



BANK OF ENGLAND

Speech

The history and future of QE

Speech given by

Ben Broadbent, Deputy Governor Monetary Policy

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Hello, and thank you for inviting me today.

In 2002, the University of Chicago held a 90th birthday party for the great American economist Milton Friedman. One important guest was Anna Schwartz, who four decades earlier had co-written with Friedman the landmark book *A Monetary History of the United States*.

It's possible that, even among those of you prepared to give up a pleasant July evening to come to a talk by a central bank official, an 800-page tome entitled "A monetary history of [anywhere]" won't have found its way to the very top of your holiday reading list.

But it's actually a gripping read, especially the chapter about the Great Depression. It also has a claim as the most influential piece of economic history ever written. The book pioneered a new "narrative" approach to identifying independent changes in monetary policy – the idea being that, to separate these from the more automatic ("endogenous") reactions of policymakers to the economy you needed to scour the historic record and understand how their decisions were actually taken.¹

It changed economists' perceptions of the role of monetary forces, including monetary policy, in economic fluctuations. For example, it helped to establish the view that the effects of monetary policy on real variables – real national income or its distribution, for example – are in the long run negligibly small. You cannot permanently enrich a country, or raise real wages, simply by easing monetary policy and engineering some inflation.

Equally, the book argued that policy can have very powerful effects at shorter, cyclical horizons. In particular, it claimed that the Great Depression could have been averted had the US Federal Reserve not over-tightened policy in the late 1920s and if had it acted more precipitously to loosen it once the downturn began. The appropriate measures would have included an earlier abandonment of the gold standard. They would also have involved "large-scale open-market purchases", designed to contain the rise in private-sector bond yields and supply reserves to the banking system. We have a new name for this – we now call it "Quantitative Easing" – but the policy itself is not new.

The book therefore had a profound influence on monetary policy makers everywhere, but especially those in the United States. One other guest at Friedman's birthday party, himself an expert on the Great Depression, was the then Fed Governor Ben Bernanke. Paying tribute, he said this²: "I first read *A Monetary History of the United States* early in my graduate school years at M.I.T. I was hooked, and I have been a student of monetary economics and economic history ever since... I would like to say to Milton and Anna: Regarding the Great Depression. You're right, we did it. We're very sorry. But thanks to you, we won't do it again".

¹ See also Romer and Romer (1989).

² Bernanke (2002).

Only a few years later, as Fed Chair, he was compelled to put his words into action. Nor was it just the Fed who responded in this way. One after the other, in the aftermath of the financial crisis, central banks in developed countries slashed interest rates, extended collateralised loans to banks and purchased significant quantities of government bonds, expanding their balance sheets many times over.

Today I want to take a brief look at what QE has done. I also want to add some colour to what the MPC has recently said about its approach to unwinding the policy, drawing in part on the experience of the US Fed.

What did QE do?

Despite the title of the book, Friedman and Schwartz didn't document 100 years of the past for the sake of historical interest alone. They wanted to understand the effects of monetary policy.

Getting at these is harder than you might think, because empirical economists can't do experiments. In a laboratory, a scientist interested in the effects of one thing on another – call them X and Y – can usually do two important things. He or she can “control” for – in other words hold constant – everything else that might also affect Y. This allows one to isolate the study purely to what X does. It's also possible³ to move the “independent variable” X around at will, observing directly what it does to the “dependent variable” Y.

Empirical economists can't do either of these things. Changes in policy are one of only many influences on the economy and it's not as if we can just switch these other things off. The best we can do is use large samples of data, coupled with various statistical methods, in an effort to even them out. And even if we could somehow freeze the rest of the world it would never be possible (or morally justifiable) then to experiment on it by arbitrarily putting up interest rates. The economy isn't a lab rat. What instead tends to happen, in the real world, is that policy reacts to events at least as much as it causes them. And it's this relationship – from the economy to policy, rather than the other way around – that dominates the data.⁴ Friedman and Schwartz's study – the “narrative” method – was an effort to identify the rare occasions when this was not the case. They were trying to uncover natural experiments.⁵

³ Scientists don't always have this luxury. In drug trials, for example, doctors cannot control for every other influence on health. In judging the impact of lifestyle choices, doctors are in the same position as econometricians: they can't control for other influences, nor can they independently change the “X” variable (which is why care is needed in interpreting such studies – see e.g. Ioannidis (2013)).

⁴ For example, interest rates tend to go up when the economy is strong, and inflationary pressure is growing, and down when it's weak. But one shouldn't conclude from this correlation that low interest rates *cause* weak growth. In fact, the effects run the other way: it's precisely when the economy is weak that you need the support of easier monetary policy (as my colleague Jan Vlieghe put it more succinctly, “umbrellas don't cause rain” (Vlieghe (2016a))).

⁵ In the particular case of the Great Depression, the “natural experiment” was the conflict between the New York Fed, which argued continually for easier policy, and other banks in the Federal Reserve System, including the Board in Washington, that were opposed to it. It was the others – the reserve banks of the “interior” – that won. The British economist Roy Harrod, in his review of *A Monetary History* in 1964, relayed an anecdote that shed some light on those arguments. It also made plain that QE was under active consideration at the time, at least by some: “The authors hold that, if the New York Bank could have retained the position of leadership that it had in the preceding period, all might have been managed much better, and special praise is given to its two experts, Carl Snyder and Randolph Burgess. Perhaps this reviewer may be forgiven for yielding to the strong temptation to introduce a personal note at this point. I had luncheon with Mr Snyder and Mr Burgess in the Federal Reserve Bank of New York in the late summer of 1930. I came briefed with statistics and arguments... With the utmost of my youthful powers I pleaded with them that they should purchase \$1 billion worth of US government securities right away. I argued that, if they did not do this, the US economy would infallibly sink down to lower levels, and that the great slump, which was then proceeding throughout the world, would assume unmanageable dimensions and cause wide-spread havoc and political disturbance. I do not recall if those two experts accepted my figure of \$1 billion... But on the general

If these challenges exist for conventional monetary policy they surely apply at least as much to QE. Our experience is more limited, the data sample therefore smaller. And the policy was very clearly a response to other events, in this case the powerful contractionary forces unleashed by the banking crisis. This has hardly been a randomised trial.

