

# **No STRESS IV**

## **The flaws in the Bank of England's 2018 stress tests**

Kevin Dowd



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# ABOUT THE AUTHOR

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# EXECUTIVE SUMMARY

- The Bank of England has now undertaken five annual concurrent stress tests of the financial health of the UK banking system. Like their successors, the 2018 stress tests continue the Bank's fine tradition of trying to persuade us that the UK banking system is strong when the evidence suggests otherwise. Their results are wholly lacking in credibility.
- The stress tests are compromised by:
  - Conflicted objectives,
  - An inadequate number of stress scenarios,
  - Low pass standards,
  - Reliance on unreliable metrics, and
  - Questionable modelling.
- Their key stressed capital ratios, projected impairment charges, and house price losses are too low to be believable.
- The results from the stress tests are contradicted by the evidence from banks' latest balance sheets and market prices, which show that banks are weak now, before any stress, rather than strong after a future stress that is supposedly more severe than the GFC.
- The continuing weakness of UK banks after a long economic recovery is testimony to the failure of the Bank of England to per-

form its core function and rebuild the strength of the banking system after the trauma of the crisis.

# INTRODUCTION

*“The nation’s largest bank holding companies are strongly capitalized and would be able to lend to households and businesses during a severe global recession.”*

Federal Reserve (28 June 2018)

*“That, I would suggest, is a comically absurd conclusion that is belied by the most elementary analysis of the beta of those major financial institutions.”*

Fmr. US Treasury Secretary Lawrence H. Summers  
(8 September 2018)

*“No one in Britain or abroad doubts governor Mark Carney when he says British banks are safe.”*

*Financial Times* (22 November 2018)

*“I don’t believe it!”*

Victor Meldrew

The Bank of England released the results of its 2018 stress tests of the UK banking system in its November 2018 *Financial Stability Report* published on 28 November 2018. These results came out the same day as the Bank's and the Treasury's apocalyptic Brexit projections, which inevitably dominated the media reporting. As a result, media comment on the bank stress tests was muted and largely repeated the Bank's own statements. For once, the bank stress tests failed to merit the usual 'doomsday' description, presumably because that term and its various synonyms had already been appropriated by the latest round of Project Fear.

The Bank's adverse stress scenario might not have been doomsday, but it was still pretty scary. The main features of the latest stress scenario were a 4.7% fall in UK GDP, a rise in unemployment to 9.5%, a 33% fall in UK residential property prices, a 40% fall in UK commercial real estate prices, a sudden loss of overseas investor appetite for UK assets, a 27% fall in the sterling exchange rate index and Bank Rate rising to 4%. This adverse stress scenario takes place against the backdrop of a "very severe global stress" that includes a fall in Chinese GDP of 1.2% and a fall in world GDP of 2.4%.

Fortunately, the UK banking system comes through this 'worse than GFC (Global Financial Crisis) stress' with flying colours, unlike its counterpart in the actual GFC.

To quote the *Financial Stability Report*:

*Major UK banks have continued to strengthen their capital positions. They started the 2018 stress test with an aggregate common equity Tier 1 (CET1) capital ratio nearly three and a half times higher than before the global financial crisis.*



*The test shows the UK banking system is resilient to deep simultaneous recessions in the UK and global economies that are more severe overall than the global financial crisis and that are combined with large falls in asset prices and a separate stress of misconduct costs.*

*Despite facing loss rates consistent with the global financial crisis, the major UK banks' aggregate CET1 capital ratio after the stress would still be twice its level before the crisis. All participating banks remain above their risk-weighted CET1 capital and Tier 1 leverage hurdle rates and would be able to continue to meet credit demand from the real economy, even in this very severe stress. (November 2018 FSR, p. 2)*

This report focuses on the bank stress tests and the take-home message is simple: the Bank's conclusions are not to be believed.

Like their predecessors, the central purpose of 2018 stress tests is to persuade us that the UK banking system is strong when the evidence indicates the opposite. The banking system is weak *now, before* any 'worse than GFC' stress scenario, not strong *after* one.

The stress tests are compromised by conflicting objectives, an inadequate number of stress scenarios, low pass standards, reliance on unreliable metrics and questionable modelling. Their key projected stressed capital ratios, impairment charges and house price losses are all way too low to be believable and destroy any credibility they might otherwise might have had.

Once again, the stress test exercise provides false risk comfort about the health of the financial system and can be dismissed as worse than useless because it hides the all too real vulnerability of the UK banking system.

The Fed vs. Larry Summers passages quoted above show that much the same game is playing out over the pond as well.

This report is organised as follows. Section 2 starts by looking at the capital strength of UK banks using the latest available (2018Q3) data. Section 3 explains the stress test. Section 4 sets out the results of the stress tests. Sections 5 to 13 raise various specific concerns with the stress tests and section 14 concludes. To keep down the size of the main report, various longer issues are deferred to appendices.

# 1. THE STATE OF THE BIG SEVEN IN 2018Q3

Let's first assess the state of the Big Seven as of the end of 2018Q3.

Table 1 shows their core capital ratios, their CET1 ratios (the ratio of CET1 capital to Risk-Weighted Assets, RWAs) and their Tier 1 leverage ratios (the ratio of Tier 1 capital to Leverage Exposure, LE):

However, the RWA measure is highly flawed to the point where it should properly be regarded as discredited. I discuss this issue further in Appendix 1.

It follows that the CET1 ratio, the ratio of CET1 capital to RWAs, is unreliable and should be discarded.

Alternatively, consider two recent examples: Banca Carige’s 30 September 2018 CET1 ratio is a respectable 12.4%, above the Italian bank average of 11.5%. Carige was then put into receivership in January 2019. Monte dei Paschi’s 30 September 2018 CET1 ratio was even higher, at 12.5%, and trading in its shares was suspended on 14 January 2019 after a profit warning from the ECB. Both banks are poster children for the unreliability of the CET1 ratio.

**TABLE 1: CET1 RATIOS AND TIER 1 LEVERAGE RATIOS: 2018Q3**

INSTITUTION	CET1 RATIO (%)	TIER 1 LR (%)
Barclays	13.2	4.9
HSBC	14.3	5.9
Lloyds	14.6	5.3
Nationwide	31.7	5
RBS	16.7	6.3
Santander	13.1	4.4
Standard Chartered	14.5	5.8
<b>Average</b>	<b>14.7</b>	<b>5.5</b>

Notes: 1. ‘Tier 1 LR’ = Tier 1 Leverage Ratio. 2. Results shown on an IFRS 9 transitional basis. 3. Tier 1 leverage ratio is expressed as a percentage of the leverage exposure measure excluding central bank reserves, in line with the PRA’s Policy Statement 21/17. 4. Source: November 2018 FSR Table A4.A.

The second column in Table 1 gives the second regulatory capital ratio, the leverage ratio, which is the ratio of Tier 1 capital to a measure of the total amount at risk known as the Leverage Exposure, LE. This measure serves a similar function to the Total Assets (TA) measure and is typically a little lower than the TA.

There are problems with this ratio too:

- When assessing capital adequacy, we should use a measure of core capital and the Tier 1 capital measure is an inferior measure of core capital to CET1. I discuss this issue further in Appendix 2.
- There are also problems with both the TA and the LE ‘at risk’ measures, but on balance, the TA is to be preferred. I discuss these issues in Appendix 3.

So the best option is to use a capital ratio with CET1 as the numerator and TA as the denominator. Focussing on the big five banks, which account for 91.5% of the value of TA amongst the seven institutions included in the BoE stress test, we then get the CET1-to-TA results shown in the following table:

**TABLE 2: BIG 5 BANKS’ CET1 TO TOTAL ASSET RATIOS: 2018Q3**

<b>BANK</b>	<b>CET1/TA (%)</b>
Barclays	3.56
HSBC	4.71
Lloyds	3.64
RBS	4.51
Standard Chartered	5.6
<b>Average</b>	<b>4.84</b>

Notes: 1. ‘Based on information in banks’ latest financial statements at time of writing. 2. Source: November 2018 FSR Table A4.A. 3. The average is a weighted average using shares of combined TAs as weights.

So the book value ratio of CET1 capital to total assets varies from 3.56% for Barclays to 5.6% for Standard Chartered, and is on average 4.86%.

However, how can we assess whether these ratios are sufficiently high for banks to be considered adequately capitalised?

In a famous FT letter in 2010, Anat Admati and 19 other distinguished academic finance experts recommended a ratio of *at least* 15%, and I could name a considerable number of others who would agree with them. To quote their letter:

*The Basel III bank-regulation proposals that G20 leaders ... fail to eliminate key structural flaws in the current system. Banks' high leverage, and the resulting fragility and systemic risk, contributed to the near collapse of the financial system. Basel III is far from sufficient to protect the system from recurring crises. If a much larger fraction, at least 15%, of banks' total, non-risk-weighted, assets were funded by equity, the social benefits would be substantial. And the social costs would be minimal, if any.*<sup>1</sup>

Moreover, in his book, *The End of Alchemy*, former BoE governor Mervyn King suggested that a 10% ratio of capital to assets would be “a good start, compared with the 3-5 per cent common today” (King, 2016, p. 280).<sup>2</sup>

The capital-to-asset ratios in Table 2 are less than half the minimum ratio recommended by King and under a third of the minimum range recommended by Admati and others in her camp.

There is another problem. The results in Table 2 refer to book values, and banks' price-to-book (PtB) ratios, the ratios of banks' market capitalisations to their accounting book values indicate that their market values are much lower than their book values:

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<sup>1</sup> A. Admati et alia, “Healthy Banking System is the Goal, not Profitable Banks,” *Financial Times*, 9 November 2010.

<sup>2</sup> The subject of the appropriate minimum capital ratio warrants a much longer discussion than I have time or place to provide in this report, but for a good start I would refer the reader to A. Admati and M. Hellwig, *The Bankers' New Clothes: What's Wrong with Banking and How to Fix It*, Princeton University Press, 2013, and M. Goldstein *Banking's Final Exam: Stress Testing and Bank-Capital Reform*, Peterson Institute for International Economics, 2017.

**TABLE 3: BIG 5 BANKS' PRICE-TO-BOOK RATIOS:  
28 NOV 2018**

<b>BANK</b>	<b>PRICE-TO-BOOK RATIO (%)</b>
Barclays	44
HSBC	68
Lloyds	83
RBS	55
Standard Chartered	39
<b>Average</b>	<b>67.1</b>

Notes: 1. Based on information provided by ShareTelegraph. 2. The average is a weighted average using shares of combined TAs as weights.

These banks' PtB ratios vary from 39% for Standard Chartered to 83% for Lloyds, and their average is 67.1%.

There is a strong argument that market values are more informative than book values and the fact that banks' PtBs are well below 1 suggests that the markets perceive problems with the banks that are not reflected in their book values. I discuss the relative merits of market vs book values in Appendix 4.

Given that (a) we want to use CET1 as our core capital measure but CET1 is a book value measure, and (b) that we want to use market values instead of (or at least in addition to) book values, we then need some sort of market-value equivalent of the CET1 measure.

The simplest way to obtain such a measure is to multiply the CET1 by the PtB, i.e.:

(1)           Market-value CET1 (MVCET1) = PtB CET1

A justification for this MVCET1 measure is provided in Appendix 5. After obtaining the MVCET1 numbers, we get the MVCET1/TA ratios given in Table 4:

**TABLE 4: BIG 5 BANKS’ RATIOS OF MARKET-VALUE CET1 TO TOTAL ASSETS: 2018Q3**

BANK	MARKET-VALUE CET1/ TOTAL ASSETS (%)	MARKET CAP/TA
Barclays	1.57	2.47%
HSBC	3.2	4.38%
Lloyds	3.02	4.92%
RBS	2.48	3.77%
Standard Chartered	2.26	2.32%
Average	2.91	4.02%

Notes: 1. Market values are obtained by multiplying the P2B ratios in Table 3 by CET1 capital.

So the best available metric, the ratio of market-value CET1 capital to total assets, varies from 1.57% for Barclays to 3.20% for HSBC, and is on average 2.91% across the big five.

This latter figure is 18% of the minimum recommended by Admati and her colleagues and 27% of that recommended by King.

For those who might prefer the market cap to TA ratios, these are shown on the right hand column: they vary from 2.32% to 4.92% with an average of 4.02%



It is clear that these banks are nowhere near being capital-adequate by the Admati or King standards. And if UK banks are nowhere being capital-adequate *now*, *before* any major stress, then it is *simply not possible* for any stress tests to demonstrate that the banks will be capital-adequate *after* a major stress.<sup>3</sup>

I emphasise that this conclusion holds *even if one only uses book-value numbers*, but it applies *all the more strongly if we use market-value numbers*, whether those be market cap or market-value CET1 capital.

Returning to the main storyline, the results in Table 3 and (especially) 4 are, thus, the sows' ears that the stress tests magically transform into silk purses.

## LARRY SUMMERS ON MARKET VALUES

The importance of market values was also highlighted by former US Treasury Secretary Larry Summers in a 22 May 2017 article in the *Washington Post*.<sup>4</sup> Let me quote it at some length:

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<sup>3</sup> These ratios reported in my tables do not take account of the hidden vulnerabilities implied in banks' Level 2 and Level 3 fair valuations of their marketable positions. Roughly speaking: Level 2 (or 'mark to model') assets do not have directly observed market values and are traded less frequently in thin markets, but have (hopefully approximate) fair values that can be obtained from models calibrated to observed market prices. Examples include some corporate and most municipal bonds. Level 2 valuations are at best approximate and can sometimes be gamed by selecting the model that gives the preferred valuations. Level 3 (or 'mark to myth') assets are highly illiquid and can only be fair-valued using models calibrated to guesstimates of key parameters. Level 3 valuations are unreliable and potentially highly gameable, because both models and calibrations can be chosen to manipulate valuations and this gaming is difficult for outsiders to detect. Examples include asset-backed and mortgage-backed securities and many forms of CDS. The experience of the GFC showed that Level 3 positions can be wiped out in a major crisis. As a general rule, banks' L2 positions are multiples of their CET1 capital, but their L3 positions are usually only small percentages of their CET1. The size and potential unreliability of the L2 positions is a major red flag. A recent analysis of these positions is provided in No Stress III, pp. 130-132.

<sup>4</sup> Lawrence H. Summers, "Larry Summers: 5 suggestions for avoiding another banking collapse," *Washington Post*, May 22, 2017.

*There's a widespread view that banks are now safer because they are better capitalized, but that argument – popular though it is – needs more scrutiny. Specifically, I continue to be puzzled by the gap between what is widely believed and my reading of market evidence.*

*Early this month, I gave a talk on this subject based on my Brookings paper<sup>5</sup> with Natasha Sarin at the Atlanta Fed's annual research conference. (Here are the [video](#) and [slides](#).) I began by highlighting ... facts that seem to me to be in substantial tension with the widespread view about banks' safety and how well they're capitalized. Mark Carney's statement that "the capital requirements of our largest banks are now ten times higher than before the crisis. ... This substantial capital and huge liquidity give banks the flexibility they need to continue to lend ... even during challenging times" is typical."*

As an aside, Summers is being generous about Carney's oft-repeated 'ten times' mantra. Carney uses it to make the point that banks are now well-capitalised, but this claim is misleading. A large percentage increase in capital requirements does not represent a large absolute increase in capital requirements when the base was extremely low to start with. And why was the base so low? Because Basel II imposed very low minimum capital requirements. Correctly interpreted, Governor Carney's '10 times' claim does not imply that banks are now well capitalised; instead, it is a damning indictment of the inadequacy of Basel II. <sup>6</sup>

To return to Summers:

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<sup>5</sup> N. Sarin and L. H. Summers "Understanding bank risk through market risk measures," Brookings Papers on Economic Activity, Fall 2016: 57-109.

<sup>6</sup> K. Dowd, "Are Bank Capital Requirements Really Ten Times Higher than Before the Crisis?" Adam Smith Institute blog, 13 July 2017.

*First, there is distressingly little evidence in favor of the proposition that banks that are measured as better capitalized by their regulators [KD: he is referring to book value ratios] are less likely to fail than other banks. Andrew Haldane suggests the absence of a relationship looking across banks before the 2008 crisis. Òscar Jordà and coauthors suggest the absence of such a relationship historically, using data for many countries. Jeremy Bulow and Paul Klemperer note that for banks whose crisis failure resulted in FDIC losses, the FDIC typically had to inject an amount in excess of 15 percent of their assets, suggesting that they in fact had substantial negative capital positions.*

The phrase ‘in excess of 15 percent of their assets’ matches the Admati letter perfectly.

*Second, financial logic embodied in the celebrated Modigliani Miller theorem and suggested by common sense holds that substantial reductions in leverage, if achieved, should be associated with reduced volatility, reduced sensitivity to shocks and lower risk premiums. Our paper examines a comprehensive suite of volatility measures including actual volatility, volatility implied by option pricing, beta, credit default spreads, preferred stock yields and earnings price ratios. While each indicator has associated ambiguities, it is striking that none [of these market value indicators] suggest a major reduction in leverage for the largest U.S. financial institutions, large global institutions or midsize domestic institutions. (My underlining)*

*... a crucial challenge for financial regulation going forward is assuring prompt responses to deteriorating conditions that do not set off vicious cycles. Markets were sending clear signals of major problems in the financial sector well in advance of the events of the fall of 2008 but the regulatory community did not even limit bank divi-*

*dend payouts, even after the experience at Bear Stearns, which had been deemed very well capitalized even as it was failing. Current experiences in Europe where some institutions have a price-to-book ratio of barely 0.35 and have not yet been forced to raise capital are not encouraging about lessons learned.*

## **IMF OCTOBER 2018 GFSR HIGHLIGHTS BANKS' LOW MARKET VALUES**

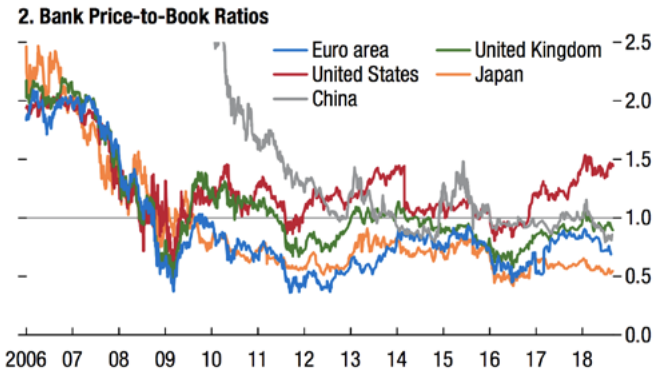
The IMF also highlights banks' low market values in its October 2018 *Global Financial Stability Report A Decade After the Global Financial Crisis: Are We Safer?*

*... market measures point to some concerns about banks. In the euro area, China, Japan, and the United Kingdom, bank aggregate price-to-book ratios are less than one ... (IMF GFSR October 2018 p. 26)*

It then refers to their Figure 1.20, panel 2 shown below:

## IMF OCTOBER 2018 GFSR FIGURE 1.20 PANEL 2

... but equity market valuations are mixed.



Note also that the US banks' PtB ratios are much higher than UK banks' PtB ratios, so the points made by Summers about the US banks must apply all the more to UK banks.

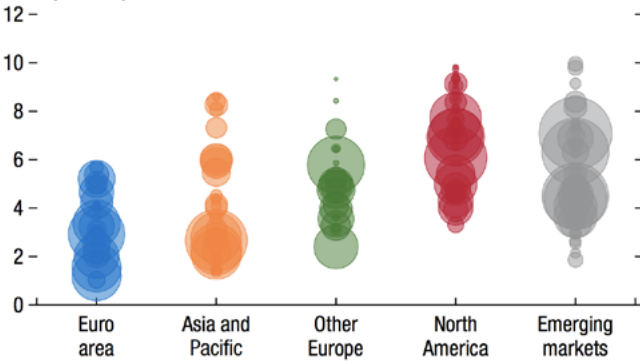
*This means that the market value of equity is less than the amount of capital booked on bank balance sheets. If market valuations are used to calculate capital ratios—in place of the balance sheet value of capital used in the regulatory ratios—a number of banks would have a market-adjusted capitalization of less than 3 percent, the minimum level in the Basel III framework ... (loc. cit.)*

It then refers to Figure 1.20, panel 3, which shows *market-value capital-to-asset ratios*, the very creatures whose name the Bank refuses to utter:

IMF OCTOBER 2018 GFSR FIGURE 1.20 PANEL 3

Some banks have a low market value of equity.

