

The Distributional Effects of Asset Purchases Bank of England, 12 July 2012

Summary

- The MPC sets monetary policy for the economy as a whole in order to achieve the Government's inflation target. Changes in interest rates and asset purchases financed by issuing reserves (QE) unavoidably have distributional implications.
- Without the Bank's asset purchases, most people in the United Kingdom would have been worse off. Economic growth would have been lower. Unemployment would have been higher. Many more companies would have gone out of business. This would have had a significant detrimental impact on savers and pensioners along with every other group in our society. All assessments of the effect of asset purchases must be seen in that light.
- The Bank's asset purchases have been almost entirely of gilts, causing the price of gilts to rise and yields to fall. But this in turn has led to an increase in demand for other assets, including corporate bonds and equities. As a result, the Bank's asset purchases have increased the prices of a wide range of assets, not just gilts. In fact, the Bank's assessment is that asset purchases have pushed up the price of equities by at least as much as they have pushed up the price of gilts.

The implications of QE for savers

- Changes in Bank Rate – not asset purchases – have been the dominant influence on the interest households receive on bank deposits and pay on bank loans.
- By pushing up a range of asset prices, asset purchases have boosted the value of households' financial wealth held outside pension funds, but holdings are heavily skewed with the top 5% of households holding 40% of these assets.

The implications of QE for pension funds and pensioners

- The pension income of those already in receipt of a pension before asset purchases began has not been affected by QE.

Defined benefit pension schemes

- The retirement incomes of people coming up to retirement in a defined benefit pension scheme have not been affected by QE.

- When assessing the impact of QE on the value of defined benefit pension funds, it is important to remember that asset purchases increase the value of a pension fund's assets as well as its liabilities.
- For a typical fully-funded pension scheme, asset purchases are likely to have had a broadly neutral impact on the net value of the scheme. The fall in gilt yields raised the value of the pension fund's liabilities. But the associated increase in bond and equity prices raised the value of their assets by a similar amount.
- For a defined benefit pension scheme in substantial deficit, asset purchases are likely to have increased the size of the deficit. That is because although QE raised the value of the assets and liabilities by a similar proportion, that nonetheless implies a widening in the gap between the two. The burden of these deficits is likely to fall on employers and future employees, rather than those coming up for retirement now.

Other pension schemes

- Asset purchases are likely to have had a broadly neutral impact on the value of the annuity income that could be purchased with a personal pension pot. By pushing down gilt yields, QE has reduced the annuity rate. But the flipside of that fall in yields has been a rise in the price of both bonds and equities held in those pension pots. Another way of explaining this is that the income flows from a pension pot (dividends in the case of equities and coupons in the case of bonds) will not be reduced by QE. Indeed, if the pension pot contains equities, then the flows could even be higher as a result of increased dividend payments from the boost to the wider economy from QE.
- Over the past five years, the main factor driving both the widening of deficits in defined benefit schemes and the decline in the annuity income that can be purchased from other pension funds has been the fall in equity prices relative to gilt prices. This fall in the relative price of equities was not caused by QE. It happened in all the major economies, much of it occurred prior to the start of asset purchases, and stemmed in large part from the reluctance of investors to hold risky assets, such as equities, given the deterioration in the economic outlook, almost certainly as a result of the financial crisis. Indeed, by boosting the economy, monetary policy actions in the United Kingdom and overseas probably dampened this effect.

- 1 In their report on the 2012 Budget, the Treasury Committee highlighted the redistributive impact of monetary policy, and asked the Bank, and MPC members in particular, to improve their efforts to explain the costs and benefits of their policy actions to groups that are perceived to have been particularly badly affected.¹ This report forms part of the Bank's response.²

Introduction

- 2 The MPC's objective is to maintain price stability, where stable prices are defined by the Government's inflation target, which is currently 2% as measured by the annual change in the CPI. Subject to that, the MPC is also tasked with supporting the Government's other economic objectives, including those for growth and employment. In pursuing its objectives, the MPC sets monetary policy for the economy as a whole.
- 3 Changes in the monetary policy stance will unavoidably have distributional implications. That is the case regardless of the instrument used to implement policy. Such distributional effects typically balance out over the course of a policy cycle: some groups benefit relative to others as interest rates are increased, but that is reversed as interest rates are lowered.
- 4 In response to the severe global financial crisis and the subsequent deep and prolonged recession, UK monetary policy has, however, been exceptionally accommodative for an unusually long time. Bank Rate has been at an historic low of 0.5% since March 2009. And since then, the MPC has authorised the purchase of £375 billion of assets, financed by the issuance of central bank reserves, through its asset purchase programme. The Bank's asset purchases, commonly referred to as quantitative easing (QE), have depressed longer-term yields. Consequently, some groups have borne a greater burden than usual from the sustained period of low interest rates. But, on the other hand, the benefits have also been greater than usual, by helping to avoid a far worse outcome for the economy as a whole.
- 5 This report sets out the distributional effects of QE, drawing out the parallels with the distributional effects of a low level of Bank Rate. The first section of this paper discusses the aims of QE and how it affects the economy. The second section discusses the impact that QE is estimated to have had on the economy in aggregate. The third and fourth sections set out the economic channels through which QE leads to distributional effects for savers and pensioners respectively, and provides a rough quantification of the direct financial implications of QE for these groups. A final section concludes.

¹ See: www.publications.parliament.uk/pa/cm201012/cmselect/cmtreasy/1910/191002.htm

² For recent comments by MPC members on this topic, see, for example, Bean (2012) and Miles (2012).

Section 1: How quantitative easing affects financial markets and the real economy

- 6 The MPC began QE in March 2009 following the intensification of the financial crisis after the collapse of Lehman Brothers and the associated sharp contraction in output. The MPC had reduced interest rates sharply, with reductions of 3 percentage points in Bank Rate during 2008 Q4 and a further 1½ percentage points in early 2009, such that by early March 2009, Bank Rate had been reduced to 0.5%. But, despite this substantial relaxation of policy, the MPC judged that, without additional monetary easing, nominal spending would be too weak to meet the 2% CPI inflation target in the medium term. The aim of QE was, therefore, to ease monetary conditions further in order to boost nominal spending and thus help to achieve the inflation target. The MPC completed £200 billion of asset purchases between March 2009 and January 2010, and a further £125 billion of purchases between October 2011 and May 2012. At its July 2012 meeting, the Committee voted to increase the size of its asset purchase programme by a further £50 billion to a total of £375 billion, which is expected to take four months to complete. The analysis in this paper focuses on the effects of the £325 billion of asset purchases that the Bank has already completed.
- 7 There are a number of potential channels through which such asset purchases affect spending and inflation.³ Purchases of financial assets – which in the United Kingdom have largely been UK government debt (gilts)⁴ – from the non-bank private sector financed by the issuance of central bank money increased private sector broad money holdings. In turn, that affected a wide range of asset prices through three main channels. The first is through *portfolio balance* effects. When the central bank purchases gilts, the monetary deposits of the sellers are increased. Unless that money is regarded as a perfect substitute for the gilts sold, the sellers will seek to rebalance their portfolios by buying other assets that are better substitutes for the gilts that they have sold. That shifts the excess money balances to the sellers of those assets who will, in turn, attempt to rebalance their portfolios by buying other assets – and so on. That process will raise the prices of all assets to the point where investors, in aggregate, willingly hold the overall supplies of assets and money. Higher asset prices mean lower yields, and so lower borrowing costs for companies and households, which acts to stimulate spending.⁵ In addition, higher asset prices stimulate spending by increasing the net wealth of asset holders.
- 8 The second channel is through *policy signalling* effects. This channel includes anything that market participants conclude about the likely path of future monetary policy from the MPC's asset purchases. For example, QE may have led market participants to expect policy rates to remain low for longer than would otherwise have been the case.