So you cannot conclude from the fact of the recession of 2008-09, or the weak growth that followed, that QE was of no help. Alarmingly, things might have been that much worse without it. They certainly were in the Great Depression. Within three years of the Wall Street crash, the yield on US corporate bonds had risen to over 11%, even as the economy was collapsing; thousands of US banks failed, taking a third of deposits with them; industrial production halved and unemployment rose by over 20% points (Charts 1a-d compare these things with the UK's experience in the last crisis, with the dashed vertical line drawn at the date of the inception of QE).

Equally, there were many other differences between the last financial crisis and the Great Depression, so we can't on the face of it give QE all the credit for having avoided that fate. There was no deposit insurance during the early 1930s, something that surely contributed to the widespread runs on banks and their subsequent failure. In 2008-09, as well as conducting QE, central banks cut interest rates close to zero and engaged in direct collateralised lending to the banking system. Governments also provided support to the banking system, via equity bailouts and lending schemes of their own. They also eased fiscal policy more aggressively and managed to avoid the protectionist measures that had exacerbated the Great Depression. To a greater or lesser extent all these things must have helped.

So what can we say about the specific contribution of QE? We may not be able to employ their "narrative" method, nor is our experience of QE as extensive as for more conventional monetary policy. But we do have some advantages over Friedman and Schwartz. We have more data than they did, including a lot of high-frequency information on the behaviour of financial markets. This allows us to see the reaction of asset prices to QE announcements over short periods of time, cutting down on extraneous influences. We also have more advanced statistical techniques, helping to refine the estimates of the effects on economic activity.

I won't go into all this work in any great detail. (For that you can read a very good and comprehensive survey by Andy Haldane and other Bank economists,⁶ and the references therein.) Let me just try and summarise what it says:

Charts 1a-d: Things might have been worse

issue I found that they were in complete agreement with me. They spoke very frankly about the shift of power within the System. They earnestly wanted to pursue a policy of this kind, but could not do so without persuading the Banks of the "interior" and they had so far been unable to persuade them." (Harrod (1964)).

⁶ Haldane et al (2016).

Chart 1.a: Corporate bond yields

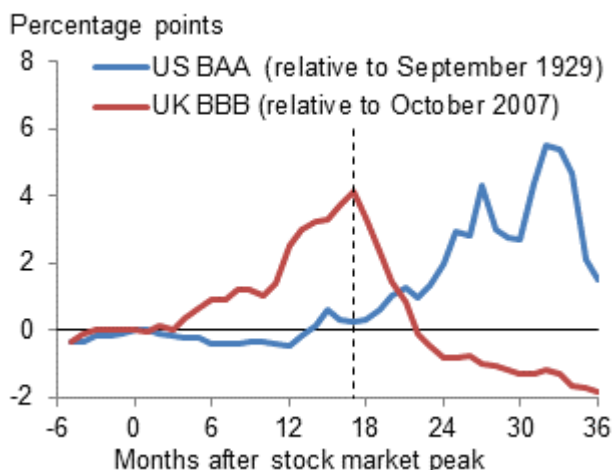


Chart 1.b: Deposits

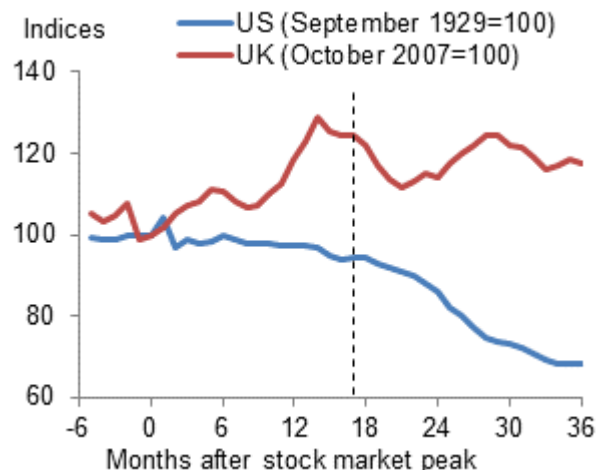


Chart 1.c: Industrial production

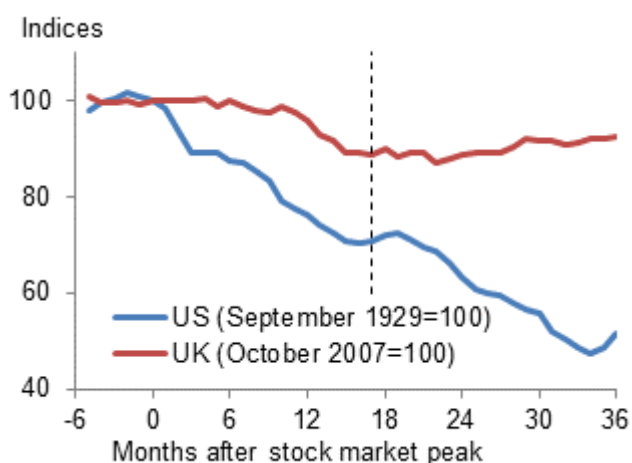
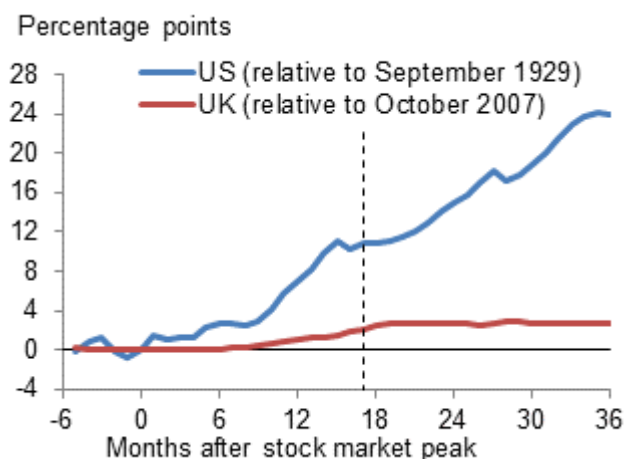