3. Bank Market-Adjusted Capitalization, September 2018  
(Percent)

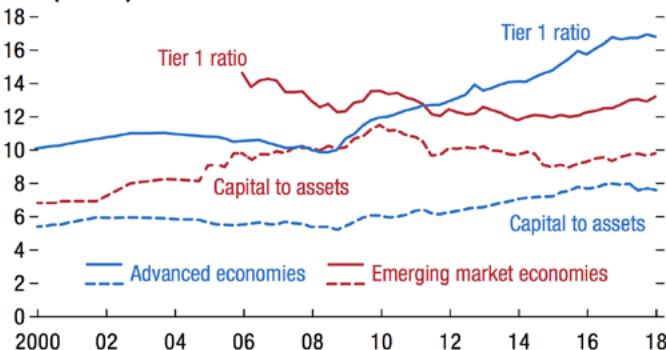


For those who find this blobs chart visually hard to digest, one gets a similar picture if one looks at their capital-to-asset ratios in Figure 1.6 panel C:

IMF OCTOBER 2018 GFSR FIGURE 1.6 PANEL C

Capital positions of banks in advanced economies have improved, but are less robust in some emerging market economies ...

5. Banking System Capital Ratios by Region  
(Percent)



The dashed blue line gives the developed countries capital-to-asset ratios. Multiply those by the PtB ratios in Figure 1.20 panel 2 above (shown below) and you see the capital-to-asset ratios in market value terms.

# **UK BANKS’ KEY RATIOS HAVE DETERIORATED YEAR-ON -YEAR**

We might also note that these results reflect a deterioration since the previous year, as shown in Table 5:

**TABLE 5: BIG 5 BANKS’ RATIOS OF MARKET VALUE  
CET1 TO TOTAL ASSETS: 2017Q3**

<b>BANK</b>	<b>BOOK VALUE CET1/TA (%)</b>	<b>PtB RATIO (%)</b>	<b>MARKET-VALUE CET1/ TA (%)</b>
Barclays	3.9 (3.56)	45 (44)	1.73 (1.57)
HSBC	5.2 (4.71)	81 (68)	4.23 (3.20)
Lloyds	3.8 (3.64)	97 (83)	3.66 (3.02)
RBS	4.4 (4.51)	66 (55)	2.90 (2.48)
Standard Chartered	5.8 (5.60)	50 (39)	2.50 (2.26)
Average	5.2 (4.84)	78.2 (67.1)	3.6 (2.91)

Notes: 1. Comparable sources to earlier Tables. Numbers in brackets are 2018Q3 equivalents taken from previous tables.

The book value CET1/TA, PtB and MVCET1/TA ratios are all lower for each bank than they were a year before. The recent direction of

travel is, thus, for the most part, a downward one.<sup>7</sup>

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<sup>7</sup> The Bank says the opposite, but its evidence is flimsy. To quote a passage from p. 2 of the November 2018 *FSR*, “Stress-test participants’ capital ratios have continued to strengthen since the Bank’s 2017 stress test. [My emphasis.] This is not how I would put it. The Bank states: “Banks started the 2018 test with an aggregate Tier 1 risk-weighted capital ratio of 17.7%, up from 16.4% at the beginning of the 2017 test. The aggregate CET1 and Tier 1 leverage ratios — on which banks are assessed in the stress test — had also risen from 13.4% to 14.5% and from 5.4% to 5.7% respectively.” In response: (1) Any capital ratios with RWA denominators are unreliable, because of the gameability of the RWA measure, e.g., these ratios will rise when banks reduce their RWAs and there has been a lot of that. (2) Across the big 5, the ratio of CET1/TA fell from 5.2% in 2017Q3 to 4.84% in 2018Q3 (compare Tables 5 and 2). (3) According to the Table A4.A in the November 2018 *FSR*, the Tier 1 leverage ratio fell from 5.7% at the end of 2017Q4 to 5.5% at the end of 2018Q3. So I see the banks deteriorating over the last year.



## 2. THE 2018 BANK STRESS TESTS

The purpose of the stress tests is, in essence, to persuade us that the banking system is *actually* in good shape on the basis of a *make-believe* exercise which purports to show what *might* happen in the event of a supposed severe stress scenario as modelled by a central bank with a dodgy model *and* a *vested interest* in showing that the banking system is in great shape thanks to its wise policies. We are also expected to believe that the central bank has managed to rebuild the banking system despite enormous pressure placed on it by the institutions it regulates, whose principal objective is to run down their capital ratios (or equivalently, maximise their leverage) in order to boost their returns on equity and resulting profits, and never mind the systemic risks and associated costs imposed on everyone else or the damage their high leverage did in the GFC.

Ostensibly, the primary purpose of central bank stress testing is to assess the banking system's capital adequacy, i.e., to assess the abil-

ity of banks to withstand financial stress.<sup>8</sup> A stress test has three components:

- An hypothetical adverse stress scenario – basically a make-believe scenario generated by modellers at the central bank.
- A metric to gauge the strength of each bank. This metric will be some sort of capital ratio, a ratio of ‘core’ capital to some measure of assets - the intuition being that core capital provides a buffer to absorb potential losses and keep the bank solvent in a stress.
- A pass standard by which to determine whether the stressed value of the capital ratio is (or is not) high enough to merit a pass mark in the test.

There is a natural analogy with a school exam, the purpose of which is to assess a student’s academic strength. It too has three components:

- There is an exam paper based on a set of questions and the underlying issue of how easy or tough the exam paper might be. The difficulty of an exam paper is comparable to the severity or otherwise of the stress scenario.
- There is the performance of the candidate in the exam, i.e., the grade they receive.
- There is the pass standard, i.e., the minimum mark that a student must achieve in order to pass the exam.

One then draws one’s conclusions. For example, if one had an easy set of questions, a low pass standard and a student who achieved a low mark, then one would conclude that the student was academically

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<sup>8</sup> I emphasise that I am concerned in this report only with stress tests for bank solvency: stress tests for bank liquidity adequacy are another subject on which there is much to be said. An introduction to those stress tests is L. L. Ong and M. Eihák, “Of Runes and Sagas: Perspectives on Liquidity Stress Testing Using an Iceland Example,” IMF Working Paper 10/156, July 2010.

weak.

Similarly, if one had a stress test with a mild stress scenario, a low pass standard and low stressed capital ratios then the test would prove that the banking system was financially weak.

Central bank stress tests also have a second objective – to promote public confidence in the banking system and, implicitly, to promote confidence in the central bank’s policies towards the banking system. Indeed, this objective is stressed so frequently by central banks that one often gets the impression that the promotion of confidence must be the primary objective.

Yet the question is whether that confidence is justified.

The problem is that these two objectives are often in conflict. If the banking system is weak then a bona fide stress test with a severe scenario and a rigorous pass standard should reveal that weakness. Unfortunately, revealing that weakness would undermine confidence in the banking system and undermine the second objective. In such circumstances, the only way to achieve the confidence-boosting objective is to water down the stress test exercise to engineer an undeserved pass result.

If the stress tests give the banking system a clean bill of health, the clash between these two objectives gives the central bank a credibility problem: it needs to persuade potential critics that the test really was demanding, and it needs to reassure them that it is not putting its confidence-boosting objective ahead of the integrity of the test itself.

This credibility problem is *the* central issue with the stress tests.

This problem is heightened further by the fact that the central bank

has a vested interest in the confidence-boosting objective: apart from anything else, for the central bank to suggest that the banking system was in poor shape would be to acknowledge that its own policies had failed.

However, it is sometimes still possible for an outside observer to make an informed judgment on the integrity of any stress test: the key is to look for evidence that the test is demanding. So if there is strong evidence that the adverse scenarios are genuinely severe and if there are a reasonable number of them, if the pass standards are high, if there are no obvious major biases or weaknesses, and so forth, one might be inclined to believe the results.

Conversely, one might not. A sure sign of a cheat is a stress test that emphasises harsh macro assumptions but does nothing to ensure that these harsh assumptions make it through to the projected loss rates. Central bank stress testers are experts at this game.

# 3. RESULTS OF THE 2018 STRESS TESTS

## CAPITAL RATIOS

Stress test results for the projected CET1 ratios are shown in Table 6:

**TABLE 6: PROJECTED CET1 RATIOS IN THE STRESS SCENARIO**

BANK	MIN STRESSED RATIO	PASS STANDARD	SURPLUS
(A) IFRS TRANSITIONAL			
Barclays	11.0%	7.9%	3.1%
HSBC	9.1%	7.8%	1.3%
LBG	11.4%	8.5%	2.9%
NW	14.1%	7.9%	6.2%

RBS	9.7%	7.3%	2.4%
Santander	10.9%	7.5%	3.4%
St. Ch.	7.9%	6.7%	1.2%
<b>Aggregate</b>	9.7%	7.8%	1.9%
<b>(B) IFRS Non-Transitional</b>			
Barclays	8.8%	7.0%	1.8%
HSBC	8.2%	6.6%	1.6%
LBG	8.6%	6.9%	1.7%
NW	14.1%	7.8%	6.3%
RBS	9.2%	6.9%	2.3%
Santander	9.7%	7.7%	2.0%
St. Ch.	7.5%	6.4%	1.1%

Notes. 1. Source November 2018 FSR Tables A4.A, A4.C to A4.I. 2. Minimum stressed ratio after impact of strategic management actions and any conversions of AT1. 3. Surplus – min stressed ratio minus pass standard. 4. No aggregate numbers are available for IFRS 9 non-transitional.

Keep in mind that these results are not to be taken too seriously if only because the CET1 ratio uses a discredited denominator. Even so, two points jump out:

- The banks do not seem to perform very well at all. Their surpluses – their minimum values under the stress minus the pass standards – are small. For example, in the IFRS 9 transitional results, the average surplus is a mere 1.9 percentage points.
- There are notable differences between the IFRS 9 transitional results and the IFRS 9 non-transitional ones.

From a solvency and prudential viewpoint, it would seem to me that the latter was the better approach because a non-transitional approach takes *more* account of expected losses already coming through (and the losses are coming through anyway, expected or not!), so we should pay more attention to these results than the tran-

sitional ones.

Stress test results for the projected Tier 1 leverage ratios are shown in Table 7:

**TABLE 7: PROJECTED TIER 1 LEVERAGE RATIOS UNDER THE STRESS SCENARIO**

<b>BANK</b>	<b>MIN STRESSED RATIO</b>	<b>PASS STANDARD</b>	<b>SURPLUS</b>
<b>(A) IFRS TRANSITIONAL</b>			
Barclays	3.90%	3.61%	0.29%
HSBC	4.60%	3.75%	0.85%
LBG	4.50%	3.79%	0.71%
NW	5.10%	3.60%	1.50%
RBS	5.20%	3.59%	1.61%
Santander	3.90%	3.26%	0.64%
St. Ch.	4.90%	3.48%	1.42%
<b>Aggregate</b>	<b>4.60%</b>	<b>3.52%</b>	<b>1.08%</b>
<b>(B) IFRS Non-TRANSITIONAL</b>			
Barclays	3.20%	3.25%	-0.05%
HSBC	4.20%	3.34%	0.86%
LBG	3.40%	3.25%	0.15%
NW	5.10%	3.58%	1.52%
RBS	4.80%	3.25%	1.55%
Santander	3.40%	3.25%	0.15%
St. Ch.	4.60%	3.25%	1.35%

Notes. As per Table 6.

Ideally, we should have results for the stressed CET1/TA ratios, but the Bank only reports stressed CET1 numbers for the IFRS 9 transi-

tional case and does not report any stressed TA numbers at all. I have therefore reported the Bank's stressed Tier 1 leverage ratios as a second best 'make do'.

Again we see the differential impact between IFRS 9 transitional and IFRS 9 non-transitional, with results generally better for the latter case. Again we see that the surpluses – in this case, stressed Tier 1 leverage ratios minus their pass standards – are small. Barclays' also narrowly fails to reach the pass standard in the non-transitional case.

If we now obtain a market-value Tier 1 leverage ratio in the same manner as we would obtain a market-value CET1/TA ratio, i.e., by multiplying by the PtB ratio, we get the stressed market-value Tier 1 leverage ratio results shown in Table 8.

With one exception (Lloyds in the transitional case) all the banks have stressed market-value Tier 1 leverage ratios that *fall below* the Bank's own pass standards and the average shortfalls are 51 basis points for the transitional case and 69 basis points for the non-transitional case.

The pass standards themselves are remarkably undemanding: on average 3.92% for the transitional case and 3.65% for the non-transitional one. These pass standards are not much more than a third of the King standard or a quarter of the minimum Admati standard range.



**TABLE 8: BIG 5 BANKS' PROJECTED MARKET-VALUE TIER 1 LEVERAGE RATIOS IN THE STRESS SCENARIO**

<b>BANK</b>	<b>TIER 1 LR</b>	<b>P2B</b>	<b>MV TIER 1 LR</b>	<b>PASS STANDARD</b>	<b>SURPLUS</b>
<b>(A) IFRS 9 TRANSITIONAL</b>					
Barclays	3.90%	44%	1.72%	3.61%	-1.89%
HSBC	4.60%	68%	3.13%	3.75%	-0.62%
LBG	4.50%	83%	3.74%	3.25%	0.48%
RBS	5.10%	55%	2.81%	3.25%	-0.45%
St. Ch.	5.20%	39%	2.03%	3.25%	-1.22%
<b>Average</b>	<b>5.07%</b>	<b>67.1%</b>	<b>3.40%</b>	<b>3.92%</b>	<b>-0.51%</b>
<b>(B) IFRS 9 NON-TRANSITIONAL</b>					
Barclays	3.20%	44%	1.41%	3.25%	-1.84%
HSBC	4.20%	68%	2.86%	3.34%	-0.48%
LBG	3.40%	83%	2.82%	3.25%	-0.43%
RBS	4.80%	55%	2.64%	3.25%	-0.61%
St. Ch.	4.60%	39%	1.79%	3.25%	-1.46%
<b>Average</b>	<b>4.42%</b>	<b>67.1%</b>	<b>2.97%</b>	<b>3.65%</b>	<b>-0.69%</b>

Notes. 1. Source Nov 2018 FSR Tables A4.A, A4.C to A4.I and ShareTelegraph. 2. The average is a weighted average using shares of combined TAs as weights. 3. Otherwise as per previous two tables.

## CET1 LEVELS

It is also interesting to examine the impact of the stress scenario on CET1 levels shown in Table 9:

**TABLE 9: CET1 LEVELS**

<b>BANK</b>	<b>TIER 1 LR</b>	<b>P2B</b>	<b>MV TIER 1 LR</b>	<b>PASS STANDARD</b>
Barclays	42	42	46	4
HSBC	95.9	99.1	74.1	-25
LBG	30	30	28	-2
NW	10	10	10	0
RBS	32	32	28	-4
Santander	10	11	9	-2
St. Ch.	29.6	29.6	22.6	-7
<b>Total</b>	<b>249.6</b>	<b>253.7</b>	<b>217.7</b>	<b>-36</b>

Notes. 1. £ billions. 2. Stress impact = 2017Q4 minus Min Stress. 3. Source Nov 2018 FSR Tables A4.C to A4.I.

Across the banks, the impact of the stress (relative to the starting 2017Q4 value) on CET1 is to reduce CET1 by £36 billion, a fall of 14.2%.

For an adverse scenario that is “more severe overall” than the GFC, this capital loss figure is implausibly low.

To give a comparison, in the actual GFC, the UK banks that got bailed out suffered losses equivalent over £98.4 billion (and this number could be a considerable under-estimate) in capital losses, a number which is equivalent to 183% of their reported 2007 capital.<sup>9</sup>

Alternatively, consider this passage from James Ferguson:

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<sup>9</sup> See Local Authority Pension Fund Forum, UK and Irish Banks Capital Losses - Post-Mortem, p. 3. Admittedly, the capital numbers are not directly comparable because CET1 did not exist then, but the magnitudes of the Bank's projections to (some of) the capital losses experienced during the GFC are nonetheless striking. Even more striking are the ratios of losses to capital, i.e., >14.2% vs. 183%.

*In addition to the more than £200bn in cumulative loan loss provisions UK banks have had to deal with, there have been roughly £100bn in securities and restructuring (goodwill, etc) losses and at least £60bn in PPI, LIBOR and other legal redress to deal with. These sums overwhelmed the starting 2007 sector shareholder capital, which totalled about £180bn at the time.<sup>10</sup>*

In short, UK banks made losses of one form or the other of about £360 billion, which was twice their 2007 shareholder capital.

Consider also the impacts of the stress on individual banks. Only HSBC gets a stress vs. starting point CET1 hit that gets into double figures. Standard Chartered gets a hit of £7 billion, RBS a hit of £4 billion, LBG and Santander get hits of £2 billion, the Nationwide gets a hit of zero, and Barclays gets a ‘hit’ of minus £4 billion, i.e., it is £4 billion better off after the stress than when it started!

For a ‘more severe than GFC’ stress, the hits to banks at the peak of the stress look awfully unstressful: the banks don’t even break into a sweat. My suspicion (which appears to be justified by evidence we shall shortly see) is that the Bank has greatly underestimated losses and greatly overestimated banks’ profits in the stress.

## **IMPAIRMENT CHARGES TO MORTGAGES AND REAL-ESTATE BUSINESS LOANS**

Projected cumulative impairment charges to mortgages and real-estate business loans over the stress scenario period are shown in Table 10:

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<sup>10</sup> J. Ferguson, “UK bank ‘stress’ test,” MacroStrategy Partnership, 2 December 2018.

**TABLE 10: PROJECTED IMPAIRMENT CHARGES TO MORTGAGES AND REAL ESTATE BUSINESS LOANS UNDER THE STRESS SCENARIO**

<b>BANK</b>	<b>MORTGAGES</b>	<b>CRE LOANS TO BUSINESSES</b>	<b>TOTAL REAL ESTATE</b>
Barclays	1.2	0.2	1.4
HSBC	0.5	0.5	1
LBG	9.4	1.1	10.5
NW	1.9	0.1	2
RBS	1.4	0.6	2
Santander	2.3	0.5	2.8
St. Ch.	-	-	-
<b>Total</b>	16.7	3	19.7

Notes. As per Table 9.

Given that the stress scenario posits huge falls in real estate prices – a 30% fall in residential house prices and a 40% fall in CRE prices – these projected impairment charts are incredibly low. So, a collapse in real estate leads to projected cumulative five-year losses equal to just £20 billion or 7.9% of the big 7’s CET1.

I don’t believe it!

I will come back to this issue below (see section 11).

## **LOSSES ON TRADED RISK POSITIONS IN 2018**

The traded risk element of the scenario included a test of banks’ abil-

ity to withstand a severe shock to financial market asset prices, the default of several large counterparties. It also covers the impact on banks' investment banking revenues and costs projected over the five years of the test.

Projected losses on traded risk position in 2018 under the stress scenario are shown in Table 11:

**TABLE 11: PROJECTED TRADED RISK LOSSES FOR 2018 UNDER THE STRESS SCENARIO**

BANK	LOSSES (£ BILLIONS)
Barclays	6.5
HSBC	9.7
LBG	2.1
RBS	1.5
Santander	0.6
St. Ch.	3.3
Total	23.6

Notes. 1. NW is excluded because it has minimal traded risk exposures. 2. Source: Nov 2018 FSR, Table A5.E.