³ For more details, see Benford *et al* (2009) and Joyce *et al* (2011).

⁴ A key reason for concentrating purchases on gilts was that the gilt market was judged to be deep and liquid enough to accommodate the volume of purchases thought necessary.

⁵ The first stage of this process is that companies respond to higher equity and bond prices by increasing their use of capital markets to raise funds. There was some evidence of that in 2009, with both net equity and corporate bond issuance by UK private non-financial corporations particularly strong relative to the 2003-08 period.

- 9 The third channel is through *liquidity* effects. When financial markets are dysfunctional, central bank asset purchases can improve market functioning by increasing market liquidity through actively encouraging trading. Asset prices may consequently increase as a result of lower illiquidity premia.
- 10 In addition to these asset price channels, QE may also have a stimulatory impact through its broader effects on *expectations*. To the extent that QE leads to an improved economic outlook, it may directly boost consumer confidence, and thus people's willingness to spend. Some of this more general improvement in confidence may also be reflected back in higher asset prices, especially by reducing risk premia.⁶

Section 2: The impact of QE in aggregate

- 11 Previous Bank analysis has sought to quantify the impact of QE on the economy in aggregate. Joyce *et al* (2011) present a range of estimates of the macroeconomic impact of QE using a number of different methodologies. None of the methods used fully capture all the transmission channels discussed above. The effects of QE nevertheless appear economically significant, though subject to considerable uncertainty. According to the reported estimates of the peak impact, the £200 billion of QE between March 2009 and January 2010 is likely to have raised the level of real GDP by 1½ to 2% relative to what might otherwise have happened, and increased annual CPI inflation by ¾ to 1½ percentage points. Assuming that the additional £125 billion of purchases made between October 2011 and May 2012 had the same proportionate impact, this would translate into an impact from the £325 billion of completed purchases to date of roughly £500-£800 per person in aggregate. For comparison, a simple ready-reckoner from the primary forecasting model used by the Bank of England suggests that a cut in Bank Rate of between 250 and 500 basis points would have been required to achieve the same effect. This suggests that, in the absence of QE, the UK recession would have been even deeper. Moreover, these calculations do not explicitly incorporate impacts of QE operating through the exchange rate and confidence.
- 12 Of course, these figures do not translate into extra cash for each individual in the economy. One reason is because they are an attempt to gauge the impact of QE relative to what would otherwise have happened, so the benefits might show up as smaller falls in wages than employees would otherwise have experienced, and lower job losses. In addition, there will have been distributional consequences, with some groups being affected more than others. The remainder of this note explores the particular implications of QE for savers and pensioners.

⁶ Other channels include the effects of QE on bank lending. When assets are purchased from non-banks (either directly or indirectly via intermediate transactions), the banking sector gains both new reserves at the Bank of England and a corresponding increase in customer deposits. A higher level of liquid assets could then encourage banks to extend more new loans than they otherwise would have done. But, given the strains in the financial system at the time and the resultant pressures on banks to reduce the size of their balance sheets, the MPC expected little impact through this channel when it first started its asset purchase programme.

- 13 When considering these distributional impacts, however, it is important to remember that without the Bank's asset purchases, most people in the United Kingdom would have been worse off. Economic growth would have been lower. Unemployment would have been higher. More companies would have gone out of business. That would have had a detrimental impact on savers and pensioners along with every other group in our society. All assessments of the effect of asset purchases must be seen in that light.

Section 3: The implications of QE for savers

- 14 'Savers' can be defined in several different ways, and the impact of QE will vary depending on the group that is considered. One definition is households who have a higher value of financial assets than financial liabilities (eg debt): put another way, savers are those with *positive net* financial assets.⁷ Another commonly used definition of savers is households that have any gross savings, even if their debt is larger than their assets (ie they have *negative net* financial assets). Households may think of themselves as savers if they regularly save money out of their income, even if their net financial assets are negative. In this section, we use this wider definition, and focus on the impact of QE on those with gross financial assets.⁸ Limited data are available on the number of savers in the economy, but data from the 2011 NMG survey suggest that around 80% of households typically have some gross savings, although not all will yield interest.
- 15 The calculations in this section relate to the impact of QE on savers in terms of direct financial flows. They are therefore partial, and omit wider impacts of QE on savers. For instance, in the absence of QE, savers may have been more likely to lose their jobs, or seen companies that they owned go out of business. In addition, they do not take account of the impact of QE on inflation, and hence how these financial flows translate into real spending on goods and services. Other things being equal, increased inflation as a result of QE reduced the volume of goods and services that a household could purchase with a fixed amount of money spending. There are likely to be distributional consequences of that higher inflation.⁹
- 16 Monetary policy affects households in a number of ways.¹⁰ First, looser monetary policy pushes down the nominal interest rates paid on the stock of deposits and loans. That reduces both the interest income savers receive on their savings and the interest payments made by debtors (what is sometimes called an 'income effect'). There is also an additional 'substitution effect', as lower interest rates encourage households to bring forward spending at the expense

⁷ For many households, however, their mortgage is the largest component of their financial liabilities, so for them, the relevant asset concept may include housing wealth, as well as financial assets.

⁸ Detailed information on the composition and distribution of household net financial assets are not readily available.

⁹ See Galli and van der Hoeven (2001) for a review of the empirical literature on the complex distributional effects of inflation.

¹⁰ For a fuller account of the transmission mechanism of monetary policy, see:

www.bankofengland.co.uk/publications/Documents/other/monetary/montrans.pdf.

of saving. Looser monetary policy also typically pushes up asset prices (sometimes referred to as the ‘wealth effect’), so those households with significant asset holdings will benefit by more than those without. There will also be an effect on the exchange rate, which would be expected to depreciate, raising the price of imported goods and services and reducing the price of exports. All of these channels would tend to raise spending in the economy in the near term. The income and wealth channels, in particular, will give rise to important distributional effects on savers. These effects would operate for changes in both Bank Rate and QE. But the strength of these channels is likely to vary across the two policy instruments.

