IEO evaluation of the Bank of England's approach to quantitative easing

In July 2019 the Bank's Court commissioned its Independent Evaluation Office to conduct an evaluation of the Bank's approach to quantitative easing.

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Foreword from the Chair of Court

Maintaining price stability is at the heart of what the Bank of England does. For the first decade of its existence, the Bank's Monetary Policy Committee (MPC) was able to achieve that stability through changes in one policy tool – Bank Rate. But in responding to the global financial crisis, Bank Rate was cut to close to zero and the MPC, like policymakers around the world, had to turn to other – less familiar – tools to meet its aims. In 2009, the MPC began a programme of quantitative easing (QE), through the Bank's Asset Purchase Facility, intended as a temporary measure to support the economy in the aftermath of the crisis. But a decade on from its introduction in the UK, QE has become bigger, broader and more persistent than expected. That is why in 2019 the Bank's Court commissioned this evaluation of the Bank's asset purchase programme. And, although not a key focus of this report, the further expansion of QE in 2020 as the MPC responded at pace and scale to the Covid-19 crisis, has only made this review more timely.

The Independent Evaluation Office (IEO) was asked to carry out an end-to-end evaluation of the QE rounds between 2009 and 2016. That covers the Bank's understanding of how QE works, tool design and implementation, governance and risk management and communication. Its findings are described in this report.

The report shows that the Bank has delivered asset purchase programmes effectively. There has been impressive and collaborative staff input to deliver innovative programmes at pace over a number of rounds of QE – in particular in the midst of the global financial crisis in 2009 and again as the Bank responded to the 2016 vote to leave the EU. The Bank's researchers made a valuable contribution to the growing literature on the effects of QE – especially in the early stages. The Bank has developed strong governance and risk management to underpin delivery of QE. The bespoke technical infrastructure that facilitates purchases has proved resilient, overseen by experienced staff. And the Bank has honed its communications on what is a complex tool. More generally, there is good evidence of the Bank learning and adapting as the programme has expanded. The recommendations in this report are intended to build on and encourage such learning.

Those recommendations fall under three themes. The first considers how the Bank can continue to advance and apply its technical understanding of QE, given that important knowledge gaps remain. The second looks to ensure that the governance and implementation of QE remain fit for the future, recognising the complexity and risk considerations of asset purchases. And the third focuses on building public understanding and trust in QE, a tool which remains poorly understood and often contentious. Taken together these three themes and accompanying recommendations can help to reinforce QE's role in the Bank's toolkit. And the lessons from the first decade of using QE can also inform the Bank's approach to future policy design.

At our 11 December meeting, Court welcomed the Bank's commitment in taking forward these recommendations. We will monitor their implementation as part of the IEO's follow-up framework.

Brad Fried, Chair of Court
January 2021

Executive summary

In July 2019, the Court of Directors (the Bank's board) commissioned its Independent Evaluation Office (IEO) to conduct an evaluation of the Bank's approach to its Asset Purchase Programme, commonly known as quantitative easing (QE).

QE was first launched in the UK in March 2009 in the midst of the financial crisis, when the Monetary Policy Committee (MPC) announced £75 billion of asset purchases, financed by the issuance of central bank reserves. With Bank Rate having been cut to close to its effective lower bound, the aim of QE was to provide further monetary stimulus, in order to boost economic activity and meet the inflation target in the medium term.

Since then, QE has become significantly larger in scale, broader in type and more persistent than was initially expected. As of November 2020, the MPC has announced QE purchases totalling £895 billion, equivalent to over 40% of annual UK GDP. The vast majority of these purchases have been of UK government debt. The QE portfolio also includes around £20 billion of corporate bonds. QE has proved more persistent than initially expected, with repeated additional purchase rounds and no reductions in the stock of purchases.

This growing role for QE reflects both significant shocks and long-term, structural trends. The impact of the financial crisis proved longer lasting than initially anticipated. It also became clear that global 'equilibrium' interest rates – those consistent with full employment and stable inflation at target over the medium term – had fallen. That meant that average policy rates needed to be lower than in the past in order to meet the MPC's aims. In turn, this increased the chance of Bank Rate being near its lower bound, such that other tools would be needed in the face of negative shocks. Moreover, the UK economy has faced significant shocks – the euro-area crisis, the vote to leave the EU and Covid-19 – since then.

The expanded role for QE underlies the importance of this evaluation. QE should no longer be seen as a transient, 'unconventional' crisis response. Instead, it is now an established part of the monetary toolkit that has been used in the UK and in many other countries in response to a range of shocks. It is likely to continue to play a key role for central banks for years to come, at least while equilibrium interest rates remain low. Nevertheless, the use of QE has sometimes been challenged. For example, there has been significant public debate about the possible spillovers associated with QE, with a particular focus on the potential for distributional effects.

This evaluation was commissioned in 2019, with the aim of covering QE from its inception to 2016 – the last round of purchases at the time. While the evaluation was in train, the MPC voted to expand purchases further in response to the severe downturn associated with the Covid pandemic. The IEO does not comment on live policy decisions. But we have drawn on the experiences of the most recent round of purchases, particularly where there has been clear learning from previous episodes or where issues that we had previously identified were brought into sharper relief.

The IEO was tasked with a broad evaluation of the Bank's approach to the end-to-end QE process. Our focus is not on reviewing estimates of QE impact – there is already a large literature on that. Instead, we have assessed the Bank's understanding of the QE transmission mechanism and its potential spillovers, the Bank's approach to designing and operationalising QE, the associated governance and risk management framework and the Bank's QE communications. Overarching all this, we have assessed the Bank's learning over the past decade about a new tool. An important focus of our recommendations is about how this learning can continue to be fostered and embedded.

Across our evaluation criteria, we found a wide range of positive evidence on the Bank's evolving support for the MPC's QE decisions. The Bank has significantly advanced its understanding of QE over the past decade and has made a good contribution to the international QE evidence base. Since 2009, the Bank has also developed its QE design choices along a number of dimensions in response to new shocks. A common finding across successive rounds of QE is that the Bank has excelled at delivering at pace and under pressure, drawing on very effective staff input from multiple areas. The governance frameworks associated with QE have been strengthened and have proved flexible. Market participants and journalists told us that the Bank's QE communications have been reasonably good overall, given the complexity of the tool.

The nature of QE as a new tool, with a rapidly expanding role, has naturally also brought a range of new challenges, many of them common to other central banks conducting QE. It was a significant shift to move the focus of monetary policy from a short-term interest rate (Bank Rate) to a quantity of purchases (QE). Establishing and communicating the

economic rationale for QE – which is to stimulate the economy by lowering longer-term interest rates – has not been straightforward. The nature of the QE transmission mechanism remains uncertain and the Bank's emphasis has evolved over time. It has been difficult to communicate to the public about a tool that operates indirectly via financial markets and which was launched during a financial crisis. The institutional structure underpinning QE's implementation is also complex, reflecting the risks associated with large-scale asset purchases. As the size and persistence of QE has grown, so has the importance of learning about how it works, ensuring its robust implementation and building public understanding of the tool. These challenges motivate our recommendations. Table 1 summarises our recommendations, which we arrange into three broad themes.

> First, we consider how the Bank can continue to advance and apply its technical understanding of QE.

Since 2009, the Bank has significantly advanced its understanding of QE. Nevertheless, a decade on, there remain open debates about how QE works in different states of the world, its broader interlinkages and its potential limitations. These debates are not surprising and are not unique to the Bank – they reflect the global state of knowledge about a relatively new tool. They can, however, matter a lot for designing the most effective QE programme and should therefore be prioritised. There is considerable value in sustained investment in learning about QE, particularly given its more persistent role in the monetary toolkit. At times over the past decade, and accepting the considerable demand on its resources, the Bank arguably underprioritised such investment work and lacked a structured plan for delivering it. Our recommendations therefore focus on prioritising the outstanding knowledge gaps, ensuring new evidence continues to closely inform QE design choices and fostering the internal and external QE debate. These recommendations are mutually reinforcing.

> Second, we focus on ensuring that the governance and implementation of QE remain fit for the future.

There are multiple dimensions to designing a QE programme, requiring the effective interaction of many stakeholders. Our review of the associated governance, risk management and infrastructure found that they have been tested at times, but overall have proved fit for purpose. Our recommendations consider how to safeguard QE's successful delivery in the future. That includes ensuring that QE governance arrangements are clear and well understood. We suggest regularly raising awareness of the cash transfer arrangements between the Bank's Asset Purchase Facility (APF) and HM Treasury (HMT). In light of the full indemnity HMT provides to the APF, any accounting profit or loss is transferred to HMT each quarter. To date, that has meant a series of positive flows to HMT, totalling around £110 billion. But given that the APF may need to receive cash transfers as QE is unwound, it is important that this scenario continues to be widely understood by relevant stakeholders, ahead of time. We also recommend that the Bank continues to regularly review its internal understanding of where QE design responsibilities lie and the principles behind the relative roles of the MPC and the Executive. That is particularly important given QE's expanded and probably persistent role as a core part of the monetary policy toolkit. Finally, in light of QE's expanded role, the Bank may wish to consider further investment in the operational and risk management infrastructure that underpins QE delivery, alongside its priorities for other capital projects.

> Third, we consider how to build public understanding and trust in QE.

Good communication to the public supports both the accountability and the effectiveness of the Bank of England. With QE now a core part of the monetary policy toolkit, the public's trust in and understanding of the tool is important for the Bank's mission. We recognise the communication challenges that QE has faced, given it is a complex tool with

perceived side effects. Feedback on the Bank's overall communications have been positive and the Bank has seriously engaged with analysis of potential spillovers, albeit relatively slowly. Nevertheless, QE remains a poorly understood monetary policy tool for much of the public and for some its use has been contentious. In particular, there remain strong views about QE's potential distributional side effects. The absence of climate considerations in the Bank's approach to its corporate bond purchases has also been challenged, with some arguing that a more positive environmental signal could be sent. Our recommendations are designed to help the Bank better engage with these issues. To continue to build trust and understanding, we suggest that the Bank develops more accessible, layered communications on QE. Recognising the nature of public debate about QE, we also recommend embedding a structured approach to engage with the potential spillovers of any new tool. In order to deliver these, we think the Bank may wish to consider embedding a more strategic approach to QE communications.

Our report focuses on QE. Nevertheless, the Bank may wish to consider whether our findings could be applied to other elements of the policy toolkit.

The evaluation was conducted by a dedicated project team reporting directly to the Chair of Court.[1] The IEO team benefited from feedback and challenge from a Bankwide senior-level advisory group (including Bank Governors and an external member of the Bank's MPC). Guy Debelle (Deputy Governor, Reserve Bank of Australia) and Ricardo Reis (A. W. Phillips Professor of Economics, London School of Economics) provided support and independent challenge to the team and reviewed and endorsed the findings in this report.

The report was approved for publication by the Chair of Court at the December 2020 Court meeting.

Table 1: Table of recommendations

Continuing to advance and apply technical understanding of QE

- Produce a prioritised work plan for future investment in analysis to fill QE knowledge gaps.
- Maintain a summary of the rationale and evidence supporting each practical QE design decision.
- Provide a forum to allow regular MPC discussions on how QE (as part of the wider monetary policy toolkit) would be used in the event of a big shock.
- At an appropriate horizon/frequency, update technical audience on the Bank's latest collective thinking on QE and proactively foster external engagement with that.

Ensuring that the governance and implementation of QE remain fit for the future

- Regularly raise awareness of APF cash transfer arrangements, and their implications during unwind, to key senior stakeholders and externally.
- Review internal understanding of what the principles of the MPC Concordat mean for QE design responsibilities in practice.
- Consider prioritising further investment to make improvements to operational and risk management infrastructure.

Building public understanding and trust in QE

- Develop more accessible layered communications on QE.
- Embed a structured approach to engage with the potential spillovers of any new tool.
- Embed a more strategic approach to QE communications.

1: Context for the evaluation

In the United Kingdom, as in most advanced economies, monetary policy makers have typically used their ability to change short-term interest rates to help manage fluctuations in demand in the economy and hence inflation. When the financial crisis hit in 2008, the Bank of England cut Bank Rate sharply. By early 2009, it was close to its effective lower bound and with little scope to reduce short-term interest rates further, the Bank then had to consider alternative, so-called 'unconventional', tools to support the economy.

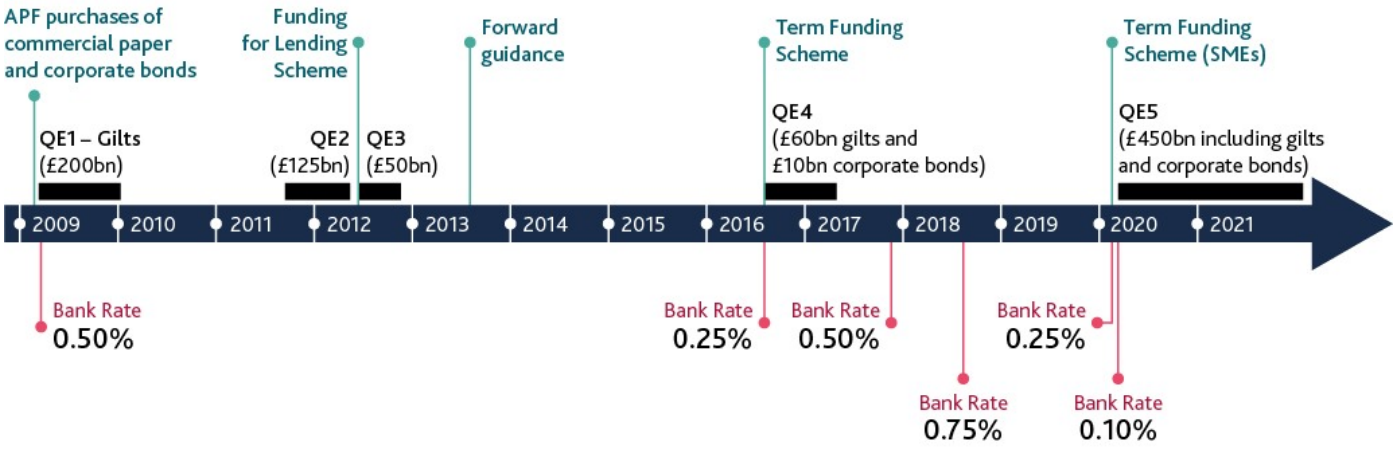
In January 2009, the Chancellor announced that the Bank would set up an Asset Purchase Facility (APF), indemnified by HM Treasury (HMT). Initially, the APF was used to purchase high-quality private sector assets, in order to increase the availability of corporate credit.[2] A provision was also made that allowed the MPC to use the APF for monetary policy purposes.

In March 2009, the Monetary Policy Committee (MPC) announced that it would use the APF to buy £75 billion of assets, with the aim of increasing nominal spending growth to a rate consistent with meeting the inflation target in the medium term. It noted that as well as funding any private sector asset purchases under the APF, the Bank would also buy UK government debt (gilts) in the secondary market and that it was likely that the majority of the overall purchases would be of gilts. This type of policy – commonly known as Quantitative Easing (QE) – had been introduced in Japan in 2001 and had subsequently been adopted by the US Federal Reserve as part of its crisis response. Since 2009, a number of central banks have used asset purchases as part of their monetary policy toolkit. Annex 1 provides a summary of international programmes.