Therefore projected total losses under the first year of severe stress are equal to just over £23.6 billion or 9.3% of latest CET1.

Cue Mr. Meldrew.

Suffice here to ask how credible are these numbers in the light of recent experience from the GFC? More to the point, how could any central bank stress tester *possibly* have any idea of what these losses might be, when derivatives exposures are often well-hidden as we saw in the well-known cases of Lehman, AIG, MF Global and Liborgate,

and in less well publicised cases such as Deutsche Bank's leveraged super senior trades<sup>11</sup> or Deutsche's Santorini trades with Monte Paschi?<sup>12</sup>

The next sections address various specific concerns about the stress tests.

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<sup>11</sup> Over the period 2005 to 2009, Deutsche had a large – at one point, a \$130 billion large – position in leveraged super senior trades, 'super senior' or quadruple A meaning theoretically safer than AAA bonds. The main risks in these positions were credit risks, but it transpired that the bank was hedging them with S&P put options, and both the original position and its supposed hedge appear to have massive hits at the same time. Deutsche appears to have hidden the problem until the truth emerged in 2012. See T. Braithwaite, M. Mackenzie and K. Scammell, "Deutsche Bank: Show of strength or a fiction?" *Financial Times*, December 12, 2012.

<sup>12</sup> "Deutsche Bank AG designed a derivative for Banca Monte dei Paschi di Siena SpA at the height of the financial crisis that obscured losses at the world's oldest lender before it sought a taxpayer bailout. ... The Santorini transaction shows how investment banks devised opaque products that years later are leaving companies and taxpayers with losses." E. Martinuzzi and N. Dunbar, "Deutsche Bank derivative helped Monte Paschi hide losses," *Bloomberg* 17 January 2013.

## 4. THE STRESS SCENARIO(S)

A stress scenario is a hypothetical adverse event – essentially, it is a model-based guess of what might happen in the future.

The first question that then arises is how severely adverse should a stress-scenario be? There are no hard and fast rules here, but one needs a scenario that is seriously severe but not off-the-chart severe. If a scenario is too mild, then the usual stress test result – that the banks pass the stress test – is of no use beyond an attempt at propaganda. A stress test based on a mild scenario is like an exam with a too easy set of questions: it tells us nothing useful because even a poor candidate will pass. At the other extreme, an impossibly severe scenario is of no use either. The corresponding exam analogy also applies: an exam with an impossibly demanding set of questions tells us nothing useful because even the best candidate will fail.

Then there is the question of which type of scenario to use in a stress test. Again, there are no hard and fast rules, but one is looking for plausible ‘what if’ adverse events. These could be based on suspected vulnerabilities: if one suspects that a bank is heavily exposed to, say, real estate, then one might use stress tests that attempt to gauge the bank’s ability to withstand a severe real-estate downturn. One can also select scenarios based on hypothetical repeats of historical experiences or contemporary experiences overseas. Obvious scenarios could be based on the 1930s, the East Asia crisis, the GFC, the recent experience of the Eurozone or a major meltdown in China. If one is looking for a guiding principle here, one would take a scenario that is plausible because it has happened somewhere, perhaps recently, and then add on a little more severity for the sake of prudence.

There is also the question of how many scenarios to run. Since the future is uncertain, one wants a range of substantially different scenarios that one hopes might approximate the main risks that banks face as best one can perceive them, but there is no magic formula to tell us how many scenarios to consider.

There is, however, one hard and fast rule: both the risk management literature<sup>13</sup> and common sense suggest that one should *not* rely on a single adverse scenario. The chances of any particular scenario coming to pass are very small, and it is highly likely that one will get an outcome quite different to that envisaged.

So even if one conducts an otherwise flawless stress test that shows that the banking system is safe under the scenario considered, one cannot possibly know whether the banking system will be safe under all the other plausible scenarios that were not considered. This is so

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<sup>13</sup> For more on the state of the art in financial stress testing, see, e.g., “Stress testing”, pp. 291–307 in K. Dowd, *Measuring Market Risk*, 2nd edition, Chichester: Wiley, 2005 or D. Rösch and H. Scheule (eds) *Stress Testing for Financial Institutions*, London: RiskBooks, 2008.



because:

- The impact of any scenario on a bank depends on the extent to which the scenario captures that bank's particular vulnerabilities – banks have different business models and different sectoral and geographical footprints.
- If one relies on just one scenario one could easily have a situation where a weak bank performs well in a stress test only because the scenario misses its main risk exposures. It is precisely to reduce this danger that the stress testing literature advises that, if one is to do stress testing at all, one should rely on multiple and substantially different scenarios in the hope that if a bank has a major vulnerability, then at least one of the scenario analyses will flag it.

No single scenario can *ever* give you confidence that the banking system is safe. A recent article put this point much better than I could:

*A key principle underlying the Bank's approach to stress testing is to explore a range of scenarios. Any single scenario is almost certain not to materialise. And it is not desirable from a regulatory perspective that the banking system as a whole is only assessed against a single 'bad state of the world'. Moreover, from a practical perspective, differences in banks' business models imply that scenarios that might be stressful for one bank might be much less so for another. To make the framework useful for policymakers, stress tests should explore different vulnerabilities and manifestations of possible future stresses.*

This admirable advice comes from the Bank of England's own 'framework' paper on the stress tests.<sup>14</sup>

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<sup>14</sup> See Bank of England, "A framework for stress testing the UK banking system," October 2013, p. 19.

Doctors giving health check-ups wouldn't run a test for bowel cancer, and then use a negative result to conclude that one was free of heart disease. If your doctor did that, they would be struck off. No one medical test can guarantee perfect health, and yet this is what the Bank is trying to do with its stress tests: it is trying to use one test (and an unconvincing one) to demonstrate that the banking system is in good health.

In stress testing, what is important is to model a range of different scenarios in a simple broad-brush manner, not to fine-tune any one scenario while ignoring other scenarios entirely. To quote risk expert Christopher Finger:

*We do not look at any single scenario carefully, but rather hope that the set of scenarios covers the spectrum of risks we might face.<sup>15</sup>*

One might even say that this is the first fundamental principle of good stress testing.

The stress scenarios are also way too orderly in that they do not capture the key features of real-world financial crises. They understate the fat tails and nonlinearities; they do not capture the adverse feedback and amplification effects, the chaos, confusion, funding and fire-sale problems. As well as underestimating the impact of real sector effects on the financial sector, they also underestimate the impact of financial sector effects on the real sector, and above all, they underestimate the opaque interconnectedness of the system. To quote Anat Admati:

*It is impossible to predict with any precision how an actual crisis,*

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<sup>15</sup> C. C. Finger, "Epilogue – Fishing for complements", p. 444 in D. Rösch and H. Scheule (eds) *Stress Testing for Financial Institutions*, London: RiskBooks, 2008.

*which may come from an unexpected direction, would play out in the highly interconnected system. The opacity of the system and the existence of many layers of intermediation make it difficult to assess true counterparty risk and the correlation between underlying macro risk and counterparty risk. Risks that are assumed to be transferred and dispersed may instead be concentrated elsewhere, as happened in the case of AIG.<sup>16</sup>*

These factors make financial crises much more costly than normal recessions and the stress tests greatly understate them.<sup>17</sup> Morris Goldstein provides a neat example:

*(a) Note that when former Federal Reserve Chairman Ben Bernanke testified to Congress in 2007 about the subprime crisis, he estimated that it would generate total losses in the neighborhood of \$50 billion to \$100 billion ... (b) But ... when Bernanke gave testimony in an AIG court case ... he explained that, by September and October of 2008, 12 of 13 of the most important financial institutions in the United States were at risk of failure within a period of a week or two. The question for stress test architects and modelmakers is, ‘how do you make your models generate a transition from (a) to (b) in the course of, say, a year or two?’ This is not a technical sideshow. In stress modeling, it is the main event.<sup>18</sup>*

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<sup>16</sup> A. R. Admati, “The missed opportunity and challenge of capital regulation,” National Institute Economic Review Number 235, February 2016, pp. R4-R14.

<sup>17</sup> M. Goldstein, Banking’s Final Exam: Stress testing and bank-capital reform: Washington DC: Petersen Institute for International Economics, May 2017.

<sup>18</sup> Op. cit., p. 251.

## 5. HURDLE RATES/ PASS STANDARDS

*Performance in the test is assessed against the Bank's hurdle rate framework, which comprises elements expressed in terms of both risk-weighted CET1 capital and Tier 1 leverage ratios. For the 2018 ACS, the hurdle rate framework has evolved in a number of ways, as set out in Box 2. Each bank's hurdle rates reflect its minimum capital requirements, plus an additional element to reflect its systemic importance, less an adjustment related to the impact of IFRS 9 ...*

This succinct statement hides the fact that the determination of the pass standards – my terminology, the Bank prefers the posh term ‘hurdle rate’<sup>19</sup> – is the outcome of an extraordinarily convoluted process in which the pass standards are lovingly honed to the nth degree of precision by a superhumanly wise Financial Policy Committee that

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<sup>19</sup> The Bank does not regard its hurdle rate as a pass standard as such. The Bank always makes a point of saying that the result of the test is not some automated pass/fail exercise based purely on how the min-stressed CET1 ratio or leverage ratio compares to its hurdle rate: the Financial Policy Committee gives due consideration to other factors. However, in practice so far, the FPC has always operated ‘as if’ the exercise were an automatic pass/fail one based purely on how that ratio, marked perhaps a little on the lenient side, compared to the hurdle rate, and so for present purposes we are entitled to treat the exercise ‘as if’ it were this way.

has now mastered the art (or science or whatever) of fine-tuned counter-cyclical policy. We have the capital conservation buffer (CCB), the countercyclical capital buffer (CCyB), the systemic risk buffer (SRB) and the global systemically important institution buffer (G-SII buffer), we have Pillar 1, Pillar 2A, Pillar 2B, PRA buffers vs. CRD IV buffers, buffers for the CET1 ratio and buffers for the leverage ratio, and we have the Basel III leverage ratio vs. CRD IV leverage ratio vs the leverage ratio now used by the BoE, blah de blah de blah.

We can however, at least be grateful that for the 2018 stress tests the Bank has abolished the systemic reference point (SRP), so we no longer have to distinguish between the SRP and the hurdle rate. I had barely got my head around the SRP when they abolished it a year later, but I shall miss it nonetheless. “Look at our fancy system,” is the message, “it must be good because it is so darn complicated.”

It is certainly complicated and it is precise as well. Consider the leverage ratio hurdle rates. We have a pass standard of 3.25% for Santander, 3.48% for Standard Chartered, 3.59% for RBS, which jumps to 3.60% for the Nationwide and jumps again to 3.61% for Barclays, then 3.75% for HSBC and unlucky Lloyds gets 3.79%. (These numbers come from the November 2018 *FSR* Table A4.4.) One wonders how they can be sure that the Nationwide merits 3.60% but RBS only merits 3.59%. Can we really be 100% sure that it shouldn't be the other way round? Heaven forbid. This degree of precision would make perfect material for the BBC gameshow “Pointless”. It is entirely spurious.

There is of course simply *no point* in all this elaborate fine-tuning when *all* of the banks *fall way below any reasonable* pass standard. One may as well worry about fine-tuning the sea defences when the town is already well under water. The entire framework is not just point-

less, but useless too.<sup>20</sup>

My advice would be to fine tune them all to 15.00% for the leverage ratio or capital to total assets ratio in market value terms and be done with it.

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<sup>20</sup> Or, rather, worse than useless. A system in which pass standards are so low that capital-inadequate banks can easily pass the stress test exam is one that provides false risk comfort to anyone who goes with the BoE line. False risk comfort then leaves people unknowingly exposed to risks that they could have managed had they been properly informed. Low pass standards make a bad situation worse.

## 6. IFRS 9

The 2018 stress test is the first to be conducted under the new accounting standard governing expected losses, International Financial Reporting Standard 9 (IFRS 9).

The introduction of this new accounting standard is welcome in so far as it brings forward the recognition of expected losses. However, the Bank does not give any indication of how the introduction of IFRS 9 *as such* has impacted the banks' key capital ratios or stress test performance, i.e., how IFRS 9 impacts the banks relative to the old accounting standard. One would have thought that omission was a fairly glaring one. Instead, the Bank compares IFRS 9 on a transitional basis and a non-transitional basis, with the emphasis/preference on the former. "The Bank remains committed to giving banks the full benefit of IFRS 9 transitional arrangements, including in the stress test," states the *FSR* (p. 9). This commitment is unfortunate. The Bank's first concern should always be prudence, and it would be prudent to report the full impact of expected losses coming through in the stress, as far as these can be gauged, and the full impact can only be gauged by stripping out the transitional items.

On the other hand, emphasizing the results on a transitional basis has the benefit of making the numbers look better.

# 7. IMPAIRMENT CHARGES

*Banks incur impairment charges of more than £140 billion over the five years of the stress.*

*Large contractions in output combined with falls in asset prices and higher interest rates lead to significant credit impairments in the stress. In total, impairments amount to £143 billion over the five years of the stress, equating to a five-year impairment rate of 4.3%. Total five-year impairments in the 2018 test are broadly similar to those seen in the 2017 ACS...*

*UK lending impairment charges amount to more than £70 billion in the test and are associated with a cumulative five-year impairment rate of 4.7%.*

For a stress that is “more severe overall” than the GFC, these projected impairment charges look awfully low. Cumulative loss rates for the GFC were perhaps 10% for UK banks. For a typical bank crisis, loan loss rates might be 10%, but in a severe one it could be more: 15% and maybe even as high as 25%. The BoE would have us believe that a crisis more severe than the GFC would inflict on the banks a loan



loss rate of under half of that inflicted in the GFC and under a half or maybe under a third of the losses inflicted by a typical or typical-severe bank crisis.

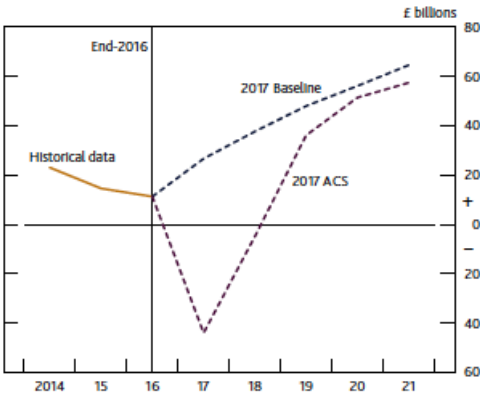
Look at it another way. The GFC wiped out banks' entire capital perhaps twice over or more, and yet the Bank's model tells us that its simulated 'more severe than the GFC' stress will wipe out just under 16% of its CET1 capital as of the beginning of the stress. The less severe real-world stress more than wipes the banks out but the Bank's more severe model-based stress has the banks coming through with a small to medium dent to their capital.

These low projected losses are *in and of themselves more than enough* to discredit the entire exercise.

# 8. PROJECTED PROFITS

In its earlier stress test reports, the BoE has always had a nice chart showing a healthy projected profit under the baseline scenario and a strong recovery in profits after the initial dip in the stress. An example is the following chart from the 2017 stress test report:

**Chart A1.2** Projections for aggregate profits before tax<sup>(a)</sup>



Sources: Participating banks' STDF data submissions, Bank analysis and calculations.

(a) For HSBC and Standard Chartered, annual profits are converted from US dollars to sterling using exchange rates consistent with the scenarios.

Unfortunately, the latest *FSR* has no such chart and gives no infor-

mation about the Bank's projected profits in the 2018 stress test exercise.

Now consider the closest relevant information provided by the Bank on pp. 6-7 of their November 2018 *FSR*:

*The widening of net interest margins in the stress supports net interest income.*

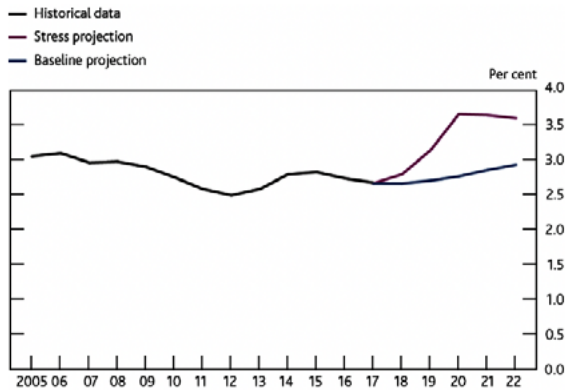
*Net interest income is the largest source of income for all banks participating in the 2018 stress test and in 2017 accounted for just under two thirds of banks' aggregate income. Around two thirds of total net interest income is accounted for by sterling.*

*The assumed rise in Bank Rate to 4% in the stress helps banks to widen the gap between what they are able to earn from interest on loans and what they are required to pay out on deposits. In part that is explained by banks' ability to reinvest their non-interest bearing liabilities (such as current account deposits and equity) in sterling assets on which the return rises through the stress.*

*Consistent with that, banks' net interest margin widens in the stress to a greater degree than under the baseline scenario. Sterling loan margin — a measure of the spread between average effective sterling loan and deposit rates — starts the test at 2.66% and rises to 3.14% by the low point of the stress (Chart A.11).*

**Chart A.11 Sterling loan margin widens in the stress**

Sterling loan margin in the 2018 ACS<sup>(a)</sup>



Sources: Participating banks' STDF data submissions, Bank analysis and calculations.

(a) Sterling loan margin calculated as net interest income received on sterling assets and liabilities divided by sterling assets...

So the sterling loan margin shows a modest dip followed by a modest rise in the baseline projection, but shows a surge in that margin in the stress projection thanks to the (remarkable) projection of sterling falling 27%.

This information is wholly unsatisfactory as a substitute for a decent chart on the Bank's profit projections, however.

Nonetheless, there is reason to suppose that the Bank is again projecting a moderate hit to profits followed by a strong recovery at least in the stress scenario. The first part of this conjecture is supported by the projected capital resilience shown in Table 9. CET1 falls by about £36 billion from the start of the scenario to the low point of the stress, and we might take this fall in CET1 as a rough order of magnitude estimate of the corresponding loss, so bank profits would be about -£36 billion.

This figure is less severe than the corresponding loss in the 2017

stress test report (see Chart A1.2 on p. 24), which was about £50 billion. But what of profits post the low point of the stress? The best chart to illustrate the recovery in profits after the stress low point would appear to be Chart A.2 on page 2 of the November 2018 *FSR*, which looks at the evolution of banks' capital profiles. If one compares that with the same chart from the 2017 stress test report (Chart A1.1, p. 24) there is a similar capital rebuilding profile. So it is reasonable to infer that the 2018 stress test projects a similar rebound in profits as the 2017 stress test.

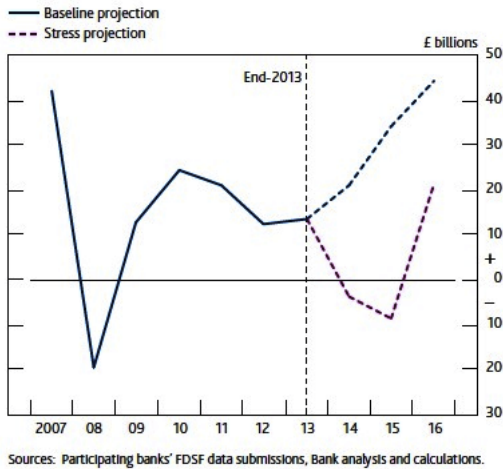
The fact that the *FSR* leaves us in the dark about the profit profile both in the baseline and in the stress – in contrast to earlier stress test reports and I am already regretting having been so mean toward them – is not some omitted 'detail' or two. It is fundamental to what is going in the stress. Strong profits lead to stronger resilience and resilience (or otherwise) is the heart of the story.