Chart 1.d: Unemployment



Sources: Bank of England; ICE BoAML; National Bureau of Economic Research and Board of Governors of the Federal Reserve System, retrieved from FRED, Federal Reserve Bank of St Louis; ONS; and Bank calculations. Stalks indicate March 2009. For Chart 1b, US data on deposits are seasonally adjusted while UK data are not.

First, and all else equal, asset purchases do seem to have had a significant impact on economic activity. Some studies get at that effect using existing estimates of the sensitivity of GDP to bond yields and combining those with the impact of QE announcements on those yields. Others estimate the impact on bond markets and activity jointly.

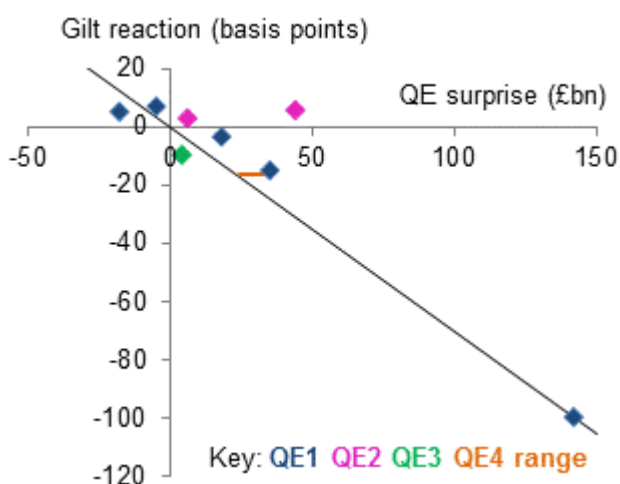
There is some suggestion in Haldane et al (2016) that the early phases of asset purchases had more powerful effects, and it's clear that the biggest daily moves in bond yields occurred after the very first QE announcements in early 2009 (Chart 2⁷). But on average, and whichever method one uses, there does

⁷ The impact of subsequent rounds was found to be smaller on the day because markets had come to expect them in advance. Even allowing for that however – Chart 2 plots moves in gilt yields against the surprise in asset purchases, derived from survey measures at the time – the early-2009 moves still look a bit larger than the others. Note that the impact of the asset purchases in August 2016 (“QE4”) is drawn as a spread rather than a dot. That’s because the MPC purchased corporate as well as government debt. If you view the two as reasonably close substitutes, you should count the combined purchases as the size of the decision, not just those of gilts (£70bn versus £60bn). The same issue arises later when considering the impact of QE in the United States.

seem to have been a significant effect on demand. The central estimate in Weale and Wieladek (2016), for example, is that purchases worth 1% of GDP boost UK GDP by around 0.25%.

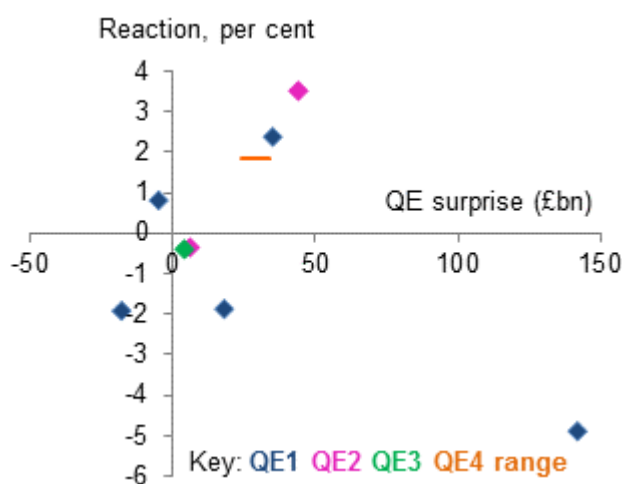
Second, if the effect on long-term bond yields is clear, the impact on share prices is harder to detect. On some days after QE announcements equity prices went up – the largest rise happened to be after the extension of asset purchases in October 2011, when gilt yields actually went up – but on others they fell. That doesn't prove there was no impact. By their nature, prices of risky assets are more volatile. Such was the flow of negative news about the economy and corporate profits in 2009, even from day to day, that equity markets often weakened even as bond markets strengthened.

Chart 2: QE1 had the largest impact on yields



Sources: Bloomberg Finance L.P., Tradeweb, Reuters Poll, and Bank calculations. The reaction is for 5-25 year gilts. The chart is based on figure 10 in Haldane et al (2016).