QE was introduced in the UK to provide temporary support to the economy. The impact of the financial crisis was, however, longer lasting than initially anticipated. It also became clear that global 'equilibrium' interest rates – those consistent with full employment and stable inflation at target over the medium term – had fallen.[3] That meant that average policy rates needed to be lower than in the past in order to meet the MPC's aims, and increased the chance of Bank Rate being near its lower bound, such that other tools would be needed in the face of negative shocks. Moreover, the UK economy has faced significant shocks – the euro-area crisis, the vote to leave the EU and Covid-19 (Covid) – since then. In response, UK QE has been expanded over four further phases (Figure 1.1).

In the initial phases of UK QE, the MPC provided stimulus through large-scale purchases of longer-term UK government debt. Since then, the vast majority of UK QE purchases have continued to be of gilts. But the MPC has also purchased some private sector assets for monetary policy purposes: the Corporate Bond Purchase Scheme (CBPS), introduced in 2016, saw the MPC purchasing bonds issued by companies that make a material contribution to the UK economy as part of the QE programme.

Figure 1.1: Bank of England QE programmes and selected policy interventions since 2009 (a)



(a) Monetary policy and credit easing policies since 2009. For more information about Bank Rate decisions and Forward Guidance, please see respective MPC minutes. Further information about other schemes can be found here: APF Purchases of Commercial and Corporate Bonds, Funding for Lending Scheme, Term Funding Scheme and Term Funding Scheme (SMEs).

Relative to initial expectations, UK QE has therefore become:

- **Much bigger in size**: by November 2020, the Bank had announced purchases totalling £895 billion.
- **Broader in scope**: in 2016, the programme expanded to include Corporate Bond purchases, with £10 billion bought in 2016–17, and a further £10 billion in 2020.
- **More persistent**: in 2009, the Bank noted that asset sales could be undertaken as part of a tightening in monetary policy as the economy recovered. But that point has not yet been reached.

Overall, QE has transitioned from being a transient, unconventional crisis response, to a persistent part of the monetary policy toolkit. With structural factors putting continued downward pressure on equilibrium interest rates globally, Bank Rate is more likely to come up against its effective lower bound in the event of economic shocks. QE is therefore likely to continue to play a key role in the monetary policy toolkit for years to come.

The remainder of this section summarises the Bank's approach to QE and our approach to this evaluation.

1.1: The Bank's approach to QE

Objective and transmission of QE

The objective of QE is to provide monetary stimulus, helping the MPC to meet its inflation target. If the MPC projects inflation to fall below its 2% target, it can use QE to boost demand in the economy, and hence inflation. At a high level, QE involves buying assets from the private sector – financed by the creation of central bank reserves. That is intended to lower longer-term interest rates and, in turn, encourage spending on goods and services, boost economic activity and employment and put upward pressure on prices. As set out in Box A, there are a number of potential channels through which QE supports demand and inflation. Purchases of corporate bonds have a similar impact to gilt purchases, but may also reduce liquidity premia in sterling corporate bond markets, and stimulate issuance and hence corporate borrowing.

Institutional design and governance of the Asset Purchase Facility

The Bank conducts its asset purchases through a separate fund – the APF. The APF is funded by a loan from the Bank at Bank Rate (financed by the creation of reserves). Importantly, the APF is fully indemnified by HMT from any losses arising out of or in connection to the facility. As a separate entity, the APF has its own Directors (who are the Bank's Executive Directors for Markets, Banking, Monetary Analysis and Finance) and publishes annual accounts, audited by the National Audit Office. Although indemnified, the Bank risk manages the APF on behalf of HMT. The UK approach to

delivering asset purchases through a separate indemnified fund is different to that taken by other major central banks, which – reflecting their individual governance and funding arrangements – have typically used their own balance sheets to conduct purchases.

HMT is a key stakeholder in the governance of QE. Initially, HMT indemnified the Bank for up to £150 billion of purchases. Each time the MPC has decided to expand the size or composition of the facility, the Governor has requested an expansion in the value of the assets the APF is authorised to purchase from the Chancellor. The institutional design ensures that the MPC remain operationally independent and fully accountable.

Design and implementation of QE by the Bank

Unlike Bank Rate, there are several potential dimensions to asset purchase decisions – including selecting the quantity, maturity and type of asset – and the purchase of some assets may carry higher risk than others. The governance and risk oversight of QE is therefore a key element of policy design.

The relative responsibilities for the MPC and the Bank's Executive are outlined within a concordat, designed to cover the broader Sterling Monetary Framework. At a high level, the MPC is responsible for determining the amount of monetary stimulus needed. The Executive are responsible for operational decisions on how that stimulus is delivered and for risk management.

The MPC votes on a stock of gilts and corporate bonds within the APF. So long as the MPC has voted to maintain or increase the stock of purchased assets, the Bank ensures that the proceeds of any maturing assets are reinvested in the APF. Those reinvestments are communicated via the MPC minutes and market notices. Given the scale of gilt holdings in the APF, gilt reinvestments are carried out regularly. For the much smaller stock of corporate bonds, the Bank reinvests periodically when the required reinvestment has reached a sufficient size to conduct an effective auction programme.

For corporate bonds, the Bank purchases sterling investment grade bonds, issued by private non-financial companies that make a material contribution to the UK economy. The assessment of the materiality of the contribution to the economy made by individual businesses is conducted by the Bank's risk management area.[4] Operationally, purchases are designed to deliver a balanced portfolio of bonds across eligible issuers and sectors, so as not to influence the allocation of credit to particular companies or sectors of the economy.

The Bank's QE operations are all in the secondary market – it does not buy gilts or corporate bonds directly from their issuers. The Bank offers to purchase gilts and corporate bonds in reverse auctions, which have been designed to take into account the features of each market. These are carried out through its bespoke Btender platform, with specific sets of firms able to participate in its different auctions. Further details of the Bank's operations are available in the Bank of England Market Operations Guide.

Given its activities in the gilt market, the Bank has established a set of operational arrangements with the UK Debt Management Office (DMO) – which has responsibility for debt and cash management for the UK government and hence the issuance of gilts in the primary market. These establish a clear delineation of roles and ensure smooth functioning of the gilt market. For example, the Bank does not offer to purchase gilts issued by the DMO within one week of their issue. In August 2009, the Bank and DMO also introduced a gilt lending facility to relieve any undesirable frictions in the functioning of the market in specific gilts arising from the Bank's purchases. And the Bank has made clear that should asset sales become appropriate it will liaise with the DMO in order to minimise interference with their issuance programme.

Internal organisation of QE delivery

The successful delivery of QE relies on input from staff around the Bank.

- Research and analysis on issues such as the effectiveness of QE and modelling its transmission is carried out by Monetary Analysis, Markets and the Research Hub. Colleagues in Financial Stability and the PRA input on the linkages with financial sector balance sheets and the International Directorate bring a global perspective. Together with analysis on the economic outlook, this analysis feeds into the MPC's policy decision.

- Responsibility for operationalising a decision to purchase assets lies with the Markets area, who consider the approach to purchases and the parameters to ensure smooth market functioning.
- Decisions on new tools and operational choices are scrutinised by the Bank's risk management functions, which advise the Bank's Executive on any implications for financial and non-financial risk (such as reputational risks). Legal experts are also consulted on relevant issues.
- At the point of implementation, the Bank's dealers carry out the auctions and liaise with counterparties; trades are processed by the middle and back office areas in Markets.
- QE decisions are communicated through the MPC's minutes and the Monetary Policy Report (MPR),[5] with colleagues in the Communications Directorate helping to deliver those messages outside the Bank. The Bank's Agents also play a key role in communicating the Bank's policy tools in their regions.

1.2: Approach to our evaluation

Our evaluation is broad in scope, covering the Bank's approach to the end-to-end QE process. We based it around four evaluation criteria:

1. Does the Bank have a clear view on the QE transmission mechanism and the overall impact of QE, grounded in the available evidence?
2. Does the Bank have an effective process for designing and operationalising QE?
3. How appropriate is the governance and risk management framework for QE?
4. Does the Bank effectively communicate QE?

Our focus is not on reviewing estimates of QE impact. There is already a large literature on that, with key findings summarised in Box B. Instead, our focus is on the Bank's overall understanding of QE, the application of that to the implementation of QE in practice and the Bank's capacity to learn given QE's expanded and persistent role.

This evaluation was commissioned in 2019, with the aim of covering QE from its inception to 2016 – the last round of purchases at the time. While the evaluation was in train, the MPC voted to expand purchases further in response to the severe downturn associated with the Covid pandemic. The IEO does not comment on live policy decisions. But we have drawn on the experiences of the most recent round of purchases, particularly where there has been clear learning from previous episodes or where issues that we had previously identified were brought into sharper relief.

The evaluation has drawn on a wealth of evidence. This includes around 150 interviews with current and ex-policymakers and Bank staff, academics, think tanks and journalists. We have also reviewed internal and external research, analysis and documentation. And we have carried out textual analysis of both Bank publications and media coverage of QE. Annex 2 provides more details on our remit, scope and method.

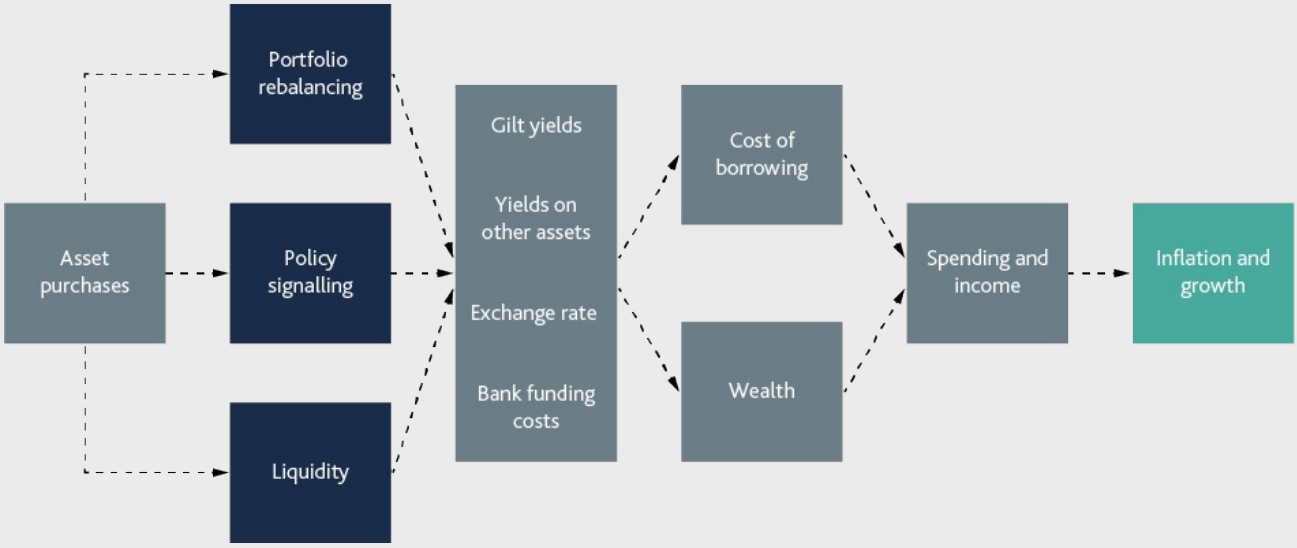
Box A: The QE transmission mechanism

Monetary policy affects economic activity and inflation through several channels. Collectively, economists call these channels its 'transmission mechanism'. This box sets out the key steps for how QE is transmitted through to the economy, illustrated in Figure A.[6]

QE is intended to lower longer-term borrowing costs for households and companies. This happens through several channels, which may vary in importance over time:

- Portfolio rebalancing: By buying bonds that that other investors want to hold, central banks push up the price of these bonds. Sellers of these bonds may then buy other assets, pushing up their price in turn. In doing so, QE effectively reduces the interest rates on these bonds.[7]
- Signalling: Asset purchases may signal that the Bank will keep its policy rate low for a long time. This should reduce long-term interest rates in the economy. The importance of this channel depends on the extent to which investors would otherwise have expected a rise in the policy rate.
- Market liquidity: By committing to buying certain bonds, central banks can reassure other investors that they can sell these bonds if they need to. Given that holding these bonds is now less risky, their price rises. This channel is most effective when financial markets are stressed and demand for liquidity is high.
- Other channels: QE may also work through other channels on which the Bank places less emphasis, such as the bank lending channel. Central banks buy bonds with new reserves.[8] These are very liquid assets for banks, so the creation of more reserves may encourage banks to lend more to the economy.[9]

Figure A: Stylised QE transmission mechanism



Source: Bank of England (simplified version of transmission mechanism in Bailey et al (2020)).

Most of the channels above are likely to raise the price of securities issued by companies and the Government. In doing so, QE effectively reduces the cost at which they can fund themselves. The resulting fall in interest rates will also put downward pressure on the exchange rate, which may boost net exports. Household wealth (including the value of pensions) would also increase. All this is likely to stimulate spending and investment, support jobs and ultimately push up economic activity and inflation.

The transmission of QE is more dependent on financial markets than that of conventional monetary policy. For example, QE has a more opaque impact than Bank Rate on retail financial products like mortgages. In addition, the impact of QE through some channels is dependent on the state of financial markets at the time – in other words, it is 'state-contingent'.

As discussed in Section 2, there is still an active debate about exactly how QE works. Economists are still learning about the relative roles of the different channels in the dark blue boxes in Figure A. That said, as Box B sets out, there is a broad consensus that QE programmes successfully lowered government bond yields and eased financial conditions.

Box B: Literature on QE impact

This box gives a high-level summary of the large body of literature on the impact of QE. For more detail, there are a number of comprehensive papers that cover international meta-studies.[10] The aim of this evaluation is not to duplicate these studies, but instead to assess the Bank's overall approach to QE.

Much of the academic literature is focused on the impact of QE on financial conditions. This includes variables such as interest rates, corporate credit spreads, bank funding costs and other asset prices. There is a broad consensus that QE programmes successfully lowered government bond yields and eased financial conditions across jurisdictions, albeit to varying degrees. A number of papers assess these impacts by applying an 'event study' approach, looking at the immediate reaction of government bond yields and wider asset prices to announcements about QE. In the UK, QE1 purchases of £200 billion, which were around 14% of nominal GDP at the time, led to an estimated fall in 5–25 year gilt yields of around 100 basis points overall (see for example, Joyce et al (2011)). Gagnon (2016) surveys 24 QE studies across jurisdictions (many of which take an 'event study' approach), which suggest that for QE purchases worth 10% of domestic GDP, the median reductions in the 10-year government bond yields in the UK, US and euro area were between 45 and 55 basis points.