# 9. BACKTESTING THE STRESS TESTS

The stress test programme has been going on long enough that we now have enough accumulated projections to backtest some of those projections, i.e., to check how they compare to the subsequently realised outcomes.

Consider the following chart from the Bank of England's first (2014) stress report.

**Chart 5 Projections for aggregate profits before tax, before the impact of 'strategic' management actions<sup>(a)</sup>**



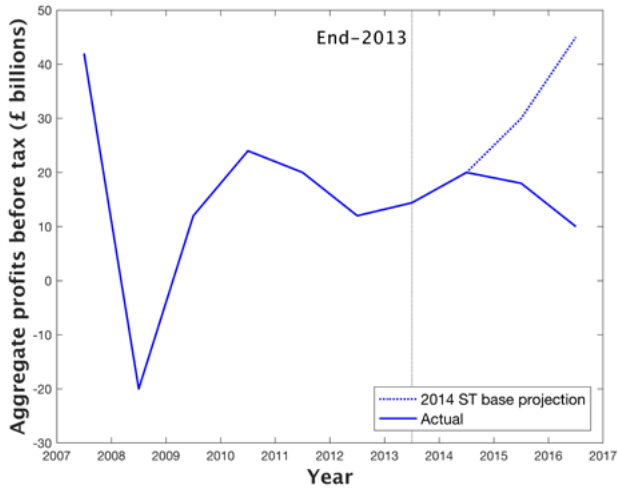
Source: Bank of England 2014 stress test report.

As Dean Buckner recently observed, the first report in 2014 includes forecasts for 2014 (£20bn), 2015 (30bn) and 2016 (£45bn) which are definitely *upward* sloping. However the corresponding *actuals* are £20bn, £18bn, £10bn, i.e., are *downward* sloping.<sup>21</sup>

The impact of these revisions and actual outcomes are shown in Chart 1:

<sup>21</sup> D. Buckner, "Stress fest," The Eumaeus Project, 28 November 2018.

**CHART 1: 2014 STRESS TESTS: PROJECTED BASE PROFITS VS ACTUAL**



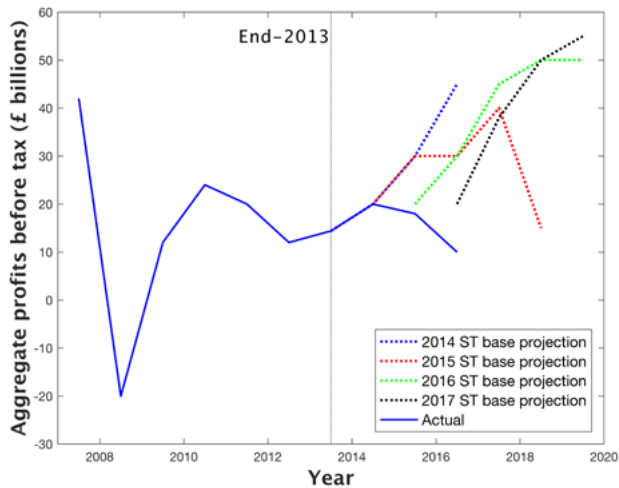
Source: Bank of England stress test reports.

The Bank’s 2014 base projections thus turned out to be well off the mark.

Subsequent stress tests then continue to project optimistic profit surges in their baseline scenarios, even as actual outcomes are first lacklustre and then decline:

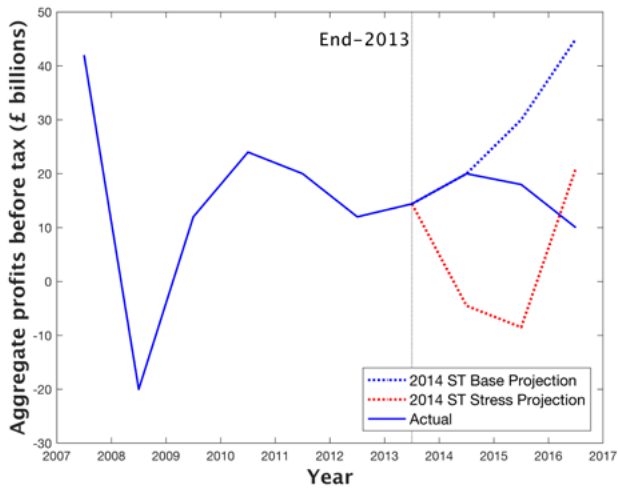


**CHART 2: HOPE IN THE FACE OF EXPERIENCE:  
REVISIONS TO STRESS TEST BASE PROFITS PRO-  
JECTIONS**



The Bank’s 2014 stressed profits projections were also problematic:

**CHART 3: THE BANK’S OVER-OPTIMISTIC 2014 STRESSED PROFITS PROJECTIONS**



Source: Bank of England stress test reports.

These projected a strong recovery after the initial stress dip, but it is interesting to note that the Bank’s projected 2017 profits in the 2014 stress test exceed the actual profits for 2017. In short, banks made lower profits for 2017 in the *absence* of any stress than the Bank had projected for that year in its ‘severe’ stress test projection!

# 10. HOUSE PRICE LOSSES

The Bank's stress test results suggest that the Bank's 'more severe than GFC' stress scenario would generate real estate losses of £20 billion.

To quote a private email from an analyst whom I respect:

*"What is so [deleted] about Carney's forecast is that if house prices fall by a third the UK banking industry will be bust, bust, bust."*

Of all the incredible results in the 2018 stress tests, this result is the least credible of all. It suggests that UK banks have only a small exposure to real estate after a long bull market.

This assessment does not ring true from credible studies elsewhere.<sup>22</sup> In the Irish property collapse of a decade ago, house prices fell around 55% and CRE prices fell over 70% – these are much more severe falls than those posited by the Bank of England – and the bank-

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<sup>22</sup> See, e.g., M. Kelly, "On the likely extent of falls in Irish house prices," Quarterly Economic Commentary, Summer 2007, pp. 42-54.

ing system collapsed.

There are also other factors that ring warning bells about banks' exposure to real estate.

James Ferguson from the MacroStrategy Partnership informed me in mid 2017 that the risk weighting game had crowded into mortgage risk weights, which across Europe were by then averaging around 11-12 percent, having been 25 percent pre-crisis and 35 percent in the standardised Basel III framework. Only large banks are allowed to use their Internal Ratings-Based (IRB) models to manipulate their risk weights in this way, however. Pre-crisis the banks had half their RWAs in mortgage assets, but have about two-thirds in mortgage assets now, he wrote. They then use their IRB models to change their assumptions to make those assets as risky as they wish them to be. These considerations suggested that institutions such as Lloyds and the Nationwide could be highly exposed to a housing crisis and the fact that the stress tests had largely missed this exposure is further confirmation of their inadequacy.

Mr. Ferguson's analysis is spot on. Banks have remarkably low capital requirements against real estate portfolios. Consider the Nationwide. This firm is triply exposed by a combination of (a) property prices having risen to very high levels, (b) its high concentration into real estate assets, and (c) its extremely low risk weights and their resulting impact on capital requirements:

**TABLE 12: NATIONWIDE BS RWAs AND CAPITAL REQUIREMENTS: RETAIL MORTGAGES VS. GROUP**

RETAIL MORTGAGES /TA	73.0%	
	RWA/ASSETS	MIN REQ CAP/ASSETS
Retail mortgages	6.88%	0.55%
Group	12.22%	0.98%

Source: NW Pillar 3 Disclosure Sept 2018, p. 35.

Seventy-three per cent of its total assets consist of retail mortgages, so the firm is heavily concentrated in the sector. Its average ratio of RWAs to assets is 12.22% across the group but only 6.88% on its retail mortgages portfolio. These RWA/asset ratios are the lowest I have ever encountered. The corresponding minimum capital requirements (expressed to assets) are 0.98% and 0.55%. This financial institution is therefore allowed a leverage of  $1/0.55\% = 181.8$  on its retail mortgages!

And it passed the Bank's stress tests.

# 11. IMPACTS ON INDIVIDUAL INSTITUTIONS

There are also some odd results at the individual institution level. Continuing with the Nationwide projected performance under the stress:

- CET1 flat-lines at £10bn;
- the T1 leverage ratio rises from 4.9% to 5.1%;
- risk weights more than double from £32 billion to £71 billion, a rise which confirms the unreliability of the RWA measure. Since when does the denominator in a reliable capital ratio more than double in a couple of years, and what else could such an increase signify other than the unreliability of the measure itself? And
- this rise in RWAs results in the CET1 ratio plummeting from 30.4% to 14.1%.

So it is fair to say that the modelling of the Nationwide under the stress does not look right.

There are also some strange things going on with the other banks under the BoE's projected stress:

Barclays:

- CET1 capital up 9.5%;
- RWAs up 34%.

HSBC:

- RWAs up 19.3%.

Lloyds:

- CET1 capital down (only) 6.7%;
- RWAs up 16%.

RBS:

- CET1 capital down 12.5%;
- RWAs up 43%.

Santander:

- CET1 capital down 18%.

Standard Chartered:

- RWAs up 31%.

One (fairly) common factor is the sharp increase in RWAs compared to the small changes in CET1. Consequently, the increase in the CET1 ratio that the Bank highlights primarily reflects the perplexing increase in RWAs, as opposed to the capital increase we would have liked, which would have been an increase in the CET1 ratio driven by a strong increase in actual capital.

A PS on Barclays. To quote a story in the 15 May 2019 *Financial Times* (“Bank of England warned criminal charge could destabilise Barclays”):

*The Bank of England warned prosecutors that a criminal charge against Barclays could present an existential threat to the lender, showing that regulators still worry about large banks being “too big to jail”.*

*According to people familiar with the matter, in 2017, Sam Woods, the BoE’s top banking supervisor, told David Green, the then-director of the Serious Fraud Office, that there could be unpredictable consequences if there were charges against Barclays over crisis-era payments to Qatar.*

*Mr Woods questioned whether a corporate criminal charge would be in the public interest as officials believed it would present a small – but not insignificant – threat to Barclays’ safety and soundness. ...*

*Although the SFO went ahead and charged Barclays in June 2017, the BoE’s intervention shows a lingering concern that a criminal prosecution could destabilise large lenders. This “too big to jail” fear has long hampered enforcement action in the UK and US, setting off fierce public debate on both sides of the Atlantic.*

So the Bank of England’s position is (a) that the banks are “resilient



to deep simultaneous recessions in the UK and global economies that are more severe overall than the global financial crisis and that are combined with large falls in asset prices and a separate stress of misconduct costs,” but (b) that banks might not be resilient to the Bank of England imposing a hefty fine on a single bank like Barclays for its past misdemeanours.

The Bank’s actions reveal what it really thinks, right?

# 12. WHY ARE PRICE-TO- BOOK RATIOS SO LOW?

Then there is the issue of the low Price-to-Book ratios. The *FSR* (p. 24) correctly observes that “Major UK banks’ price to book ratios ... have been low since the crisis (Chart B.3). And they have fallen further in recent months reflecting movements in bank equity prices.”

### Chart B.3 Price to book ratios have been low since the crisis

Major UK banks' equity prices since June 2018<sup>(a)</sup>(b)(c)(d)



Sources: Bloomberg Finance L.P., [Datastream](#) from [Refinitiv](#) and Bank calculations.

(a) UK banks are Barclays, HSBC, Lloyds Banking Group and RBS.

(b) Relates the share price with the book, or accounting, value of shareholders' equity per share.

(c) HSBC's price to book ratio is adjusted for currency movements.

(d) The underlying data have been sourced from Thomson Reuters [Datastream](#) up to 2013, and from Bloomberg from 2014 onwards.

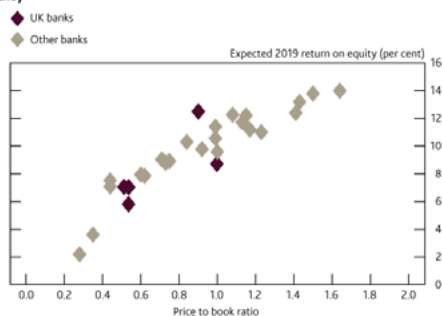
The issue is what to make of these low PtB ratios. To my way of thinking, these must reflect *some problem* with the banks, otherwise these ratios would be higher than 100%. The natural interpretation is that they reflect impaired asset values, i.e., hidden losses not reflected in the accounting book values.

The Bank does not share that interpretation. It prefers instead to interpret low PtB ratios as reflecting poor expected profitability:

*The FPC continues to judge that UK banks' low price to book ratios are consistent with market concerns over expected future profitability rather than concerns about existing asset quality. Their market valuations remain consistent with the relationship internationally between price to book ratios and expected future returns on equity (Chart B.4). (November 2018 FSR, pp. 24-25, my emphasis)*

**Chart B.4** There is a positive correlation between banks' price to book ratios and expected returns on equity

Price to book ratios for major global banks compared with expected one year ahead returns on equity<sup>(a)(b)</sup>



Sources: Bloomberg Finance L.P., [Datastream](#) from [Refinitiv](#) and Bank calculations.

- (a) The price to book ratio relates the share price with the book, or accounting, value of shareholders' equity per share.  
 (b) UK banks are Barclays, HSBC, Lloyds Banking Group, RBS and Standard Chartered.

The FPC's explanation is fatuous. The expected book-value return is PtB times the expected market-value return as a matter of arithmetic, so the positive correlation in the chart proves nothing.<sup>23</sup> The Bank's chart B.4 might be 'consistent' with the Bank's preferred low expected future profitability hypothesis, but by the same logic it is also consistent with the 'impaired assets' hypothesis that the Bank is seeking to dismiss. The Bank's chart supports neither hypothesis over the other.

The Bank also says that it has other evidence to support its position:

*Other market indicators corroborate this judgement. If this trend were caused by deteriorating asset quality, bank funding costs should reflect that. However, market indicators of bank credit risk, including spreads between yields on AT1 capital instruments and risk-free rates and credit default swap (CDS) premia, remain with-*

<sup>23</sup> The chart says 'expected return on equity' but does not say whether that is market or book. I have interpreted it as book because the alternative explanation leads to a negative correlation that contradicts the positive correlation in the chart.

*in the range they have occupied over the past two years (Chart B.5).*

### Chart B.5 Bank funding costs reflect their resilience

UK banks' indicative long-term funding spreads<sup>(a)</sup>



Sources: Bloomberg Finance L.P., IHS Markit and Bank calculations.

- (a) UK banks are Barclays, HSBC, Lloyds Banking Group and RBS.
- (b) Option-adjusted spreads. Refers to non-financial euro-denominated investment-grade corporate bonds issued in Eurobond or euro member domestic markets.
- (c) Simple average of secondary market spreads over government bonds.
- (d) Constant maturity unweighted average of secondary market spreads to mid-swaps for the major UK lenders' five-year euro-denominated senior unsecured bonds issued by the holding company or a suitable proxy when unavailable.
- (e) Unweighted average of five-year euro-denominated senior CDS premia for the major UK lenders.
- (f) Constant maturity unweighted average of secondary market spreads to mid-swaps for the major UK lenders' five-year euro-denominated senior unsecured bonds issued by the operating company or a suitable proxy when unavailable.

I don't think so. Chart B.3 shows a big dip in 2011 and a smaller dip in 2016. Chart B.5 shows a big peak in 2011 and a smaller peak in 2016. Chart B.3 also shows that the PtB ratio has declined over 2018 whilst Chart B.5 shows that spreads have risen over 2018. These co-movements are *what we would expect* if low PtB ratios reflected impaired assets. This evidence, such as it is, does not corroborate the FPC's judgement that low PtB ratios are not due to impaired assets. Instead, it undermines that judgement.

The FPC view that low PtB ratios can be explained by low expected returns is also undermined in another way: it is not possible to come up with plausible calibrations of a Dividend Discount Model that would support it. This subject is a bit murky, however, so I defer a longer discussion to Appendix 6.

The Bank's view on this issue also misses the main point, which is

that low PtB ratios signal *some* problem that is not reflected in the banks' accounting or book values. Whether that problem is impaired assets or low expected future profitability shouldn't matter: market values can be low for either reason. Either way there is a problem that the Bank's 'low expected profits' hypothesis does not explain away.

The BoE has been in denial on this issue for some time. Consider this passage from a letter from Vickers to Carney of 5 December 2016:

*... market-to-book ratios for some major UK banks are well below 1. That indicates market doubt about the accuracy of book measures. To the extent that such doubts are correct, stress tests based on book values are undermined.*

*The Bank appears to take the view that low market-to-book ratios [for UK banks] are down to dimmed prospects of future profitability rather than problems with current asset books. But such a view is hard to sustain for banks with [price-to-book] ratios below 1. There is, at the very least, a serious possibility that low market-to-book ratios are signalling underlying problems with book values. This certainly cannot be dismissed, especially when one is examining the ability of the system to bear stress – an exercise that calls for prudence.<sup>24</sup>*

To me this statement is self-evidently correct, so I was surprised that in his reply Governor Carney attempted to challenge it: he continued to defend the Bank's earlier position that low market-to-book is due to low future profitability and dismissed Vickers' concerns about the *possibility* that markets might be signalling deeper issues with the book values.

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<sup>24</sup> "Supplementary market-based stress test results," letter from Sir John Vickers to Governor Mark Carney, 5 December 2016.

I have to ask myself how the Bank of England can be *so sure* (and prudently so!) that its interpretation is correct and Vickers' is not.

Carney's response does not address Vickers' concerns and in any case raises further issues, e.g., that dimmed future earnings prospects to some extent reflect the Bank's own low interest rate policy, which has the effect of making banks' core business model unprofitable, because that model depends on the Net Interest Margin that low interest rates pull down.

There is another problem. As Tim Bush observed:

*there is a circularity in Dr. Carney's reference to low future profitability being the drag down of price/book ...*

*"Low future profitability" implies banks will be knowingly writing sub-standard business going forwards, which is irrational. And if it were true, the Bank should stop it.*

*I think the low future returns are the unwinding of currently overstated positions. Be it loans, be it derivatives.<sup>25</sup>*

Then consider Vickers' (March 3rd 2017) response to Carney:

*The regulation of banks is based on accounting measures of capital. A major source of risk to financial stability is that capital is mis-measured by the accounting standards used in regulation. In that case, bank regulation that allows high (e.g. 25 times) leverage relative to accounting (or 'book') measures of capital is more fragile than may appear.*

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<sup>25</sup> Personal correspondence.

*An instance of this point is that stress tests based on book values are themselves vulnerable to erroneous measurement of capital, because those measurements are their starting point. Furthermore, bank regulation nowadays counts convertible debt instruments such as CoCos as akin to equity capital, but the conditions in which they convert to common equity (or are written down) are also dependent on accounting measures of capital. In short, a lot is riding on book values being reasonably accurate. ...*

*None of this is to say that markets necessarily value assets accurately. Rather, the point is that low price-to-book ratios, especially when below one, signal a serious possibility that book values are inaccurate, and hence that the basis for regulation (not just in stress tests) is open to question.*

*Market values are not always reliable, but when [market values] are low, systematic attention should be paid to them, and transparently so.*<sup>26</sup> (My underlining)

The Bank then came up another objection to the use of market values in its March 2017 submission to the Treasury Committee's capital enquiry:

*Low market valuations can reflect a number of things, all of which lead to weak expected profitability. But, crucially, different reasons for weak profitability can have quite different implications for a bank's resilience. This is because they have different impacts on the value of the bank's assets if it needed to sell them to pay for losses elsewhere in the business.*<sup>27</sup>

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<sup>26</sup> J. Vickers, "Response to the Treasury Select Committee's Capital Inquiry: Recovery and Resolution," 3 March 2017, pp. 7, 8 and 12.

<sup>27</sup> Quoted from Vickers' letter to Alex Brazier, 26 April 2017.



The Bank illustrated this point by comparing two hypothetical banks with the same cash flows – one is efficient but has poor assets, the other is inefficient but has good assets and could sell some if needs be.