Chart 3: The impact on share prices is harder to detect

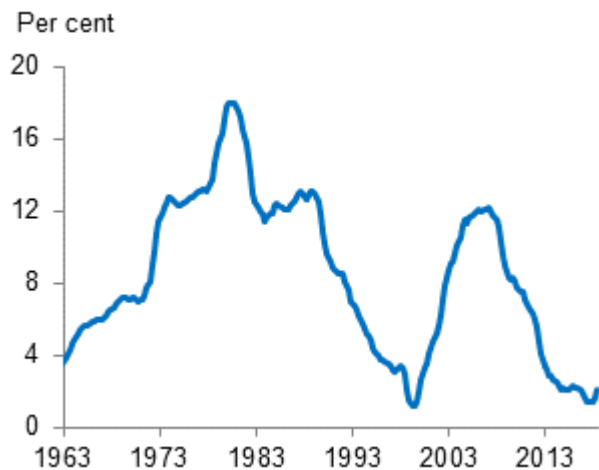


Sources: Thomson Reuters Datastream, Reuters Poll, and Bank calculations. The share price reaction is for UK-focused equities.

But it should be borne in mind when reading – as one often does – that QE has done little except boosted prices of assets like shares and houses, or even led to a “boom” or “bubble” in those markets. It's also worth looking at Charts 4 and 5. Chart 4 plots average annual growth of UK house prices over rolling 10-year periods. The latest figure is 2%. That's less than household income growth over the past decade. It's also close to lowest rate of growth over any ten-year period since the period following the Second World War. The peak rate of 18% a year was during the 1970s.

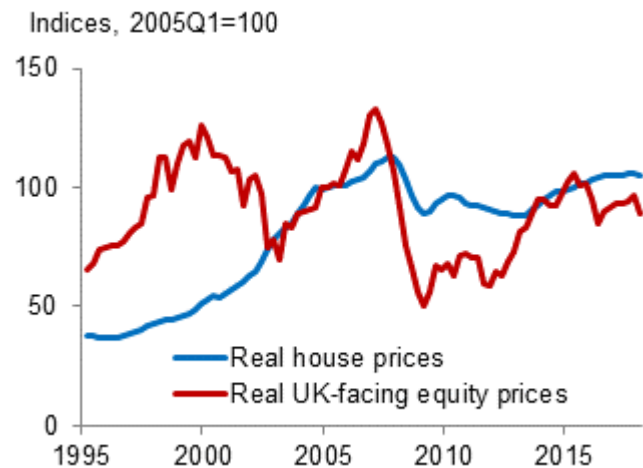
The general level of inflation was also very high at that time: every price was going up rapidly. It's therefore more informative to look at asset prices in real terms (i.e. relative to consumer prices). The level of real house prices is plotted in blue in Chart 5. As you can see, they went up extremely rapidly between 1996 and 2004. But the latest figure is barely any higher than it was in the middle of the last decade. As for shares, real equity prices of UK-facing companies (in red) are still 30% lower than immediately before the financial crisis (and almost as far below the earlier peak in the late 1990s).

Chart 4: House prices haven't risen much over the past 10 years



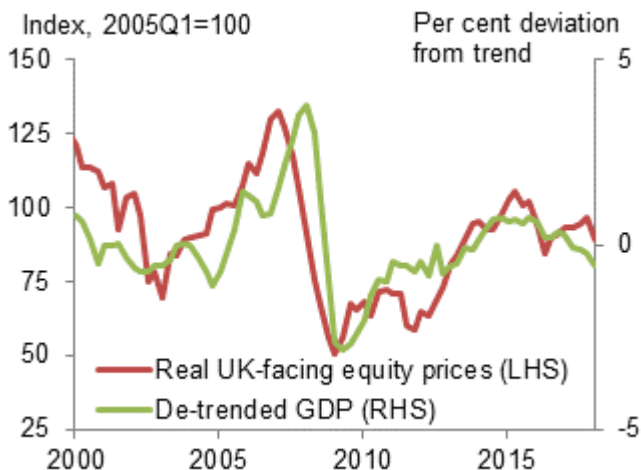
Sources: Nationwide and Bank calculations.

Chart 5: Real equity prices well below pre-crisis levels



Sources: Nationwide, ONS, Thomson Reuters Datastream, and Bank calculations.

Chart 6: Real equity prices and de-trended GDP



Sources: ONS, Thomson Reuters Datastream, and Bank calculations. Output de-trended using a HP filter.

As I say, we can't conclude from all this that QE had no impact at all on these prices, even at the margin. Given its effects on longer-term interest rates, and on economic activity, it probably did. But their apparent lack of response does at least demonstrate that the policy had quite a bit to fight against. To the extent there was such an effect, it would be more accurate to say QE helped to prevent these prices from falling further, rather than that it fuelled any sort of "boom".

You can tell the same story about QE and the wider economy. All else equal, the policy

supported demand, activity and employment. But that support was being provided in the face of significant contractionary forces, arising from both the first phase of the financial crisis and then its unwelcome offspring, the euro area crisis of 2010-12. You can see from Chart 6 that it wasn't until confidence in the single currency was restored in mid-2012⁸, and a more sustained economic recovery began in the UK (the green line is de-trended GDP⁹), that these asset prices also recovered.¹⁰

⁸ I've argued before that one of the critical precursors to that recovery was Mario Draghi's pledge in the summer of 2012, supported soon after by political leaders in the euro area, to "do whatever it takes" to preserve the integrity of the single currency. In conjunction with our own Funding for Lending Scheme, this led to a sharp fall in funding costs, particularly for banks, and soon after a resumption in the supply of credit to the domestic economy (Broadbent (2014)).

⁹ The green line is purely a statistical construct (HP-filtered GDP) and, because potential output growth is also stochastic, it won't necessarily be the same as the "output gap". In particular, the decline in the past few years is likely to reflect slower growth of supply rather than a rise in the degree of spare capacity.