- 17 One difference between the transmission channels of Bank Rate and QE to spending and inflation is that a change in Bank Rate acts largely by affecting short-term market interest rates, while QE acts largely through longer-term interest rates.¹¹ Households can hold their savings directly or indirectly, for instance via a pension fund. The majority of households’ direct savings are held as deposits in banks and building societies, and generally in forms that are easily accessible: over the past year, around 55% of the stock of deposits was held in relatively short-term accounts (sight and non-interest bearing deposits), with the remainder being time deposits. And only around 10% was in accounts with interest rates fixed for more than two years. As a consequence, households tend to receive a return linked to short-term rather than long-term interest rates. That suggests that deposit holders are likely to have been affected much more by the cuts in Bank Rate than by downward pressure on longer-term interest rates as a result of QE.
- 18 Reduced interest rates have depressed the aggregate interest payments received by households on deposits. Lower interest receipts on deposits compared with September 2008 levels cumulated to a total of around £70 billion by April 2012 (Table 1). By contrast, the household sector may have benefited by around £100 billion by having to pay less on outstanding loans. The gap between interest paid on deposits and interest received on loans over the period would have been absorbed in the first instance by the banking sector, but ultimately that would have resulted in lower profits and hence potentially lower dividends or remuneration, or in higher banking costs and fees. Either way, much of that would feed back eventually to household incomes.

¹¹ The bulk of the gilts purchased during the QE period have maturities of between 5 and 25 years.

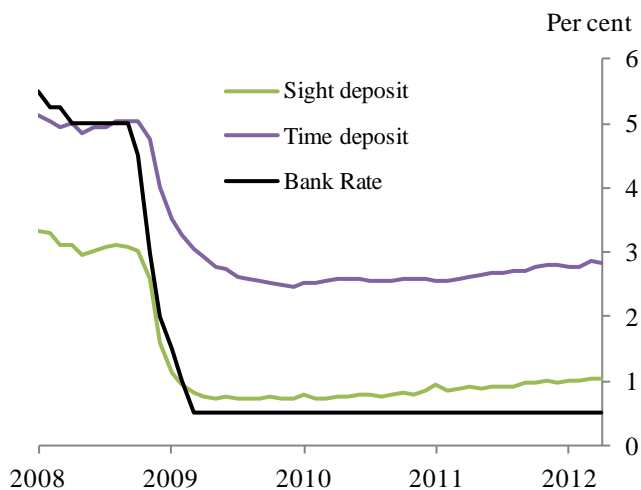
Table 1 Estimated impact of changes in interest rates since September 2008^(a)

	Change in effective interest rates (bp)	Effect on income from change in interest payments (£bn)
Memo: Bank Rate	-450	
Deposits		-70.0
<i>o/w Sight</i>	-206	-37.4
<i>Time</i>	-218	-32.6
Secured lending		94.4
<i>o/w Floating rate</i>	-312	89.1
<i>Fixed rate</i>	-102	5.9
Unsecured lending		7.9
<i>o/w Credit cards</i>	-116	0.7
<i>Overdrafts</i>	3	1.2
<i>Personal loans</i>	-109	6.1
Total		32.3

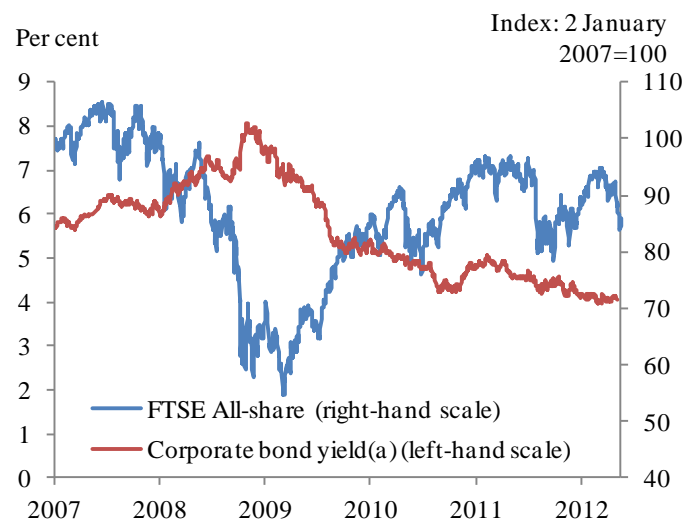
Source: Bank of England and Bank calculations.

(a) Latest data are for April 2012. In estimating the effect on interest payments and receipts, the calculations assume that the stocks of loans and deposits were as actually occurred. In practice, the stock of deposits and loans are likely to have been higher if interest rates had remained at 2008 levels.

- 19 These estimates are likely to represent a lower bound on the impact that monetary policy has had on interest flows, however, as other factors have tended to raise deposit rates over the past few years. Bank Rate was cut by 450 basis points between September 2008 and March 2009, and has remained at 0.5% since then. But effective rates on the stock of sight and time deposits were only around 200 basis points lower in April 2012 than in September 2008 (Chart 1). In part, that is likely to reflect the zero lower bound on nominal interest rates: sight deposit rates tended to be significantly below Bank Rate before the crisis, so banks were not able to reduce deposit rates by as much as the fall in Bank Rate. Deposit rates have drifted up since mid-2009, despite Bank Rate remaining flat at 0.5%. In part, that may reflect banks competing more aggressively for deposits as part of a wider strategy to reduce their reliance on wholesale market funding. Without these factors, deposit rates received by households are likely to have been even lower.

Chart 1 Household deposit rates and Bank Rate^(a)

(a) Monthly average of UK resident monetary financial institutions' effective interest rates on the stock of outstanding deposits.

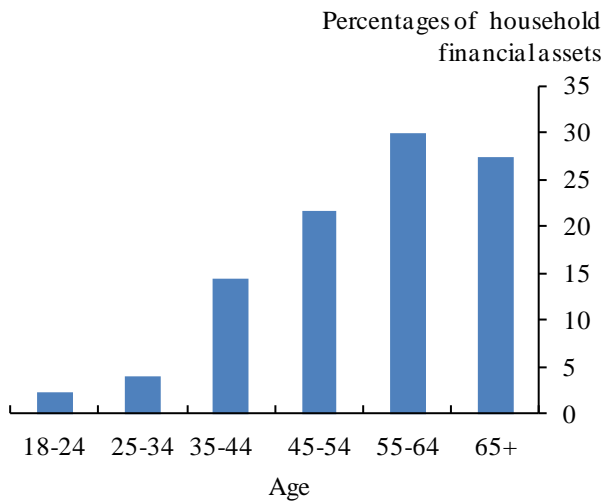
Chart 2 Equity prices and corporate bond yields

Sources: Bank of America/Merrill Lynch and Thomson Reuters Datastream.

(a) Non-financial companies (excluding utility companies) sterling investment grade corporate bond yield.