Vickers squashed this argument in his 26 April 2017 letter to Alex Brazier:

*A holder of the BoE view, if I may put it that way, can however respond by noting ... that the inefficient bank with good assets can sell some. If such a bank alone faced difficulties – so in the absence of systemic stress – this would be a reasonable answer.*

*But it is harder to see how asset sales could be a satisfactory response in conditions of systemic stress, a typical feature of which is precisely the inability of banks to sell assets except at distressed prices. This is the well-known 'fire sale' problem ...*

The gist of this problem that a bank that suffers a large loss might be forced to reduce its asset holdings by selling assets at fire-sale prices. If other banks must revalue their assets at these temporarily low market values, then the first sale can set off a cascade of fire sales that inflicts losses on many institutions and thereby creates a systemic problem.

*This kind of risk, I suggest, should be central to thinking about financial stability, and to stress tests. Financial stability policy should take a prudent approach as a general matter. In particular, it should not place reliance on banks being able to sell assets in crises at good prices. While that might cope with an idiosyncratic shock affecting one bank, it will not do in a systemic crisis. But systemic crisis risk is the principal risk that regulation should guard against. The prudent stress test question, then, is whether the bank can meet*

*its obligations without resorting to asset sales. It is not whether it can do so on the assumption that assets can be sold at good prices.*

And, one might add, the prudent response by the Bank would be to raise its capital requirements.

*In sum, low market valuations imply less resilience even when the possibility of asset sales is allowed for. Tests of resilience that rely on resort to asset sales are flawed because, as experience shows, in a systemic crisis it may well be impossible to realise full value from asset sales.*

Tim Bush also makes an appropriate observation:

*Essentially, from the perspective of a shareholder providing capital, the BoE's second example (good current balance sheet, poor future returns) is really an admission that a bank as a whole is one big impaired asset. Nothing resilient about that. Particularly, no incentive to refinance it if it incurs unexpected losses for example. New investment won't achieve an appropriate return.*

*The BoE's line is a bit like saying British Leyland was resilient if the factories were brand new.<sup>28</sup>*

So why does the Bank continue to insist that low PtB ratios reflect low expected profitability rather than impaired assets? Does the Bank have some stake in denying the impaired assets hypothesis?

It would appear that it does.

Acknowledging impaired assets would undermine its 'banking sys-

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<sup>28</sup> Personal correspondence.

tem fixed' narrative. The banking system is fixed, you see, but it is also still carrying these whacking great impaired assets.

Imagine the criticism that would get on Treasury Committee.

Its preferred explanation is much easier to sell politically. The banks are fixed, but their long-term profit outlook is low. Now that doesn't look nearly as bad, politically speaking. It is also much harder for outside analysts to unpick. But hasn't the BoE been telling us earlier that banks could expect *high* profits?

Yes.

And so we come to the central contradiction at the heart of the Bank of England's stress test modelling. In explaining away the awkward implications of the impaired assets explanation for low PtB ratios, the Bank has to insist, however implausibly is another matter, that banks' expected future profits must be low. Yet elsewhere in its modelling, the Bank has been assuming that expected future profits will surge after the initial impact of a severe stress, and would grow strongly absent the stress (see, e.g., Chart A1.2 from the 2017 Stress Test Report referred to earlier). The Bank can't have it both ways. Either the Bank believes that future profits will be weak or it believes that future profits will be strong, and the Bank must choose which it believes. If it believes that that future profits will be weak, then it undermines its own projections that purport to show the banks performing well in future years, with or without a stress. But if it believes that future profits will be strong, then it should abandon its view that low PtB ratios must be due to low profits and acknowledge the implication, i.e., that low PtB ratios must be due to impaired assets. Either way, the Bank's narrative, that the stress tests show that the banking system is fixed, is unsustainable.

# CONCLUSIONS

This year marks the fifth in the Bank's annual concurrent stress test of the financial health of the UK banking system. Like their successors, they continue the Bank's fine tradition of trying to persuade us that the UK banking system is strong against the evidence that it is not.

The stress tests are compromised by conflicted objectives, an inadequate number of stress scenarios, low pass standards, reliance on unreliable metrics and questionable modelling. Their results are wholly lacking in credibility. Their key stressed capital ratios, projected impairment charges, house price losses and traded risk losses are all way too low to be believable. The results from the stress tests are contradicted by the evidence from banks' latest balance sheets and market prices, which shows that banks are weak now, before any stress, rather than strong after a future stress that is supposedly more severe than the GFC. It is also clear from continuing low price-to-book ratios that banks are still carrying considerable impaired losses from the GFC or earlier.

Going back to the headline points from this year's stress test report:

*Major UK banks have continued to strengthen their capital positions.*

No they haven't.

*They started the 2018 stress test with an aggregate common equity Tier 1 (CET1) capital ratio nearly three and a half times higher than before the global financial crisis.*

CET1 ratios have risen substantially since before the GFC, but CET1 ratios are misleading, gameable and undermined by the useless RWA denominator. The fact that this ratio has increased does not tell us that any ratios are high enough, and the capital to asset ratios that matter aren't even close to high enough.

*The test shows the UK banking system is resilient to deep simultaneous recessions in the UK and global economies that are more severe overall than the global financial crisis and that are combined with large falls in asset prices and a separate stress of misconduct costs.*

The use here of the verb "shows" is magician's sleight of hand. What the Bank should have written was "If you believe our model then ... " There is a world of difference between what would *actually* happen in the severe stress the Bank hypothesises and what would happen *according to the Bank's highly flawed model*. No-one can say for sure what would happen if the Bank's hypothetical stress were to have occurred, but one can be highly confident that any such stress would have been much more severe in its impact on UK banks than the Bank supposes.

*Despite facing loss rates consistent with the global financial crisis*

...

The loss rates generated by the Bank's stress test models are *not* consistent with those of the GFC. They are much lower.

*... the major UK banks' aggregate CET1 capital ratio after the stress would still be twice its level before the crisis. All participating banks remain above their risk-weighted CET1 capital and Tier 1 leverage hurdle rates*

which shows that the pass standards are far too low

*and would be able to continue to meet credit demand from the real economy, even in this very severe stress. (November 2018 FSR, p. 2)*

They should have added "as modelled by the Bank".

The fact that UK banks are still weak after a long economic recovery is testimony to the failure of the Bank of England to perform on its core job function and rebuild the strength of the banking system after the trauma of the crisis.

Based on the true state of the banking system, the BoE has no business approving banks' capital plans especially in so far as they involve shareholder dividends and stock buybacks.

Bread and water are called for the banks, and sackcloth and ashes for the Bank.

The Bank has surpassed itself this time.

# APPENDIX

## 1: RISK WEIGHTED ASSETS

The exposure measure long favoured by bank regulators is the ‘Risk Weighted Assets’ (RWAs) measure. At first sight, it seems to make sense to have risk-adjusted capital requirements but in practice the adjustments create many more problems than they solve.

The way RWAs work is simple. Every asset is given an arbitrary fixed ‘risk weight’ that is usually between 0% and 100% but in unusual cases more. The ‘risk-weighted’ asset is then equal to the risk weight times the size of the position.<sup>29</sup>

In the most egregious case, OECD government debt – including, at

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<sup>29</sup> If you think that these ‘risk weights’ have no relationship to any reasonable sense of the riskiness of these assets, you would be right: this methodology is unsound in principle, and people have pointed this problem out ever since ‘risk weights’ were invented.

least until recently, Greek government debt – is assumed to be riskless and therefore attracts a risk weight of zero; bank holdings of such debt then attract a zero capital requirement.<sup>30</sup> The debt of OECD governments would then be given a zero risk weight on the presumption that it is riskless whereas commercial debt would be given the full risk weight of 100%. Risk weights on mortgage loans were also very low. These zero or low risk weights encouraged banks to load up on such assets and were a key aggravating factor in the European banking crisis – a classic case of political expediency leading to predictable disaster.

The result is to create artificially low ‘Risk Weighted Asset’ measures that are much lower than total assets: for the big 5 banks, the latest RWA/TA ratios are 30%, and I gave the example in the text of the Nationwide with an RWA/TA ratio equal to 12.22% and 6.88% on its retail mortgages portfolio.

Such problems have been known about for a long time. It is then hardly surprising that, to quote Andy Haldane:

*Surveys of investors suggest a fairly deep-seated scepticism about risk weights, with only a small fraction regarding them as trustworthy ... From a low base, investor faith in these risk weights has continued to fall fast.*<sup>31</sup>

He presents the following chart comparing RWAs with the simpler metric of bank risk, bank leverage or the ratio of bank assets to capital:

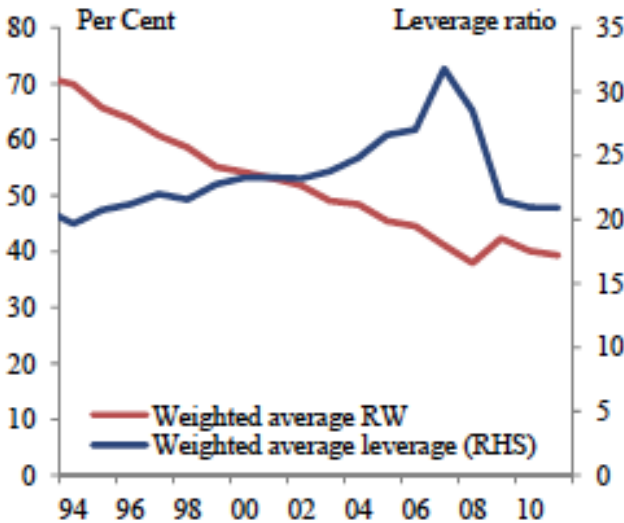
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<sup>30</sup> I believe the zero risk-weighting of Greek government debt is now under revision by the Basel Committee, years after the riskiness of Greek government debt exploded on the scene in 2011.

<sup>31</sup> See A. G. Haldane, “Constraining Discretion in Bank Regulation,” speech given at the Atlanta Fed conference, “Maintaining Financial Stability: Holding a Tiger by the Tail(s),” April 9, 2013), p. 11.



**FIGURE A1: AVERAGE RISK WEIGHTS AND LEVERAGE**



Source: The Banker and Bank calculations

(a) Sample consists of Deutsche Bank, HSBC, BNP Paribas, Barclays, Citigroup, UBS, BAML, BONY, Commerzbank, ING, JPM, LBG, RBS, Santander, State Street, UniCredit, Wells Fargo. Data are not available for the remaining G-SIBs.

(b) Leverage ratio is defined as Total assets / Tier 1 capital.

The shapes of the two plots are virtually mirror images of each other. In the period from 1993 up to the crisis, average risk weights fell from 70% to 40%, whilst average leverage rose from about 20 to well over 30. The leverage ratio picked up the growing riskiness of the banking system, but the average RWA was a *contrarian* indicator of banking risk. He then observed:

*In the pre-crisis boom, bank leverage rose steadily to reach historically unprecedented levels. This signalled high and rising bank risk. Indeed, bank leverage and bank risk weights moved in opposite directions over this period ... While the risk traffic lights were*

*flashing bright red for leverage, for risk weights they were signalling ever-deeper green.*

*The subsequent financial crisis has made clear which traffic light signal was at fault. The boom was leverage-fuelled and so too has been the subsequent bust.* <sup>32</sup>

The explanation is that the lower risk weights do not reflect reduced riskiness, but instead reflect the increasing ability of bankers to game the risk-weighting system to hide the risks they were really taking. Thus, ironically, a *lower risk weight* usually translates into *greater risk taking* and we can reasonably conclude that the RWA measure is discredited.

There is the point that estimates of required capital to RWA ratios based on a boom period *cannot* give us sensible expected loss numbers in a crash. To quote James Ferguson:

*When calculating the required capital to risk weights, banks estimate both the probability of default and the expected loss given default. Since they use recent (non-crisis) history to 'calculate' these probabilities, the higher the leverage that drives the credit boom pre-crisis, the lower both the estimated probability of default (which is a function of recent default figures) and the expected loss given default because the LTV falls. However, we all know that the best (only) way to create a crash is to inflate a boom first, making this risk weight methodology truly insane.* <sup>33</sup>

The RWA measure violates a basic principle of scientific methodology – namely, that measures of the things we measure should actu-

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<sup>32</sup> Haldane, op. cit., p. 10.

<sup>33</sup> Personal correspondence.

ally measure the things that we think they measure. Instead, RWA is a pretend number that bears no useful relationship to the risks actually taken. Reliance on this pretend RWA number then has the effect of artificially boosting capital ratios that use RWA in the denominator, thereby creating the appearance of capital that isn't really there, i.e., fake capital.

The inadequacy of the RWA measure (and that of the Tier 1 capital measure too) was also demonstrated in the GFC. As Sir Jon Cunliffe observed in 2014:

*In early 2009, around the height of the financial crisis, the market valued the combined equity of the major UK banks at less than 2% of their total assets. ... [Yet on] a risk weighted basis, the banks had 6.7% common equity capital – well above the 2% minimum. Tier 1 capital [to RWA] ratios were almost 9%.*

That is, banks were well capitalised according to the standard regulatory RWA metrics. To continue:

*This was of course the time when fear was at its peak. The message was crystal clear. When it mattered most, the market did not at all believe the published numbers for bank capital adequacy. ...*

*This episode tells us two things. The first is that financial reporting matters. It matters at all times. But it matters most in times of stress ...*

*The second thing this episode shows us is that, when push came to shove, how little confidence investors had in the regulatory capital framework. In essence, markets discounted all types of capital except pure equity. And as they distrusted the risk-weighted numbers, they wrote down the value of the equity to reach the numbers I mentioned earlier.*

*And, in many cases, they were right to do so. Capital adequacy turned out to be an illusion. ...*

*When the crisis struck, not only did a significant portion of the assets turn out to be far riskier than estimated. Market confidence in the risk-weighted capital adequacy framework as a whole pretty much evaporated.<sup>34</sup> (My underlining)*

Part of the explanation for the failure of the RWA measure is that banks were loading up on assets with low RWAs to reduce their capital requirements. This RWA system is tailor-made for gaming: a bank loads up on low-weighted assets and is rewarded with a lower capital requirement because it is deemed to have low risk. In the limit, it could load up entirely on zero-weighted assets: it would then be deemed to have zero risk and incur a zero capital requirement.

As an aside, the gameability of the system is further increased by its complexity. Consider this passage from former Enron CFO Andrew Fastow:

*“Accounting rules and regulations and securities laws and regulation are vague,” Fastow explained. “They’re complex ... What I did at Enron and what we tended to do as a company [was] to view that complexity, that vagueness ... not as a problem, but as an opportunity.” The only question was “do the rules allow it — or do the rules allow an interpretation that will allow it?”*

*Fastow insisted he got approval for every single deal — from lawyers, accountants, management, and directors — yet noted that Enron is still considered “the largest accounting fraud in history.”*

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<sup>34</sup> J. Cunliffe “The role of the leverage ratio and the need to monitor risks outside the regulated banking sector,” speech to the Financial Reporting Council annual conference, London, Thursday 17 July 2014, p. 1.

*He asked rhetorically, “How can it be that you get approvals ... and it’s still fraud?”*

*Because it was misleading, Fastow said — and he knew it. “I knew it was wrong,” he told the crowd. “I knew that what I was doing was misleading. But I didn’t think it was illegal. I thought: That’s how the game is played. You have a complex set of rules, and the objective is to use the rules to your advantage. And that was the mistake I made.”<sup>35</sup>*

The banks were also gaming the system aggressively. To quote the FSA’s report into the failure of RBS:

*The capital regime was most deficient, moreover, in respect of the trading books of the banks, when required capital for many instruments was estimated using value-at-risk (VaR) approaches. The acquisition of ABN AMRO meant that RBS’s trading book assets almost doubled between end-2006 and end-2007. The low risk weights assigned to trading assets suggested that only £2.3bn of core tier 1 capital was held to cover potential trading losses which might result from assets carried at around £470bn on the firm’s balance sheet.*

£2.3 billion divided by £470 billion is less than 0.5%:

*In fact, in 2008, losses of £12.2bn arose in the credit trading area alone (a subset of total trading book assets).*

Note too that the RBS’s credit risk models would have given this £12.2 billion loss a probability of about zero: such losses were effectively impossible according to the models.

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<sup>35</sup> P. Elkind, “The confessions of Andy Fastow,” *Fortune* 1 July 2013.

*A regime which inadequately evaluated trading book risks was, therefore, fundamental to RBS's failure. This inadequacy was particularly significant for RBS, given that the purchase of ABN AMRO significantly increased RBS's trading book assets. RBS was allowed by the existing regulations massively to increase its trading risk exposure counterbalanced only by a small increase in capital buffers available to absorb loss.<sup>36</sup>*

When the higher Basel III capital standards were first announced in 2011, bankers' first instincts were to comply by gaming the system. To quote an article by Tom Braithwaite in the *Financial Times*:

*Jamie Dimon, JPMorgan's chief executive, said last week that he intended to "manage the hell out of RWA" to reach the higher levels. Morgan Stanley revealed that its risk-weighted assets had ballooned by \$44bn after the Fed said the bank was managing the hell out of its assets too much and told it to stop.*

*A senior executive at a third bank told me that it was scouring its balance sheet, looking for assets that could be structured differently to achieve lower risk weights. ...*

*A senior regulator tells me officials are fully expecting various nefarious schemes to circumvent the rules, including structured transactions that do not reduce their risk but do reduce their RWA.<sup>37</sup>*

Banks were (and still are) engaging in vast financial engineering transactions to move assets from high to low weight classifications in order to reduce their capital requirements. This game even has a name – Risk-Weight ‘Optimisation’ (RWO) – and RWO really means

<sup>36</sup> Quoted in Bailey, op. cit., p. 5.

<sup>37</sup> T. Braithwaite, "Banks turn to financial alchemy in search for capital," *Financial Times*, October 24 2011.

risk-weight *minimisation*. RWO was the main driving force behind the enormous growth in derivatives trading and securitization in the years running up to the GFC – and in so far as it led to (much) greater risk taking and (enormous) capital depletion, RWO was also a major contributing factor to the GFC as well.<sup>38</sup>

Thus, zero or low RWAs do not mean that the assets involved are actually zero or low risk; instead, they merely mean that Basel allows them to assign zero or low risk status to the positions so designated, which is an altogether different matter. Examples include not just Greek government debt but also carry-trade positions, which have zero risk weights, and many credit derivatives, securitizations and mortgaged-backed positions, which have very low risk weights. What these positions have in common is that they are all highly risky, but the Basel system operates to make those risks virtually invisible.

It was widely acknowledged that RWAs were flawed. The solution, it was claimed, was to make the capital requirements more risk-sensitive – and the way to do that was to allow banks with approved risk-modelling capabilities to use their risk models to help determine their capital requirements. This principle was first enshrined in the Market Risk Amendment to Basel I (1996): this Amendment allowed banks to use their risk models to help determine their capital requirements for their market risks. The use of risk models to help determine capital requirements for credit and operational risks was then the central feature of Basel II, which was rolled out to great fanfare

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<sup>38</sup> A good example is the ‘how to destroy’ securitisation co-invented by Gordon Kerr in 2001. This little beauty used financial alchemy to game the Basel capital rules to transform a bog standard (big) bond portfolio held by a major UK financial institution into a (supposedly) almost risk-free credit derivative that warranted only one sixteenth of its previous capital requirement. Unfortunately, the risk reduction was only cosmetic and the bond portfolio remained as risky as it had been before. The transaction reduced the bank’s required regulatory capital by fifteen sixteenths. This securitization was widely copied and Gordon was left wondering afterwards why it took so long for the banking system to fall over. See G. Kerr, “How to destroy the British banking system – regulatory arbitrage via ‘pig on pork’ derivatives,” The Cobden Centre, January 21, 2010.

in 2004. However, supplementing RWAs with risk models to determine capital requirements only made matters worse, as the risk models themselves are highly problematic:

- They are based on unreasonable assumptions (such as Gaussianity) and unreasonable risk measures (such as Value-at-Risk) that give enormous scope for creative traders and financial engineers to hide risks: traders can stuff risk into the VaR tails and so on.
- They are based on huge numbers of parameters, many of which cannot be estimated with any reasonable precision, and involve a great deal of model risk and just plain guesswork, all of which gives plenty of further scope for creative game-playing to drive the risk numbers down.
- They use probability of default (PD) and loss given default (LGD) models that are by their nature pro-cyclical and in practice impossible to calibrate properly.
- There is an abundance of evidence from recent empirical studies to suggest that simpler models out-perform more complex ones.<sup>39</sup>

At a deeper level, Basel II created a model monoculture in which everyone was trying to do the same thing – to model risks the same way to play the system – but what none of the risk models could measure were the risks created by all the banks acting as a herd of lemmings, which is exactly how they then behaved.

