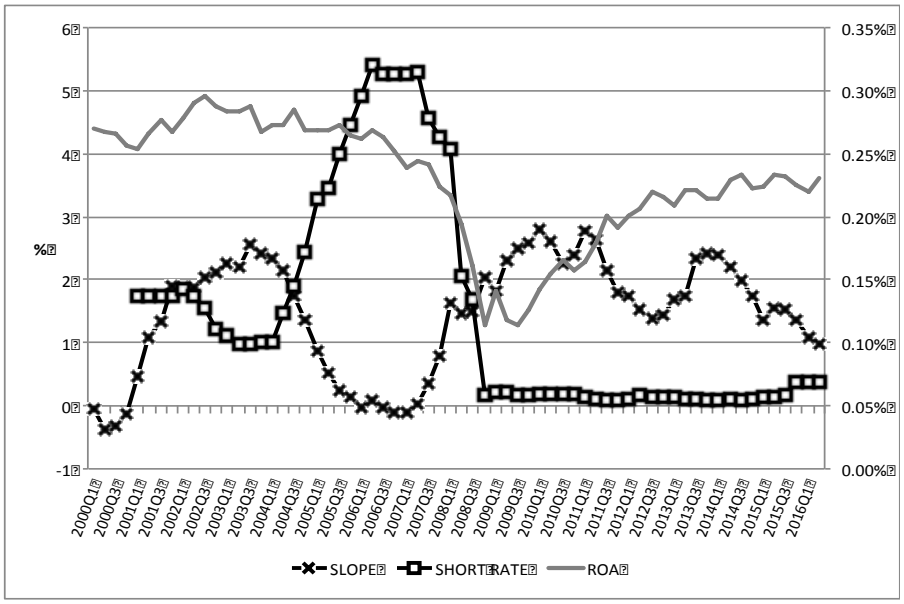


Fig 2 EURO

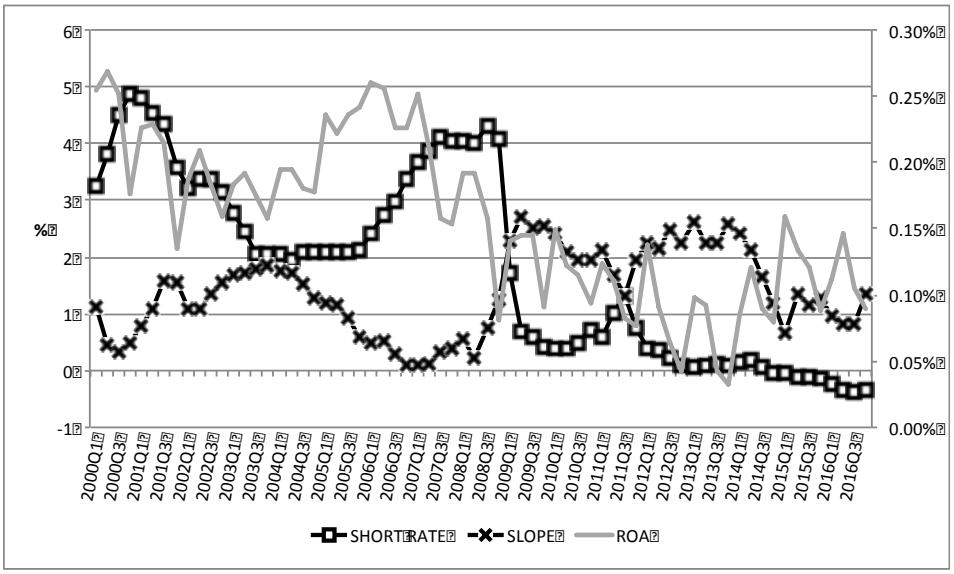


Fig 3 UK

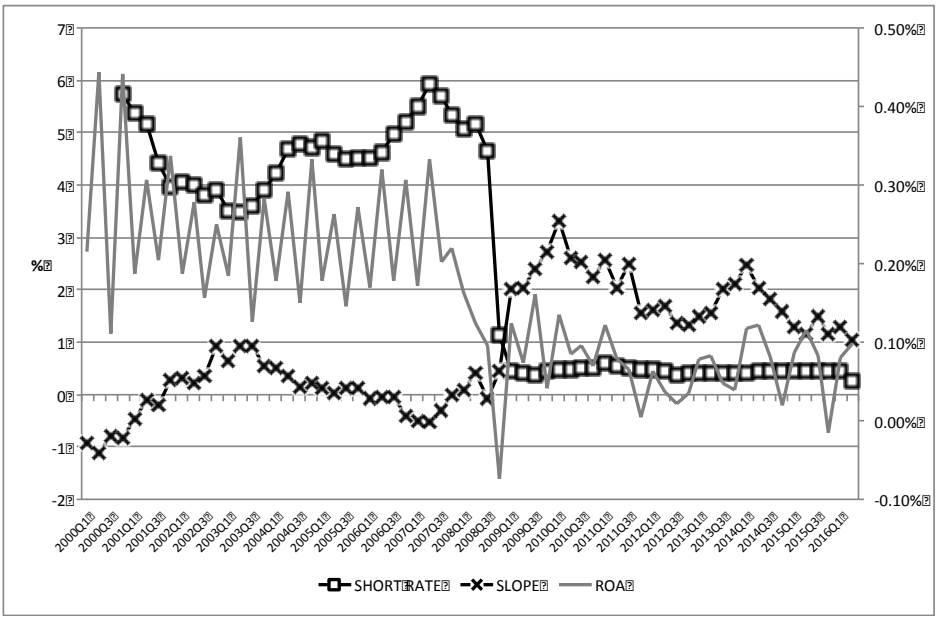


Fig 4 USA

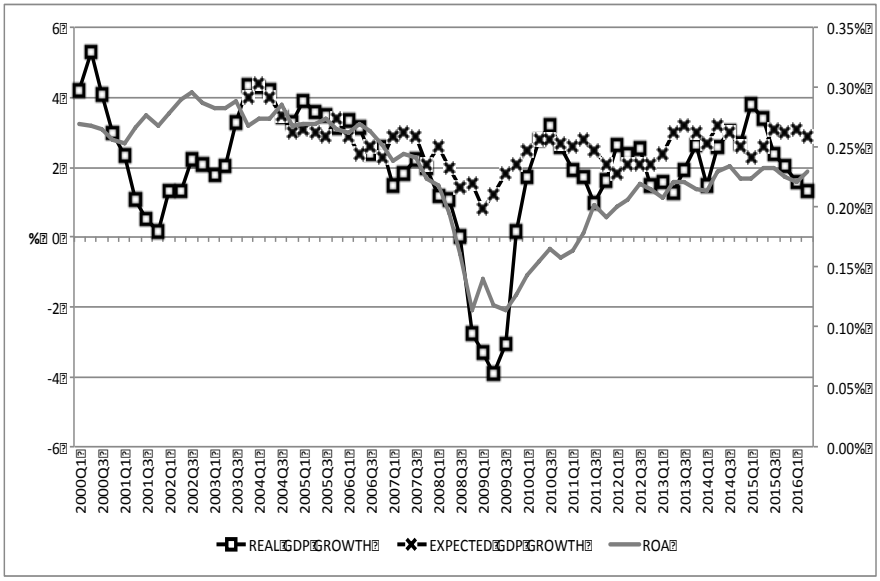


Fig 5 EURO

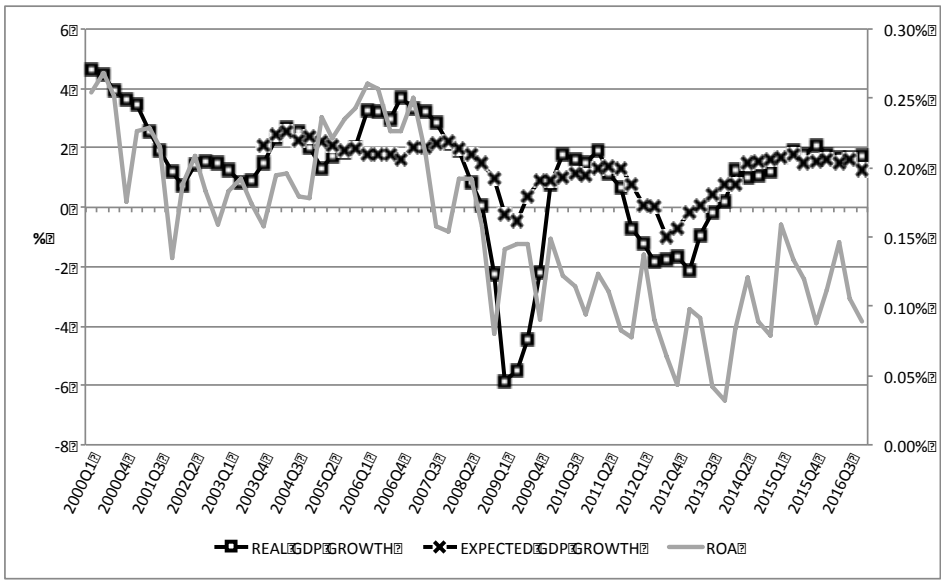
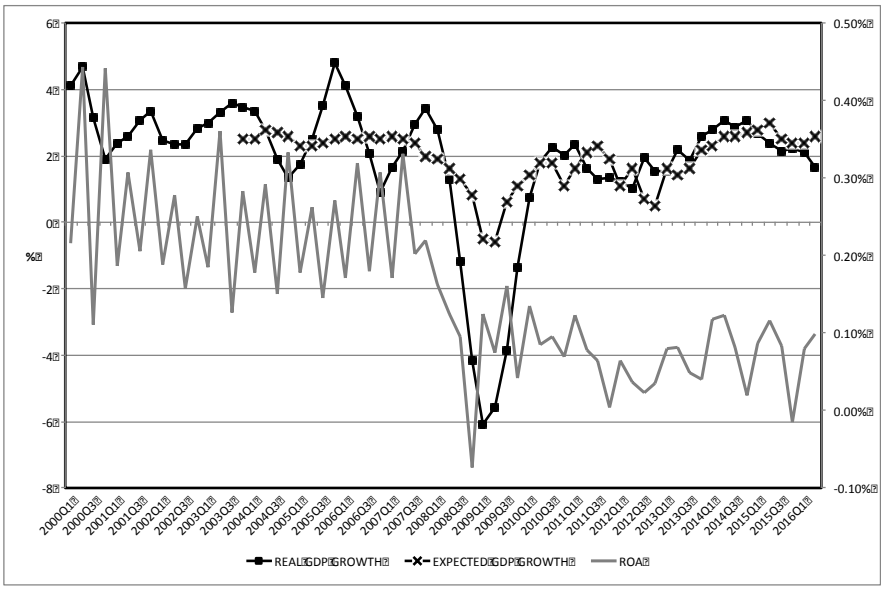


Fig 6 UK



Econometric Methodology

We estimate the following regression for the Euro-area

$$ROA_{i,j,t} = a_i + b_1 Level_t + b_2 Slope_{j,t} + wX_{j,t} + qZ_{i,j,t-1} + e_{i,j,t} \qquad (1)$$

where ROA is the return on assets of a bank "i" operating in a country "j" at time "t"; a_i are bank fixed effects; b_1 and b_2 are the coefficients associated with the $Level$ of a short-term interest rate (the three-month OIS) and the country-specific $Slope$ of the term structure – calculated as the difference between the yields on government bonds with a residual maturity of ten years and two years.[7]. The model also includes a set of country-specific[8] and one bank-specific control, X_j, and $Z_{i,j,t-1}$, respectively. Country specific controls include current and expected GDP growth, expected inflation, a measure of stock market volatility (VIX), and a forward looking measure of borrower risk (the expected default frequency, 'Default Average'). The bank-specific control is the

[7] Positive values for these two coefficients would imply that an increase in interest rates or a steepening of the term structure tends to lead to an increase in bank profitability

[8] We include VIX in this term although it is same for all countries

lagged dependent variable. The vectors of coefficients w and q indicate the response of bank profitability to the controls used in the regression.