The literature on the impact of QE on macroeconomic variables like GDP and inflation is more limited. This is unsurprising: the longer lags involved in the later stages of QE transmission make it much more difficult to identify causal effects, particularly given relatively few international observations to draw on. Williams (2013) notes that the uncertainty surrounding estimates of the macroeconomic impact of QE is at least twice as large as that for changes in interest rates. Nevertheless, studies of these effects tend to find meaningful impacts of QE on both GDP and inflation, albeit to varying degrees. Reis (2016), for example, noted positive evidence of the effect of the initial round of QE in the US on inflation expectations but less evidence in later rounds. CGFS (2019) surveys 25 studies across several countries and finds positive effects overall on both output and inflation, though acknowledges the uncertainty and differences through time of those estimates. In the UK, Bank of England analysis suggests that the initial £200 billion of QE during 2009–10 may have increased GDP by 1.5%–2% and inflation by 0.75%–1.5% (Joyce et al (2011)). Later work by Weale and Wieladek (2016) and Haldane et al (2016) support this finding of a significant impact of QE on both activity and inflation. Fabo et al (2020) survey 54 QE studies across jurisdictions and find that when averaging across the studies, QE purchases worth 10% of GDP are estimated to increase the level of output by 2.4% and the price level by 1.9% at their peaks.[11]

Literature on the impact of QE and its theoretical underpinnings continues to grow. As discussed in Section 2, there remain important debates about how QE works. The new Bank of England Agenda for Research (BEAR), which was launched in September 2020, includes 'The Monetary Toolkit' as a key topic, including QE's role within that.

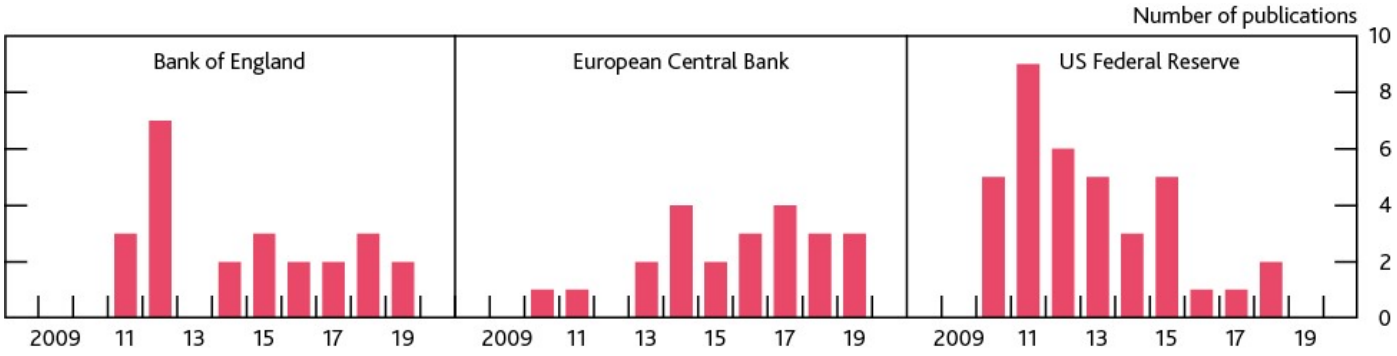
2: Continuing to advance and apply technical understanding of QE

The Bank has significantly advanced its understanding of QE over the past decade. In 2009, when QE was first launched in the UK, there was limited international evidence to draw on. Inevitably, that meant there was considerable uncertainty about the effects that QE might have. Since then, a large evidence base has developed (see Box B).

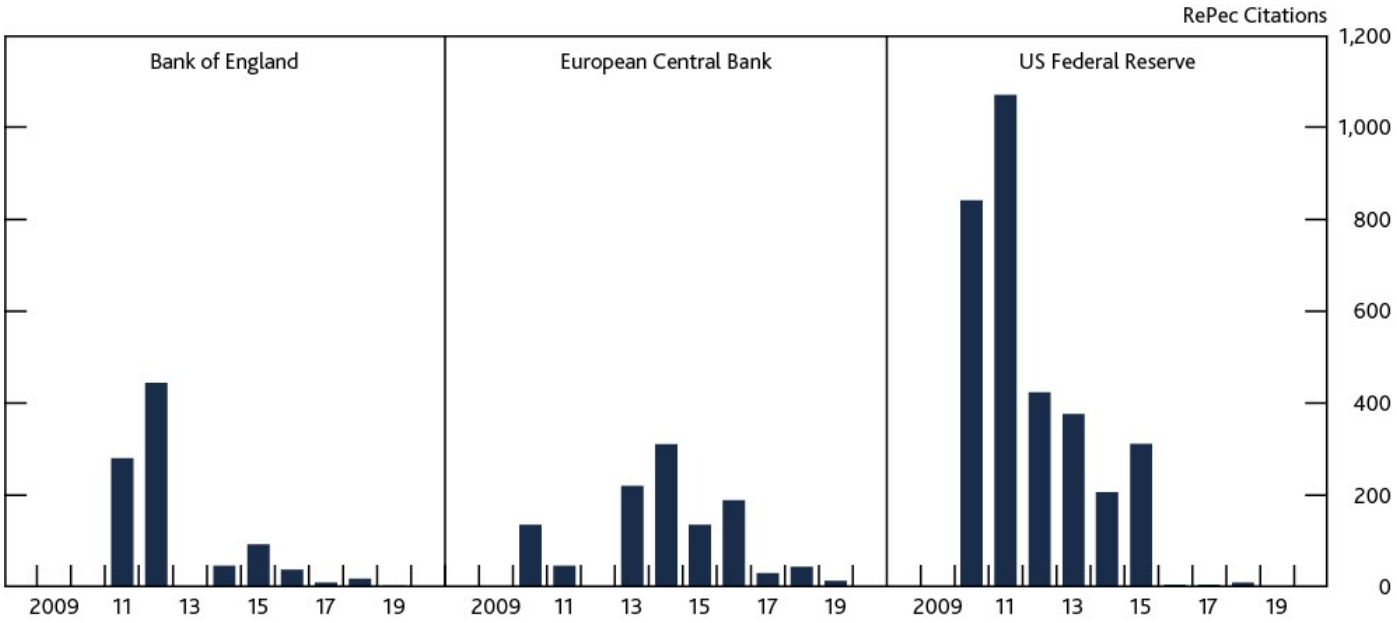
We find that the Bank's research and analysis has made a notable contribution to the QE knowledge frontier. Chart 2.1 shows the number of QE-related research publications – and the associated number of citations – from the Bank of England over time and compares that to some other central banks. Given the relative size of the institutions, we think the Bank has had a good 'footprint' on QE research, particularly with early papers around 2011/12. Our discussions with academics and economic practitioners outside the Bank corroborated this positive assessment (see Box C).

Chart 2.1: Bank of England contribution to QE literature (a)
Number of papers and RePec citations for selected central bank empirical QE literature

Panel 1: Number of QE-related publications



Panel 2: Number of RePec citations



Sources: RePec CitEc project and Bank calculations.

(a) This chart is based on a selected sample of 84 QE-related empirical papers published by central banks. Panel 1 shows the number of papers published each year between 2009 and 2019. Panel 2 shows the total number of RePec citations of those papers (by year of publication) as at 2 December 2020. We base our sample of papers on a survey of central bank literature from the Bank of England, European Central Bank and the US Federal Reserve. We select papers published with at least one author who worked at these institutions at the time of publication. Our sample focuses only on empirical QE research (rather than papers covering theoretical perspectives). We cross-check our sample against references in the following QE meta-studies: Borio and Zabai (2016), Bhattarai and Neely (2016), Haldane et al (2016), CGFS (2019) and Fabo et al (2020). Our cut-off for publication is December 2019. Citations usually build over time so recent papers will tend to have fewer citations than older ones. Given the large body of QE literature and several alternative sample criteria, this list has been compiled on a best efforts basis and should be treated as indicative rather than exhaustive.

We find that the Bank has excelled at delivering new rounds of QE under pressure in response to varied shocks. This has relied on very effective staff input, which feedback consistently suggests has been collaborative, nimble and impressive. Staff from around the Bank have worked together to design and operationalise QE at pace.

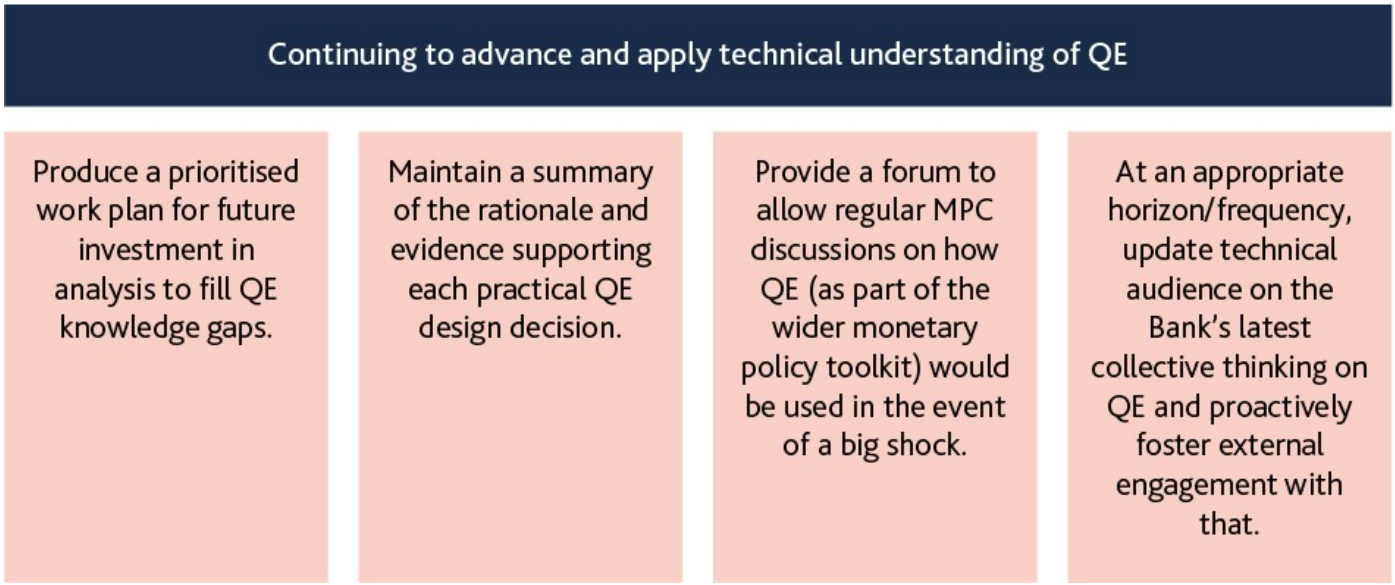
Nevertheless, we have heard that the Bank could benefit from continuing to develop its thinking on the use of QE. This remains important even when not actively considering QE expansion in the near term, in order to improve preparedness for future shocks. At times over the past decade, accepting the considerable demand on its resources, the Bank arguably underprioritised such investment work and lacked a structured plan for delivering it.

This matters, because a decade on there remain open debates about how QE works in different states of the world, its broader interlinkages and its potential limitations. These debates are not surprising and are not unique to the Bank – they reflect the global state of knowledge on a relatively new tool.[12] They do, however, have implications for how best to design an effective QE programme.

There are several dimensions to QE decisions, including selecting the quantity, type and maturity of assets to buy, determining the purchase pace and the approach to reinvestment. The Bank has innovated on these QE design features, in response to new challenges. As design choices are flexed, it is important that the Bank continues to clearly link its evolving understanding of how QE works to how it does it. Externally, this may also improve understanding of the MPC's reaction function.

Our assessment is that there would be considerable value for the Bank in systematic and sustained QE development work. The theme of this section is therefore continuing to advance and apply technical understanding of QE. Our recommendations are summarised in Figure 2.1. We suggest prioritising the outstanding knowledge gaps and ensuring that evolving understanding continues to closely inform practical QE design choices. Internally, we recommend a regular forum to discuss QE's role in the event of a big shock. We also suggest that the Bank updates its technical audience on its latest thinking on QE and proactively fosters external engagement with that. Our recommendations are mutually reinforcing.

Figure 2.1: Summary of recommendations



We are mindful that investment work of this kind is subject to resource constraints and competing priorities. Moreover, we recognise that our recommendations might involve some rebalancing of resource away from near-term issues towards longer-term strategic policy questions. Nevertheless, we think there is considerable value in sustained investment in learning more about QE, particularly given its more persistent role in the monetary toolkit.

These recommendations focus on QE. The Bank may wish to consider the extent to which they could also be usefully applied to other elements of the policy toolkit.

2.1: A prioritised QE work plan

Our first recommendation is to **produce a prioritised work plan for future research and analysis to fill QE knowledge gaps.** It is for the Bank to decide on the key elements of that plan in light of resource constraints and existing commitments. But to aid that, this sub-section notes topics that were raised in our discussions with the Bank's experts and external stakeholders (see Box C for further detail on externals' views).

A common finding was that continued analysis and modelling of the QE transmission mechanism would be valuable. As discussed in Box A, QE is thought to operate through several potential channels. The Bank's emphasis on different channels has evolved over time and a decade on there is not a settled view on which channels matter the most.

Open questions about the QE transmission mechanism are not surprising and are not unique to the Bank. QE is a complex tool and there are a relatively small (albeit growing) number of observations globally, from which to learn. Moreover, the role of different transmission channels is likely to depend on the economic context – so-called 'state-contingency' (for further detail, see Bailey et al (2020)). This may have important implications for effective QE design. For example, the relative weight placed on signalling versus portfolio balance channels might affect which assets it is most effective to buy and how best to communicate QE to maximise its impact. Similarly, the importance attached to the liquidity channel may affect judgements on when QE can be most effective and whether the pace of purchases matters. Considerations of this kind might also inform the degree of emphasis placed on the quantum of QE purchases versus the intended impact on long-term interest rates. Drawing out the implications of these different elements of the transmission mechanism for effective QE design, interactions with other tools and noting the key uncertainties would be beneficial.

There was also appetite from Bank experts and external stakeholders for further analysis on the ultimate impact of QE on GDP and inflation. As set out in Box B, the macroeconomic effects of QE are naturally harder to pin down than the immediate impact on financial conditions. Nevertheless, there may be opportunities to glean further evidence on these effects, as more QE observations accrue.

Feedback also supported further analysis of the interlinkages between QE and financial stability. This could build on the Bank's existing work on the potential implications of QE for financial institutions' balance sheets, which we found effectively draws on expertise from around the institution. The interactions between QE and financial stability may vary depending on the time horizon considered. For example, in the medium term, potential risks associated with 'search for yield' behaviour may be considered. In the near-term, the potential benefits of QE for market functioning were illustrated by recent Covid-related interventions.

Further consideration of potential monetary-fiscal interlinkages was noted as another topic that the Bank may wish to include in a QE work plan.[13] That is consistent with the much larger and more persistent effect of QE on central bank balance sheets than initially expected.

Finally, longer-term issues raised included exploring the potential limits of QE, including how that might interact with very low long-term interest rates, and analysing the implications of QE unwind, well in advance of any decision to reduce the stock of QE. Alongside the Bank continuing to advance its own understanding of QE, it was noted that continuing to assess how external expectations of QE were set was also important.