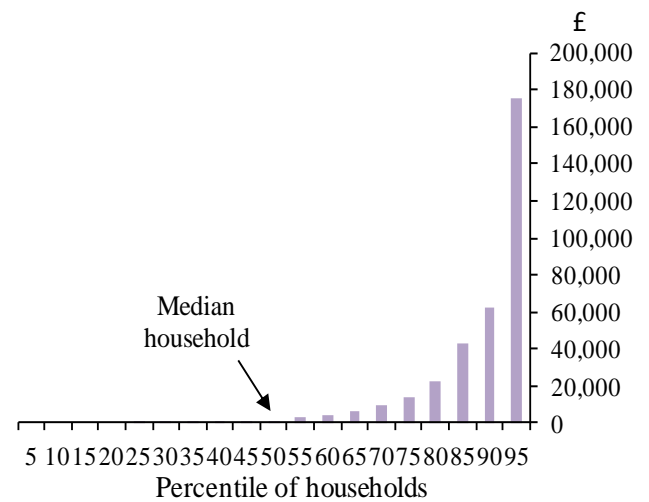
- 20 There will have been differences in experiences across households too. For example, savers with floating rate products were affected soon after the cuts in Bank Rate, with their rates falling from around 3% in September 2008 to under 1% by February 2009 (the green line in Chart 1). In contrast, households with savings in fixed-rate products and accounts would not have been affected until later. Moreover, around 10% of the stock of deposits pay no interest at all. Similarly, there will have been different experiences amongst debtors.
- 21 One channel through which expansionary monetary policy will have benefited some individuals is by raising asset prices, including government and corporate bonds, and equities (Chart 2 shows movements in equity prices and corporate bond yields). Moreover, by supporting activity, QE will also have boosted dividend payments and reduced corporate defaults (raising the returns on corporate bonds). So the larger the share of these types of assets in households' portfolios, the greater the boost from QE relative to reduced interest payments on money held in the form of deposits. QE may also have supported non-financial asset prices. For example, to the extent that QE prevented a deeper recession and a sharper fall in employment, the fall in house prices during the crisis is likely to have been smaller than would otherwise have been the case.

Chart 3 Distribution of household financial assets by age group^(a)



Sources: NMG consulting survey 2011 and Bank calculations.
 (a) Respondents to the NMG survey are asked: 'How much do you (or any member of your household) currently have in total, saved up in savings and investments? Include bank/building society savings accounts or bonds, stock and shares, ISAs, Child Trust Funds, NS&I account/bonds and premium bonds. Please exclude any pensions you may have.'

Chart 4 Distribution of household financial assets^(a)



Sources: NMG consulting survey 2011 and Bank calculations.

(a) See footnote to Chart 3 for details of the question asked.

- 22 The overall impact of QE on household wealth is likely to have been substantial. Joyce *et al* suggest that the £200 billion of asset purchases made between March 2009 and January 2010 lowered gilt yields by around 100 basis points. The effect on a wider range of financial asset prices is more uncertain. Taking into account the estimated composition of household net financial assets, their analysis suggests an overall boost to UK households' net financial wealth (which includes pension wealth) of about 16%. Assuming that the £125 billion of asset purchases made between October 2011 and May 2012 had the same proportionate impact as the first round of asset purchases, that would give an estimate of the total increase in household wealth stemming from the Bank's £325 billion of asset purchases up to May 2012 of just over £600 billion, equivalent to around £10,000 per person if assets were evenly distributed across the population.
- 23 In practice, the benefits from these wealth effects will accrue to those households holding most financial assets. Evidence from the 2011 survey by NMG Financial Services Consulting,¹² carried out on behalf of the Bank, suggests that close to 80% of financial assets (excluding pension wealth, but including deposits) are held by those above the age of 45 (Chart 3).¹³ And the survey suggested that the median household held only around £1,500 of gross assets, while

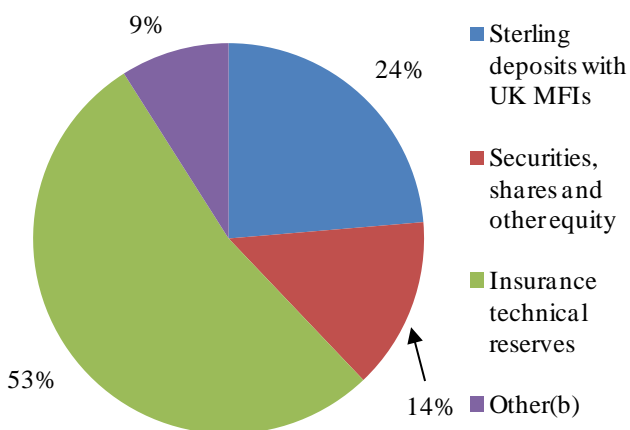
¹² For a detailed discussion on the results of this survey, see Kamath *et al* (2011). Analysis of the survey data has suggested that households tend to underreport the value of the assets, but that issue ought not to affect the distribution of assets across households.

¹³ By contrast, financial liabilities are less skewed towards older groups, with only around 30% of liabilities held by those aged over 45. Those aged 35-44 have the largest liabilities, at around 45%.

the top 5% of households held an average of £175,000 of gross assets (Chart 4), or around 40% of the financial assets of the household sector as a whole.

- 24 The balance between the income and wealth effects from QE depends on the distribution of assets across households. In aggregate, sterling deposits with UK monetary financial institutions (deposit-taking banks and building societies) make up around 25% of households' financial wealth, while around 15% is held directly in equities and other securities (Chart 5).¹⁴ According to the 2006/08 *Wealth and Assets Survey*, the vast majority of households hold deposit accounts, with the median household holding around £1,000 in current accounts, excluding overdrafts. In the same survey, around 15% of households reported that they directly held UK shares, ie in addition to shares held indirectly via pension funds, and 10% held stocks and shares ISAs.

Chart 5 Composition of stock of household gross financial assets in 2011 Q4^(a)



(a) Includes households and non-profit institutions serving households.

(b) Includes currency, other deposits, loans and other accounts receivable/payable.

- 25 To conclude, monetary policy has reduced interest rates and supported asset prices in order to stimulate spending and avoid an even deeper and more prolonged recession following the financial crisis. Largely as a result of the sharp reductions in Bank Rate – and not of QE – nearly all savers have seen the interest payments on their deposits fall since 2008. The vast majority of households hold deposit accounts, so these lower rates have affected most households to some extent. But some households have been affected more than others. Working against the effect of lower interest rates on deposits, some savers will have seen an increase in the value of their holdings of other financial assets as a result of the low level of Bank Rate and QE. In aggregate, such assets make up a larger share of households' total

¹⁴ Consistent with the importance of pension-related issues for savers, the largest share of household assets is made up of assets held on behalf of the household sector by insurance companies and pension funds (referred to as 'insurance technical reserves'), making up a little over 50%.

portfolio of financial assets than deposits. Holdings of financial assets, including deposits, are heavily concentrated among certain households.

Section 4: The implications of QE for pensions

26 This section discusses the implications of QE for pensioners, and for those approaching retirement. It also considers the implications for pension providers,¹⁵ because developments for these companies will affect the pensions provided to the individuals participating in these schemes as they retire. People in, or close to, retirement make up a relatively large share of the UK population. According to the latest available population estimates (data for mid-2010), people older than the relevant State Pension age (currently 60 for females and 65 for males¹⁶) account for around 20% of the UK population. The pension incomes of the bulk of these individuals – those who had already retired prior to the start of the financial crisis – will not have been adversely affected by QE.¹⁷ Indeed, some individuals may even have benefited if they were net holders of financial wealth, because QE increased the prices of bonds and equities. Data on real consumption growth rates by age group show that the over-65s are the only group that has been able to maintain positive consumption growth during the crisis (Chart 6).¹⁸ Those who have reached the State Pension age since mid-2007 – around 3 million people, approximately 5% of the population – will have potentially been more affected.¹⁹ This section includes calculations of changes in the position of hypothetical pension schemes over four periods within the past five years.