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<sup>39</sup> These include: A. Demirgüç-Kunt, E. Detragiache, and O. Merrouche, "Bank Capital: Lessons from the Financial Crisis," World Bank Policy Research Working Paper Series No. 5473 (2010); D. G. Mayes and H. Stremmel, "The Effectiveness of Capital Adequacy Measures in Predicting Bank Distress," mimeo (2012); A. N. Berger and C. H. S. Bouwman, "How Does Capital Affect Bank Performance during Financial Crises?" *Journal of Financial Economics* 109 (2013): 146–76; A. Blundell-Wignall and C. Roulet, "Business Models of Banks, Leverage and the Distance-to-Default," *OECD Journal: Financial Market Trends* 2012, no. 2 (2014); T. L. Hogan, N. Meredith and X. Pan, "Evaluating Risk-Based Capital Regulation," *Mercatus Center Working Paper Series* No. 13-02 (2013); and V. V. Acharya and S. Steffen, "Falling short of expectation – stress testing the Eurozone banking system," *CEPS Policy Brief* No. 315, January 2014.



There is also a version of Goodhart's Law operating by which risk models break down when used for control purposes, i.e., no model can take account of how it will be gamed. This interaction between the risk managers, the models they use to control risks and the responses of those being controlled by these models means that markets are not mathematizable. Risk modelling is then just a game: the bankers pretend to model risks, but they are really gaming the risk numbers – and the regulators openly encourage them to do so.

What then happened was that the banks hijacked the system and used it to ensure that their capital requirements became ever lower. The Basel system, which was meant to prop up banks' levels of capital, had become how the banks were decapitalised by the bankers themselves. It was no coincidence that the financial crisis hit soon afterwards and much of the international banking system collapsed.

In short, the real (though seldom explicitly acknowledged) purpose of risk modelling is to use capital regulation to decapitalise the banks. The cybernetic POSIWID principle applies: the purpose of a system is what it does, not what some regulator says it does. When the banks later go bust, the bankers play dumb and lobby for a bailout; the banks then get recapitalised at public expense and the game repeats itself until the public eventually refuse to put up with it any more.

It is therefore no wonder that the models don't work: they were not intended to.

One could give many examples of the inadequate performance of risk models but three in particular are positively stunning:

- Calculations performed by the Bank of England showed that for the four biggest UK banks, cumulative trading losses over the height of the crisis were up to *six times* the value of the model-

determined capital set aside to cover against such losses.<sup>40</sup>

- UK banks' reported losses – and these were primarily banking book losses – over 2007-2010 were over 183% of the banks' combined capital and reserves.<sup>41</sup>
- In August 2007 Goldman's CFO David Viniar famously explained that their flagship GEO hedge fund was being bit by 25-standard deviation (or 25 sigma) moves, several days in a row. It was then being said that Goldman must have been unlucky, as a single 25 sigma event was a once in a 100,000 year event. Unlucky is not the word, however. I sat down and did the calculations myself: the expected waiting time to observe a single 25 sigma daily event under the Gaussian distribution, the one normally used in finance, is  $1.309 \times 10^{135}$  years, i.e., about 1.3 with the decimal point moved 135 spaces to the left, a number that so vast that it dwarves cosmological numbers.<sup>42</sup> Therefore the Gaussian distribution, the most popular distribution used in risk management, is useless in the face of the big risks that matter. Risk managers should be banned from using it.

In each case, the risk models and resulting capital charges were signed off as compliant by regulators, but subsequent losses greatly exceeded the risk capital set aside to cover against them: the banks appeared to be capital adequate, but the model-based risk-weighted metrics merely disguised how weak the banks really were.

This RWA issue means that banks shouldn't be assessed by the ratio of core capital (however measured) to RWA. They should be assessed

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<sup>40</sup> A. G. Haldane, "Capital Discipline," speech given to the American Economic Association, Denver, Colorado, January 9, 2011, chart 3.

<sup>41</sup> LAPFF, 2011, p. 3.

<sup>42</sup> To put this number into perspective, the number of particles in the universe is believed to be no more than  $10^{84}$ . See K. Dowd, J. Cotter, C. Humphrey and M. Woods, "How unlucky is 25-sigma?" *Journal of Portfolio Management*, Vol. 34, No. 4, (Summer 2008), pp. 76-80.

against a capital ratio that uses a much broader exposure measure that does not presume to predict or assign risk weights among asset classes, is more difficult to game and provides a clearer picture of a bank's ability to absorb loss regardless of source.

As a final point on the RWA issue: whilst even regulators are now willing to concede that regulators were complicit in RWA games in the period up to the GFC, the fact is that they are still playing these games themselves. To give just one example, the Bank's November 2016 *Financial Stability Report* tried to pass off the increase in the banks' CET1 ratio from 6.92 percent in 2009 to 12.61 percent in 2015 as *capital rebuilding* whilst simultaneously noting that almost three-quarters of this capital 'rebuilding' actually boosted the capital ratio by reducing the risk weighted assets in the denominator. An innocent reader could easily have formed the impression that the increase in the capital ratio from 6.92 percent to 12.61 percent reflected a substantial increase in actual capital!

# APPENDIX 2: MEASURING CORE CAPITAL

For capital adequacy purposes we want a measure of core capital, not total shareholder equity or the market capitalisation. By core capital, I mean the loss-absorbing capital reliably available to support the bank as a going concern in the heat of a crisis. There are several core capital measures available, and their reliability is in inverse proportion to their broadness: the broader the capital measure, the more ‘soft’ capital it includes and the less reliable it is as a measure of core capital. The issue here is that ‘soft’ capital instruments like Deferred Tax Assets (DTAs), intangibles and debt can’t be relied upon to absorb losses in a crisis.

With any capital adequacy metrics, a major concern is cheating or ‘gaming’ to use the more polite language used in this area: bankers don’t ‘cheat’ except on LIBOR, they ‘game’. In the case of the capital measure, the concerns relate to bankers’ ability to exploit loopholes (e.g., by stuffing less expensive-to-issue softer capital items into the core capital measures approved by regulators) and with their lobbying

to create such loopholes in the first place.

## TANGIBLE COMMON EQUITY

From a first principles perspective, the ideal core capital measure is Tangible Common Equity (TCE). The word ‘tangible’ implies that one deducts from market cap and/or book value intangibles (such as goodwill and DTAs). The acid test is this: if the bank were to fail tomorrow, what would the relevant capital instruments be worth? Goodwill and DTAs would be worth nothing. The word ‘common’ implies that one deducts items like preferred shares and hybrid capital to which ordinary shares are subordinate.

The importance of TCE as the ultimate core capital measure was highlighted in a 2011 speech by former senior Federal Reserve official Daniel Tarullo. When reflecting on the experience of the GFC, Governor Tarullo observed that

*at least some of the instruments that qualified as “Tier 1 capital” [a core capital measure under Basel II] for regulatory purposes were not reliable buffers against losses, at least not on a going concern basis. It is instructive that during the height of the crisis, counterparties and other market actors looked almost exclusively to the amount of tangible common equity held by financial institutions in evaluating the creditworthiness and overall stability of those institutions [and essentially ignored any broader capital measures altogether].<sup>43</sup> (My underlining)*

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<sup>43</sup> D. K. Tarullo, “The Evolution of Capital Regulation,” speech to the Clearing House Business Meeting and Conference, New York, November 9, 2011.

## COMMON EQUITY TIER 1 (CET1) CAPITAL

Amongst the measures used by regulators, the narrowest and the least ‘polluted’ by softer capital instruments is Common Equity Tier 1 (CET1) capital. CET1 is equal to common shares plus realised earnings, accumulated other items and disclosed reserves and certain not too clear regulatory adjustments.<sup>44</sup> But we should remember that even CET1 capital materially exaggerates the true common equity figure owing to the substantial portions of retained bank earnings attributable to derivatives ‘profits’ in cases where these latter have been booked but not yet been realised.<sup>45</sup>

## TIER 1 CAPITAL

The Basel III regulations also specify a second somewhat broader core capital measure, Tier 1 capital. Tier 1 capital is equal to CET1 capital plus Additional Tier 1 (AT1) capital. Capital instruments are eligible to be classified as AT1 if they meet certain conditions, e.g., that they be issued and paid-in, be perpetual and be subordinate to depositors, general creditors and subordinated debt.<sup>46</sup> In practice, the AT1 instruments that matter most are Contingent Convertible bonds, known as CoCos, that convert to equity under certain conditions. CoCo capital instruments ought not to be regarded as *on any par* with

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<sup>44</sup> For a more complete definition of CET1 capital, see Basel Committee on Banking Supervision (BCBS) “Basel III: A global regulatory framework for more resilient banks and banking systems” (Basel Committee, June 2011), p. 13.

<sup>45</sup> Typical examples are Credit Default Swaps using Special Purpose Vehicle securitisations based on dubiously calibrated default models, which allow hoped-for (or even fictional) future profits to be booked up front and distributed. Some examples can be found in G. Kerr *The Law of Opposites: Illusory Profits in the Financial Sector*. London: The Cobden Centre and Adam Smith Institute.

<sup>46</sup> For more on the qualifying conditions for AT1 capital, see Basel Committee on Banking Supervision (BCBS) “Basel III: A global regulatory framework for more resilient banks and banking systems” (Basel Committee, June 2011), p. 15.

## CET1:

- CoCos have not been tested in a major crisis.
- CoCos send out a distress signal that can aggravate a crisis, i.e., they may be of no use when needed most. For example, it would be difficult, to say the least, for regulators to authorize the bail-in of a systemically important bank, for fear that doing so might itself trigger a systemic crisis.
- CoCos create the prospect of ‘death spirals’ and the danger that they might trigger or amplify a broader crisis as the CoCo market collapses. Once it became clear that triggers might soon be breached, investors would sell CoCos and possibly bank stock too.<sup>47</sup> And once one bail-in occurs, there is a danger that investors will run from weaker banks, creating not just liquidity stress, but a broader crisis too.
- CoCos are procyclical and their use by regulators undermine their efforts to counter the cycle.<sup>48</sup>
- CoCos arguably displace the most advantageous form of recapitalization, which is new funds from existing shareholders. To rely on CoCo’s is to accept that a bank may not even be an attractive investment proposition for its existing shareholders.

Further doubts about their reliability arise from recent experience. In Italy, the adverse public reaction to regulators bailing-in CoCo investors in late 2015 has made authorities reluctant to do the same again, e.g., with MPS. In February last year, falls in the prices of Deutsche Bank’s CoCos triggered concerns that Deutsche might fail and cast doubt on the ability of CoCos to support a major systemic bank in a crisis. As a consequence, even ECB regulators have been having sec-

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<sup>47</sup> See also, e.g., Tracy Alloway, “An explanatory CoCo death spiral,” *Financial Times* Alphaville, March 8th 2011.

<sup>48</sup> J. Zeng, “Contingent Capital Structure,” London School of Economics Working Paper, January 1st 2014.

and thoughts about relying on them.<sup>49</sup> And the CoCos' one supposed success story - the June 2017 bailing-in of CoCo investors in Banco Popular in Spain - suggests that, to the extent they helped at all, CoCos only worked as *gone*-concern loss-absorbency for a non-systemic bank. However, any measure of core capital is meant to be *going* concern capital that supports a bank *before* it fails

One might also ask who would be holding these instruments and how the discipline would operate. Banks holding each others' CoCos can hardly recapitalize the banking system. Retail investors can be ruled out too: the Bank of England regards CoCos as so risky that it bans retail investors from holding them. Pension funds are another possibility, but they have to operate within risk tolerance limits that would sensibly preclude instruments as risky as CoCos and one can imagine the outcry if they were to suffer major losses on CoCos that were bailed-in. Then there are hedge funds and private equity groups with high risk tolerance, but it is difficult to see these as stable long-term investors. It is therefore difficult to see what social usefulness CoCos can serve. On the other hand, they would appear to be ideal vehicles for investors who wish to speculate on the view that, when push comes to shove in a major crisis, then central banks wouldn't dare bail-in investors who had bet against them.

Even the Bank itself has expressed doubts about CoCos. To quote Box 3 of its June 2014 *Financial Stability Report*, there are a number

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<sup>49</sup> M. Arnold and T. Hale, "ECB is having second thoughts on 'coco' bonds," *Financial Times*, April 24th 2016.

One other concern is that CoCos create possibility of price manipulation and hence gaming around triggers. To quote Martin Taylor from the FPC: "I worry that CoCos may be subject to potentially destabilising manipulation by convertible arbitrageurs ..." See M. Taylor, "The fence and the pendulum," speech to the International Association of Credit Portfolio Managers, London May 22nd 2015, or S. Sundaresen and Z. Wang (2010) "On the design of contingent capital with market triggers," New York Fed Staff Report No. 448. However, such concerns are largely theoretical in Europe, because European CoCos must have book value triggers. I thank Wande McCunn for this clarification.



of issues concerning how this new and untested form of capital will work to mitigate risks to financial stability ...

*While AT1 can potentially increase CET1 of banks under a stress, a sharp market reaction following a trigger event, or as understanding of the features and risks of AT1 instruments evolve, could limit banks' ability to raise further capital and affect confidence in the banking system. It could also impose significant losses on holders of AT1 instruments, some of which may be systemically important. ... [W]ith only limited information on the investor base available at present, it remains difficult to assess precisely this risk for financial stability.*

As Vickers noted in his Capital Enquiry evidence:

*... even for AT1 capital, which regulation treats as akin to common equity, there are questions about investor understanding, market liquidity, the possibility of downward share price spirals (if the trigger were a market price), the credibility of conversion (if the trigger is a regulatory value, as in fact) and the corresponding risk that regulatory values will be manipulated or relaxed (e.g. by delaying asset impairments or by reducing risk weights) to forestall conversion.*

*Unless conversion is triggered well above levels at which resolution becomes an issue, the theoretical benefit of Cocos as going-concern capital could be evaporated. But the EU Capital Requirements Regulation requires a minimum trigger level of only 5.125% of CET1 capital in terms of RWAs. The PRA requires UK banks to have a minimum trigger level of 7% of CET1 capital, which is better but not a high figure, especially when the possibility of regulatory mis-measurement is allowed for.<sup>50</sup>*

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<sup>50</sup> Capital Enquiry evidence, p. 4.

Thus, CoCos are also unreliable because their triggers are very low and are based on questionable regulatory and accounting measures.

A leading expert in this field, Ayowande McCunn, informs me that the trigger probably needs to be at least 11% of CET1 to RWA for the CoCo to be a going concern instrument, the point being to recapitalize banks *if* they fail. If the trigger is too low, CoCos involve forbearance incentives that undermine this primary purpose. As he wrote in a recent working paper:

*CoCos were designed by regulators to absorb losses prior to resolution to create incentives for stakeholders to monitor. However, CoCo stakeholders have incentives to forbear (delay triggering CoCos). This incentive means that CoCos may be triggered as part of resolution (or other insolvency process) rather than being triggered in advance.*

*In fact, if CoCos are triggered as part of resolution then they are unlikely to create incentives for stakeholders to monitor. As a consequence, it is difficult to justify the existence of CoCos as regulatory [core] capital. Accordingly, it might be argued that CoCos operate, in an economic sense, in a similar way to preference shares with tax deductible interest payments.<sup>51</sup>*

To quote former Bank Deputy Governor Andrew Bailey in his 2014 speech:

*The big lesson from this history [of innovative capital instruments being included in regulatory measures of core capital] is that a going concern capital instrument must unambiguously be able to absorb*

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<sup>51</sup> A. McCunn, "Forbearance Incentives: Undermining the distinction between going and gone-concern capital" SSRN Working Paper, 5th April 2016.

*losses when the bank is a going concern. Apologies for stating the blindingly obvious, but history painfully demonstrates why it is important to state the obvious.<sup>52</sup> (My underlining)*

Then there is the point that CoCos cannot be relied upon to work in a systemic crisis:

*Bail-in securities may make sense for an idiosyncratic bank failure—like the 1995 collapse of Baring Brothers, which was the result of a single rogue trader. But they do not make sense in the more common and intractable case where many banks get into trouble at roughly the same time as the assets they own go bad. On such occasions these securities, which may also have encouraged excessive lending, either will inappropriately shift the burden of bank resolution on to ordinary pensioners or, if held by others, will bring forward and spread a crisis. Either way they will probably end up costing taxpayers no less and maybe more. In this regard, fool’s gold is an apt description. ... Either we need real gold – more equity capital – or not. Fool’s gold is no alternative. ...*

*Bail-in securities are not the silver bullet... they will likely make matters worse. If more gold plating of bank capital is what is required, then this fool’s gold will not do.<sup>53</sup> (Avinash Persaud)*

This difference between real gold and iron pyrites is exactly the point: CoCo instruments are not of the same quality as CET1 and therefore Tier 1 capital should never be used as a measure of core capital.

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<sup>52</sup> A. Bailey, “The capital adequacy of banks: today’s issues and what we have learned from the past,” speech to Bloomberg, London, 10 July 2014, p. 4.

<sup>53</sup> A. Persaud, “Why bail-in securities are fool’s gold,” Peterson Institute for International Economics Policy Brief PB14-23, November 2014.

Finally, there is also a danger that the use of Tier 1 capital and hence dependence on CoCos will leave the financial system exposed to much the same problems as its dependence on hybrid instruments produced in the GFC. To quote a speech by Bank Deputy Governor Sir Jon Cunliffe in 2014:

*The market in 2008 and 2009 clearly did not believe either the numbers for bank capital or for bank assets. Capital was not just pure equity. Tier 1 capital also included so-called ‘hybrid’ capital instruments – debt that was supposed to convert to equity to absorb losses. However, the ability of these instruments to absorb losses proved to be illusory. ...*

*We have tightened up on the required quality of regulatory capital. The ‘hybrid’ debt instruments that proved not to be loss-absorbing no longer count as Tier 1 capital.<sup>54</sup>*

He is right, but omits to point out that CoCos, which are allowed to account for up to a quarter of Tier 1 capital, are themselves a form of hybrid capital and share many of the features of the pre-GFC hybrids that melted down during the GFC when they were needed. It would imprudent, to say the least, to assume that we can rely on modern CoCos when their chocolate teapot antecedents didn’t work the last time.

And so we have a lot of good reasons why we should never use Tier 1 as a core capital measure.<sup>55</sup>

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<sup>54</sup> Cunliffe, op. cit., p. 1.

<sup>55</sup> A more extensive discussion of the inadequacies of Co-cos as core capital is to be found in K. Dowd, “Are CoCo Bonds Suitable as Core Capital Instruments?” 24 February 2018, forthcoming, *Journal of New Finance*.