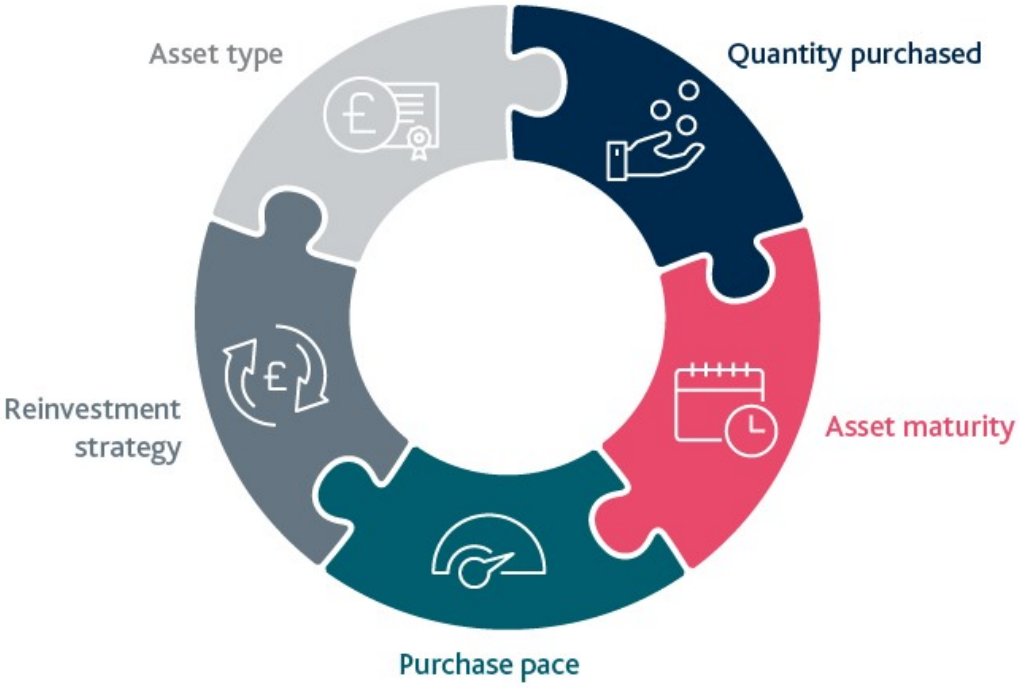
When considering its QE work plan, we would encourage close interaction between the Bank's policy and research teams. This is consistent with the Bank's Agenda for Research (BEAR), the first topic of which is the monetary policy toolkit. It is clearly important that the Bank maintains and develops the human capital required for advancing understanding of the policy toolkit.[14]

2.2: The rationale and evidence supporting practical QE design choices

Our second recommendation is that as the Bank continues to learn about QE, it **maintains a summary of the rationale and evidence supporting each of its practical QE design decisions**, to clearly link its understanding of how QE works to how it does it.

There are several elements to QE design (see Figure 2.2 for an illustration). Clearly, a key feature of any QE intervention is the quantity of assets purchased. Decisions also need to be made over: the type of asset class to purchase – for example, whether government or private sector debt; the maturity of the assets; and the pace of purchases. Another design choice is whether and how to reinvest cash flows as assets mature.

Figure 2.2: Illustration of elements of QE design decisions



Since 2009, the Bank has developed its QE design choices along each of these dimensions. For example, while the vast majority of QE purchases have been of gilts, corporate sector asset purchases were also included with the launch of the CBPS in 2016 and its extension in 2020. The Bank has also flexed the pace of its asset purchases. For example, given the nature of the Covid shock in March 2020, the initial pace of gilt purchases in response was particularly rapid, peaking at more than double that seen in previous rounds of QE in the UK.

Given the range of potential QE design choices, there may be benefit in maintaining a framework that considers the conditions under which different elements might be flexed. This would help guide the design of any QE response to future shocks. It might also provide a natural opportunity to circle back to previous design decisions, testing the underlying rationale as new evidence emerges.

One case study relates to the CBPS, where feedback suggests a lack of clarity about when and why the Bank buys corporate bonds. A more systematic framework linking the intended CBPS transmission channels to its role in response to different types of shock might be useful. Such an assessment might also help to anchor CBPS design choices. For example, we believe that a cost benefit analysis on the merits of maintaining the CBPS stock through reinvestment may be warranted.

2.3: Regular forum to discuss QE's role in the event of a big shock

Our third recommendation is that the Bank **provide an internal forum to allow regular MPC discussions on how QE (as part of the wider monetary policy toolkit) would be used in the event of a big shock.** The aim would be to facilitate impactful QE debate ahead of time, drawing on continued learning and also steering future work plan priorities.

Feedback suggests that the Bank at times over the past decade under-prioritised strategic monetary policy projects. In part, that reflected resource constraints, given many pressing policy challenges. Nevertheless, further work on the policy implications of sustained low equilibrium interest rates (so-called 'lower-for-longer') may have been warranted sooner. This might have included additional assessment of QE's role. Instead, we found that the Bank's work on QE tapered off somewhat from around 2013. With hindsight, continued analytical investment on the impact and transmission of QE during this period could have brought forward some of the work required for the relaunch of QE in 2016.

In contrast, in recent years the Bank has conducted very effective policy contingency planning in response to known events such as the possibility of a no-deal Brexit. Feedback suggests that the Bank's preparations for the potential risks associated with Brexit also proved useful when considering the policy response to Covid.

The Bank may wish to consider mechanisms to ensure that similar contingency discussions continue in the longer term. We believe that such discussions remain important, even when there is no large shock on the horizon and when an extension of QE may seem to be a distant prospect.

We found some support for a regular forum to consider 'big picture' monetary policy questions. As an illustration, this might ask the MPC and relevant teams about the adequacy of the monetary policy toolkit to respond to a large output gap.[15] We think that such a forum would provide a mechanism to discuss important longer-term issues related to QE. These might include: QE's role in providing significant future stimulus; the associated risk management trade-offs; state contingencies and potential limitations of QE; and the interaction of QE with other tools.

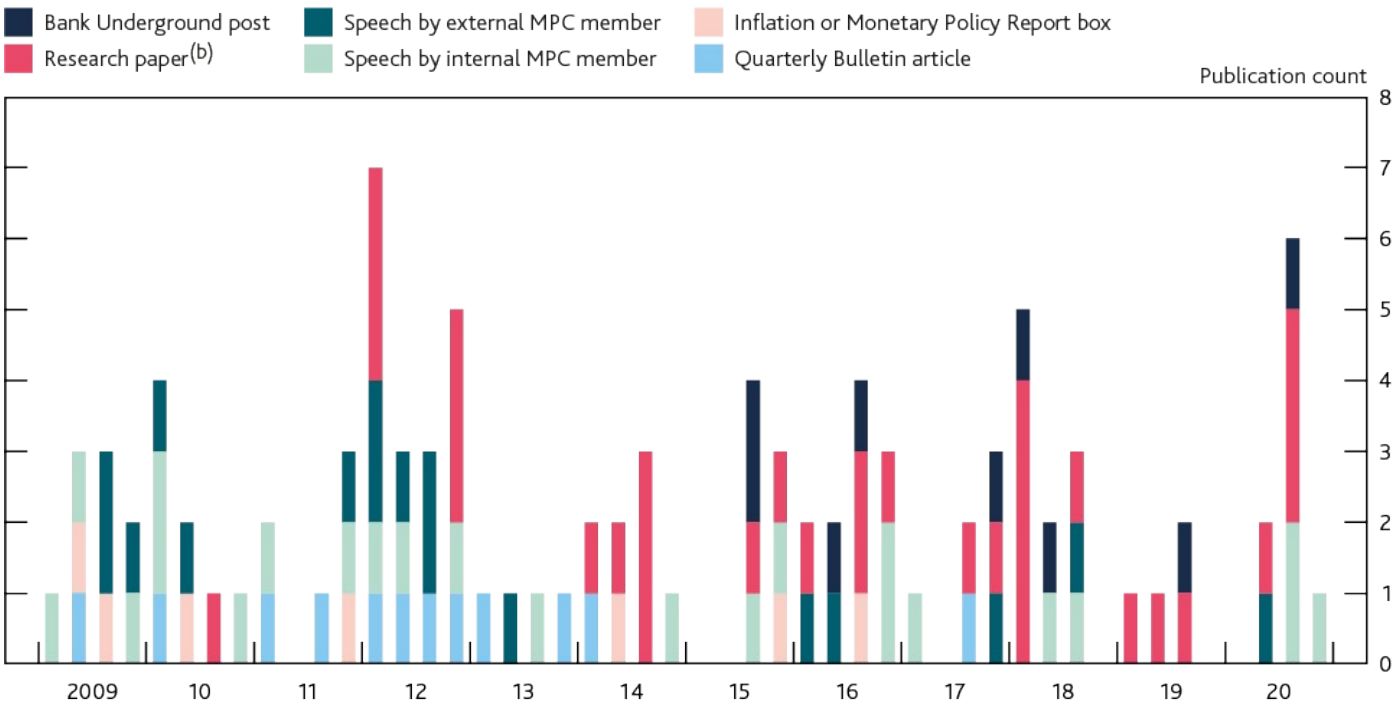
Such a forum might naturally foster a culture of challenge and longer-term analytical investment. This could reinforce our previous recommendations by encouraging the Bank to test the latest evidence on QE, consider the implications for policy design and, in turn, identify future work streams.

2.4: Update technical audience and foster external engagement

Our fourth recommendation is that, where appropriate, the Bank considers **updating its technical external audience on its latest collective thinking on QE and proactively fosters external engagement with that**.

The Bank has put out a raft of research, analysis and commentary on QE over the past decade. As an illustration, Chart 2.2 provides a count of QE-related publications by the Bank of England that we have identified, arranged by publication type. Since 2009, we estimate that the Bank has published around 40 speeches, 32 papers, 12 articles, 9 Bank Underground posts and 7 Report boxes materially related to QE.

Chart 2.2: Count of QE-related publications by Bank of England, by publication type (a)



(a) 'QE-related publication' defined by a combination of thresholds for the frequency of QE terms and judgement. Data cut-off is 5 November 2020.
(b) Includes Staff Working Papers, Discussion Papers and External MPC Discussion Papers.

There is, however, a lack of published material on the Bank's collective view on QE, particularly recently. For example, we heard that there was not much agreed material to draw on when writing about QE in official publications such as the MPC minutes. In part, this may reflect the fact that there is understandably not a settled collective view on exactly how QE works. Moreover, we have heard that the Bank has become increasingly open in welcoming a diversity of views and the associated debate.

We think that a collective update from the Bank on its latest thinking on QE might serve a number of purposes. First, feedback from some external stakeholders suggests that the Bank might usefully clarify some elements of its QE reaction function (see Box C). Second, we note that a technical update from the Bank on QE could be a useful source for other policy communications, such as the MPC minutes. Third, an external update on QE might also provide a helpful focal point around which to organise internal debate, consolidating our first three recommendations. Finally, this could foster continued external engagement on the topic. Where there is not a firm collective view, this would be an opportunity to be open about key outstanding uncertainties and their implications. Setting out the priorities for the QE work plan might also help to re-catalyse external debate, including with academics and peer central banks. As an example, we heard that the Bank's 2011 QE conference was very successful in bringing together early views on QE.[16]

The appropriate timeline for any external update on QE is for the Bank to determine, in light of current challenges and associated resource constraints. But the Bank may wish to consider bringing together the latest evidence from the recent 'QE5' round of purchases, building on Bailey et al (2020). Further ahead, we believe the MPC should continue to share – at a moderate frequency – its best collective view on how one of its key policy tools supports the economy. We note, for example, that the FPC publishes a policy statement for each of its powers of direction to explain how it plans to use them and why.

Box C: Summary of external views on the Bank's understanding and design of QE

We spoke to academics, journalists, think tanks and financial market practitioners (including specialists in sterling bond markets and economists). This box summarises their views about the Bank's understanding and design of QE.

The Bank's QE research is generally seen as high quality

Academics and market practitioners broadly agreed that the Bank has made a material contribution to the QE literature. Contacts thought the Bank's early research was particularly strong, highlighting Joyce et al (2011) as especially influential.

We heard several areas where the Bank could focus future analysis. These included the real economy impact of QE, the conditions under which QE may no longer be an effective monetary policy tool and interactions between QE and fiscal policy.

The Bank has learned about the QE transmission mechanism, but challenges remain

The Bank has advanced its understanding of QE since 2009 but there remain open debates about how exactly QE works. Most market practitioners thought this was a sensible response to the evolving evidence base on QE.

But we also heard that the Bank has not sufficiently drawn out the implications of its evolving view. For example, given the increasing weight that the Bank places on the signalling channel of QE, the Bank might publish a projection for Bank Rate over several years in order to clarify the 'signal' implied by asset purchases, or even target the price of bonds at a particular maturity. There is also a desire for the Bank to do more to signpost and explain changes in its views, as well as to reflect the uncertainties about QE in its public communications.

There is a desire for more clarity about how the Bank designs and implements QE

Some market practitioners were unsure about the conditions under which the Bank buys corporate bonds as well as gilts. We also heard some specific criticisms of CBPS's design. For example, that the Bank should consider buying sterling bonds issued by non-investment grade companies because they are typically thought to be more UK-focused than investment-grade sterling issuers.

Given the importance of both the large size and rapid pace of asset purchases in calming market dysfunction in March 2020, we heard a desire for more clarity about how the Bank sets the pace of purchases. Some of the Bank's technical audience noted that it would be useful to have more clarity on the conditions that would lead to QE unwind and the views across the MPC on this issue.

The operational details of the Bank's QE programmes (eg selection of bonds for purchase) were generally seen as clear and predictable. But some market participants said market notices and details on particular operations are difficult to find on the Bank's website.

The Bank's approach to the side-effects of QE is more contentious

We heard praise for the quality of the Bank's underlying analysis on the distributional impact of QE, particularly the 2018 Staff Working Paper Bunn et al (2018). But in several discussions the Bank's presentation and interpretation of the analysis was challenged. For example, it was noted that the public is likely to find the impact of QE in pound-terms on the income or wealth of different groups to be a more intuitive distributional benchmark than the percentage impact. In pound-terms, the rich appear to benefit more from QE. But the percentage impact suggests a fairly even impact across the income distribution. Publications that focused on standard measures of inequality, which emphasises the percentage impact, were criticised by some that we spoke to. But the Bank typically presented its analysis in both terms.

Some market practitioners also thought the Bank should do more to understand the financial stability risks from QE, including via its impact on banks, pension funds and asset valuations. One practitioner noted that this was a potential blind spot for most central banks.

The Bank's approach to buying corporate bonds without taking account of climate considerations drew criticism. Some external stakeholders want the Bank disproportionately to buy 'green' sectors relative to the eligible universe of corporate bonds. Given the Bank's other work on climate-related financial risks, we also heard that reducing the Bank's exposure to carbon-intensive assets would be prudent for risk management reasons. At the same time, given the small size of the UK corporate bond market, others were sceptical that greening the CBPS would have a significant impact on the economics of the transition to a carbon-neutral economy and that this issue was outside the Bank's remit.