¹⁰ A related criticism of QE is that, because it pushed up prices of assets, it also increased inequality. But real asset prices haven't gone up over the past decade, as we've seen, nor has inequality, either of wealth or of income. Furthermore, even though QE probably raised asset prices at the margin (all else equal), the effect on inequality was offset by the support to real activity and employment.

Why the impact of QE might be changeable

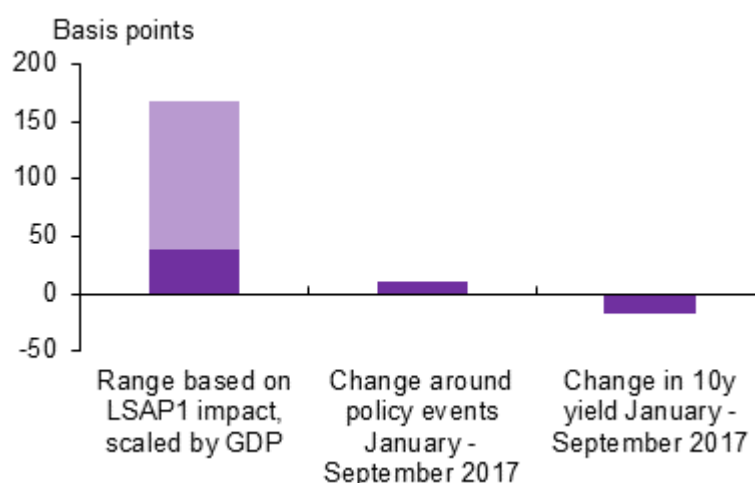
Estimates of how QE has affected the economy often assume the effect is invariant: so many pounds of QE means such-and-such an impact on GDP, no matter what else is going on. Yet our experience so far suggests the effect may not be fixed. In particular, it seems to have been larger when QE was first launched than in subsequent rounds. If that can only be a tentative conclusion from the UK experience what's happened more recently in the US is surely more striking.

As you know, the Fed has now started to reduce its asset holdings: it has embarked on what you might call "QT" (T for tightening).

Given the sizeable impact of QE1, including in the US, you might have expected this to result in a material rise in bond yields, especially at a time when the US government is also starting to sell more debt. The first column in Chart 7 gives you some idea of the predicted effect on this basis. It takes the median projection for the decline in the size of its balance sheet over the next three years (as calculated by the New York Fed). It then multiplies that by the estimated response of Treasury yields, per dollar of purchases, in the first phase of QE.¹¹

In the event, things have turned out rather differently. Despite the various QT announcements in the first nine months of last year (and despite rising short rates and easier fiscal policy) yields actually fell over that period (the right-hand bar). That, of course, might be due to any number of other influences. But even if you focus on the particular points at which the policy was communicated¹² (the middle bar) there was essentially no reaction in the government bond market.

Chart 7: US QT has done little to US bond yields



Sources: Bloomberg Finance L.P., BEA, Federal Reserve Bank of New York (2017), academic studies and Bank calculations. See footnotes 11 and 12 for further details.

That's because cyclical rises in unemployment, which would have been much larger in the absence of QE, are larger at the lower end of the wage distribution. Taking both into account, the central estimates in a recent study by Bank economists are that QE itself actually had essentially zero (actually marginally *negative*) net impacts on the inequality of wealth and income (Bunn, Pugh and Yeates (2018)). I include some exhibits illustrating these points at the back of this talk. See also Broadbent (2016) and Carney (2016). Economists at the ECB and Princeton University recently reached a similar conclusion (Ampudia et al (2018)).

¹¹ The balance sheet projections are from the New York Fed (see Federal Reserve Bank of New York (2017)). The estimated QE multipliers are an average based on the following studies: Gagnon et al (2011), Krishnamurthy and Vissing-Jorgensen (2011), D'Amico and King (2013), D'Amico et al (2012), Christensen and Rudebusch (2012), Bauer and Rudebusch (2014), Neely (2015) and Chadha, Turner and Zampolli (2013). In the chart there's a wide range for the estimated impact. That's because the Fed bought (government guaranteed) mortgage securities as well as government bonds and the per-\$ impact depends on whether or not you count both. If you view those asset classes as perfect substitutes, the quantum of QE1 would be larger and the per-\$ estimated impact on bond yields would be smaller. If you thought Treasury yields had been affected only by purchases of those specific securities the estimated per-\$ impact would be larger, as would the predicted effect of QT. We know the two aren't perfect substitutes because they have different yields, but they're probably close substitutes. The true estimate must lie somewhere in the middle of the range (and therefore within the lighter-shaded part of the bar).

¹² The impact was estimated using 30-minute decompositions around FOMC balance sheet communications.

Why might this be?

One thing that might have amplified QE's impact when it was first used was its sheer novelty value. Once markets discover the policy is feasible, perhaps the premium required for holding longer-term bonds is permanently lowered, if only to a small extent.¹³

But there are potentially more important reasons why the later rounds of QE – and in particular the early stages of QT – have had smaller effects. These are connected with the various ways in which QE actually works. To understand why, it's worth stepping back and reminding ourselves what the mechanics of the policy actually are.

QE is sometimes described as “printing money”. That can be a helpful piece of shorthand. It can also be a misleading one. It risks giving the impression that the central bank simply hands out wads of cash, getting nothing in return.¹⁴ I've often heard, in particular, that QE involves “giving” money to the banks.

What actually happens is this (there's a stylised depiction at the back of this speech): the central bank buys government bonds, mainly from non-banks, on the open market. Imagine we pay for them with a cheque. The seller of the gilt lodges the cheque at its own commercial bank, increasing the size of its deposit holdings; that commercial bank, in its turn, sends the cheque back to us, increasing its deposits at the central bank (so-called “reserves”). And there's no direct effect on anyone's net financial position. The seller of the gilt ends up with more money in its bank account but no change in its total assets. The two banks, of the commercial and central variety, end up with larger balance sheets but the rises in assets and liabilities are of equal size.