27 It is worth noting at the outset that, just as deposit rates have been affected by factors other than monetary policy in recent years, there have been factors other than QE affecting pensioners and pensions too. Although UK monetary policy has put downward pressure on gilt yields in recent years, it cannot explain all of their fall. The broadly similar trend in UK and other international government bond yields over the past decade (Chart 7) suggests that there have been other important global factors driving the reduction in yields apart from monetary policy. Some have suggested that downward pressure on interest rates has arisen from unusually high levels of savings in some emerging market economies, especially China, which have been more than enough to finance the high levels of investment there.²⁰ Other factors that may have pushed down gilt yields include a shortage of high-quality safe assets, and the sharp declines in corporate investment during the crisis. Pension wealth is normally held in the form

¹⁵ That includes both institutional investors, such as insurance companies and pension funds, and employers providing pensions to their past and future employees. But it excludes the provision of state pensions, and other related payments during retirement such as Pension Credit.

¹⁶ The State Pension Age is likely to rise over time to 68 for both females and males.

¹⁷ To the extent that QE pushed up inflation, that would have reduced the real income of some pensioners. But that has to be seen in the context of the wider benefits of QE. Analysis in this section focuses on the direct impact of QE on interest rates and asset prices.

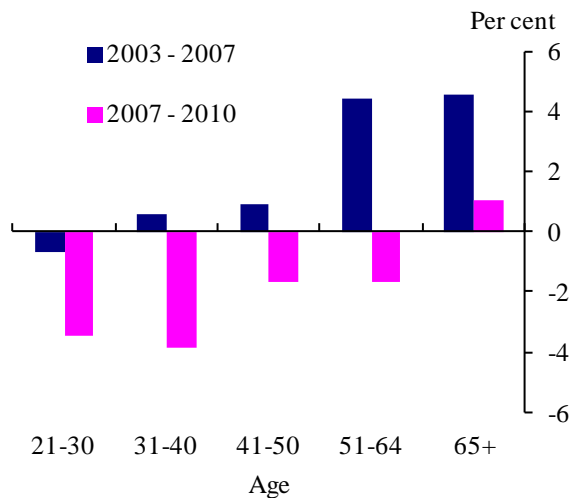
¹⁸ See Weale (2012).

¹⁹ That does not equate to the precise number of people drawing pensions, for example because some above the State Pension age remain in employment, while others below that age will have begun to draw on pensions.

²⁰ See Bernanke (2005).

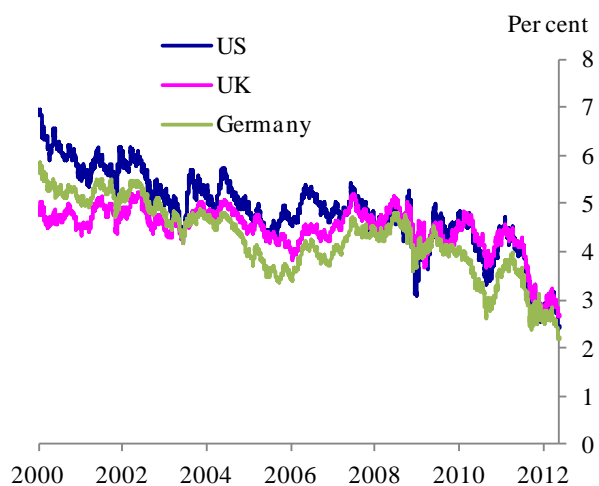
of equities and corporate bonds in addition to government bonds. The prices of such assets have been affected by many factors other than QE over the past five years, including the weak economic environment. Continued increases in life expectancy have also affected pension schemes, raising the average costs of pension providers and increasing the amount that people need to save for their retirement. In addition, many pension funds were in deficit before the crisis, and, as discussed below, this was an important contributory factor in the deterioration of their financial deficits during the current crisis.

Chart 6 Average annual real consumption growth rates by age group



Sources: LCF, EFS, FES and Bank calculations.

Chart 7 Fifteen-year spot government bond yields^(a)



Sources: Bloomberg and Bank calculations.
(a) Zero-coupon yields.

28 Pensioners, people saving specifically for their retirement and pension providers are affected by many of the same issues as savers in general. For example, lower Bank Rate and QE reduce interest rates received on deposits and raise the value of asset holdings in exactly the same way as for savers. So, as for savers in general, both the composition of assets and type of deposits will be important. One difference, however, is that assets held in order to save for retirement are likely to be in a more illiquid form than other savings, so they are more likely to receive a return based on longer-term interest rates. As a result, downward pressure on longer-term interest rates from QE has played a more important role than cuts in Bank Rate in determining the overall impact on this group. And pension wealth (ie dedicated savings for retirement) is more likely to be held in the form of non-deposit assets.

29 There are several different ways that individuals may save for their retirement, and the channels through which QE affects these individuals will vary depending on the methods that they use. Historically, the most common types of scheme are those that provide defined benefits (eg final or career average salary schemes), where the employer/shareholder bears the main risks. According to Towers Watson, around 60% of wealth held by pension funds was in defined benefit (DB) schemes in 2011. An alternative model is one in which individuals, or

their employers, pay in a fixed contribution per period, and there is not a pre-defined income in retirement. These are commonly referred to as ‘defined contribution’ – DC – or ‘money purchase’ schemes. Upon retirement, individuals use the assets accumulated in the scheme²¹ to purchase an insurance (or annuity) contract paying out a stream of payments for the remainder of their life. Here, the main risks are borne by the individual.²² Assets held in DC schemes made up the remaining 40% of pension fund assets in 2011. Alternatively, individuals may save for their retirement independently. In that case, they could either live off the income from their assets during retirement, or else they use their savings on retirement to buy an annuity. If individuals take up the latter option, the channels through which QE affects them are likely to be similar to those individuals in DC schemes. In practice, many individuals are likely to use a combination of these approaches to provide for their retirement.²³

Defined benefit schemes

- 30 The net impact of QE on DB pension schemes’ overall position reflects two additional factors to the general channels discussed above.
- 31 First, the extent to which there is a mismatch between the funds’ assets and liabilities. If a pension fund is fully funded and holds government debt with coupon payments that exactly match the future flow of its liabilities, then a change in gilt yields would have no net impact.²⁴ But many pension funds hold a mix of assets, including equities and other types of securities. Estimates by the Bank suggest that QE increased the value of equities by a broadly similar amount to gilts, so even with a mix of gilts and equities, a fully funded pension fund would not have been materially affected by QE. But over the period since the start of the financial crisis, equity prices have fallen relative to gilt prices for reasons unrelated to QE, causing pension deficits to open up. The mismatch between assets and liabilities, which is common across many pension funds, has had an important bearing on the performance of pension funds over the past five years or so.
- 32 Second, if a DB pension scheme is in deficit, then QE can lead to a widening in that deficit. That comes about because although QE causes the assets and liabilities of a pension scheme to rise by similar proportionate amounts, because the pension fund’s liabilities are greater than its assets, the absolute size of the deficit increases. The larger the size of the deficit, the larger the

²¹ That would typically include the accumulated income from those assets (less any fees).