For the Euro-area area we use bank level and macro economic data from the following countries; Austria, Belgium, France, Greece, Germany, Italy, Ireland, Spain and Portugal. Due to data availability we use forecast data from Q42003- Q42016 from IHS markit. We exclude Luxembourg, Cyprus, Estonia, Latvia, Lithuania, Malta, Slovakia and Slovenia due to data availability, where sufficient data on macro economic expectations were not available. We collect data for 116 Euro-area Banks. These data are sourced from Bloomberg as those banks classified as European banks for the countries listed above. These banks are all headquartered in the countries detailed above.

For the USA dataset we adapt the model in Eqn.(1) so that we only test US banks with US Macroeconomic Data. We take all banks listed on Bloomberg as 'US banks' and add USA headquartered 'Global Banks', which do not feature in the original commercial bank listing from Bloomberg. In total we gather data for 331 US banks and do not include any foreign banks that are active in the USA, in the dataset.

For the UK, we use data from 13 banks operating in the UK for which quarterly data are available; these include non-UK headquartered Banks. We also use only UK Macroeconomic data even though some banks are non-UK headquartered.

Our tests for the UK and USA can be summarized in the following regression (2) where all values for Macroeconomic variables are restricted to a single country, the USA or UK respectively.

$$ROA_{i,t} = a_i + b_1 Level_t + b_2 Slope_t + wX_t + qZ_{i,t-1} + e_{i,t} \quad (2)$$

Summary statistics for the USA and Euro-area are shown in Table 1.

Table 1

Summary stats for USA

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	22,473	0.0020	0.0058	-0.6541	0.0611
SHORT RATE (OIS)	22,508	1.3794	1.7065	-0.3610	5.3925
SLOPE	22,508	1.4596	0.8942	-0.3800	2.8000
VIX	22,508	20.1312	8.2511	11.6200	55.2800
REAL GDP GROWTH	22,508	2.0155	1.7038	-3.9244	5.2977
INFLATION	22,508	2.1832	1.3545	-1.4268	5.0218
EXPECTED GDP GROWTH	17,543	2.640	0.659	0.800	4.400
EXPECTED INFLATION	17,543	1.6943	0.3779	1.1000	2.9000
DEFAULT AV	22,508	0.0028	0.0026	0.0004	0.0146

Summary stats for EURO Area

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	5,832	0.0012	0.0134	-0.4976	0.1209
SHORT RATE (OIS)	8,500	1.8456	1.6486	-0.3610	4.8700
SLOPE	7,998	1.3810	1.2067	-6.8919	18.4217
VIX	8,500	20.1312	8.2514	11.6200	55.2800
REAL GDP GROWTH	8,500	1.1378	2.8348	-10.7863	29.2577
INFLATION	8,500	1.8719	1.3040	-2.8942	5.7607
EXPECTED GDP GROWTH	6,621	1.2907	1.2290	-10.4000	6.5000
EXPECTED INFLATION	6,641	1.7114	0.5876	-1.4000	4.7000
DEFAULT AV	8,500	0.0050	0.0081	0.0000	0.0418

When we estimate the models in Eqns. (1) and (2) we regressions that matches Table 2 in ABP (2018). We begin with independent variables corresponding to their column 1 regression, then col 2, and finally column 4.

Section III

In Table 2 we set out a comparison of the authors' Columns 1, 2 and 4 from their Table 2, p. 13, with our results, trying to find closely equivalent data from the USA, UK and the Euro-area area. By far the best and most comprehensive data that we could find came from the USA. Whereas ABP have 6768 data points from 288 Euro banks, we have 22,473 data points from 331 US banks. As noted above, our least good data are from the UK, so we put these in the final comparative column. The EURO data come in between.

As will be immediately seen from Table 2, our results are very mixed. The most supportive, of the ABP results are those in our data set from the USA. In this case, as in ABP, the coefficient on the short rate is positive and significant in the comparison to their Column 1, where SR and Slope are the only explanatory variables, but turns negative, and just significant, in the comparison with Column 4. Again, similar to ABP, the expected growth of GDP is positive and significant, and much more so than the actual growth of GDP, in a comparison of Columns 2 and 4. But even here there are some obvious differences. In our US data the slope coefficient is negative and significant throughout; note that in Figure 1 US slope rises 2007-2009, while RoA collapses, and then trends down, as RoA recovers. Beyond that, the coefficient on expected default has the opposite sign (while being significant) in these two data sets.

Table 2: COL 1,2 and 4 (grey shaded) report the results from the corresponding columns in Table 2 of Alatavilla, Bucharina and Peydro (2018). USA, UK and EURO area represent our replications of these regressions from our regression eqn (2) for USA and (1) for EURO area and UK (see text). Errors are robust and clustered at bank level for USA and EURO area. For the UK we use cross section weights and Panel Corrected Standard Errors (PCSE) (weighted).