So perhaps a more accurate description of the process is that it replaces one liability of the consolidated public sector (longer-term government bonds) with another (deposits at the central bank). The effect is to depress the average maturity of those consolidated liabilities. And you might wonder, especially since both bonds and reserves pay interest, why this should do anything at all. Indeed, there's a famous neutrality result in finance, originally applied to corporate balance sheets, that says exactly this. Under certain conditions, when financial markets are functioning smoothly, pure financial transactions of this sort do nothing. At least in this idealised theoretical setting, it makes no difference to its overall cost of capital if a firm issues interest-bearing debt and buys back its own shares. The maturity profile of government debt wouldn't matter for bond yields. And, viewing central bank money simply as the shortest-maturity liability that the public sector can issue, nor would those yields respond to open-market operations by the central bank

¹³ Roughly speaking, the current price of an asset should correspond to what markets expect it to be in the future (appropriately discounted). That expectation of future prices will take into account all possible states of the world, including those in which the term and liquidity premia suddenly go up. If those are also circumstances in which the central bank might choose to buy the assets, then the realisation this is possible could permanently raise their value, however unlikely those circumstances. They might now include a QE “option value”, if only a small one.

¹⁴ The phrase “printing money” is closer to Friedman's “helicopter drop”, a thought experiment designed to illustrate the implications of a pure increase in the supply of money.

(QE).¹⁵ This is what Ben Bernanke was getting at when he quipped that QE is something that “works in practice but doesn’t work in theory”.

So why does it work in practice – why has it had noticeable effects on bond yields (albeit to varying degrees)? I’m not to go into any great detail here. There’s masses of stuff you can read – if you wish to – about the various mechanisms involved.¹⁶ Economists have generally focussed on three. The “bank lending” channel emphasises the importance of banks’ liquid assets, and the potential constraints that a lack of reserves can impose on their behaviour, including their appetite to lend. The “portfolio balance” channel, generally reckoned to be more important after the 2008-09 financial crisis,¹⁷ stresses the direct price effects on the assets purchased by the central bank, and sets out what’s necessary for these to exist. (What’s usually required, in one form or another, is that holders of long-dated assets have “preferred habitats”, and can be persuaded to move out of them – to sell those assets – only by a rise in prices.) The third – the potential “signalling” effect – says what matters is what QE says about the central bank’s intentions regarding future policy, and in particular the likely path of official interest rates.

The point I want to make here is that all three can change. One might even say this is intrinsic to the effects involved.

The first two – the “bank lending” and “portfolio balance” channels – rely, in their different ways, on markets being sufficiently imperfect that the neutrality result no longer applies. But markets are more impaired at some times than others. Before the crisis, many financial assets were considered liquid. They could be easily traded, prices were readily quoted and investors would happily switch between them, even in response to relatively small changes in their relative price. The demand for central bank money was lower – why would you need it if liquidity was easily available elsewhere? – and “preferred habitats” weaker. In that environment, shifts in the central bank’s balance sheet may not have had much effect. It was when things started to seize up, and markets became more dysfunctional, that these transactions really mattered. With fewer assets considered liquid, the demand for central bank money went up. With preferred habitats more entrenched, the effect of asset purchases on prices were larger. You might therefore have expected QE, at least through these channels, to have become more important. Conversely, you might also expect their

¹⁵ The original result is Modigliani and Miller (1958). The result is generalised in Stiglitz (1969). Wallace (1981) applies it to open market operations by the central bank.

¹⁶ See, for example, Benford et al (2009), Joyce, Tong and Woods (2011), Haldane et al (2016), Bhattarai and Neely (2016), and Bernanke (2017).

¹⁷ If banks are constrained by a lack of liquid assets, then raising their deposits at the central bank can relax these constraints and encourage an expansion of their balance sheets, including greater lending. Though Friedman and Schwartz were more concerned about the behaviour of deposits, rather than lending, this is more or less the mechanism emphasised in *A Monetary History* and it does seem likely that these constraints were very real at the time of the Great Depression. With no insurance of their deposit liabilities, and a much greater potential for “runs”, banks felt obliged to hold much higher levels of reserves. In monetarist language, the demand for money – in particular the demand for the most secure and liquid assets of all, physical cash and central bank deposits – rose very significantly. It was the failure to meet this demand, Friedman and Schwartz argued, that so amplified the downturn. Circumstances in the recent financial crisis were rather different and it’s unlikely the “bank lending channel” was ever going to be as important as in the 1930s. Statutory reserve requirements are now lower or non-existent and deposits are insured. In 2008-09 banks were therefore constrained not so much by a lack of “liquidity” as by a lack of equity: the fear was that, after significant losses, too many of them had insufficient assets, whatever their composition, to cover their interest-bearing liabilities. That’s not to say the extra reserves supplied by QE (and by direct lending to the banking system) were unimportant. No central bank would ever have taken the risk of failing to supply them, by whatever means. But I don’t think this is how they expected the policy to work, nor does the evidence *ex post* show it to have been that important (Butt et al (2014)).

impact to diminish once more normal market conditions are restored. While he was on the MPC my former colleague David Miles gave a very clear and more detailed explanation of this point (Miles (2014)).¹⁸

As for the third, it surely makes sense that the strength of the “signalling effect” – what markets infer from QE decisions about future interest rates, and the central bank’s intentions regarding its overall policy stance – depends on what it communicates alongside its decision.