3: Ensuring that the governance and implementation of QE remain fit for the future

The Bank's approach to the governance of QE has evolved steadily over the past decade. This partly reflects the demands of a larger and more complex set of asset purchases than foreseen when QE was launched in 2009. It also reflects the evolution of the Bank as an organisation and changes to the governance of its overall balance sheet and operations.[17]

In this section, we focus on three key elements that underpin QE governance and implementation:

- external governance arrangements with HMT;
- internal governance to facilitate QE design decisions and associated risk assessment; and
- the delivery of QE through market operations and associated infrastructure.

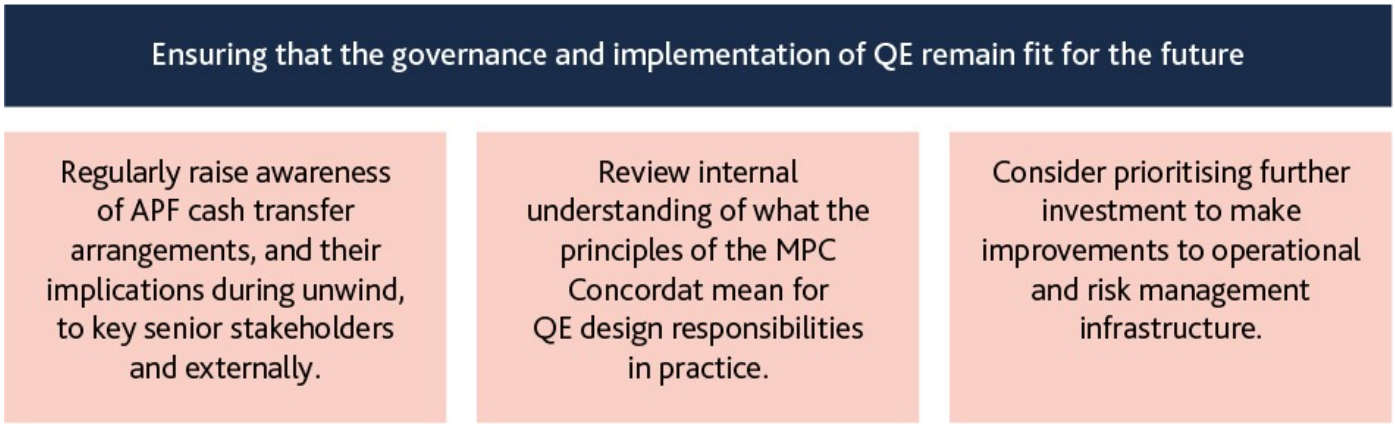
Overall, we find that the external governance arrangements for QE are well designed and have functioned effectively. As set out in Section 1.1, the Bank's APF was set up as a wholly-owned subsidiary of the Bank, which is indemnified by HMT. The institutional structure has allowed appropriate oversight and accountability and has provided the Bank with the necessary operational independence to deliver QE. Effective working relationships between the Bank, HMT and the DMO have been built over time. The Bank should continue to maintain and embed these working relationships, through continued regular engagement on both current and forward-looking topics of mutual interest.

Internally, the Bank has strengthened its framework for QE governance. As discussed in Section 2.2, there are several dimensions to QE decisions with implications for QE's impact, the appropriate operational approach and risk. Implementing QE therefore relies on the interaction of a range of stakeholders. In response, the Bank has developed clear terms of engagement and respective decision-making remits between the Bank's Court, Executive and MPC, which are set out in an MPC Concordat.[18] The risk management framework for the APF has also become increasingly comprehensive over time, aided by an internal review in 2015.[19]

The technological infrastructure underpinning the Bank's operations and risk management has also developed over time. This infrastructure, run by experienced staff, has been instrumental in effectively monitoring and delivering larger and more complex QE operations over the past decade.

Given QE's role as a core part of the Bank's monetary policy toolkit, our recommendations consider how to safeguard QE's delivery in the future. This includes ensuring that QE governance arrangements are clear and well understood. We suggest regularly raising awareness of the cash transfer arrangements between the APF and HMT. We also recommend that the Bank continues to regularly review its internal understanding on where QE design responsibilities lie and the principles behind that. Finally, the Bank may wish to consider further investment in the operational and risk management infrastructure that underpins QE. These recommendations are summarised in Figure 3.1.

Figure 3.1: Summary of recommendations



3.1: Raising greater awareness of the implications of APF cash transfer arrangements

Our first recommendation is that the Bank **regularly raises awareness of APF cash transfer arrangements, and their implications during unwind, to key senior stakeholders and externally.**

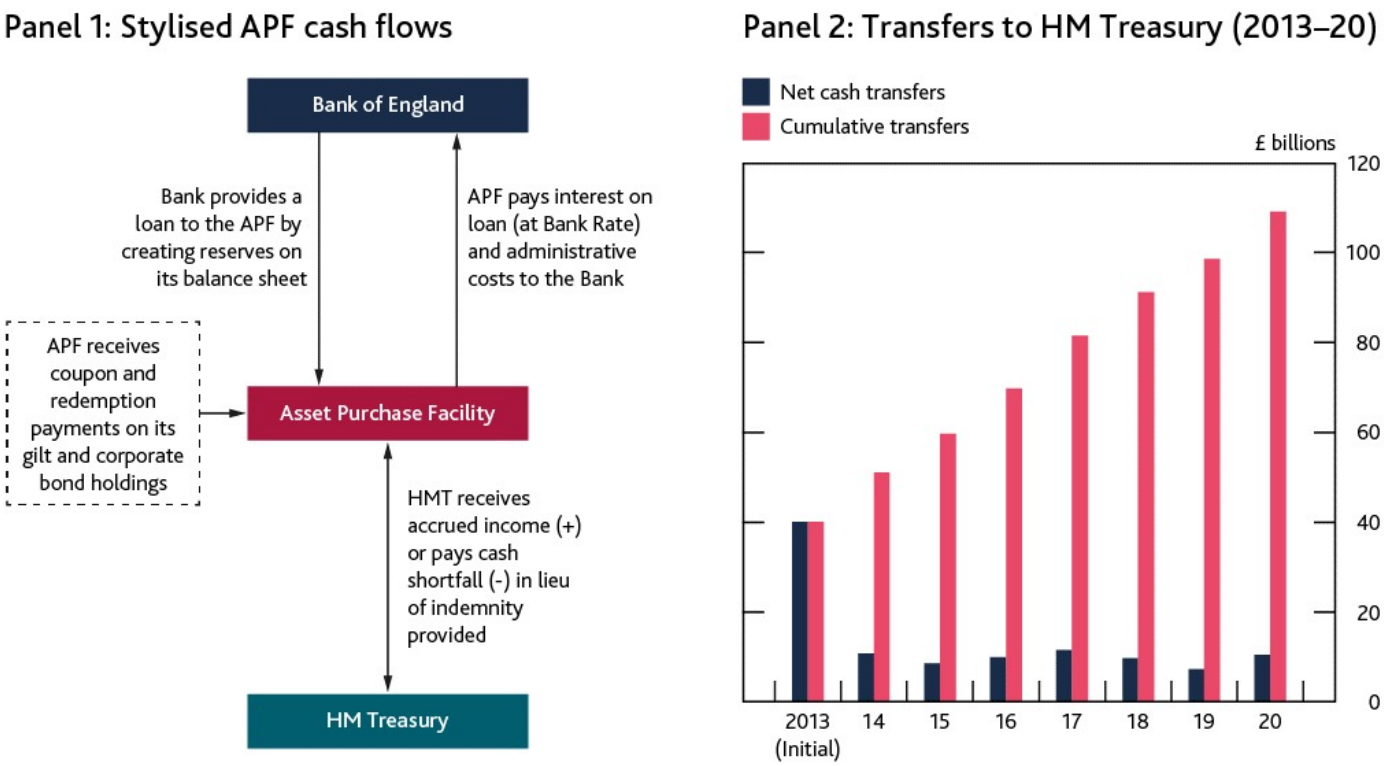
The APF is a subsidiary of the Bank, and is indemnified by HMT. This means that any financial losses as a result of asset purchases are borne by HMT, and any gains are owed to HMT. The institutional set up has important implications for the Bank and public sector balance sheets.

The assets in the APF generate income and their value will fluctuate over time. When the Bank engages in asset purchases for monetary policy purposes, it increases the loan to the APF financed by newly created central bank reserves. In turn, the APF purchases the required assets (currently gilts and corporate bonds) from the private sector. These assets generate income for the APF through, for example, coupon payments. This income is used to fund the interest payments on the APF's loan from the Bank (set at Bank Rate) and any administrative costs. These flows need not be equal, so over a given period it is possible for the APF to make an accounting profit or loss. Moreover, if the proceeds on maturity of an APF asset are different to the original cost (which will tend to be the case if it was not bought at exactly par value), then this will also result in an accounting profit or loss to the APF.[20] Panel 1 in Figure 3.2 illustrates these cash-flow arrangements.

In 2012, a change was made to cash management arrangements between the APF and HMT. An exchange of letters set out that there would be a quarterly transfer of net cash flows accruing to the APF. Any net profit made by the APF (adjusted for forthcoming known expenses) at the end of each quarter is transferred to HMT, with net losses resulting in a transfer from HMT to the APF.[21]

Since QE was launched in 2009, interest rates have fallen and stayed low, and the MPC has not reduced the stock of QE assets. The Bank has re-invested the proceeds from maturing assets to maintain the QE stock. The income generated from APF asset holdings has been sufficient to cover interest payments on the loan from the Bank, administrative costs and any shortfalls arising when proceeds from maturing assets (bought above their par value) have been below their price at the time of purchase. There have therefore been a series of positive net flows from the APF to HMT, cumulating to around £110 billion as of October 2020 (Panel 2 in Figure 3.2).

Figure 3.2: APF cash-flow arrangements



Sources (Panel 2): Office for National Statistics and Bank calculations.

Although net flows to HMT have been positive so far, the APF can also experience net cash shortfalls, which would require transfers from HMT to the APF. The exchange of letters makes clear that HMT will make these return payments on a timely basis, in order to limit any risks to the Bank of England balance sheet. The Bank's analysis, published in 2013 (McLaren and Smith), notes that while such shortfalls are likely to be large under many scenarios, their potential size and timing are uncertain and will vary depending on factors such as the total size and composition of asset holdings, the future path of Bank Rate and the path of any asset sales.

Given the one-way nature of these flows between the APF and HMT so far, however, there could be reputational risks if any large future cash-flow reversals took any stakeholders by surprise. We heard that future scenarios for APF cash flows are regularly discussed at working level between the Bank and HMT, as part of the risk management process. And the issue is discussed periodically with senior stakeholders.

Given the potential for fading institutional and public memories, it is important that arrangements to manage a reversal of cash flows remain well understood by relevant stakeholders, ahead of time. We therefore recommend that the Bank continues to ensure that key stakeholders are aware of the implications of these cash transfer arrangements. As part of this, the Bank may wish to share regular updates of APF cash-flow simulations with senior stakeholders. External awareness could also be raised, for example, with references in relevant Bank speeches and through an update of the analysis in McLaren and Smith (2013). Until September 2017, the Bank published a spreadsheet illustrating future cash-flow scenarios on its website. Updating and re-publishing these scenarios, alongside explanatory notes, may help interested parties better understand these arrangements.

3.2: Reviewing internal understanding of the principles of the MPC Concordat

Our second recommendation is that the Bank **reviews internal understanding of what the principles of the MPC Concordat mean for QE design responsibilities in practice.**

The Bank's internal oversight and decision-making framework for QE has strengthened through time. As discussed above, implementing QE relies on the interaction of multiple areas, spanning policy, operational and risk management

functions. In response, the Bank has developed a framework of engagement for key senior stakeholders, which include the Bank's Court, Executive and MPC. This is outlined in an MPC Concordat, which was last updated in June 2018, following an internal review. Box D summarises how the Bank organises its QE governance and risk management.

Stakeholders noted that the overall principles underlying these governance arrangements are well shaped and have facilitated decision-making. At a high level, the concordat notes that decisions relating to the selection of policy tools (such as asset purchases) with the primary intention to affect monetary conditions and the amount of stimulus needed to achieve the inflation target are within the MPC's purview. The Executive's role is to select the operational framework to design and implement MPC decisions, and to assess the risks to the Bank's balance sheet, as delegated by Court. Feedback suggests that the high-level nature of these principles is helpful and enables flexibility in times of crisis, when quick decisions are needed under uncertainty.

We heard of some occasions over the period since 2009 where it was not necessarily clear whether some dimensions of QE design were principally for the Bank's Executive or for the MPC. For example, the Bank's decision in 2012 to change its QE maturity buckets for gilt purchases led to a degree of internal debate at the time. These issues have been navigated successfully. We also heard that there are advantages in having some flexibility, rather than attempting to codify the full range of potential QE design and implementation responsibilities. Given QE's expanding role and complexity, the Bank should remain alert to the possibility of future 'grey areas' in internal governance responsibilities.

Overall, we believe that more could be done to raise internal understanding of what the principles of the MPC Concordat mean for evolving QE design responsibilities in practice. While there have been some staff efforts to do this so far, we believe the Bank could do more to review and systematise such discussions in the future. Given the range of potential QE design choices (as discussed in Section 2.2), having clarity around the framework for decision-making can continue to facilitate effective governance in future. Moreover, a common message from stakeholders was that well-functioning internal governance is likely to remain particularly important while Bank Rate remains close to zero, and the MPC has to use historically 'unconventional' policy tools. That is because such tools are likely to have additional implications for financial and non-financial risk on the Bank's balance sheet.

Some stakeholders also noted that there may be merit in considering a light-touch update of the Concordat. For example, to reference APF indemnity arrangements as per the Financial Relationship principles set out in the 2018 Bank-HM Treasury Memorandum of Understanding.

3.3: Prioritising further investment in operational and risk management infrastructure

Our third recommendation is that the Bank **considers prioritising further investment to make improvements to operational and risk management infrastructure.**

The Bank has developed internal systems and technological infrastructure to implement and oversee its asset purchase programmes. This includes an in-house electronic tendering system (Btender) and systems and processes to help staff monitor the risk implications of QE. Bank staff have effectively responded to the increasing challenges of an expanding QE portfolio, requiring more operations and more complex risk oversight and reporting. That said, stakeholders have said that further investment in the associated technical infrastructure could improve and support the Bank's operations over the long term, and may also reduce dependence on key experienced staff.

Btender has been used for the Bank's QE operations since 2009. We heard that the system was well designed and has been operationally resilient and reliable through the past decade. However, the technological infrastructure is now facilitating a much larger and more persistent QE portfolio than initially envisaged in 2009. Btender requires significant input to run and maintain. External counterparties face occasional idiosyncratic issues when interacting with it. So far, staff efforts have been effective in mitigating any negative consequences, which have at times needed ad-hoc changes to the infrastructure. We also note that the Bank has been considering a project to explore investment in more permanent infrastructure improvements (such as greater automation) to Btender, but this project continues to be on hold given competing priorities and budget constraints.