²² Until the annuity is taken out, all the risks are borne by the individual. After the annuity is taken out, the balance of risk-sharing depends on the type of annuity chosen. For example, for an index-linked annuity, the individual would always receive the same real income, and the provider would bear the risk of inflation evolving in a way that it had not expected. For a ‘with-profits’ scheme, the individual bears the risk of the return proving less than expected.

²³ For example, an individual may have been part of a DB scheme with one employer, but subsequently moved into a DC scheme with a new employer.

²⁴ Pension fund liabilities will normally be uprated in line with RPI inflation, so index-linked gilts might be a better match for them than conventional gilts.

detrimental impact of QE. The average pension fund deficit was equal to about 35% of total liabilities in March 2007, calculated on a full buy-out basis, falling to 33% in 2011.²⁵

- 33 In order to illustrate the importance of the asset and liability structure of the pension scheme when assessing the effect of QE, both in terms of underfunding and asset and liabilities mismatch, Table 2 sets out illustrative scenarios for how the deficits of different hypothetical DB pension schemes would have evolved over time, given actual movements in asset prices and yields. The calculations are sensitive to the precise assumptions used, so they should be treated as indicative only.
- 34 The table considers three hypothetical pension schemes. The first column sets out a baseline case, in which the scheme is assumed to be fully funded in March 2007 (with £100 million assets and £100 million liabilities), and the expected future cashflows from the assets and liabilities of the scheme are matched as the scheme holds only gilts. That is then compared with two alternative schemes. Scheme 1 is assumed to be fully funded in March 2007, but its assets are composed of 60% equities and 40% bonds (column 2). Scheme 2 has the same asset structure as Scheme 1, but is assumed to start in March 2007 with a deficit of £30 million (column 3), ie liabilities are £100 million compared with assets of £70 million. Scheme 1 therefore has an asset-liability mismatch but was fully funded in March 2007; Scheme 2 has an asset-liability mismatch but was under funded in March 2007.
- 35 The table traces out changes in the deficit of each pension scheme from March 2007 to the following four dates: February 2009 (ie just before the start of QE), February 2010 (ie after the first £200 billion of purchases had been completed), September 2011 (ie just before the announcement of further purchases) and May 2012 (ie after the completion of a further £125 billion of purchases).
- 36 The table also contains some illustrative estimates that isolate the impact of QE. In each example, QE has two effects: first, it increases the scheme's assets by pushing up the value of the gilts and equities held by the scheme; second, it increases the scheme's liabilities by reducing the discount rate the pension scheme applies to its *future* liabilities, and hence increasing the *current* value of its liabilities. The impact of 'other factors' affecting deficits is calculated by residual, and includes movements in gilt and equity prices that are unrelated to QE (as discussed in paragraph 27).

²⁵ See *Purple Book* 2011.

Table 2 Illustrative examples of DB scheme deficits^(a)**£m deficit for £100m (valued at Mar. 2007) DB pension schemes**

- numbers in () are the values of assets/liabilities at point in time

- numbers in [] are the changes in deficits as a proportion/percentage of the initial asset level

Negative figures indicate deficits or any increase in deficits/liabilities	Baseline Scheme	Scheme 1	Scheme 2
	Fully-funded at Mar. 2007	Fully-funded at Mar. 2007	Under-funded at Mar. 2007
	Matched Asset/Liability	Asset/Liability Mismatch	Asset/Liability Mismatch
Deficits at:			
End Mar. 2007	0.0 (100/100)	0.0 (100/100)	-30.0 (70/100)
End Feb. 2009	0.0 (102.9/102.9)	-26.5 (76.4/102.9)	-49.4 (53.5/102.9)
End Feb. 2010	0.0 (99.3/99.3)	-9.6 (89.7/99.3)	-36.5 (62.8/99.3)
End Sep. 2011	0.0 (125.0/125.0)	-26.5 (98.5/125.0)	-56.1 (69.0/125.0)
End May 2012	0.0 (140.1/140.1)	-33.5 (106.6/140.1)	-65.5 (74.6/140.1)
<hr/>			
Changes Mar. 2007- Feb. 2009	0 [0%]	-26.5 [-26.5%]	-19.4 [-27.8%]
<i>Due to QE</i>	0	0	0
<i>Due to other factors</i>	0	-26.5	-19.4
<hr/>			
Changes Mar. 2007- Feb. 2010	0 [0%]	-9.6 [-9.6%]	-6.5 [-9.3%]
<i>Due to QE</i>	0	0.0	-4.1
<i>Change in assets</i>	13.8	13.9	9.7
<i>Change in liabilities</i>	-13.8	-13.8	-13.8
<i>Due to other factors</i>	0	-9.6	-2.4
<hr/>			
Changes Mar. 2007- Sep. 2011	0 [0%]	-26.5 [-26.5%]	-26.1 [-37.2%]
<i>Due to QE</i>	0	-2.4	-6.9
<i>Change in assets</i>	17.4	15.1	10.5
<i>Change in liabilities</i>	-17.4	-17.4	-17.4
<i>Due to other factors</i>	0	-24.1	-19.2
<hr/>			
Changes Mar. 2007- May 2012	0 [0%]	-33.5 [-33.5%]	-35.5 [-50.7%]
<i>Due to QE</i>	0	-5.1	-12.6
<i>Change in assets</i>	30.3	25.2	17.7
<i>Change in liabilities</i>	-30.3	-30.3	-30.3
<i>Due to other factors</i>	0	-28.4	-22.8

Sources: Bloomberg, Thomson Reuters Datastream and Bank calculations.

(a) In all the schemes, liabilities are assumed to be discounted using fifteen-year gilt (spot) yields, and the value of gilts held as assets is assumed to move in line with fifteen-year gilts. The baseline scheme is assumed to hold 100% gilts. Scheme 1 and 2 each hold 40% gilts and 60% equities. Scheme 2 is 70% funded, while Scheme 1 is fully funded. The value of equities is assumed to follow the FTSE All-Share index. The impact from QE on gilt yields and equity prices are based on the estimates in Joyce *et al* (2011). In particular, it is assumed that the £200 billion of QE between March 2009 and January 2010 led to an immediate 100 basis point fall in gilt yields and a gradual 20% increase in equity prices over the period of the purchases. A similar proportionate impact is assumed for the £125 billion of QE between October 2011 and May 2012; that is, a 62.5 basis point fall in gilt yields and a 12.5% rise in equity prices. Estimates are rounded to the nearest £0.1million, so the impacts may not add up due to rounding.