In the early phases of QE the policy was seen as an aggressive attempt to ease monetary conditions for an extended period. Whatever else it might have done to depress the “term premium” – the extra yield required by long-maturity bondholders, even above their expectations of future short-term interest rates – it also lowered those rate expectations. QE and forward interest rates were effectively used in a *complementary* fashion, pushing in the same direction.

Something similar occurred, albeit in the opposite direction, when the Fed suggested in 2013 that it might reduce the pace of its asset purchases (the so-called “taper tantrum”). This wasn’t yet QT – nor, in the Congressional testimony that triggered the reaction, did Fed Chair Ben Bernanke refer directly to future interest rates (“If we see continued improvement [in the economy] and we have confidence that that is going to be sustained then we could, in the next few meetings, take a step down in our pace of [asset] purchases”).¹⁹ But it was taken as a sign of a more hawkish stance overall: because the Fed was getting more optimistic about the economy, QE would be tapered and, the markets judged, official interest rates would also begin to rise earlier than previously expected. As a result, and although the move was reversed within a few months, US bond yields also rose significantly.

The communication around the Fed’s “QT” policy was rather different. When in the early part of last year it first signalled its intention to start shrinking the balance sheet later in 2017, the FOMC went out of its way to say that, to the extent the policy tightened monetary conditions, official interest rates would be that much lower than they otherwise would have been. This is how Janet Yellen put it in a speech in January 2017: “The downward pressure on longer-term interest rates that the Fed’s asset holdings exert is expected to diminish over time -- a development that amounts to a “passive” removal of monetary policy accommodation. Other things being equal, this argues for a more gradual approach to raising short-term rates”.

In other words, rate rises and any tightening effect of shrinking the balance sheet should be seen as *substitutes*. More of the latter would mean less of the former, and the overall stance of policy – the balance sheet and official interest rates taken together – would be whatever it needed to be to meet the Fed’s remit, given the economic conditions prevailing at the time. Compared with the “taper tantrum” episode this sent a

¹⁸ Vlieghe (2016b) provides evidence that, at least under more normal market conditions, the “signalling channel” is the most important mechanism.

¹⁹ The point was emphasised again in the minutes of the FOMC’s April 30 – May 1 meeting released later that day: “a number of [FOMC] participants expressed willingness to adjust the flow of purchases downward as early as the June meeting”.

different message about the overall stance of policy and I suspect that played a part in dampening the impact of QT announcements on longer-term bond yields.

The MPC's approach to unwinding QE

In time the QE will also start to be unwound in the UK. The MPC set out its basic framework for this process some time ago, in the November 2015 *Inflation Report*. We said then that we would begin to start reducing the stock of QE only once the official Bank Rate had risen some way. This was partly because conventional policy is more flexible, better suited to responding to shorter-term economic fluctuations. It was also a response to the relatively higher degree of uncertainty about the effect of changes in the stock of QE.²⁰

I've discussed this at some length today. The smaller sample means estimates of the impact of unconventional policy are bound to be less precise. If that's the case when the impact is unchangeable it can only be truer still if it varies according to economic conditions. But even in 2015, the MPC felt sufficiently confident in its assessment of what changes in interest rates do – more so, in particular, than in the estimated impact of changes in QE – that it said would prefer to use Bank Rate as the “marginal” or “primary” instrument of policy. That means getting Bank Rate to a level from which it could be cut (“materially”) as well as raised. The US Fed subsequently adopted a similar approach, saying that rises in official interest rates should be “well under way” before the unwind process began.

At the time of that initial guidance our version of “well underway” was judged to mean a Bank Rate of “around 2%”. Since then we have also reduced our estimate of the effective lower bound for interest rates (thanks in part to the effectiveness of the Term Funding Scheme, part of the package of measures put in place in August 2016, we now think we can safely cut Bank Rate close to zero, if necessary). So when we updated the guidance this summer, in the June *Monetary Policy Summary*, we lowered the estimated threshold to “around 1.5%”. We don't know exactly when that will be. But the framework is designed to ensure that, should inflationary pressures weaken after that date, the first response would be to cut interest rates.

In principle, those disinflationary influences might include the process of QE unwind itself. To that extent, Bank Rate would be lower than it otherwise would have been. That's why we took care to add another sentence to last month's MPS: “Decisions on Bank Rate will take into account any impact of changes in the stock of purchased assets on overall monetary conditions, in order to achieve the inflation target”.

In some ways this is no more than the phrase “primary instrument of policy” implies. As long as they're free to do so, interest rates will always move around to offset things that affect inflation – in both directions, and

²⁰ There's an important distinction here between the effects of existing stock, such as they are, and those of future changes in the APF. If there's material uncertainty about the impact of the existing stock, even many years after it was purchased, there's an argument for beginning the unwind that much earlier (i.e. for having a lower interest-rate threshold). If, on the other hand, the more significant uncertainty involves the potential impact of *future* changes, that argues for a higher threshold. My own sense is that, because most of the APF was accumulated several years ago, the second is more likely. We have a good sense of what those earlier purchases did to financial asset prices, and it's likely that any subsequent impact on demand has also passed its peak.

wherever those influences come from. But we were also aware of the US experience and the Fed's careful communication around QT.

Summary

QE has often been described as a “new-fangled” policy, something that involves “printing money” and has served only to engineer large rises in the prices of financial and other assets, benefiting only the better off.

Broadly speaking I don't think any of these things is true. It's not new; it's not exactly printing money; equity and house prices are in real terms still comfortably below their pre-crisis levels; inequality hasn't risen – nor, according to the most detailed analysis available, did easier monetary policy have any net impact on it.²¹

To be sure, asset prices would probably have fallen further had QE and other measures not been put in place in 2009. The same goes for the economy itself. As far as we can tell, asset purchases provided significant support to aggregate demand, even if it wasn't enough to offset fully the extended contractionary effects of the crisis. Perhaps Friedman and Schwartz over-emphasised the failures of the US Fed as a cause of the Great Depression. But I don't think anyone can reasonably argue it was worth risking those same mistakes a second time.