# APPENDIX 3: TOTAL ASSETS VS. LEVERAGE EXPOSURE

## **TOTAL ASSETS**

Traditionally, the total ‘amount at risk’ was taken to be the total assets of the bank. This exposure measure worked fairly well when off-balance sheet items were fairly small and/or safe, and the accounting standards were fairly reliable. In these circumstances TA is a good proxy for the most that the bank can lose. However, for many years now the on-balance-sheet amounts at risk have been overshadowed by the amounts at risk off the balance sheet in derivatives (such as Credit Default Swaps) and certain securitizations. These off-balance-sheet risks have long since made total assets highly inadequate as a measure of exposure, even leaving aside the fact that the TA is itself gameable.

Consider Barclays as an example'. Reported data for end-2016 from its 2016 *Annual Report*, indicates that the fair value of Barclays' total OTC (over the counter) derivatives liabilities for trading purposes was 25% of its reported total assets. However, these fair value numbers are based on a bunch of assumptions about hedge accounting and netting – many of which would unravel in a crisis. Any reasonable estimate of Barclays 'true' OTC derivatives exposure would then be higher than that. At the other extreme, the notional value of its OTC derivatives positions weighs in at 1,042% of total assets. This latter figure however will be a major over-estimate of the bank's OTC derivatives exposure as many notional amounts are close to meaningless as indicators of true exposure. So all we (think we) know is that the 'true' OTC exposure is somewhere between 25% and 1,042% of total assets, and there are the other off-balance-sheet exposures to consider as well. It is therefore safe to conclude that Barclays' true exposures would be considerably greater than its total assets figure might lead us to believe.

So is there a better 'amount at risk' measure?

## THE LEVERAGE EXPOSURE MEASURE

An alternative measure is the 'leverage exposure' measure introduced by Basel III. This measure makes an attempt to incorporate some of the off-balance-sheet risks that do not appear in the total assets measure.

One problem is that large derivatives positions can remain excluded from the leverage exposure because of rules that allow them to be excluded if they are offset by other positions, the theory being that the net position is hedged. Unfortunately, some hedges are very poor and none is perfect. Hedges are imperfect for several reasons:

First, few if any hedge instruments are exact matches to the underlying position being hedged, which compensate exactly for losses on that position. Any *ex ante* assessment of the performance of a hedge instrument in an adverse scenario is dependent on a lot of assumptions, especially in very adverse scenarios (i.e., the ones that matter). There is always some slippage – known as basis risk – and some hedges involve a *lot* of basis risk. So even when a hedge might look good on paper, we often have little idea how well it would perform in a crisis.

To give an example, over the period 2005 to 2009, it transpired that Deutsche Bank had a large – at one point, a \$130 billion large – position in leveraged super senior trades, ‘super senior’ or quadruple A meaning theoretically safer than AAA bonds. The main risks in these positions were credit risks, but it transpired that the bank was hedging them with S&P put options, i.e., it was hedging credit risks with market risks. Such a hedging strategy involves an amateurish mistake on a grand scale: market and credit risks are quite different, and there was a very real danger that both the original position and its supposed hedges could take massive hits at the same time. Indeed, this seems to have been what happened. This gross-becomes-net outcome proved fatal for Lehman and may well have proven fatal for Deutsche too – had the bank allegedly not hidden the problem until (some of) the truth emerged in 2012.<sup>56</sup>

Second, most hedges involve contracts with counterparties and therefore create an exposure to counterparty credit risk. As we saw with AIG, if a key counterparty fails, the netting breaks down and the gross position can become net with miserable consequences for the party relying on the hedge. Such problems could then create cas-

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<sup>56</sup> T. Braithwaite, M. Mackenzie and K. Scammell, “Deutsche Bank: Show of strength or a fiction?” *Financial Times*, December 12, 2012.

cade effects. Suppose Bank A has some credit exposure to Bank B and institutes what appears to be a good hedging strategy to manage *that* exposure. Bank B, in turn, is exposed to Bank C, and institutes what appears to be a good hedging strategy to manage that exposure. Bank C then goes belly-up and Bank B experiences a gross-becomes-net disaster that is transmitted to Bank A, which was unaware of its indirect exposure to Bank C. Concerns about counterparty cascade effects were a key feature in the AIG fiasco.

On paper, the leverage exposure is meant to take account of off-balance sheet items that would not show up in total assets. However, the regulatory leverage exposure measure is also a highly compromised measure that is the product of a lot of behind the scenes lobbying by banks keen to keep their measured exposures down in order to minimise their capital requirements. Given (a) that off-balance-sheet items can be large relative to on-balance-sheet ones and (b) that accounting netting rules tend to hide a great deal of financial risk, then we would expect any reasonable exposure measure to be considerably larger than reported total assets.

But they are not, at least not for UK banks. When I looked into this matter, I was astonished to discover that the leverage exposures of UK banks was usually lower than their total assets. As of 2016q3, LE was lower than TA for four of the big five banks, and on average, LE was just under 94 percent of TA. Consequently, the leverage exposure measure that takes account of (some) off-balance sheet items is usually less than the total assets measure that does not take account of any of them. If you don't understand that, then your brain is working.

What seems to have happened is that the problems posed by hidden off-balance-sheet risks and inadequate RWA measures led to regulatory pressure to find a new denominator measure that could be used



as a basis for additional capital requirements. This response started as a worthy effort to patch up some of the more glaring loopholes in the Basel system. However, the banking industry soon piled in to lobby against a broader denominator that would have increased their capital requirements – which was, of course, one of the objectives of the regulators in the first place.

Naturally, the banking lobby did not openly oppose the leverage exposure measure on the grounds that it would have led to higher capital requirements – that would have been too obvious. Instead, the banks emphasised level playing field issues – which are fundamentally irrelevant, but that is another story<sup>57</sup> – relating primarily to the differences between US Generally Accepted Accounting Principles (GAAP) accounting standards and the IFRS accounting standards that apply in many countries outside the United States. The key point here is that the latter produce notably higher asset values and lower capital ratios than the former, other things being equal.

This US GAAP vs. IFRS issue provided a useful smokescreen to divert the reform discussion towards harmonisation for the purposes of agreeing how to measure the denominator in the new regulatory leverage ratio. The banks had hijacked the reform effort and the result was peddled as a solution to the off-balance-sheet problem when the reality was that it was not.

So why is the leverage exposure of similar or less magnitude to total assets under IFRS? The answer is that US GAAP allows much more generous netting arrangements than IFRS, so from an IFRS perspective, leverage exposure equals IFRS total assets + plus OBS add-ons + less generous netting, and these latter two offset each other. From the US GAAP perspective, leverage exposure equals US GAAP total

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<sup>57</sup> For more, see, e.g., A. Admati and M. Hellwig, *op. cit.*, pp. 194-199.

assets + plus OBS add-ons + more generous netting, and so leverage exposure is somewhat, perhaps about 40 percent, higher than US GAAP total assets, and may or (probably) may not be a good measure of true exposure.

Well, you might say, at least the leverage exposure gets us away from the evils of RWAs. It does not even do that, however. Instead, it reintroduces them through the backdoor under a different name. The relevant Basel Committee document<sup>58</sup> handles derivatives exposures by means of a system of ‘Credit Conversion Factors’, add-on factors that are arbitrary, low and frankly senseless. For example, for standard interest-rate, FX, equities and commodity derivatives there are a series of add-on factors that vary from 0% to 15%, and for more exotic Total Return Swaps and Credit Default Swaps there are add-ons of 5% or 10%. The resulting numbers for OBS positions are low and bear no relationship to the true risk exposures. And so these add-ons reintroduce the equivalent of new risk weights and take us back to the RWA problems that the broader exposure measures were supposed to escape from!

The LE is also vulnerable to gaming by the central bank. Since 2017, the Bank has taken to departing from the previous Basel III leverage exposure or in its EU variant, the CRD IV leverage exposure. It does so by subtracting banks’ reserves held at the central bank from the earlier leverage exposure measure. The result is to reduce the leverage exposure and thereby push up the reported Tier 1 leverage ratios, which just so happens to make those numbers look better.<sup>59</sup>

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<sup>58</sup> See Basel Committee, “Basel III leverage ratio framework and disclosure requirements,” January 2014, pp. 18-19.

<sup>59</sup> This departure from the international norm in this regard gives the lie to the Bank’s repeated claim (which is wheeled out when convenient in other contexts) that it is bound by these norms. It’s a shame that the Bank chooses not to depart from Basel III or CRD IV in other, more productive, productive ways, e.g., by raising the minima and not relying on Tier 1 capital.

So all in all, it is probably better to stick with the total assets measure.

# APPENDIX 4: MARKET VS. BOOK VALUES

Book values are those reported for accounting purposes in banks' annual reports and interim financial statements. Or as a friend of mine recently explained, "book values are the values that the accountants made up. When I was working in the City, we never paid any attention to them." Market values are those given or implied in market prices, e.g., stock prices.

So which is better?

The truth is that there is no universally correct answer, but there should be a presumption in favour of market values especially when market values are lower than book values.

Suppose that a bank has an asset with a specified book value, e.g., a branch or a financial asset, and the bank wishes to sell that asset. In these circumstances, the book value is irrelevant and what matters is what it can get for the asset, i.e., the market value. Similarly, suppose

a bank wishes to issue shares and to make the example concrete, suppose that the book value of the share is £1 but the market value is 50p. If the bank issues a new share, then it gets no more than 50p for it and the book value is irrelevant. More generally, when it comes to buying and selling an asset, the book value is irrelevant and it is the market value that matters.<sup>60</sup>

It is often also the case market values are to be preferred because they are more informative. From this perspective, one might go as far as to say that as a general though by no means universal rule, market values are more appropriate because market values reflect information not in the book values, such as the impact of news or market participants' perceptions of problems that are not reflected in the book values. Most financial economists would also agree with this claim. Whilst few now subscribe to the strong-form Efficient Markets Hypothesis (EMH) belief that share prices are *fully* informative, few subscribe to the polar opposite extreme and claim that share prices are completely *uninformative*.

These considerations undermine an objection sometimes made against the use of market values: namely, that a belief in the informativeness of market values presupposes a belief in strong-form EMH. This objection is a straw man, however. Skepticism about strong-form EMH does not imply that market values or share prices must be totally uninformative. Weaker forms of EMH have merit.

A second (and valid) concern about market values is that there are

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<sup>60</sup> However, there are occasions where book values might be more useful. For example, suppose a financial institution holds a AAA-rated bond that it intends to hold to maturity. The price of this bond will fluctuate from day to day in response to changes in interest rates, but as far as the financial institution is concerned, these short-term fluctuations are noise, as the stream of payments promised by the bond is (more or less) known, assuming no big adverse credit shock. In such circumstances, it might make sense for the bank to value the bond using some accrual, i.e., book-value, method, and to ignore the market value – unless it might become necessary to consider selling the bond, in which case we are back to market values.

circumstances in which market values – including bank share prices – can fluctuate excessively. Banks' market values were clearly too high in the run-up to the GFC and they can undershoot in the heat of a crisis. For example, the UK merchant bank Hill Samuel experienced a period of excessively low share prices in the highly volatile environment after the Herstatt Bank failure in 1974. At one point, its market value fell to about a quarter of its par value before bouncing back.

Hill Samuel was a sound bank that was caught up in a storm, but it does not follow that any bank experiencing a low share price is another Hill Samuel. Some banks experience low share prices for good reason: because the market correctly perceives them to be at risk of insolvency. Think of Northern Rock in 2007, Citi and Dexia in 2008, and so on. In such cases, market prices correctly signalled problems ahead.

Alex Brazier made another objection to the use of market values in his evidence to the Treasury Committee on 11 January 2017:

*...if you had [relied on market cap values] before the crisis, you would have been led completely astray ... You would have been led to the conclusion that the British banking system was remarkably resilient, and, as forecasting errors go, that would have been quite a good one.<sup>61</sup>*

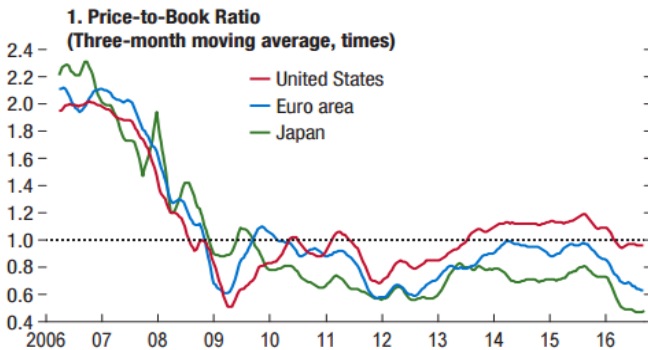
Actually, if you had relied on market cap, you would have noticed that the PtB ratios *were* signalling problems. Consider this chart, which shows how the PtB ratios of international banks fell the before crisis.

## CHART A4.1: PRICE-TO-BOOK RATIOS OF BANKS

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<sup>61</sup> Treasury Committee, "Oral evidence: Bank of England Financial Stability Reports," HC 549, Wednesday 11 January 2017, answer to Q173.

## INTERNATIONALLY



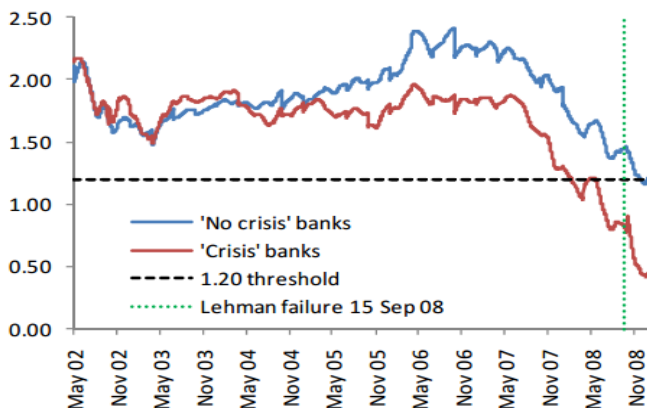
Source: IMF *Financial Stability Report*, October 2016, Figure 1.11, panel 1.

The PtB ratios for UK banks are similar. Market values and PtB ratios started falling sharply in April 2007, well before the GFC.

Credit spreads is another well-known example in which market values anticipated problems well before the GFC.

Then consider the next chart, which shows the ratios of market capitalisation to the book value of equity for two sets of international banks, the “crisis” ones that failed, required assistance or were taken over in distressed conditions, and the “non-crisis” ones that weathered the storm.

## CHART A4.2: MARKET CAPITALISATION TO BOOK-VALUE OF EQUITY(A),(B)



Source: Haldane, 2011, Chart 8.

Notes to Chart:

(a) "Crisis" banks are a set of major financial institutions which in autumn 2008 either failed, required government capital or were taken over in distressed circumstances. These are RBS, HBOS, Lloyds TSB, Bradford & Bingley, Alliance & Leicester, Citigroup, Washington Mutual, Wachovia, Merrill Lynch, Freddie Mac, Fannie Mae, Goldman Sachs, ING Group, Dexia and Commerzbank. The chart shows an unweighted average for those institutions in the sample for which data are available on the given day.

(b) The "no crisis" institutions are HSBC, Barclays, Wells Fargo, JP Morgan, Santander, BNP Paribas, Deutsche Bank, Cr dit Agricole, Soci t  G n rale, BBVA, Banco Popular, Banco Sabadell, Unicredit, Banca Popolare di Milano, Royal Bank of Canada, National Australia Bank, Commonwealth Bank of Australia and ANZ Banking Group. The chart shows an unweighted average for those banks in the sample for which data are available on the given day.

It is, thus, clear that markets were signalling problems with the banks and they correctly identified the weakest banks too. In the UK case, they also correctly identified in advance the two biggest UK problem banks, HBOS and RBS.<sup>62</sup>

Mr. Brazier omits to mention that the Bank was relying on Basel model-based book values that completely missed the impending melt-down and he does not offer any alternative that would have credibly worked better.

<sup>62</sup> See, e.g., Chart 2.73 on p. 153 of the FCA/PRA report The Failure of HBOS plc.



He also omits to mention the Bank's own record on this issue. The 'British banking system is resilient' is *exactly the message that the Bank itself* was putting out before the GFC. Not only did the Bank itself have no inkling of the GFC before it hit, but in the early stages of the GFC and even after the run on Northern Rock, it was *still* reassuring us that there was little to worry about and that the UK banking system was more than adequately capitalised. These reassurances proved to be as wrong as wrong can be.

As the previous two charts demonstrate, there is considerable evidence that market values *did* provide some warning and performed better on this criterion than book values did. To quote from a careful analysis of this issue by the Bank's chief economist, Andy Haldane:

*market-based measures of capital offered clear advance signals of impending distress. ... Replacing the book value of capital with its market value lowers errors by a half, often much more. Market values provide both fewer false positives and more reliable advance warnings of future banking distress.*

*... market-based solvency metrics perform creditably against first principles: they appear to offer the potential for simple, timely and robust control of a complex financial web.<sup>63</sup>*

But the best statement I have ever seen on the subject comes from former Fed legal official Walker Todd:

*From time of Abraham to 1938 in the USA and the traditions that preceded it, banks were supposed to keep their books using market-value accounting. The Finance textbooks say that market value is,*

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<sup>63</sup> A. G. Haldane, "Capital discipline," speech given at the American Economic Association, Denver, January 9th 2011, p. 8.

*after all, real value, while book is historic cost, which is not real value. In 1938, the Fed led an effort, blessed by FDR, to impose book value accounting on the banking system to enable the authorities to dispose of failed banks' assets without triggering automatic markdowns throughout the rest of the banking system. ...*

*Now here we are. Jamie Dimon argued in 2008 that his bank (and probably Goldman Sachs and Wells Fargo), did NOT need the capital provided by TARP. My argument is that, using market value accounting, they all needed the capital, even JP Morgan, Chase, Goldman and Wells.*

*It's a tough fight, but I think market value is worth defending.<sup>64</sup>*

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<sup>64</sup> Personal correspondence.

# APPENDIX

## 5: MARKET-VALUE CET1

This Appendix sets out a justification for the ‘Market-Value’ CET1 (or MVCET1) measure introduced in the text.

I do so in the context of the following data for Barclays Bank:

**TABLE A5.1: CAPITAL METRICS FOR BARCLAYS BANK PLC**

VARIABLE	VALUE
Market capitalisation [1]	£28,896m
Price-to-book ratio [1]	44%
Book value of equity [2]	£65,672m
CET1 [3]	£41,744m

Sources: [1] ShareTelegraph, 28 November 2018. [2] Product of market capitalisation and price-to-book ratio. [3] Barclays Bank plc September 2018 Pillar 3 report.

If we want an unbiased valuation of the market value of the bank, then

the measure we want is the market cap, which is £28,896m.

But there are situations in which we do *not* want an unbiased valuation. In these situations we would be concerned with *prudent assessment*, i.e., we want valuations or projected valuations or risk assessments that are conservative or biased on the prudent side. Examples are where we are trying to assess a bank's projected solvency in the event of a major crisis, or where we are conducting or interpreting a stress test that postulates a severe stress.

To make the argument concrete, suppose we are interested in a severe stress and are concerned that some capital items will be unreliable, i.e., they will not be fire resistant, in the heat of a crisis. These unreliable items would include goodwill, deferred tax assets and Additional Tier 1 items i.e. mainly CoCo bonds (see Appendix 2). We then take our market cap and decompose it as follows:

Market cap = fire-resistant market cap items + non-fire-resistant market cap items and we want to eliminate the latter items. However, the first term on the right-hand side is (more or less) the market value of the CET1 capital measure, and we can obtain that as the PtB ratio times CET1, bearing in mind that CET1 is a book-value item.

All we need to do is replace market cap with the PtB ratio times CET1 capital, thereby giving us the following formula for the market-value CET1 or MVCET1:

$$(A5.1) \quad \text{Market-value CET1 (or MVCET1)} = \text{PtB CET1}$$

Using the numbers in Table A6.1, the market-value CET1 = 44% x £41,744m = £18,367m.

There are two implicit assumptions in this calculation:

The first is that the non-CET1 capital items in the market cap ‘burn away’ or go to zero over the course of the stress.