	COL 1	USA	EURO	UK	COL 2	USA	EURO	UK	COL 4	USA	EURO	UK
ROA(-1)	0.556***	0.2581***	0.450216***	0.05877	0.539***	0.25007***	0.4397851***	0.05661	0.505***	0.379801***	0.4310912***	0.04763
	[0.0363]	[0.00957]	[0.0394846]	[0.141295]	[0.0364]	[0.0088]	[0.0439815]	[0.140879]	[0.041]	[0.0073]	[0.0457211]	[0.142128]
SR	0.0349***	0.00005***	0.003019*	0.000601***	0.0195***	0.0000556***	0.0005216**	0.000694***	-0.00340	-0.0000178**	0.0006773**	0.001266***
	[0.00713]	[0.00002]	[0.0001611]	[0.000229]	[0.00745]	[0.0000189]	[0.0002066]	[0.000244]	[0.0085]	[0.00000746]	[0.000286]	[0.000048]
SLOPE	0.00382***	-0.0006***	0.00057	0.00044	0.00313**	-0.0000155*	0.00071	0.00064	0.00040	-0.00016***	0.00092	0.001779***
	[0.00128]	[0.00004]	[0.0004569]	[0.000455]	[0.00132]	[0.0000348]	[0.0004927]	[0.000503]	[0.00137]	[0.0000156]	[0.0005988]	[0.000682]
VIX					-0.00325***	0.000000525	-0.0000284	-0.0000559	0.00213*	-0.00000601***	-0.0000202	-0.0000747
					[0.000785]	[0.00000355]	[0.0000172]	[0.0000404]	[0.00113]	[0.000001]	[0.0000203]	[0.0000577]
REAL GDPg					0.0154***	0.000105***	0.0002439**	-0.00020	-0.00571	0.0000611***	0.0001285**	0.000069
					[0.00484]	[0.0000185]	[0.0000959]	[0.000195]	[0.00464]	[0.00000665]	[0.0000637]	[0.00039]
INFLATION					0.0394**	-0.00001	-0.0005954**	-0.00024	0.0327*	0.00000958*	0.0007183**	-0.00048
					[0.0162]	[0.0000214]	[0.000279]	[0.000219]	[0.0178]	[0.00000579]	[0.0002983]	[0.000336]
EXPECTED GDPg									0.0828***	0.000162***	0.0005133*	-0.00075
									[0.0109]	[0.0000152]	[0.0002841]	[0.000584]
EXPECTED INF									0.0687**	-0.0000608***	-0.0002614	-0.00049
									[0.0348]	[0.0000194]	[0.0004912]	[0.001054]
DEFAULT									-0.0593***	0.0000162***	-0.1469924***	0.00093
									[0.0202]	[0.0000031]	[0.056411]	[0.002154]
OBS	6768	22142	5422	491	6768	22142	5422	491	6768	17508	4293	446
R2	0.69	0.31	0.23	0.57	0.7	0.3	0.24	0.59	0.70	0.16	0.25	0.6

Perhaps the most contrary results are those for the UK, where the only significant, and positive, coefficients throughout, are those for the short rate and slope. While we tend to discount these results because of the relatively small number of banks, and hence of observations, it is somewhat more in line with the traditional view.

In the case of the Euro-area, our results are not greatly out of line, with one important exception. This is that with our Euro-area bank data, the coefficient on the short rate remains positive and significant throughout. Minor exceptions are that the inclusion of expected GDP growth does not completely remove the significance of actual growth, and that the coefficient on expected default has the opposite sign and significance.

Possibly the main lesson is that one should not rush to make any conclusions from an econometric exercise over a short data period, with three clear phases for the dependent variable, and massive problems of endogeneity and simultaneity, irrespective of the apparent number of observations and degrees of freedom. In particular we feel that the claim of ABP, that they have a 'robust finding' that 'a monetary policy easing…. is not associated with lower bank profit once we control for the endogeneity of the policy measures to expected macroeconomic and financial conditions' cannot be safely generalized beyond their own data set.

We wondered also how far the results were driven by the dramatic and extreme results of the short-lived GFC. We tested this by comparing our Column 4 results for the USA, Euro-area and UK (columns headed in grey in Table 3), with the results for running with dummy variables taking the value 1 for 2008 Q4 to 2009 Q3 (headed GFC), or excluding those observations altogether (headed no GFC). Somewhat to our surprise, excluding the GFC period made relatively little difference to the overall picture. This can also be regarded as a robustness test.

Table 3: The area shaded in grey shows Col 4 from Table 2 in Altavilla Bucharina and Peydro (2018). The other columns show the results for our replication of Col. 4, as highlighted in section II above for the USA, EURO Area and UK. The GFC column refers to our addition of the dummy variable from q2,2007 to q4,2008 =1 and =0 otherwise. The column 'No GFC' shows the regressions with all data from q2, 2007 to q4, 2008 dropped from the regressions.