Later rounds of QE may have been less effective than the first. In the US, where the Fed has begun to shrink its balance sheet, its “QT” announcements appear to have had very little impact. At least in part, that's likely to be by design. The pace of unwind is very gradual. And the FOMC emphasised that, to the extent a shrinking balance sheet tightened monetary conditions the official interest rate would be commensurately lower (than it would otherwise have been). The overall stance of policy would be set to ensure the central bank meets its objectives.

The same is true here. Our task remains to hit the inflation target and we will always seek to ensure that the combined effects of the APF and of more conventional changes in Bank Rate are set to that end.

Thank you.

²¹ I haven't spent any time on this question today only because quite a bit has been said already. See footnote 10, the references therein, and the charts at the back of the speech.

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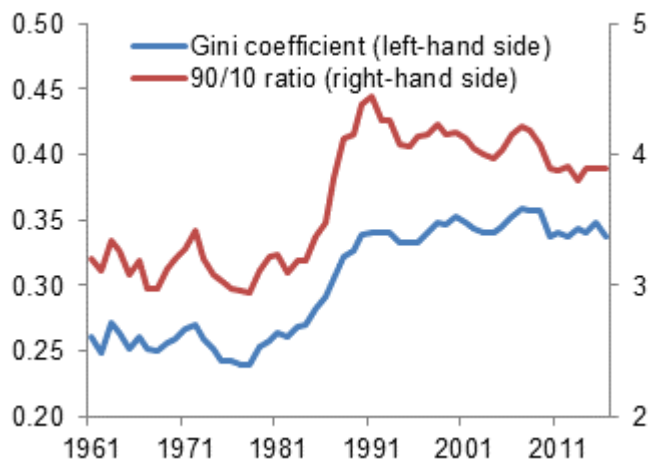
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Annex 1: Stylised depiction of the effect of QE on balance sheets

	Before QE		After QE									
	Assets	Liabilities	Assets	Liabilities								
Central bank	<table border="1"> <tr><td>Safe assets</td></tr> </table>	Safe assets	<table border="1"> <tr><td>Reserves</td></tr> <tr><td>Banknotes</td></tr> </table>	Reserves	Banknotes	<table border="1"> <tr><td>Gilts</td></tr> <tr><td>Other safe assets</td></tr> </table>	Gilts	Other safe assets	<table border="1"> <tr><td>Reserves</td></tr> <tr><td>Banknotes</td></tr> </table>	Reserves	Banknotes	
Safe assets												
Reserves												
Banknotes												
Gilts												
Other safe assets												
Reserves												
Banknotes												
Commercial bank	<table border="1"> <tr><td>Reserves</td></tr> <tr><td>Loans</td></tr> </table>	Reserves	Loans	<table border="1"> <tr><td>Deposits</td></tr> <tr><td>Equity</td></tr> </table>	Deposits	Equity	<table border="1"> <tr><td>Reserves</td></tr> <tr><td>Loans</td></tr> </table>	Reserves	Loans	<table border="1"> <tr><td>Deposits</td></tr> <tr><td>Equity</td></tr> </table>	Deposits	Equity
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Gilt holder	<table border="1"> <tr><td>Gilts</td></tr> <tr><td>Deposits</td></tr> </table>	Gilts	Deposits	<table border="1"> <tr><td>Liabilities</td></tr> </table>	Liabilities	<table border="1"> <tr><td>Deposits</td></tr> </table>	Deposits	<table border="1"> <tr><td>Liabilities</td></tr> </table>	Liabilities			
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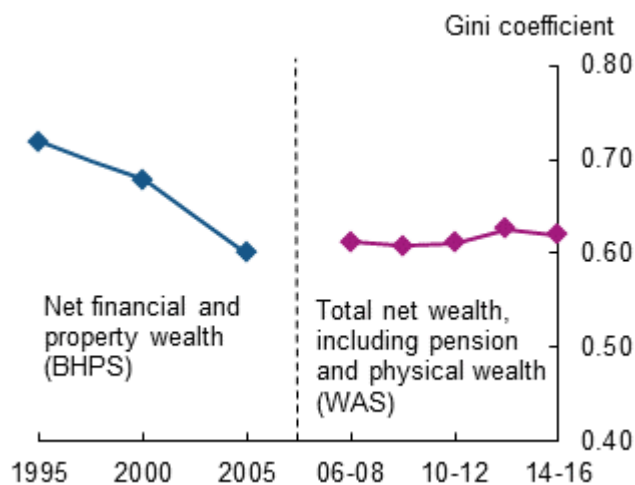
Annex 2: Inequality

Chart A1: Income inequality



Sources: Family Resources Survey (FRS) and IFS. The chart updates Chart 5 in Bunn, Pugh and Yeates (2018) to include the 2016-17 financial year. Income is before housing costs, net of direct taxes and inclusive of state benefits and tax credits. Data are for calendar years up to and including 1992 and for financial years from 1993-94 onwards.

Chart A2: Wealth inequality



Sources: British Household Panel Survey (BHPS), Wealth and Assets Survey (WAS), and calculations in Bunn, Pugh and Yeates (2018), updated to include 2014-16.

Table A1: The impact of monetary policy changes since 2007 on inequality

	Income Gini	Net wealth Gini
2012-14 data	0.360	0.612
Counterfactual: no change in policy	0.362	0.630
Monetary policy impact	-0.001	-0.017

Source: Bunn, Pugh and Yeates (2018).