Similarly, the Bank's financial risk monitoring and management infrastructure relies on number of complex systems and processes, which require significant staff input to run and extract relevant information. For example, the process to

calculate the sensitivity of APF risks to various future cash-flow scenarios continues to require significant resource. As noted in Section 3.1, a regular and reliable update of this type of scenario analysis is likely to remain an important aspect of future APF risk management. The Bank has designed a project called ‘Financial Risk Architecture Simplification’ that is intended to build more integrated and automated systems. These systems would also support the implementation of a recommendation in the 2015 Risk Review. This project has also been on hold, given competing priorities and budget constraints.

In light of this, we recommend that the Bank considers prioritising further investment to improve the operational flexibility and resilience of its platforms, alongside its priorities for other capital projects, to help ensure effective delivery of future rounds of asset purchases and other market operations.

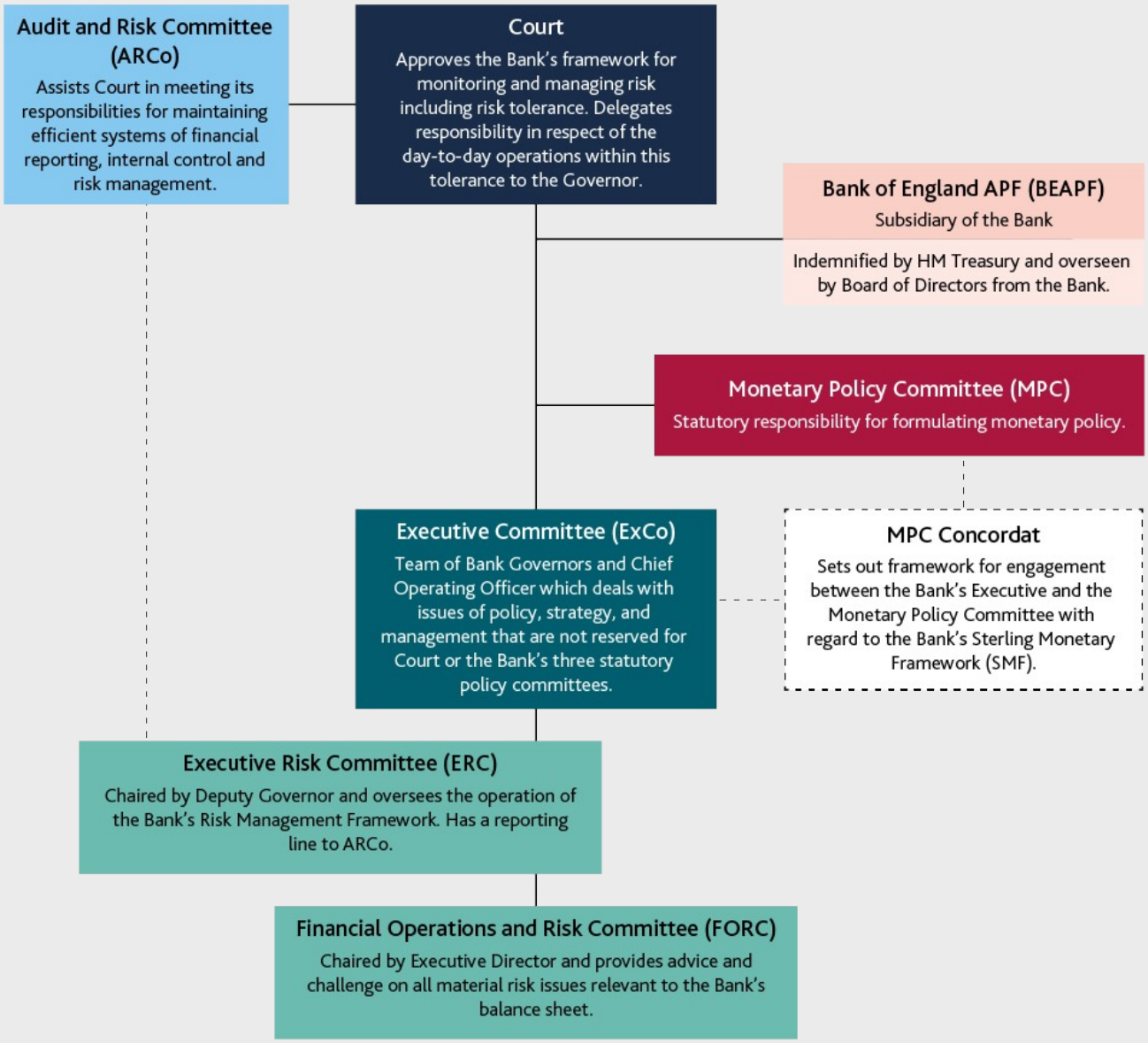
Box D: The Bank's QE governance and risk management

The Executive's responsibility for risks to the Bank's balance sheet involves extensive engagement with the Bank's risk management governance bodies. These include the Audit and Risk Committee of Court, the Executive Risk Committee and the staff-level Financial and Operational Risk Committee. These governance structures support the Executive in effectively assessing the risk implications of using QE as a policy tool. The interaction between these various components is summarised in Figure A.

Although the APF is indemnified from financial risk by HMT, the Bank manages operational and reputational risks through the same channels used for its own balance sheet operations and provides regular information on those risks to HMT. The Bank's risk management framework and processes have been substantially developed over the past decade, including following an internal review of its risk management approach in 2015. Consistent with the findings of the IEO's 2018 Evaluation of the Bank of England's approach to providing sterling liquidity, we note that these reforms have been implemented to good effect. Senior stakeholders are engaged through various committees (see Figure A). The Bank has also increased its QE-specific risk expertise to help manage and monitor risks associated with its CBPS portfolio. The consideration of any non-financial risks are also part of the Bank's overall risk framework and governance.

The launch of the CBPS in 2016, and the Bank's Covid response in 2020, were cited as examples of effective engagement between risk management and the Bank's Executive and Policy areas.

Figure A: The Bank's internal governance structures relevant to QE



4: Building public understanding and trust in QE

Good communication with the public supports both the accountability and the effectiveness of the Bank of England. With QE now a core part of the monetary policy toolkit, the public's trust in and understanding of the tool is important for the Bank's mission.

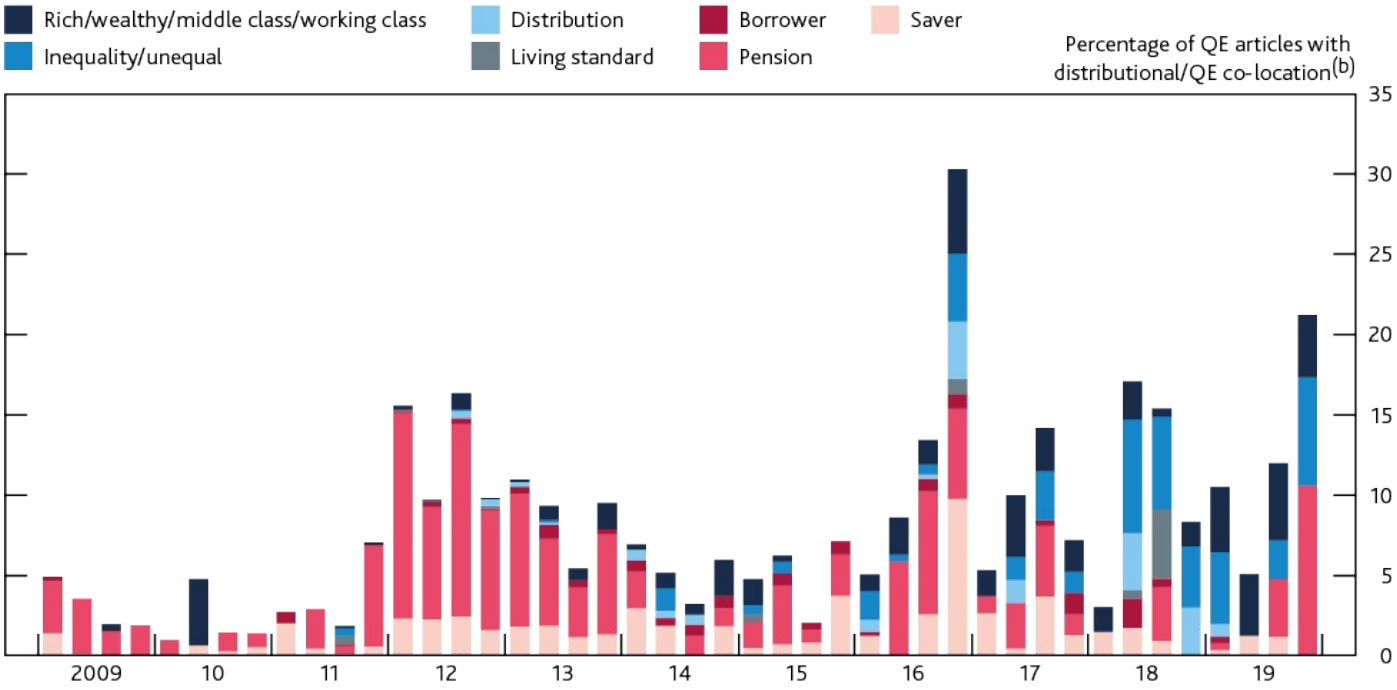
Journalists and other external stakeholders that we talked to were positive about the Bank's overall communications with the public. The Bank now talks to the public much more than when QE was launched in 2009.[22] We heard the Bank's approach to communication compares well to that of other central banks.

External stakeholders also recognise that communicating about QE is challenging. It is a complex tool. QE relies on indirect transmission channels via financial markets and has a less direct impact on retail financial products such as mortgages than Bank Rate (see Box A). The Bank also first deployed QE around the same time that the government recapitalised failed banks during the financial crisis and then tightened fiscal policy. QE may therefore be associated in peoples' minds with their views on these other policies. Finally, repeated shocks to the UK economy have prevented the Bank unwinding QE; it has only ever expanded it. As a result, any potential winners and losers from QE may appear persistent.

As a result, QE remains a contentious tool in both the UK and abroad. For example, in a 2018 survey, fewer than 40% of UK MPs thought using QE again would be advisable. This reflects lively debates about QE's potential side effects:

- The potential distributional effects of QE are the key area of contention. Bank work (see Section 4.2) suggests that the overall effect of monetary policy and QE on standard measures of income and wealth inequality has been small. But by reducing long-term interest rates, QE – alongside the more general low rate environment – is seen by many to hurt savers. Meanwhile to the extent that QE raises the prices of assets, ownership of which is fairly concentrated, many worry that it increases inequality. Consistent with this, text analysis shows that the share of UK press articles about QE that discuss it in the immediate context of distributional words (eg 'savers', 'the rich', 'inequality') has increased markedly since 2011 (Chart 4.1). The share hit around a third of QE articles after a speech by Theresa May in 2016 criticised the distributional impacts of QE.
- Another area of contention is the absence of climate considerations in the Bank's approach to buying corporate bonds.[23] The Bank's Agents and our press analysis suggest that the 'Green QE' debate is less broad-based than the distributional debate. But the topic still elicits strong views from some of the public.
- The public is also unclear about the extent to which QE is, or should be, used to finance Government borrowing. Given the UK's post-Covid fiscal position, a lack of public clarity on monetary financing could undermine the Bank of England's independence in the future.[24]

Chart 4.1: Co-location of distributional and QE words in UK press articles about QE (a)

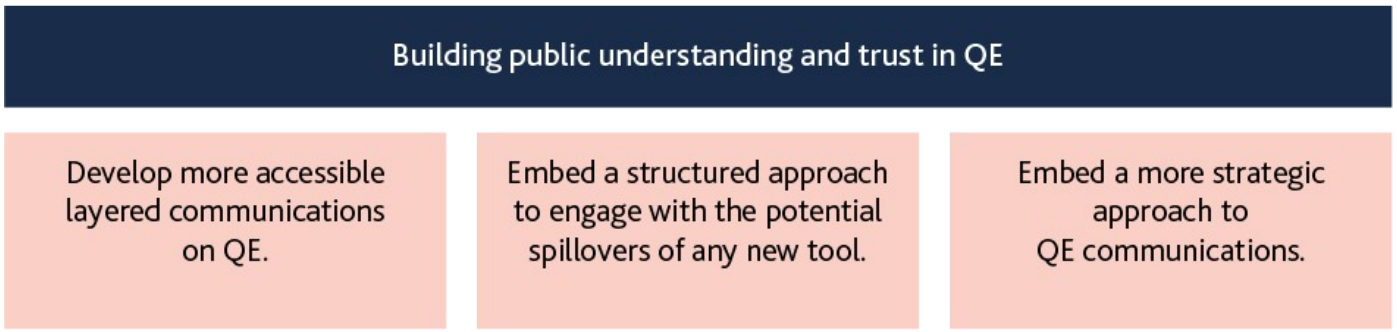


Sources: Dow Jones Factiva and Bank calculations.

(a) Articles are from City AM, Daily Mail, Daily Telegraph, Evening Standard, Guardian, i, Independent, Mail on Sunday, Metro, Mirror, Observer, Sunday Times and The Times (where City AM, i, Sunday Times and The Times only contain articles from 2010 onwards). Data are only available to end-2019 so do not include QE5.
(b) Percentage of QE articles that contain a distributional term in +/-20 words of a QE term. 'QE articles' contain at least one term from both a list of QE terms and a list of Bank of England terms. These term lists were compiled by the Independent Evaluation Office.

Our recommendations are designed to help the Bank rise to the challenge of communicating about QE and to better engage with these debates. Figure 4.1 summarises our three recommendations. Boosting public trust in and understanding of a complex tool like QE is of course a challenge. But the emerging literature on central bank communications suggests some lessons for doing so (see Box E). The Bank can aim to better support its sophisticated audiences in conveying the Bank's QE messages to the broader public. In doing so, it can help the person on the street to be at least as familiar with the positive objectives of QE as with its potential spillovers.

Figure 4.1: Summary of recommendations



4.1: Develop more accessible layered communications on QE

Our first recommendation is that the Bank **develops more accessible layered communications on QE.** The Bank 'layers' its key publications, with each layer addressing a different target audience. As Box E sets out, there is evidence that this can build comprehension, trust and engagement with central bank messages. Accessible material explaining a complex tool such as QE is particularly valuable because of the scepticism and even distrust that has grown around its effects.

Since 2009, the Bank has developed its technical explanation of QE through Inflation Report boxes, Quarterly Bulletins and speeches by senior Bank officials. A KnowledgeBank page distils these into an accessible explanation for the public.