	COL4	USA	GFC	NoGFC	EURO	GFC	NoGFC	UK	GFC	NoGFC
ROA(-1)	0.505***	0.379801***	0.2343391***	0.238995***	0.4310912***	0.429956***	0.2642197***	0.047625	0.047607	0.024585
	[0.041]	[0.0073]	[0.0245499]	[0.0186043]	[0.0457211]	[0.0443768]	[0.0731381]	[0.142128]	[0.142308]	[0.150663]
SR	-0.00340	-0.0000178**	-0.0000944***	-0.0005849***	0.0006773**	0.0009142***	0.0009394***	0.001266***	0.001267***	0.001583***
	[0.0085]	[0.00000746]	[0.0000318]	[0.0000808]	[0.000286]	[0.0003522]	[0.000233]	[0.000048]	[0.000387]	[0.000489]
SLOPE	0.00040	-0.00016***	-0.0004774***	-0.0001921***	0.0009151	0.0009142	0.0010593*	0.001779***	0.001783**	0.002352***
	[0.00137]	[0.0000156]	[0.000069]	[0.0000369]	[0.0005988]	[0.0005998]	[0.0005927]	[0.000682]	[0.000695]	[0.000835]
VIX	0.00213*	-0.00000601***	-0.0000291***	0.0001113***	-0.0000202	-0.0000017	0.0000322	-0.0000747	-0.000075	-0.0000994
	[0.00113]	[0.000001]	[0.00000687]	[0.0000282]	[0.0000203]	[0.000014]	[0.0000225]	[0.0000577]	[0.0000582]	[0.00007]
REALGDPg	-0.00571	0.0000611***	0.0001068***	0.0000819***	0.0001285**	0.0001306**	0.0002895***	0.000069	0.0000626	0.0000946
	[0.00464]	[0.00000665]	[0.0000275]	[0.0000281]	[0.0000637]	[0.0000626]	[0.0000878]	[0.00039]	[0.000432]	[0.000471]
INFLATION	0.0327*	0.00000958*	0.000013	0.0003843***	0.0007183**	-0.0006569**	-0.0007845***	-0.000475	-0.000477	-0.000551
	[0.0178]	[0.00000579]	[0.000022]	[0.0000519]	[0.0002983]	[0.000276]	[0.0002846]	[0.000336]	[0.000342]	[0.00041]
EXPECTEDGDPg	0.0828***	0.000162***	0.0004047***	-0.0000989***	0.0005133*	0.0005246*	0.0004944*	-0.000753	-0.000751	-0.000956
	[0.0109]	[0.0000152]	[0.0000538]	[0.000057]	[0.0002841]	[0.0002795]	[0.0002613]	[0.000584]	[0.000585]	[0.000663]
EXPECTEDINF	0.0687**	-0.0000608***	-0.0001488***	-0.0000374**	-0.0002614	-0.0003258	-0.0003853	-0.000493	-0.000495	-0.001047
	[0.0348]	[0.0000194]	[0.0000527]	[0.00000617]	[0.0004912]	[0.0004616]	[0.0005049]	[0.001054]	[0.001056]	[0.001185]
DEFAULT	-0.0593***	0.0000162***	0.0616416***	0.1142277***	-0.1469924***	-0.1464914**	-0.1289641***	0.000932	0.00089	0.000177
	[0.0202]	[0.0000031]	[0.0181222]	[0.0196714]	[0.056411]	[0.0573778]	[0.060955]	[0.002154]	[0.002513]	[0.003151]
GFC			-0.00018			-0.0019609			0.0000542	
			[0.0001216]			[0.0017356]			[0.001686]	
OBS	6768	17508	17508	15522	4293	4293	3718	446	446	410
R2	0.70	0.16	0.17	0.18	0.25	0.247	0.226	0.6	0.12	0.13

Another aspect of the results where our attempt at reworking the econometric exercise of ABP left their results unscathed, again slightly to our surprise, was that, at least for the USA and Euro-area, expected growth dominated actual real growth as a determinant of RoA, i.e. a measure of bank profitability. As earlier noted, we do not find their explanation of this convincing. We might advance two, associated, alternative suggestions. First, both the profits set out in bank accounts and expectations of future real growth are somewhat smoothed measures of the underlying erratic current developments. There are natural reasons for both series to get smoothed similarly in response to such erratic outcomes. Second, no one at the time has a clear vision of the current conjuncture. Perhaps expectations of growth are a better indicator of banks' perceptions of current conditions than subsequent revised data on actual growth.[9]

A final aspect of their results, more widely supported in the literature, is that bank profitability, and RoA, held up rather better in post-GFC conditions, e.g. of sluggish growth, low inflation, effective lower bound to short rates and flattening slope, than might have been expected. How did this happen? We discuss this in the next Section.

III. Components of Bank Profitability

The main sources of bank profitability can be divided into three components, see ABP, Section 3.2, pp 548-550. These are Net Interest Income (NII), which is in turn related to the Net Interest Margin times the stock of interest-bearing assets; Non-Interest Income (NNI), from fees and other sources of NNI, such as capital gains and commissions; and Provisions, which in turn relate to the likelihood of loans becoming non-performing (NPLs). We shall examine each in turn.

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[9] Liberini, et al., (2019), suggests that
"UK citizens' *feelings about their incomes* were a substantially better predictor of pro-Brexit views than their *actual incomes*. This seems an important message for economists, because the subject of economics has typically avoided the study of human feelings in favour of 'objective' data."
Nyman et al. (2018) illustrate that human emotions - measured as the balance between anxiety and excitement derived from economic news narratives, when orthogonalized to the real economy, are linked to the changes in the FTSE stock market index, Employment and Industrial production in the UK.

(a) Net Interest Income (NII) and Margins (NIM)

Under normal circumstances, the spread that banks maintain between deposit (and other borrowing) rates and lending rates can be relatively unaffected by changes in official short rates, with both deposit and loan rates moving in line with official rates, leading possibly to an almost one for one pass through (after a short lag), see, among others, Saunders (2019), 'Pass-through of Bank rate to household interest rates'.[10] Instead, the spread is mainly determined by banks' 'wholesale funding costs, their operational costs, competitive pressures, and the relative supply of deposits and demand for credit', Saunders, op cit, p. 3, who then references a sizeable literature on the determinants of NIM, (ibid, footnote 6).

But retail depositors are strongly averse to being charged for holding (sight or time) deposits with banks, and have the option of holding zero-yielding cash/currency instead. So banks have been unwilling to lower deposit rates below zero. Saunders (ibid, pages 3/4), notes that

> 'in 2000-07, household sight deposit rates on average were about 220bp below Bank Rate, with a range of 150bp to 330bp. The picture is much the same over a longer period. Time deposit rates usually exceed sight deposit rates, reflecting an illiquidity premium and at times an upward sloping yield curve, and on average were 40bp below Bank Rate during 2000-07. With similar trends in PNFCs interest rates, the overall weighted average interest rate on household and PNFC deposits during 2000-07 was roughly 135bp below the policy rate. The picture was broadly similar in the euro area as a whole, with some variation between countries.'