The second is that the PtB ratio remains the same over the course of the crisis. Equivalently, we are assuming that the capital items included in the CET1 capital measure have the *same* ratio of market-to-book values *in a crisis as they do now*.

It seems to me that such an assumption is unreasonably optimistic, however, because we would expect bank share prices and hence market valuation to fall sharply in a crisis and any corresponding fall in book values would, at best, be more limited and also lagged, i.e., we would expect the numerator in the P2B ratio to fall more than the denominator. Therefore, we would expect the P2B ratio to fall as well.

We saw exactly that in the last crisis.

Unfortunately, there is no easy way to gauge *how much* the PtB ratio *might fall* in a future crisis. This difficulty, however, does not give anyone carte blanche *to ignore* the prospect of any such fall and one would hope that any good stress test would take that into account. (As far as I can see, the BoE stress tests do not.) Those doing stress tests would then have to come up with a plausible projection of the impact on the PtB ratio and I can only wish them good luck. For those of us who are not doing stress tests, we can either make our own guesstimate (good luck us) or *just to keep in mind* that any results based on an unchanged PtB ratio in a crisis will be biased on the optimistic side, i.e., will be the opposite of prudent.

In which case, we would conclude that our best prudent assessment of the MVCET1 is that it is less than £18,367m *and possibly a lot less* than £18,367m.

The results from our prudent assessment are summarised in Table A5.2:

**TABLE A5.2: MARKET-VALUES CET1-TO-TOTAL ASSETS RATIO**

ASSUMED STRESSED PRICE-TO-BOOK RATIO	MARKET-VALUE CET1
Current PtB ratio	£18,367m
< Current PtB ratio	< £18,367m (or << £18,367m?)

Sources: ShareTelegraph, Barclays Bank plc September 2018 Pillar 3 report.

# APPENDIX 6: ROE VERSUS COE: CAN A LOW PTB BE EXPLAINED BY LOW EXPECTED RETURNS?

The BoE maintains that a low Price-to-Book ratio reflects low expected returns as opposed to impaired asset values, but is this claim credible?

I suggest not.

My understanding is that the Bank believes that a justification for a such a connection can be made using some form of the Dividend Discount Model (DDM).<sup>65</sup> The obvious first choice version of this model would be the following:

$$(A6.1) \quad PtB = (roe - g) / (coe - g)$$

where:  $PtB$  is the value of the  $PtB$  ratio;  $roe$  = projected return on equity;  $coe$  = projected cost of equity, which is typically taken as the required rate of return, i.e., the rate of return that investors ‘require’ to invest in the share, which is equal to the risk-free interest rate plus the assumed Equity Risk Premium (ERP); and  $g$  = the assumed growth of the first dividend, which is classically assumed to be the growth rate of all dividends in perpetuity. We would also expect both numerator and denominator terms to be positive, so we would expect  $g < roe$  and  $g < coe$ . We would also expect that  $g < r$  for the stock price to be finite, where  $r$  is the discount rate and we gloss over any distinctions between the discount rate and the risk-free rate. Therefore,  $g$  is constrained to be less than any of  $r$ ,  $roe$  or  $coe$ . This model is based on a number of questionable assumptions (e.g., in the standard version, that dividends and  $g$  are constant, whereas both are volatile and highly uncertain going forward), is sensitive to the calibration of its parameters and is known to be particularly tricky when applied to financial institutions. It should therefore be handled with care.

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<sup>65</sup> The seminal article on the DDM is M. J. Gordon (1959) “Dividends, earnings and stock prices,” *Review of Economics and Statistics* 41(2): 99–105. See also Aswath Damodaran here.



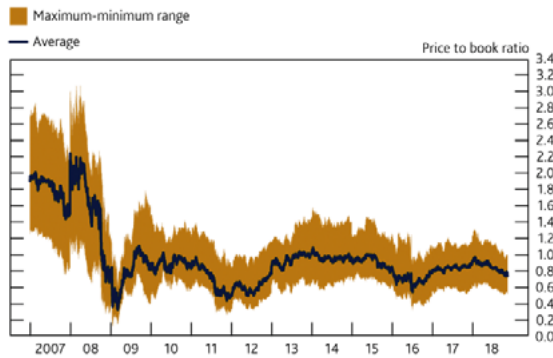
To form some intuition, set  $g = 0$ . We then obtain

$$(A6.2) \quad PtB = roe / coe$$

The  $PtB$  is then the ratio of  $roe$  to  $coe$ . In the normal course of events (think pre-GFC),  $roe > coe$  so  $PtB > 1$ .

However, since late 2008, the  $PtB$  has been well below 1 as shown in the BoE's chart B.3 from its November 2018 *Financial Stability Report*:

**Chart B.3 Price to book ratios have been low since the crisis**  
Major UK banks' equity prices since June 2018<sup>(a)</sup>(b)(c)(d)



Sources: Bloomberg Finance L.P., [Datastream](#) from [Refinitiv](#) and Bank calculations.

(a) UK banks are Barclays, HSBC, Lloyds Banking Group and RBS.

(b) Relates the share price with the book, or accounting, value of shareholders' equity per share.

(c) HSBC's price to book ratio is adjusted for currency movements.

(d) The underlying data have been sourced from Thomson Reuters [Datastream](#) up to 2013, and from Bloomberg from 2014 onwards.

## CARNEY'S DECEMBER 2016 LETTER TO VICKERS

On 5 December 2016, Sir John Vickers wrote to Governor Carney expressing concerns about book values and the significance of ratios under 1. Let me quote at length from Carney's response:

*In your letter, you expressed concern around book measures of capital for major UK banks, suggesting that price to book ratios below one were evidence of market participants doubting the accuracy of those measures. There are many reasons why valuations of a bank's equity may fall, and when we examined this issue in the November 2016 Financial Stability Report (FSR)[Footnote: See pages 26 – 30] we found little evidence to suggest that investors should be concerned about poor asset quality for UK banks. ... We are therefore of the view that current low price to book ratios reflect investors' concerns about low long-term profitability for UK banks - with return on equity of the major UK banks averaging just 2% in 2015. ...*

*This analysis suggests that low price to book ratios do not necessarily imply that banks' capital positions are mismeasured or threatened by imminent large losses.*

A little later he continues:

*As part of our stress testing approach, we construct a central projection of a bank's capital position over a five year period, and then calculate how that capital position would change in response to a severe stress scenario. We use a baseline forecast of a bank's profitability to construct the projection of its capital position. [Footnote: See Chart 4, page 17] It is possible to back out an implied price to book ratio from this forecast, after making an adjustment for*

*misconduct costs.[Footnote: see below.] We find that our baseline projection for the four largest UK banks equates to a price to book ratio of between 0.7 and 0.8, consistent with the actual price to book ratio at the time the stress tests were published. [Footnote: See Table B.1 on page 27 of the FSR.] This is not a coincidence - we look at the prevailing price to book ratios as one cross-check of our base line forecasts for bank profits. (My underlining)*

The footnote after “misconduct costs” is also significant:

*Using a Dividend Discount Model (DDM), we calculate the implied price to book ratio using a projection of a bank’s return on equity, the cost of equity and an assumption about the dividend payout ratio. We take the profits in the baseline (shown in Chart 4, page 17 of the 2016 Stress Test results document) and make an adjustment for misconduct costs based on equity analysts’ forecasts, since the baseline includes no additional provisions for misconduct costs. Using a Capital Asset Pricing Model (CAPM) we calculate the cost of equity to be 13% - in line with survey estimates of banks’ perceptions of the required rate of return. We assume that beyond the five year horizon, expected return on equity is equal to the cost of equity. We assume a dividend payout rate of 0.5. (My underlining)*

There is a lot in here.

First let’s be clear about the game that the Bank is playing. It has one observed value ( $PtB$ ) and up to four explicitly identified unobserved parameters – the  $roe$ , the  $coe$ ,  $g$  and the dividend payout ratio whose values it must assume/forecast/projected/guess etc. It is then trying to triangulate the one observed value that it has in order to get a cross-check for its profit and  $roe$  forecasts based on a model (the DDM) that is dependent on questionable calibrations of parameters (esp. the  $coe$ ) that are themselves dependent on other assumptions,

parameters etc. and on at least one other model (the CAPM) that has similar issues of its own and is notoriously difficult to calibrate in any precise way, e.g., think of the difficulties of calibrating the beta or risk premium.<sup>66</sup>

I don't approve of this type of game – it is unreliable and open to manipulation – but let's play along.<sup>67</sup>

The main points of immediate interest are that the BoE uses its in-house projections of future profits to obtain the projected *roe* and its in-house calculation of the *coe* (i.e., 13%) to obtain a *PtB* value in the then prevailing range of 70% to 80%.

Since I am not privy to the details of the Bank's DDM, the best I can do is to use my reconstruction of their DDM model to reverse engineer the main calculations.

If we now use (A6.2) as a starting point and set *PtB* equal to the middle of the target *PtB* range, then we can back out our *roe* as follows:

$$(A6.3) \quad 75\% = roe / 13\% \Rightarrow roe = 13\% \times 75\% = 9.75\%$$

and one would imagine that the Bank's *roe* would not be that far away from this estimate.

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<sup>66</sup> See also this speech by FPC member Martin Taylor in 2016, in which he says "measuring equity risk premia (ERP) and thus the cost of equity capital is a slippery business." He then gives four ways of measuring it all of which are wide open to criticism (historical estimates, broker estimates, investor questionnaire, company questionnaire) and concludes that the "ERP and the cost of equity are slippery because they appear to occupy a space that is part-objective, part-emotional." (His emphasis) This is not an exact science. See M. Taylor "Banking in the tundra." Speech given by Martin Taylor, External Member of the Financial Policy Committee, Bank of England Official Monetary and Financial Institutions Forum City Lecture, London Wednesday 25 May 2016.

<sup>67</sup> Nor do I approve of Governor's Carney's use of the term 'calculated'. The term 'calculate' connotes accuracy and objectivity, but the 'calculation' is actually a guesstimation based on a bunch of subjective assumptions and perceptions.

One might first note that a projected *roe* of 9.75% is not especially low and the Bank's 'calculated' *coe* looks very high.

Now I can't help feeling that the BoE's high 'calculation' for the *coe* has led it to undermine the case it is trying to make, because the high *coe* calculation forces the Bank to use an implausible high 'low' *roe* to obtain the targeted PtB. Had the Bank gone for a lower *coe*, then it could have gone for a lower *roe* and still hit the PtB target.

So why didn't the Bank go for a lower *coe*, lower *roe* combination?

The answer would appear to be that whilst insisting on low expected returns to explain the low PtB without acknowledging impaired assets, the Bank had also committed itself to a strong projected profit surge to enable the banks to weather the stress in good shape. It therefore needed an *roe* that was low enough for the first purpose but high enough for the second. The only way to square these conflicting needs was to obtain a high 'low' *roe*, and to do that, the Bank selected – nay, 'calculated' – a *coe* towards the high end of what it thought was a plausible *coe* range.

The Bank's projected *roe* of 9.75% or somewhere close to that level implies that the Bank was projecting a major surge over recently-prevailing returns on equity which were only 2% as Carney notes. This surge in projected *roe* is associated with a corresponding surge in projected profits and I would assert that these surges in *roe* and profits were implausibly over-optimistic even at the time. Moreover, as Dean Buckner's "Stress fest" posting points out (see section 10 above), the Bank's profit projections from its previous stress tests have since *been shown* to be wildly over-optimistic.

Turning to the *coe*, the Bank's DDM model depends on the assumption that investors are discounting by *coe* and the Bank's attempted

reconciliation of low PtB with low expected returns going forward depends on a high *coe*. Even if we accept the Bank's analysis, a high *coe* must reflect a high risk premium demanded by shareholders. But why would investors demand a high risk premium unless the perceived risk is that of imminent large losses? Therefore we must conclude that the imminent large losses *are still there*, but buried in the core of the high *coe*.

The Bank then runs into another problem. Let's take the Bank at its word when it talks about low expected returns. If we then input a genuinely low *roe*, say, 5%, we would get an implied PtB =  $5\%/13\% = 38\%$ , which well undershoots the target. Call this Choice *A*. If we stick with the earlier high *roe* of 9.75%, we hit the target PtB, but then the Bank would have the problem just mentioned, namely, that the high *coe* hides the prospect of imminent large losses and we don't want those. Call this Choice *B*. If we keep the higher *roe* but reduce the *coe* to some tolerable level, say 7%, that does not imply imminent large losses, then the implied PtB becomes  $9.75\%/7\% = 139\%$ . Choice *A* gives an uncomfortably high *coe* and undershoots the target, Choice *B* gives an implausibly high *roe* and an uncomfortable high *coe* but hits the target, and Choice *C* gives an implausibly high *roe* and overshoots the target.

However I tweak the calibrations, I cannot get a problem-free calibration that fits.

## CARNEY'S UNLUCKY 13%

But how credible was Carney's 13% *coe* 'calculation' in the first place?

Well, the Carney 'calculation' is certainly consistent with other BoE evidence. Dison and Rattan's 2017 *BEQB* article suggests an Equity

Risk Premium (ERP) of about 8% for 2016. Apply a bank beta of 1.5, and you get a bank ERP of about 12% and are close to the Carney 13% *coe* ‘calculation’. Also, the Bank’s 2017 stress test reports that UK banks expect *roes* of at least 10% and the aggregate cost of equity for major UK banks is estimated to be 9% to 14% with a central estimate of 11.5%. However, the first article merely confirms that Carney and Dison and Rattan are using much the same model, and the numbers in the stress test report are about banks’ claimed *expectations* of expected returns, which are hardly reliable *evidence*. Banks are not well known for providing reliable profit forecasts.

However, other evidence suggests that the ERP is lower than Carney *et alia* suggest. Working backwards from Carney’s 13% *coe* using the CAPM formula in Note 71 and the same calibrations for other variables, a 13% bank *coe* implies a market ERP =  $13\% - 1.5\% \div 1.5 = 7.67\%$ , which is very high. Many expert judgments of the ERP come in at 4% to 5% and a Bank of England study from 2010 also comes in at about 4%.<sup>68</sup> In my PensionsMetrics studies<sup>69</sup> with David Blake and Andrew Cairns, we had long ago worked on an assumed ERP of maybe 5% but had gradually revised that number downwards to about 3%, and we were keeping an eye on ERP estimates in the actuarial literature that we felt were plausible. We were also aware that these estimates had to be long-term to have any value, i.e., they couldn’t shift around too much if they were to be plausible.

Applying an ERP in the range 3% to 5% with a bank beta = 1.5 then gives us the *coes* in the next table, all of which are well below the Carney ‘calculation’:

<sup>68</sup> M. Inkinen, M. Stringa and K. Voutsinou “Interpreting equity price movements since the start of the Global Financial Crisis.” Bank of England Quarterly Bulletin 2010Q2: 24.33.

<sup>69</sup> See, e.g., D. Blake, A. J. G. Cairns and K. Dowd “Pensionmetrics: Stochastic Pension Plan Design and Value-at-Risk during the Accumulation Phase.” Insurance: Mathematics and Economics, 29(2), October 2001: 187-215.

**TABLE A6.1: EQUITY RISK PREMIA AND BANKS’ COST OF EQUITY**

EQUITY RISK PREMIUM	BANK COST OF EQUITY
3.0%	6.0%
4.0%	7.5%
5.0%	9.0%

Notes: Calculations assume a risk-free rate = 1.5% and a bank beta = 1.5.

But I am now thinking that even these estimates of the ERP are too high. Recall that the idea underlying the *coe* is that markets ‘demand’ a premium for taking on risk over risk-free, but as Dean Buckner recently observed:

*The empirical evidence for [this idea] used to be strong, [but] it should be noted that the premium seems to have disappeared since the high of the dotcom boom in the late 1990s.<sup>70</sup>*

*The main point is that the assumption of an equity risk premium, i.e. total return on equities exceeding the total risk free return, does not hold in the short term, where ‘short term’ means periods less than 20 years.<sup>71</sup>*

<sup>70</sup> D. Buckner, “More bloodbath,” The Eumaeus Project, 7 December 2018.  
<sup>71</sup> D. Buckner, “Power of dividends,” The Eumaeus Project, 14 December 2018.



He then gives the following chart:



The green line is the value of the FTSE (Jan 2000 = 100) and is slightly lower, currently 98.3, than when it started nearly 18 years ago. The blue line is FTSE with reinvested dividends and the red line is the hypothetical return on 10 year gilts, which is slightly more than the return on stocks. Nor is this stocks vs bonds experience unusual. To quote a recent study that looked at the relative performance of stocks and bonds over 210 years of US history:

*There are also almost a dozen cases of negative equity premia, lasting for as long as forty years. Collectively, these periods of rough equivalence (between stocks and bonds) cover about two-thirds of the 210 years. ... The best one sentence summary of the 210 year record would be that sometimes, stocks outperformed bonds, but at other times, bonds out-performed stocks; while much of the time, stocks and bonds performed about the same. (McQuarrie, 2017, pp. 29, 32).<sup>72</sup>*

<sup>72</sup> See E. F. McQuarrie "Stock Market Charts You Never Saw," Leavey School of Business Santa Clara University September 2017. For other examples, see, e.g., D. Robertson, (2018) "The Myth Of Diversification & The Risk Of "Psychological Leverage," [realinvestmentadvice.com](http://realinvestmentadvice.com).

One might then conclude that the equity risk premium underlying Carney's high *coe* has disappeared and that this disappearance should have been clear even two years ago when Carney wrote his letter. Carney's cost of equity should have been based on an equity risk premium of about zero, i.e., so the *coe* should have been about equal to the return on gilts (e.g., around 1.5%), *not* the 13% 'calculated' by Carney's advisors.

In that case, the only *roe* consistent with low PtB ratios would have been (and still is) one below the risk-free rate and the rug is well and truly pulled from under the Bank's projected profit surge. If we then take the *coe* as 1.5%, update the PtB to 67% to reflect its latest value, we get the following *roe*:

$$(A6.4) \quad 67\% = \text{roe} / 1.5\% \Rightarrow \text{roe} = 1.5\% \times 67\% = 1\%$$

Now it seems to me that the most natural explanation for this low *roe* is that it reflects the impact of impaired assets on banks' balance sheets, in which case the appropriate policy implication would be that the BoE should be pushing banks to raise capital and it could do that by increasing minimum capital requirements. In this case, the banks have a big problem. But if one insists on the Bank's 'unimpaired assets cum low expected returns' hypothesis, then those low expected returns would indicate that banks are over-capitalised and capital should be exiting the industry to raise expected returns. I find this explanation implausible given the other indications that banks are under-capitalised rather than over-capitalised, but even if one accepts it, then there is potentially a bigger problem for the Bank and the banks, because it implies that banks have a poor business model and the sector should shrink. The Bank seems oblivious to these implications of its own position.

*Finally...*

Just when you thought it couldn't get any more weird:

- In his letter Governor Carney says that the Bank *assumes* after 5 years the *roe* and *coe* will be equal to each other, but by (A6.1) this assumption implies that the PtB will have increased to 100%. Therefore, the Bank is implicitly assuming that the PtB will rise to 100% after 5 years. This 'projection' is not based on any underlying forecast of anything, but is just assumed, hope over experience, and would appear to be not just implausible, but well on the way to being falsified too.
- If you look at (A6.1), you would innocently assume that the *g* on the top and the *g* on the bottom must refer to the same entity. Not so. The *g* on the top is the rate of growth of dividends over the 5 year period, but the *g* on the bottom refers to the growth of dividends in perpetuity. The same symbol represents two different entities in the same equation!

So what should we make of the Bank's imaginative attempts to explain low PtB ratios in terms that avoid having to acknowledge any lingering impaired assets problem?

Beam me up, Scottie. It's life, Jim, but not as we know it.