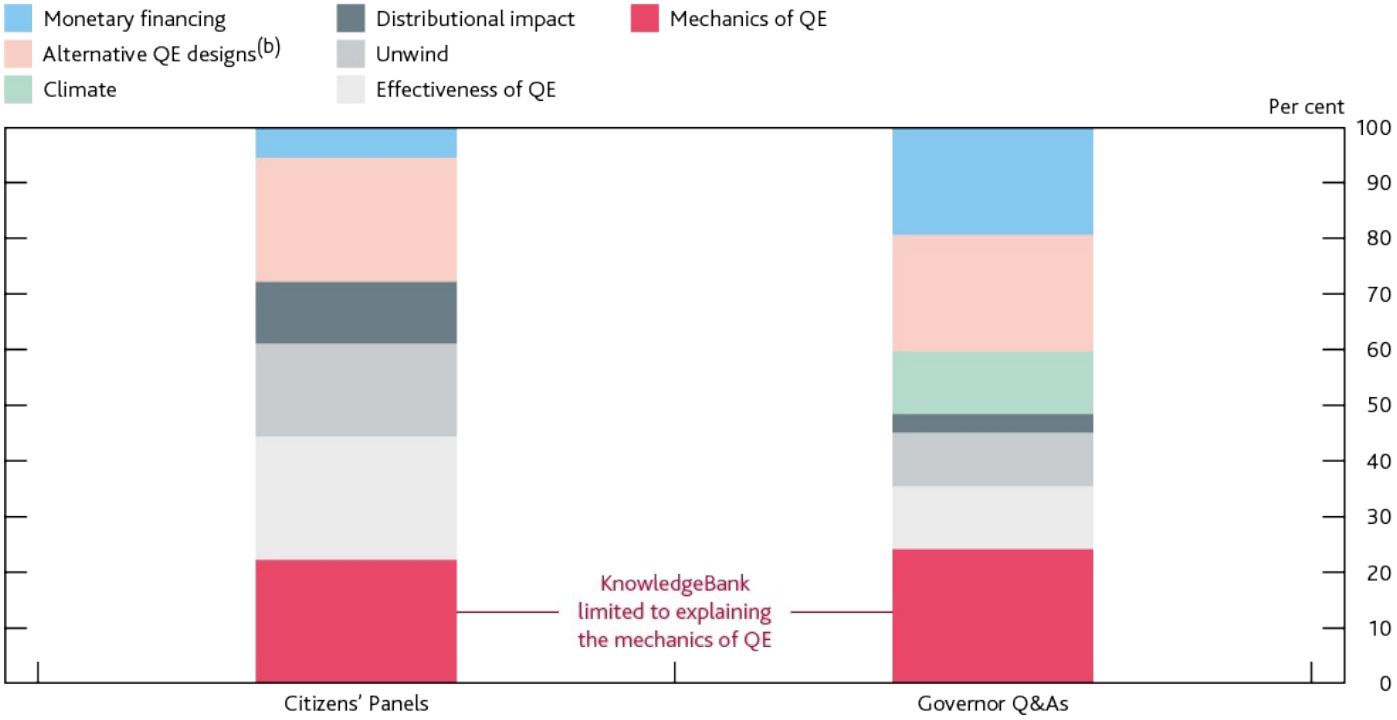
There is, however, further scope to improve the Bank's explanation of QE. External feedback and the literature on central bank communications suggest a more effective explanation could be:

- **Simple and story based**: Rather than explaining QE in terms of 'injecting' or 'printing' money, QE could be framed as a continuation of conventional monetary policy that pushes down long-term interest rates to support the economy.[25] This is a more intuitive description of the QE transmission mechanism set out in Box A and provides a simple story of how QE works, using concepts more familiar to the public.[26] Framing QE as a change in an interest rate rather than the creation of a quantity of money may also reduce the perception that QE is a transfer of wealth to the rich or to banks.
- **Relatable**: It could include a greater focus on the macroeconomic impacts on economic activity, inflation and especially jobs. Ideally, this would be grounded in real world examples. In early communications, the Bank's desire to show that QE was having an impact led to a focus on asset prices – a key initial part of the transmission mechanism. This fuelled the perception that QE chiefly helps those holding financial assets.

The Bank could also provide accessible responses to the broader debates around QE. On the basis of questions asked at Citizens' Panel events and recent online Governor Q&As, the KnowledgeBank page can only answer about a fifth of questions on the public's mind (Chart 4.2). Echoing this, some public-facing Bank staff felt they lacked accessible materials setting out the Bank's position on issues such as Green QE.

While the Bank has ad hoc internal 'lines-to-take' on these questions, it could consider building them into a published FAQ to increase the chance that internet searches for 'QE & inequality' or 'Green QE' would be directed to a Bank web page.[27] And rather than just setting out the counterfactual that welfare would be lower without QE, we also heard that the Bank could be more explicit about why alternative policy designs are not possible.

Chart 4.2: Audience questions about QE at Citizens' Panels and Governor Q&As (a)



(a) Questions categorised by the Independent Evaluation Office. These questions were asked at Citizens' Panel events held around the UK between November 2018 and February 2020 or submitted to online Governor Q&As held in July and October 2020.
(b) This includes designs that would bypass the financial system such as People's QE or helicopter money, as well as designs that would target QE's impact at certain parts of the real economy (eg at manufacturing firms).

4.2: Embed a structured approach to engage with the potential spillovers of any new tool

Our second recommendation is that the Bank **embeds a more structured and pro-active approach to engaging with the potential spillovers of any new tool.** QE's potential side effects play a big role in the public debate about the tool. But talking about these issues can be challenging for the Bank because many do not fit neatly in its remit. This recommendation is designed to help the Bank engage on these fronts.

The debate about the distributional effects of QE has proved particularly challenging. Since 2011, a number of MPC speeches have covered this issue and a Quarterly Bulletin article was published in 2012. The Bank's most comprehensive and impactful work on this topic – a 2018 Staff Working Paper – was published nearly a decade after QE was launched. That work suggests that the overall effect of monetary policy and QE on standard measures of income and wealth inequality has been small, because while QE supports asset prices, it also supports jobs and wages. We heard some praise for the underlying analysis (see Box C). While international evidence on the impact of unconventional monetary policies on inequality is mixed, the paper's conclusions are in line with the prevailing consensus that looser monetary policy reduces inequality by supporting employment (see IMF IEO (2019) for a recent summary of the literature).

The Bank has struggled to persuade external audiences of its message on distributional effects. Internal and external interviewees described the Bank as 'defensive,' while the Bank's Agents said that some local contacts are sceptical of the analysis. We also heard external criticism about how the Bank presented and interpreted the analysis (see Box C), highlighting a deficit of trust on the issue.

By contrast, the Bank's communication around Green QE drew less criticism. The absence of climate considerations in the Bank's approach to CBPS has been loudly criticised by some. But we heard praise for the Bank's disclosure that the CBPS portfolio was not aligned with Paris climate targets, because it allowed for an open public debate about the potential to 'green' QE. The Bank's Climate Hub has also been open to regular engagement with Green QE proponents. The Bank has now stated that it is considering how to incorporate climate factors into decisions on the mix of financial assets that it holds, while ensuring the policy aims of the relevant portfolios are still met.[28]

Learning from these two contrasting experiences, we think the Bank could benefit from a more structured and pro-active approach to talking about a new policy's potential side-effects. This could encourage early analysis of side effects, especially distributional ones.[29] Conducting and publishing such analysis shows the Bank takes public concerns seriously, and can underpin a range of communications. Recent strategic reviews by the US Federal Reserve and European Central Bank have featured discussions about increased engagement with distributional and (for the ECB) climate issues.

To maximise impact, the Bank could quickly distil its technical analysis of a tool and its assessment of potential side effects into accessible, layered communications. For example, a simple explanation of the widespread benefits of a tool for the real economy, and especially jobs, is likely to be particularly powerful in countering potential concerns about side effects, before they become embedded.

To build trust in these messages, the Bank may wish to invest further in more open external engagement. For example, we heard that greater staff-level contact – supported by press office – with journalists and external stakeholders around the publication of key analysis could help the Bank to build their understanding. It could also start a constructive two-way dialogue, before entrenched positions start to build distrust.

4.3: Embed a more strategic approach to QE communications

Our third recommendation is that the Bank **embed a more strategic approach to QE communications**. Building public trust and understanding in a tool like QE probably requires consistent and repeated messages delivered across a range of media. This recommendation is about building the internal processes and tools to achieve that.

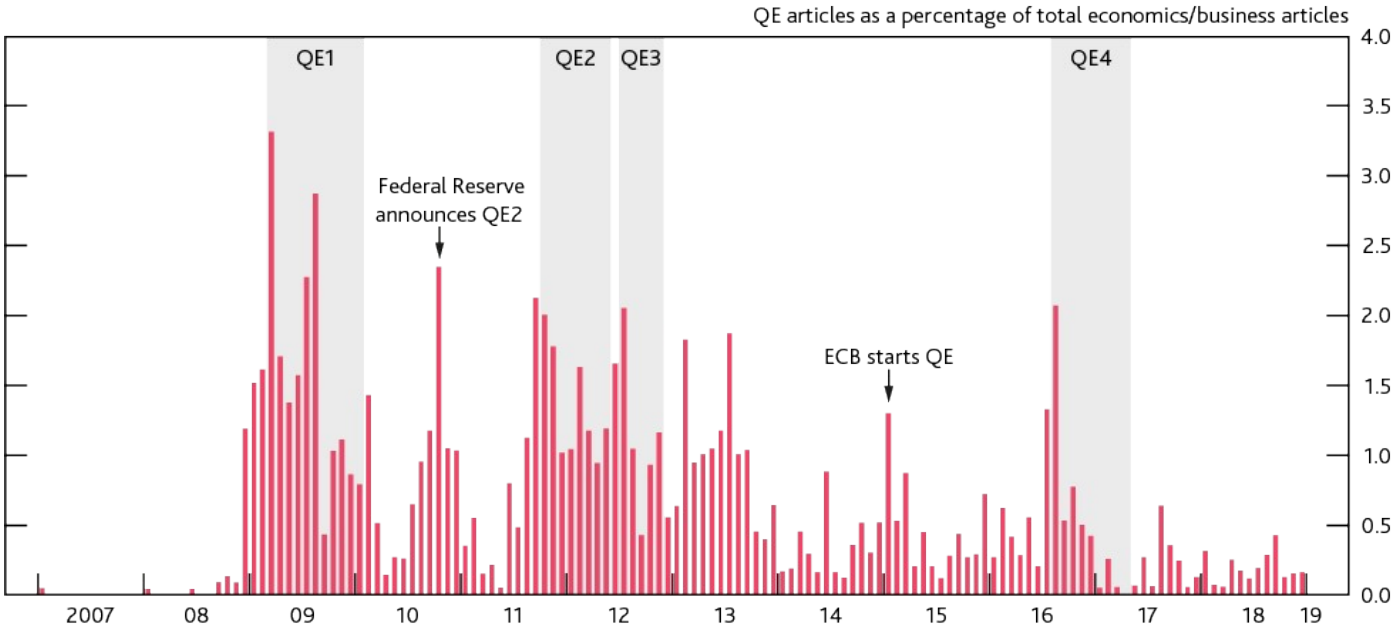
Internally, we heard that communications have at times been reactive and something of an afterthought in the policy process. There is appetite for the top of the Bank to set clearer communications priorities to direct and coordinate messaging on QE. An important consideration is how to help individual MPC members – a key voice for the Bank – explain QE in a consistent manner, while voicing their own views on policy. We also heard that the Bank could spend more time building up a constituency of support for QE outside of policy rounds.

Specific processes and tools that the Bank may wish to consider include:

- A forum for the Bank's senior leadership to discuss communications strategy for QE, including prioritising and co-ordinating messages across digital communications, speeches, direct engagement.
- More analytical capacity to monitor the media to help prioritise and pro-actively engage with public debates (eg Chart 4.3 shows how text analysis can monitor spikes in QE press coverage, while Chart 4.1 is one way of monitoring the content of the coverage).
- Joined up forward planning to allow commissioning of analytical work that can, in good time, support QE communications.

Parts of our recommendation that the Bank adopts a more strategic approach to talking about QE are likely to apply to the Bank's broader communications.

Chart 4.3: Frequency of QE articles in three major UK newspapers (a) (b)



Sources: Dow Jones Factiva and Bank calculations.

(a) Articles that include at least one term from both a list of QE terms and a list of Bank of England terms. These term lists were compiled by the Independent Evaluation Office. Data are only available to January 2019 so do not include QE5.
(b) Articles are from The Daily Mail, The Guardian and The Mirror and filtered for the subjects Commodity/Financial Market News, Corporate/Industrial News, and Economic News.

Box E: Lessons for talking about QE from the literature

There is an emerging literature on central bank communications to the general public.[30] These studies typically focus on central bank's ability to shape public inflation expectations. But they also hold lessons for how central banks can better build public trust and understanding in QE.

Lesson 1. Overall public understanding of central banks is low

In the past 20 years, central banks have dramatically stepped up their public-facing communications. But there remains low public awareness of basic facts about central banks such as their leadership or objectives, let alone their tools such as QE (eg Binder (2017)). According to the Bank of England's June 2020 Inflation Attitudes Survey, only 6% of respondents know that the MPC is the group that sets 'Britain's basic interest rate level'.[31] This suggests limited public appetite for central bank messages or investing time in understanding a tool like QE.

Lesson 2. Effective messaging can raise comprehension and trust in central bank policies

Experimental evidence shows central bank messages can shape households' expectations, understanding and even trust (eg Coibion et al (2020)). These studies suggest that effective QE communications are likely to be:

- **Simple:** There is growing evidence that simple messages are more effective in influencing beliefs than complex statements. For example, Haldane and McMahon (2018) find that the simplified layered version of the Inflation Report improves comprehension and trust in the Bank compared to the traditional executive summary. But simplified communications that do not sufficiently convey uncertainty around future economic outcomes can undermine the credibility of central banks (Gürkaynak (2018)).
- **Relatable**: Public comprehension and trust can be further improved by making content more relatable to people's lives, eg expressing financial costs in pound values instead of percentages (Bholat et al (2019)).
- **Story-based**: Candia et al (2020) show that attempts to raise inflation expectations may backfire because households interpret higher inflation as bad, even when inflation is below the central bank's target. Policymakers can help households draw the right inference about a policy with a simple story linking the tool to the desired outcome (eg 'our policies will help increase employment and thereby raise inflation toward more desirable levels').
- **Repeated**: The public may forget central bank communications unless they are repeated. Studies find that the effect of providing simple information on inflation expectations wears off after three to six months (eg Coibion et al (2019)).

Lesson 3. New communication strategies can help deliver QE messages to the public

There is some evidence that central banks can effectively talk to the public through the media. Dräger et al (2016) find that news coverage of monetary policy shapes households' economic expectations. But others are sceptical that, outside experimental settings, central banks can shape public views through the media given their complex and technocratic messages (eg Lamla and Vinogradov (2019)).

Studies with Bank of England co-authors have found some evidence, albeit tentative, that new communication strategies can increase the chance the public actually receive the Bank's messages:

- According to preliminary analysis by Haldane et al (2020), web traffic and tweets around Bank of England Inflation Reports is consistent with more layered content having somewhat broader reach with a somewhat different audience than a traditional Report. Haldane and McMahon (2018) find that layered content also increases comprehension and trust for graduate-level Economics students. So simplifying communications may also support relatively sophisticated intermediaries in relaying the Bank's messages to the public.
- There is also evidence that direct engagement with the public is effective. According to surveys carried out after the Bank's new Citizens' Panels,[32] 90% at least 'somewhat agree' that the event increased their knowledge of the Bank and 75% said that it increased their trust in the institution. Of course, the self-selection of participants may bias the results somewhat and such events are expensive to scale up, but they do suggest that targeted engagement can be effective at improving understanding and trust (Haldane et al (2020)).