The implication is clear; once official rates start to fall below 1.5%, the margin between the official short rates and deposit rates becomes progressively squeezed. In order to maintain NIM and profitability, banks have also to break the link between lending rates and official rates, so bank lending rates do not go down alongside official rates once the latter fall below much about 1.5%.

But conditions when official rates are falling towards the effective lower bound (ELB) are generally extremely adverse for banks, low (or negative) growth, rising NPLs and provisions, low demand for credit, etc. In such circumstances banks' over-riding priority is self-preservation and the

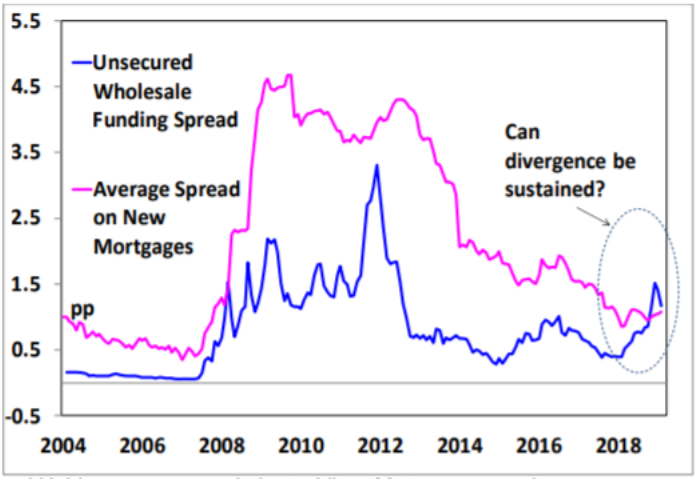
[10] Though see Drechsler, et al., (2017), who document that in the USA the spread between deposit rates and official short rates widens as short rates rise, triggering deposit outflows, and hence, they argue, to reductions in bank lending.

maintenance of profitability. In this context the response of banks to falling official rates has often been to *raise* spreads,[11] and NIM, by *raising* lending rates just as the official interest rate falls towards the ELB.[12] As Eggertsson, et al. (2019), in their study on Sweden report (p. 16),

> "Once the deposit rate becomes bounded however, this relationship flips. A one percentage point reduction in the repo rate, now *increases* bank lending rates by 0.03 to 0.31 percentage points. This reversal in sign holds across all loan contracts."

Also see Heider, Saidi and Schepens (2019). For a study giving a contrary result, see Arce, et al., (2018), especially Section 6.1. Figure 7 from Saunders, op cit, p. 7, provides a nice example.

Figure 7. UK – Mortgage Spreads and Banks' Unsecured Wholesale Funding Spreads, 2004-2019



Note: In this chart, wholesale spreads are an average of Opco and Holdco measures, relative to Libor. Mortgage spreads are measured by a weighted average of various mortgage rates against an appropriate mix of Bank Rate and swap rates.

Source: Bank of England.

[11] In Switzerland Credit Suisse raised mortgage rates the day after the Swiss National Bank introduced the negative rate on bank reserves. We thank Bill White for reminding us of this.

[12] In the eurozone, this was countered by the ECB directly offering credit at the negative policy rate, via TLTROs.

The NIM, or spread, is a measure of the cost of intermediation. So, as official rates fall below 1.5%, that cost may rise, the more so as official rates turn negative. If the cost of intermediation rises, so the volume of intermediation will decline, and the growth rate both of deposits and loans will slow, or even fall. Thus, the attempts of banks to maintain profitability and RoA will, via this route, lead to a reduction in bank intermediation, slower deposit growth and domestic credit expansion.

Moreover, as recorded by Martinez-Miera and Repullo (2019), pp 4-5,

> "a set of recent empirical papers has shown that low interest rates, especially for an extended period of time, are significant factors in the build-up of risks in the banking system. For example, Maddaloni and Peydró (2011) find that low short-term interest rates soften standards for household and corporate loans, Altunbas, Gambacorta and Marques-Ibanez (2014) document that "too low for too long" short-term interest rates lead to increase in risk-taking by banks, Jiménez et al. (2014) show that lower short-term rates induce lowly capitalized banks to grant more loan applications to ex-ante riskier firms, while Dell-Ariccia, Laeven and Suarez (2017) show that short-term interest rates are negatively associated to ex-ante risk-taking by banks, via changes in leverage. Our paper provides a theoretical framework that can account for these empirical results."

Thus measured ROA would stay up, but would fall on a risk-adjusted basis. Also see Xu, Hu and Das (2019); and Acosta-Smith (2018). But the results overall are quite mixed, see Avalos and Mamatzikis (2018, especially Section 4, and Urbschat (2018, pp 5 and 28).

(b) Non-Interest Income

ABP find 'no significant relationship is found with the level or slope of interest rates', p. 550. A fall in interest rates would raise profitability and RoA via capital gains if these were taken into the P and L account. They are somewhat dismissive of the scale of this effect; thus they write (ibid, p. 550) that capital gains

> 'should in principle benefit from a decline in interest rates, as lower yields are reflected in higher asset prices. It is however, important to note that while changes in the valuation of securities held by banks affect their economic value, they are reflected in the profit and loss account only if the securities are accounted at market values or if the capital gain/loss is realized. Since the share of securities held at market values is relatively small…. it is not surprising that the estimated coefficient is not statistically significant.'