As a property of the approach taken here, the estimated changes in assets and liabilities as a result of QE continue to grow after the completion of the first £200 billion of QE in January 2010 and before the start of the £125 billion of QE in October 2011.

- 37 In the case of the baseline scheme, which is fully funded and whose assets and liabilities are matched, the scheme remains fully funded, ie there is no deficit and the net impact of QE is zero. The fall in gilt yields, which is used to discount the pension fund's future liabilities, causes the current value of its liabilities to rise. But this is exactly matched by the rise in the value of the gilts that it holds. That is the case for all movements in gilt yields, irrespective of whether they are caused by QE or not.
- 38 In contrast, although Scheme 1 is assumed to have been fully funded in March 2007, the mismatch between its assets and liabilities means that a deficit gradually opens up over the subsequent period, such that by February 2009 Scheme 1 is estimated to have a deficit of around £27 million. That widening deficit largely reflects the sharp fall in equity prices that occurred between March 2007 and February 2009. The impact of QE on Scheme 1 is very similar to that of the baseline scheme; it raises its assets and liabilities by a similar proportionate amount.²⁶ That means that, had Scheme 1 been fully funded at the point at which the asset purchase programme was started, the impact on the scheme would have been broadly neutral. But since the scheme was in deficit by February 2009, by increasing its assets and liabilities by similar amounts, QE acted to increase the absolute size of the deficit. Even so, the vast majority of the widening in the deficit in Scheme 1 over the entire period considered (£28 million out of £34 million) was not caused by QE.
- 39 The results for Scheme 2 are qualitatively similar, but the fact that Scheme 2 was assumed to start in deficit means that the deterioration in the portfolio is more pronounced. QE accounts for around of £13 million (just over a third, ie 13/36) of the increased deficit by May 2012. That is a larger proportionate effect than in Scheme 1, reflecting the fact that the scales of the funding deficits at the points when the asset purchases were conducted were greater.
- 40 Increases in costs for DB schemes are borne in the first instance by employers, rather than by employees. So there would be no implications for existing pensioners on a DB scheme, nor for those on a DB scheme close to retirement. But, faced with higher costs of providing pensions, employers might seek to increase contributions or bear down on other staff costs including pay; it may also make them more likely to close, or alter the terms of, such pension schemes. For example, individuals on a final salary scheme might receive smaller pay rises than they had been expecting, potentially reducing their future retirement income. The extent to which that occurs may in part reflect the speed with which sponsors are required by The Pensions Regulator to make up any deficits in their funds.
- 41 The increased costs for some DB schemes needs to be set against what would have happened in the absence of QE, however. For example, by supporting nominal demand in the economy, QE has cushioned many companies from the financial crisis and ameliorated the rise in company

²⁶ In fact, Bank estimates suggest that QE raised equity prices by slightly more than gilt prices – see note (a) in Table 2 for more details.

closures and insolvencies. As well as the effect that had on supporting asset prices, it may have protected some individuals from the closure of their pension scheme.

Defined contributions schemes and individuals taking out an annuity

- 42 In assessing the channels through which QE affects individuals with DC pension schemes, and those taking out an annuity, it is helpful to split out two time periods. First, the period in which individuals are accumulating assets to fund their retirement. Second, the period from which they wish to begin drawing down on those assets by purchasing an annuity.
- 43 During the accumulation phase, the impact of QE arises via its impact on the value of their asset portfolio. The net impact will therefore depend on the same factors as those affecting savers in general, namely the composition and type of those assets. During this accumulation period, the composition of assets held by an individual may well change, for example with equities being held at early life stages, gradually shifting into fixed-income assets such as gilts as the point of retirement approaches. For simplicity, our analysis assumes a constant asset allocation over time.
- 44 When an individual wishes to begin drawing down their pension, they normally exchange their pension fund for a life annuity. There could be some flexibility in terms of the point at which they take out that annuity; some individuals may be able to choose to delay taking out their annuity for a period if they expect annuity rates to pick up. The annuity offered to an individual is a function of the value of the pension fund and the prevailing annuity rate in the market. In turn, the annuity rate will depend on the discount rate – which will be affected by long-term interest rates – and the annuity provider’s estimates of the likely longevity of the individual. So the net impact of QE will depend on two factors: its positive impact on the value of asset holdings on the one hand and, on the other, its negative impact on annuity rates through longer-term interest rates. In assessing the impact of QE, some commentators have focused solely on the latter.
- 45 Table 3 considers an illustrative example of the average life annuity income that would have been available to a 65-year old male with a lump sum of £100,000 before the financial crisis in March 2007. In the upper half of the table, the first three columns show the annuity income that he would have received as a result of purchasing an annuity at the same four dates considered in Table 2. The changes in the annuity incomes take into account changes in the value of the pension pot and the annuity rate over those periods.²⁷ The three columns differ according to the assumed split of assets between gilts and equities in three pension pots: ‘conservative’ (100%, 0%), ‘balanced’ (50%, 50%) and ‘high risk’ (0%, 100%). The final

²⁷ These simple calculations assume that the age of the individual taking out the annuity remains at 65 for the whole period. In practice, by delaying the point at which the annuity is taken out, the individual would be offered a higher annuity rate because he would be expected to live for fewer years.

column is based on actual annuity market data and shows the level or standard annuity rate offered to a 65-year old male at each point in time. For example, based on the annuity rate shown in the final column, a male with a pension pot of £100,000 in February 2010 could have received an annual pension income of around £6,800 (market annuity rate of 6.8% multiplied by £100,000), but would have only got £5,900 with a £100,000 pot in May 2012 (market annuity rate of 5.9% multiplied by £100,000).

- 46 In the lower half of the table, the first three columns decompose changes in annuity income for each of the three hypothetical portfolios over the different time periods. The fourth column shows the change in the actual annuity rate based on market data broken down into the contribution from QE and other factors. The reduction due to QE is calculated by assuming that the estimated reduction in gilt yields due to QE is fully passed through to lower annuity rates. This may exaggerate the negative impact of QE, as the historical relationship between gilt yields and annuity rates suggests a less than 100% pass-through from gilt yields.
- 47 Take as an example the results for the ‘conservative’ portfolio. If an individual had invested £100,000 solely in gilts in March 2007, that would have given an annuity of £7,140. By February 2010, the annuity value would have fallen by £430, to £6,710. That would not have reflected QE, which would have had a broadly neutral effect, as the increase in the value of the pension pot associated with the rise in gilt prices would have broadly offset the reduction in the annuity rate associated with the lower gilt yields. Over the period from March 2007 to May 2012, the annuity income from this fund would have increased by £1,060. Within that, QE would again have had a broadly neutral effect.²⁸
- 48 The overall performance of the balanced and high-risk portfolios (shown in columns 2 and 3 of Table 3) was worse than the conservative one. Over the period March 2007 to May 2012, annuity income fell, by £580 for the balanced portfolio and by £2,210 for the high-risk portfolio. This mainly reflected other factors, and particularly the sharp fall in equities over the period up to February 2009. The net impact of QE on both these portfolios was actually to boost annuity income by £130 in the case of the balanced portfolio and by £260 for the high-risk one. This reflects the fact that QE is estimated to have increased equity prices by a little more than gilt prices.²⁹