Annex 1: International QE programmes

A range of central banks have used asset purchases as a policy tool. Several have purchased government bonds and high-quality private sector debt as in the UK. Table A1.1 summarises programmes launched internationally since 2001.

Table A1.1: International QE programmes

Central Bank	Description
European Central Bank	(i) In response to the financial and sovereign debt crises between 2008–12, purchased covered bonds and government bonds through the CBPP and SMP, primarily aimed at restoring impairments in the transmission of monetary policy and improving access to credit. Later, announced OMT programme to specifically address redenomination risk but was not activated. (ii) During 2014–19, purchased a range of assets in order to support broader monetary policy objectives and provide additional stimulus. Purchases included euro-area government bonds, corporate bonds, asset-backed securities and covered bonds. (iii) In 2020, in response to the Covid crisis, announced a temporary Pandemic Emergency Purchase Programme, which includes purchases across the full range of assets bought previously, with expanded eligibility criteria.
US Federal Reserve	(i) Introduced asset purchases in response to the financial crisis in 2008. Purchases included the Debt and Mortgage-backed securities issued by US Agencies (Fannie Mae, Ginnie Mae, Freddie Mac and FHLBs) and US Treasuries. (ii) In November 2010 and September 2012 purchases of US Treasuries and Agency MBS were extended to support economic stabilisation and recovery. A maturity extension programme was also implemented. In 2013, the Fed announced a tapering of QE purchases, which were eventually stopped in 2014. Balance sheet normalisation to reduce the Fed's asset holdings began in 2017. This ended in 2019. (iii) In 2020, in response to the Covid crisis, the Fed announced 'open-ended' asset purchases, and an expansion to corporate bonds (with fiscal backing).
Bank of Japan	(i) First central bank to introduce QE in 2001. Included purchases of government bonds as the main instrument to reach their operating target of reserves balances. Programme ended in 2006, amid signs that the economy was emerging from deflation. (ii) In response to the financial crisis, commercial paper and corporate bond purchase programmes announced in early 2009. This was followed by the comprehensive monetary easing programme (CME) in 2010, which covered private sector assets including corporate bonds, commercial paper, exchange-traded funds (ETFs) and Real estate investment trusts (REITs), in addition to government securities. The objectives were to encourage a decline in long term interest rates and reduce the risk premium on particular assets. (iii) Announced Quantitative and Qualitative easing (QQE) in 2013, followed by QQE with Yield Curve Control (YCC) in 2016. Programme initially involved further purchases of government bonds, ETFs and J-REITs, and this was later followed up with a commitment as part of YCC to purchase the necessary amount of government bonds to maintain a 10-year yield target of 'around 0%'. (iv) In response to the Covid crisis in 2020, announced unlimited government bond purchases. Increased commercial paper, J-REIT, ETF and corporate bond purchases.

Central Bank	Description
Others (Pre-2020)	**Sveriges Riksbank:** Implemented quantitative easing in 2015, by purchasing government bonds to support expansionary monetary policy. **Swiss National Bank:** Combination of foreign exchange interventions and bond purchases implemented in 2009 in response to the GFC, and to address an unwarranted tightening of monetary conditions as a result of the strength of the Swiss franc. **Other:** Bank of Mexico, Bank of Israel and Bank of Korea engaged in purchases of corporate and/or government debt in response to the crisis in 2008–09.
Others (2020)	Several other countries' central banks have engaged in asset purchase policies in response to the Covid crisis.(a) These include: **Advanced Economy**: Australia, Canada and New Zealand. **Emerging Market**: Chile, Colombia, Croatia, Ghana, Guatemala, Hungary, India, Indonesia, Malaysia, Philippines, Poland, Romania, South Africa, Thailand and Turkey.

(a) Updated to November 2020. May not necessarily be an exhaustive list.

Annex 2: Background to the evaluation: remit, scope and methods

In July 2019, the Bank's Court of Directors commissioned its IEO to conduct an in-depth evaluation of the Bank's Asset Purchase Programme. The evaluation would assess the Bank's approach to its Asset Purchase Programme, commonly known as Quantitative Easing (QE).

Since the Bank first used it in 2009, QE has become significantly larger in scale, broader in type and more persistent than was initially expected. QE should no longer be seen as a transient, 'unconventional' crisis response. Instead, it is now an established part of the Bank's monetary toolkit.

The IEO was therefore tasked with a broad evaluation of the Bank's approach to the end-to-end QE process. We have assessed the Bank's understanding of the QE transmission mechanism and its potential spillovers, the Bank's approach to designing and operationalising QE, the associated governance and risk management framework and the Bank's QE communications. Overarching all this, we have assessed the Bank's learning over the past decade about a new tool.

In line with the approach taken in previous reports, we developed a set of criteria against which the effectiveness of the Bank's approach could be judged (Table A2.1).

Table A2.1: Evaluation criteria and metrics for success

Evaluation criteria	Metrics for success
Transmission mechanism	The Bank has a clear understanding of the transmission and impact of QE on its stated objectives, which reflects the available evidence.
	The Bank proactively assesses the wider consequences of QE, beyond its stated objectives, drawing on the available evidence.
Design and operationalisation	The Bank has an appropriate and effective process for the design of asset purchase programmes, which reflects the expected transmission mechanism and associated uncertainties.
	There is a robust and efficient process for the operationalisation of asset purchases.
Governance and risk management	Respective roles and responsibilities related to the Asset Purchase Facility (APF) are well-defined.
	There is a clear framework to decide the Bank's risk appetite around QE purchases.
	The division of responsibilities and accountability relating to QE between different areas within the Bank is well understood.
Communication	The Bank's public communications foster understanding and accountability.
	The Bank's communications contribute to the effectiveness of QE.

The evaluation criteria in Table A2.1 focus on the Bank's understanding and implementation of QE. Our focus is not on reviewing estimates of QE impact: there is already a large literature on that, with key findings summarised in Box B.

We used several methods to conduct our evaluation as set out in Table A2.2.

Table A2.2: Evaluation methods

Input	Details
Interviews	Approximately 150 interviews with: current and former Bank staff (including MPC members), HMT and DMO staff, policymakers, academics, think tanks and journalists.
Desk based review	Thematic analysis of Bank documents including: internal policy papers, MPC communications, Bank research, APF Annual Reports and Citizens' Panel write-ups. Literature review including research papers and meta studies on the impact of QE on financial conditions and macroeconomic variables, as well as papers on communication strategies and public comprehension of QE. Other relevant studies include the IMF IEO evaluation 'The risks and side effects of UMP: an assessment of IMF views and analysis', and BIS CGFS 'Unconventional monetary policy tools: a cross-country analysis'.
Case studies	Case studies of QE launch in 2009 and the August 2016 policy announcements, including the introduction of the Corporate Bond Purchase Scheme. Lighter touch study of other QE rounds.
Peer comparisons	Interviews with representatives from the European Central Bank, US Federal Reserve Bank and International Monetary Fund. Analysis of other central banks' QE communications and comparison of research output.
Empirical analysis	Text analysis of the Bank's publications and QE related articles from selected UK newspapers. Breakdown of the questions asked at Citizens' Panels and online Governor Q&A sessions into categories corresponding to the most common QE-related topics. Comparison of these categories to the content offered on the Bank's QE KnowledgeBank web page. Survey of 84 empirical QE-related papers published by Bank of England, European Central Bank and the Federal Reserve, comparing the number of RePec citations over time.

The evaluation was primarily conducted between December 2019 and October 2020. This evaluation was initially commissioned to cover QE from its inception to 2016 – the last round of purchases at the time. While the evaluation was in train, the MPC voted to expand purchases further in response to the severe downturn associated with the Covid pandemic. The IEO does not comment on live policy decisions. But we have drawn on the experiences of the most recent round of purchases, particularly where there has been clear learning from previous episodes or where issues that we had previously identified were brought into sharper relief.

The evaluation benefited from input and challenge from IEO-appointed external advisors Guy Debelle (Deputy Governor, Reserve Bank of Australia) and Ricardo Reis (A. W. Phillips Professor of Economics, London School of Economics). They provided support and independent challenge to the team and reviewed and endorsed the findings in this report.

The IEO team was also aided by a Bankwide Senior Advisory Group. This included internal senior representation from Monetary Analysis, Markets, Financial Stability, International, Communications, Legal and Risk directorates. It included the Deputy Governors for Monetary Policy and Markets, Banking and Resolution and an external MPC member.[33] The group provided comment and challenge throughout the project.

Consistent with previous IEO evaluations, the team's work was run at arm's length from the business areas and reported directly to the Chair of the Bank's Court of Directors. As such, recommendations and analysis contained in this report are the sole responsibility of the IEO. The report is based on data and information available as of 5 November 2020, unless otherwise stated.

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1. The IEO team was: Melissa Davey (IEO Director), Jonathan Bridges, James Howat and Aakash Mankodi. Asja Karanusic and Millie Rettie provided research assistance and analysis. The analysis and recommendations in this report, together with any errors herein, remain the full responsibility of the IEO, and not the IEO's advisors or members of Bank staff. Unless otherwise stated, this report is based on data and information available to the IEO team as of 5 November 2020.
2. From February 2009, the Bank used the Asset Purchase Facility to improve the functioning of sterling corporate bond and commercial paper markets where a lack of activity had led to a sharp rise in liquidity premia – compensation for the risk that it will be difficult to sell an asset in the future. This was intended to reduce illiquidity, aid financial stability and lessen constraints on the flow of credit to the real economy. Such 'market maker of last resort' schemes do not necessarily require significant purchases to be effective, as presence in the market as a backstop buyer can be sufficient to reduce liquidity concerns. At its peak, the Bank bought nearly £3 billion of commercial paper and corporate bonds.
3. For more detail on equilibrium interest rates, see box on page 39 of August 2018 Inflation Report.
4. This assessment takes into account a number of different factors. Companies with significant employment in the UK or with their headquarters in the UK will normally be regarded as meeting this requirement. The Bank also considers whether the company generates significant revenues in the UK, serves a large number of customers in the UK or has a number of operating sites in the UK.

5. Until 2019, this publication was known as the Inflation Report.
6. For a more detailed explanation of QE's transmission mechanism, see Bailey et al (2020).
7. When the price of a bond rises, its 'yield' falls mechanically. That is, the rate of return that investors demand to hold the bond falls. This effectively reduces the interest rate at which companies can borrow in financial markets. To the extent QE pushes up equity prices, it also allows firms to issue equity more cheaply.
8. Reserves are a form of electronic money issued by the central bank. Reserves are held mostly by commercial banks, which use them as means of payment with one another instead of bank notes.
9. Bank research suggests this channel is not important in the UK. See Butt et al (2014) and Giansante et al (2020).
10. See, for example, Haldane et al (2016), Gagnon (2016), CGFS (2019), Bernanke (2020) and Bailey et al (2020) .
11. Within that, the authors find somewhat larger estimates in papers with central bank co-authors.
12. For example, Christine Lagarde, President of the ECB, noted recently in The monetary policy strategy review: some preliminary considerations the 'need to further our understanding of the transmission channels of our different instruments, and to evaluate their relative side effects, both intended and unintended'.
13. This topic is included in the Bank's Agenda for Research (BEAR). Similarly, monetary-fiscal interactions are a topic of the ECB's strategy review (see Lagarde (2020), The monetary policy strategy review: some preliminary considerations).
14. This links closely to the findings in the IEO's previous evaluation of the Bank's research, though applies more broadly than the research community.
15. Somewhat related, the IMF IEO advised the IMF in 2019 to 'develop a playbook on policy responses for use in future downturns, which may well occur in circumstances with limited scope for conventional monetary easing'.
16. For a summary of this conference, see Quantitative easing and other unconventional monetary policies: Bank of England conference summary. The ECB has also hosted a regular workshop on non-standard monetary policy measures (for example, see Monetary policy in non-standard times).
17. For example, in response to recommendations in the Winters Review (2012).
18. The MPC and the Bank's Sterling Monetary Framework (Updated 2018).
19. For more information on the Bank's risk management framework, see pages 43–49 of the Bank of England's 2020 Annual Report (Bank of England (2020a)).
20. Bean (2009) noted early on that any such financial gains or losses from APF operations should not be seen as a measure of the broader success of QE. Instead, assessing success requires a much wider consideration of the impact of QE on government bond yields, economic activity and ultimately inflation. See Hall and Reis (2015) for further details on the interactions between the public sector and central bank balance sheets across different jurisdictions.
21. For more information, see APF Annual Report (2020).
22. Haldane (2018) describes the Bank's new approaches to public engagement, including layered communications and Citizens' Panels.
23. 'Green QE' would require the portfolio to tilt in some way towards 'green' (or away from carbon-intensive) sectors and issuers.
24. Reis (2019a) evaluates the potential channels for a central bank to affect a government's fiscal position.
25. Reis (2019b) discusses the role of targeting long-term interest rates in monetary policy.
26. See Runge and Hudson (2020) for an exploration of public understanding of economics and economics statistics.
27. The ECB's website explicitly addresses questions such as 'Is the ECB 'expropriating' savers? '.
28. As part of its Task Force on Climate-related Financial Disclosures commitments, the Bank has committed to provide an update on its approach by the time of its next climate report in 2021. As with the similar governance arrangements for the FPC and Prudential Regulation Committee, the framework for the MPC's asset purchases is determined by the Committee's remit given to it by the Chancellor.
29. This would sit comfortably with the Bank's wider agenda for research on the monetary policy toolkit. For example, in the Bank's new research agenda (BEAR) 'heterogeneity' is identified as a key heading under analysis of the monetary toolkit, calling 'for more work on the distributional effects of low interest rates and unconventional tools. Does heterogeneity affect the transmission mechanisms of policy measures, and does heterogeneity create additional unintended consequences of

policies?'.

30. It is an item on the Bank of England's Agenda for Research.
31. 29% answered the Bank of England and 54% of respondents did not know.
32. Citizens' Panels are structured discussions with a representative panel of about 25 people from a local area and a range of Bank staff. The Bank has held 23 Citizens' Panels across the UK, attended by 492 people. The US Federal Reserves ran similar Fed Listens events as part of its recent strategic review.
33. Membership consisted of Alina Barnett (Senior Technical Adviser, Financial Stability Strategy and Risk), James Bell (Director, Monetary Analysis), Nathanaël Benjamin (Head of Financial Risk and Resilience Division), Ben Broadbent (Deputy Governor, Monetary Policy), Ronnie Driver (Head of Banking Resilience Division), Julia Giese (Head of International Surveillance Division), Jonathan Grant (Head of Central Banking Legal Division), Andrew Hauser (Executive Director, Markets), Bonnie Howard (Head of Monetary and Financial Conditions Division), Rhys Phillips (Head of Sterling Markets Division), Dave Ramsden (Deputy Governor, Markets, Banking and Resolution), Tim Taylor (Head of Market Intelligence and Analysis Division), Gertjan Vlieghe (MPC external member) and Sebastian Walsh (Chief Press Officer and Head of Stakeholder and Media Engagement).