Similarly, Urbschat (op. cit, 2018 p. 6) states,

> "the *bad news* is that banks neither benefit from increased fee income (as fees are not proportional to deposits) nor from capital gains following high asset prices, which is among others due to the conservative German accounting law."

Some of the maintenance, or increase, in banks' NII will represent a shift in their pattern of business from (high capital requirement) activities such as credit extension and market-making to (low capital requirement) business such as wealth management. However, some significant proportion, (though we know of no estimates of that), will have come from raising fees and commission charges on the same business as before. Arce, et al., (2018, pp 15 and 16) concur with this hypothesis. Thus, they state,

> "This suggests that banks tried to offset the reduction in net interest income by increasing commission and fees."[13]

> "Additionally, it supports the hypothesis that low-capital banks tried to offset the reduction in net interest income, which can be used to build capital organically, by increasing commission and fees."

As in the case of raising NIMs, this may help to protect bank profitability, but at the expense of the volume/scale of bank intermediation.

(c) Provision and NPLs

Provisions are, of course, inversely related to the macro-economic conjuncture, and in so far as expansionary monetary policy improves activity and growth, it will lower provisions and NPLs. Once again, ABP find that expected growth is much more significant than actual growth, (Table 3, p. 549, column 3). Also, they find the regulatory capital ratio (negative) and the slope of the yield curve (positive) to be significant, but given the trends in these variables over this short data period any interpretation should be cautious.

The relationship between official short rates on the one hand, and provisions and NPLs on the other, is more complex. As ABP emphasize, in so far as lower rates enhance demand and activity, they will reduce provisions and NPLs. Against that, however, lower rates make the cost of carrying, rather than closing out, NPLs less, and also encourage further on-lending to weak companies to prevent them even becoming non-performing (a process known as ever-greening). Meanwhile a high stock of NPLs may be another (minor) factor causing banks to raise margins to protect

[13] Banks may react to the effective zero lower bound on retail deposit interest rates by raising fees instead.

themselves, see Bredl (2018). So the effect of lower official rates both on provisions, NPLs and the volume of lending is probably ambiguous, but the effect on the quality of the loan book is most likely counter-productive. A larger proportion of the loan book will get directed to low quality borrowers.

(d) Summary

Once rates fall to exceptionally low levels, banks are forced to take countervailing measures to protect their profitability. These measures, raising spreads and fees, will raise the cost of intermediation, and via ever-greening and other steps to lower write-offs, will lower the allocative quality of the loan book. The efforts of the banks in such conditions to maintain profitability will have corresponding costs in holding down both the quantity and quality of bank domestic credit.[14]

Saunders (op cit., pp 11-12), notes that,

> "BoE models suggest that monetary policy in the UK operates through four main channels: the exchange rate; cost of capital and non-housing wealth; the cashflow effect on households and their willingness to bring forward or delay purchases; and a housing channel. The latter two channels rely on the pass-through of policy rate changes to household interest rates…. The Bank's suite of models suggest that these two [latter] channels typically account for between a third and two thirds of the total expected medium-term impact on output from policy rate changes, depending on how persistent the interest rate change is and the extent to which it is anticipated…. It is not possible to be precise about where the threshold for such a zone of reduced policy effectiveness might be. It probably starts when sight deposit rates reach or are close to their effective lower bound, and hence when the policy rate itself is clearly above the ELB. As a rough estimate, my guess is it that for the UK this might occur at a policy rate of roughly 2% or so, reflecting a near-zero floor for sight deposit rates plus an equilibrium spread of 150-

[14] This argument has much in common with that of Gorton, Laarits and Muir (2019). They argue that,

> "this exemplifies a common feature of modern crises where a central bank is present. Banks reduce loans prior to the crisis while depositors stand pat to see what the central bank does, even if they already recognize crisis conditions. The true start of the crisis, then, can be before any obvious indications of stress, such as bank failures. Indeed, Boyd et al., (2009) examine the dating of crisis in four crisis databases and find that large reductions in loan growth *predict* crisis start dates."

In so far as exceptionally low rates, flat yield curves, and capital regulation exacerbated the tendency for banks to maintain profitability, for self-preservation, it will have placed yet further downwards pressure on the growth of deposits and bank credit.

> 200bp between household sight deposit rates and the policy rate. The reduction in policy effectiveness may become more marked as the policy rate approaches the ELB and a higher share of deposit rates (eg time deposits) become constrained."

However, he implicitly assures that the effect on demand is positive, even if muted. But what if the effect is negative?[15] Especially in circumstances when the exchange rate channel is muted, for one reason or another, then the net effect on demand of lowering interest rates could become negative, in part because of a rising cost of bank intermediation, (see for example Brunnermaier and Koby, 2018; Kumhof and Wang, 2018).

Because he assumes that the net effect of lowering interest rates beyond the point that causes banks to have problems in maintaining profitability remains always positive, Saunders argues that policy would just need to be more aggressive in order to hit its target,

> "I stress that if the monetary transmission mechanism is less effective at a low rate level – and this is still an 'if' – this will not prevent the MPC from achieving the inflation target over time. The MPC could allow for this issue by adjusting monetary policy slightly more actively (when the policy rate is low) in order to produce a desired impact on the economy."

But not only does the effective lower bound (ELB) ultimately place a firm limit on such aggression, but also if the net effect is, or becomes over time, negative, such extra aggression would be counter-productive.

IV. Conclusion

There has appeared to be a contradiction between the arguments of two sets of economists. The first set, usually populated by Central Bank economists, deny that expansionary monetary policy has had a seriously adverse effect (yet) on bank profitability, and, though more by implication than directly, on the impact of such policies on the economy via the banking system. This set has been represented here by ABP (2018).

[15] See White (2012), 'Ultra Easy Monetary Policy and the Law of Unintended Consequences'.