²⁸ The net impact of QE on annuity income is not exactly zero, with a positive estimated impact of £80 up to February 2010 and a negative impact of £10 in the period up to May 2012. The intuition for this result is that there is a small mismatch between the assets held in the portfolio and the annuity rate used. The gilts held in the portfolio are assumed to move in line with fifteen-year gilts. The annuity rates used in the calculations do not have a specified maturity: they are always quoted for a 65-year old, and there is no fixed date at which the annuity will cease. This maturity mismatch means that, for a given fall in gilt yields, the increase in the value of the pension pot associated with the rise in gilt prices does not generally exactly offset the reduction in the annuity rate associated with lower gilt yields (they would only exactly offset if the annuity rate were equal to 1/15 ie the inverse of the gilt maturity). This maturity mismatch effect is similar to that driving the difference in the estimated impact of QE between the DB Baseline Scheme and Scheme 1 in Table 2.

²⁹ See note (a) in Table 2 and Joyce *et al* (2011).

Table 3 Illustrative examples of annuities^(a)**£ per year from a pension fund valued at £100,000 at end March 2007***- numbers in () are the values of assets/liabilities at point in time*

Negative figures indicate reduction in annuity	Portfolio 1	Portfolio 2	Portfolio 3	Annuity Rate (per cent/percentage points)
	'Conservative'	'Balanced'	'High risk'	
Annuity bought at:				
End Mar. 2007	7140 (100000)	7140 (100000)	7140 (100000)	7.14%
End Feb. 2009	7160 (102940)	5630 (80860)	4090 (58780)	6.96%
End Feb. 2010	6710 (99330)	6170 (91340)	5630 (83360)	6.76%
End Sep. 2011	7700 (125020)	6340 (102930)	4980 (80850)	6.16%
End May 2012	8200 (140130)	6560 (112210)	4930 (84280)	5.85%
Changes Mar. 2007- Feb. 2009	20	-1510	-3050	-0.18 pp
<i>Due to QE</i>	0	0	0	0 pp
<i>Due to other factors</i>	20	-1510	-3050	-0.18 pp
Changes Mar. 2007- Feb. 2010	-430	-970	-1510	-0.38 pp
<i>Due to QE</i>	80	160	240	-1 pp
<i>o/w impact from higher asset value</i>	1080	1160	1240	
<i>o/w impact from lower annuity rate</i>	-1000	-1000	-1000	
<i>Due to other factors</i>	-510	-1130	-1750	0.62 pp
Changes Mar. 2007- Sep. 2011	560	-800	-2160	-0.98 pp
<i>Due to QE</i>	0	80	160	-1 pp
<i>o/w impact from higher asset value</i>	1000	1080	1160	
<i>o/w impact from lower annuity rate</i>	-1000	-1000	-1000	
<i>Due to other factors</i>	560	-880	-2320	0.02 pp
Changes Mar. 2007- May 2012	1060	-580	-2210	-1.29 pp
<i>Due to QE</i>	-10	130	260	-1.63 pp
<i>o/w impact from higher asset value</i>	1620	1760	1890	
<i>o/w impact from lower annuity rate</i>	-1630	-1630	-1630	
<i>Due to other factors</i>	1070	-710	-2470	0.34 pp

Sources: Bloomberg, Thomson Reuters Datastream, William Burrows Annuities and Bank calculations.

(a) Based on a male aged 65. Life Annuity rates are on a guaranteed five-year and level payment basis. The value of the gilts held in the portfolios is assumed to move in line with fifteen-year gilts. The impacts of QE are based on the same assumptions as those underlying Table 2. As a simplifying assumption, QE is assumed to have the same impact on the annuity rate as it does on gilt yields. Estimates are rounded to the nearest £10, so impacts may not add up due to rounding.

49 This section has set out the implications of QE for pensioners and pension providers. In making that assessment, it is important to consider that QE affects the value of pension fund assets as well as their liabilities. For a fully-funded DB scheme, QE had a broadly neutral impact. But, in practice, many DB schemes were under-funded at the point that QE began, and, as such, QE is likely to have increased those deficits. By contrast, it is likely that QE had a broadly neutral impact on the annuities offered to those approaching retirement on DC pension schemes. And those already in receipt of a pension before QE began would have been unaffected. In general, other factors have been more important than the Bank's asset purchases in widening pension fund deficits and weighing on annuities over the past five years. In particular, the main factor affecting pensions has been the fall in equity prices relative to gilt prices since 2007.

Conclusion

50 The past few years have been extremely difficult for many households, with weak growth and above-target inflation being the painful but unavoidable consequences of the severe financial crisis and the associated deep recession, as well as a sharp rise in oil and other commodity prices. In response to these difficult circumstances, monetary policy has been exceptionally expansionary for an unusually long period of time. That has supported nominal spending and incomes in the economy as a whole, mitigating the adverse effects of the financial crisis and subsequent recession. Without the loosening in monetary policy, it is likely that the economic downturn would have been far more severe, to the detriment of almost everyone in the economy, including savers and pensioners.

51 The benefits of loose monetary policy have not been shared equally across all individuals, however. Some individuals are likely to have been adversely affected by the direct effects of QE. Many households have received lower interest income on their deposits. But changes in Bank Rate – not asset purchases – have been the dominant influence on the interest households receive on bank deposits and pay on bank loans. By pushing up a range of asset prices, asset purchases have boosted the value of households' financial wealth held outside pension funds, although holdings are heavily skewed with the top 5% of households holding 40% of these assets.

52 Some pension schemes have been adversely affected by the direct effects of QE. In particular, for a DB pension scheme in substantial deficit, asset purchases are likely to have increased the size of the deficit. That is because although QE raised the value of the assets and liabilities by a similar proportion, that nonetheless implies a widening in the gap between the two. By contrast, for a typical fully-funded DB pension scheme, asset purchases are likely to have had a broadly neutral impact on the net value of the scheme. The fall in gilt yields raised the value of the pension fund's liabilities. But the associated increase in bond and equity prices raised the value of their assets by a similar amount. Likewise, asset purchases are likely to have had a

broadly neutral impact on the value of the annuity income that could be purchased with a personal pension pot. The fall in gilt yields reduced the annuity rate. But this was offset by the rise in the value of equities and bonds held in the fund. Furthermore, the pension income of those already in receipt of a pension before asset purchases began has not been affected by QE, and the same is true for the retirement incomes of people coming up to retirement in a DB pension scheme. The main factor affecting the valuation of DB pension schemes and DC pension pots over the past five years has been the fall in equity prices relative to gilt prices. That fall in the relative price of equities was not caused by QE, and stemmed in large part from the reluctance of investors to hold risky assets, such as equities, given the deterioration in the economic outlook, almost certainly as a result of the financial crisis.

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