The second set, usually represented by academic economists, argues instead that the effect of extraordinarily low interest rates on the banking channels is, or can become, negative and sufficiently so to have a net negative effect on the economy as a whole. Thus, Eggertsson, et al., (2019), argue in their Abstract that,

> "Once the policy rate turns negative, the usual transmission mechanism of monetary policy through the bank sector breaks down. Moreover, because a negative policy rate reduces bank profits, the total effect on aggregate output can be contractionary. A calibration which matches Swedish bank level data suggests that a policy rate of -0.50 percent increases borrowing rates by 15 basis points and reduces output by 7 basis points."

An aim of our paper has been to try to reconcile these two positions. The two key points of the ABP paper, were that (1) once macro-conjunctural, forward-looking variables were included in the regressions, then the (positive) effect of the policy variables (short rate and yield slope) on bank profitability disappeared, and (2) that such policies had only an ambiguous and small effect on bank profitability. We have shown that the first conclusion does not generalize to a wider set of data, and anyhow is suspect given the short time period and inherent simultaneities involved. While we accept that bank profitability has held up better than might have been expected, we claim that this is because banks, to protect themselves, have both raised the cost of intermediation and allowed the quality of their loan portfolio to fall, thereby reducing the beneficial effect of domestic credit expansion. We should, however, note that this latter claim is strongly contested by ABP who state that, according to their data, neither did the cost of intermediation rise nor did the quality of the loan portfolio fall. We, and ABP, hope to arrange a conference later this year to sort out this and other connected issues.

Banks, and the bank lending channel, are left out of too many models. In such cases the benefits of lowering interest rates to, and beyond, the zero lower bound are much exaggerated, and the net effect of such measures could even have been net contractionary.

Bibliography

Acosta-Smith, J., (2018), 'Interest rates, capital and bank risk-taking', Bank of England Staff Working Paper No. 774, (December).

Altavilla, C., Boucinha, M., and J.-L. Peydró, (2018), *Economic Policy*, 96, (October), pp 531-586; earlier (2017) in ECB Working Paper No. 2015, (October).

Ampudia, M., and S. Van den Heuvel, (2018), 'Monetary policy and bank equity values in a time of low interest rates', European Central Bank Working Paper No. 2199, (November).

Arce, O., Garcia-Posada, M., Mayordomo, S., and S. Ongena, (2018), 'Adapting lending policies when negative interest rates hit banks' profits', Banco de España Working Paper 1832.

Avalos, F., and E.C. Mamatzakis, (2018), Bank for International Settlements Working Paper No. 754, (November).

Borio, C., and L. Gambacorta, (2017a), 'Monetary policy and bank lending in a low interest rate environment: diminishing effectiveness?', *Journal of Macroeconomics*.

Borio, C., Gambacorta, L., and B. Hofmann, (2017b), 'The influence of monetary policy on bank profitability', *International Finance*, 20, pp 48-63.

Boyd, J., De Nicolo, G., and E. Loukoianova, (2009), 'Banking Crises and Crisis Dating: Theory and Evidence', IMF Working Paper, WP/09/141.

Bredl, S., (2018), 'The role of non-performing loans for bank lending rates', Deutsche Bundesbank Discussion Paper No. 52/2018.

Brunnermeier, M.K., and Y. Koby, (2018), 'The Reversal Interest Rate', National Bureau of Economic Research Working Paper No. 25406, (December).

Drechsler, I., Savov, A., and P. Schnabl, (2017), 'The Deposits Channel of Monetary Policy', *The Quarterly Journal of Economics* 132(4), pp 1819-1876.

Eggertsson, G.B., Juelsrud, R.E., Summers, L.H., and E.G. Wold, (2019), 'Negative Nominal Interest Rates and the Bank Lending Channel', National Bureau of Economic Research, Working Paper 25416, (January).

Gorton, G., Laaritis, T., and T. Muir, (2019), '1930: First Modern Crisis', National Bureau of Economic Research, Working Paper 25452, (January).

Heider, F., Saidi, F., and G. Schepens, (2019 forthcoming), 'Life Below Zero: Bank Lending Under Negative Policy Rates, *Review of Financial Studies*.

Kumhof, M., and X. Wang, (2018), 'Banks, money and the zero lower bound', Bank of England Staff Working Paper No. 752, (August).

Liberini, F., Oswald, A., Proto, E., and M. Redoano, (2019), 'Was Brexit Triggered by the Old and Unhappy? Or by Financial Feelings?', Centre for Economic Policy Research Discussion Paper, DP13439, (January).

Martinez-Miera, D., and R. Repullo, (2019), 'Monetary Policy, Macroprudential Policy, and Financial Stability', Centre for Economic Policy Research Discussion Paper, DP13530, (February).

Nyman, R., Kapadia, S., Tuckett, D., Gregory, D., Ormerod, P. and Smith, R. (2018), 'News and narratives in financial systems: exploiting big data for systemic risk assessment' *Bank of England Staff Working Paper* No. 704.

Saunders, M., (2019), 'Pass-through of Bank Rate to household interest rates', Bank of England, Speech, 6 March.

Selgin, G., (2018), *Floored!: How a Misguided Fed Experiment Deepened and Prolonged the Great Recession*, Cato Institute.

Urbschat, F., (2018), 'The Good, the Bad, and the Ugly: Impact of Negative Interest Rates and QE on the Profitability and Risk-Taking of 1600 German Banks', CESifo Working Paper 7358.

White, W.R., (2012), 'Ultra Easy Monetary Policy and the Law of Unintended Consequences', Globalization Institute Working Papers 126, Federal Reserve Bank of Dallas.

Xu, T., Hu, K., and U.S. Das, (2019), 'Bank Profitability and Financial Stability', International Monetary Fund Working Paper WP/19/5, (January).