



BANK OF ENGLAND

# Speech

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## **Pension funds and quantitative easing**

Speech given by

Charlie Bean, Deputy Governor for Monetary Policy, Bank of England

To the National Association of Pension Funds' Local Authority Conference

Cotswold Water Park Four Pillars Hotel, Gloucestershire

23 May 2012

Thank you, Joanne (Segars), for that kind introduction. When I was invited to address this conference, I was asked to discuss how the Monetary Policy Committee's asset purchases – colloquially, though rather inelegantly, known as quantitative easing or QE for short – affect pension funds. I was actually quite pleased to be assigned this brief, as in my view some of the commentary regarding QE has taken a rather partial view of its effects. Not only is the adverse impact of QE on pension funds often exaggerated, but the excessive focus on QE as a cause of low long-term risk-free interest rates also risks distracting attention from other factors driving yields which may present a more durable challenge to the sponsors and trustees of pension funds.

To begin with, it may be helpful if I remind you how QE works and what it seeks to achieve. QE essentially involves us trading one liability of the state – gilts – for another – monetary claims on the Bank of England<sup>1</sup>. The maturity structure of our purchases is designed to ensure that the gilts are largely sourced from private sector non-bank investors, such as insurance companies, pension funds and hedge funds. So, as a result of our operations, investors end up holding fewer gilts, together with more cash in their bank accounts. And corresponding to that increase in bank deposits, the banks themselves see their reserves accounts at the Bank of England increase.

If the seller were indifferent between holding the gilt and holding the associated bank deposit, then that is where things would end. But because deposits tend to yield less than gilts and assets such as corporate bonds and equities, the seller is likely in due course to want to buy some other asset instead. The consequence is upward pressure on the prices of a whole range of assets, including corporate bonds and equities. That in turn increases the availability, and reduces the cost, of finance to corporates. It also boosts the value of people's wealth, which should encourage more spending. And, more generally, QE is likely to have boosted confidence by removing some of the worst downside risks associated with a potential slide into deflation.

As I noted a moment ago, we aim to source the gilts from institutions other than banks. Because the banks end up with more customer deposits and more liquid assets, they may be encouraged to extend more bank credit. In this way, QE could boost the supply of credit through the banking system, as well as through the capital markets. But in the circumstances prevailing after the financial crisis, with the banks engaged in repairing their balance sheets, this particular channel was expected to be weak. What is probably more relevant to the supply of credit at the current juncture is the amount of bank capital and the cost and availability of bank funding. QE may then boost credit supply indirectly if it leads investors to increase their demand for bank debt and equity.

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<sup>1</sup> Cash can be thought of a zero-interest perpetuity issued by the state. But it has value because it can be used in transactions. The MPC's asset purchases are actually financed by issuing bank reserves which pay Bank Rate rather than nothing and which can be easily converted into cash.

As you will be aware, the Monetary Policy Committee has so far purchased £325 billion of gilts, £200 billion in a first phase during the worst of the recession in 2009 (QE1) and £125 billion in a second phase as the economy slowed at the end of last year and which was completed shortly before our latest policy meeting (QE2). To give some context, that represents around a quarter of the total stock of UK government debt in issue. It is, though, important to remember that throughout this time the Debt Management Office has been issuing substantial net quantities of new gilts in order to fund the Government's budget deficit. So, despite the scale of our purchases, the stock of conventional gilts held by the private sector is actually higher now than when we started our purchases (see Chart 1).

What impact have our purchases had on asset prices? Chart 2 shows the evolution of a representative gilt yield and an equity price index from the beginning of 2007, just before the start of the financial crisis. I have also marked on the periods when the MPC was buying gilts in grey. When there is bad news about the economic outlook, one would expect to see gilt yields and equity prices both falling. That is indeed what one observes during late 2008/early 2009 at the worst of the crisis after Lehman's collapsed, and again in the early autumn of last year as the euro-area crisis intensified and growth slowed.

As already noted, though, our asset purchases should drive down gilt yields and push up equity prices, other things equal. Equity prices behave as expected in both QE1 and QE2, as does the gilt yield during QE2. The gilt yield was, however, broadly flat over the period of QE1. That probably reflects the influence of other factors working against our asset purchases. In particular, during 2009 market concerns about the lack of a fully credible plan to close the fiscal deficit over the medium term increased somewhat, which would have tended to push up yields. In recent months the opposite appears to have been true. Market confidence in the UK Government's commitment to fiscal consolidation, together with heightened concerns about the fiscal positions of some euro-area sovereigns, has exerted downward pressure on gilt yields.

Quantifying the impact of QE requires one to abstract from these other influences on asset prices. One way of doing that is by looking at the immediate movements in asset prices around announcements of purchases. As market participants are forward-looking, one might expect the bulk of the movement associated with QE to happen when the purchases are announced rather than when they take place. And indeed that approach seems to work reasonably well for identifying the impact of QE1 on the yields on gilts, and those on close substitutes such as corporate bonds. Analysis by Bank staff<sup>2</sup> suggests that long-term gilt yields were around one percentage point lower than they would otherwise have been; that corresponds to a rise in long-term gilt prices of around 20%. Investment-grade corporate bond yields<sup>3</sup> fell by about the same amount, while high-yield corporate bonds fell by somewhat more.

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<sup>2</sup> For a summary of the evidence, including references to related studies, see Michael Joyce, Matthew Tong and Robert Woods (2011), "The United Kingdom's Quantitative Easing Policy: Design, Operation and Impact" *Bank of England Quarterly Bulletin*, 51(3), 200-212.

<sup>3</sup> Specifically, investment-grade yields fell by around 70 basis points, while sub-investment grade yields fell by around 150 basis points.

This approach is less suited to analysing the impact of QE2. The deterioration in the economic situation, speeches by MPC members, and the minutes of the September policy meeting all encouraged market participants to expect a re-commencement of the purchase programme. As a result, the effects were already largely incorporated into the general level of bond prices prior to the MPC's actual announcement of the new programme in October, so it becomes difficult to disentangle the effect of QE. Ahead of that announcement, however, UK sovereign bond yields did fall relative to those in Germany and the United States, consistent with an effect from QE.

Moreover, in February we did make an unexpected announcement of a change in the maturity structure of our purchases. This was intended to prevent the Bank's holdings becoming unduly concentrated in any particular segment of the market and had the consequence of shifting them more towards shorter durations. The subsequent response of yields at different maturities was broadly in line with what would have been expected on the basis of our first round of purchases (see Chart 3).

The approach is also less suited to analysing the impact on the prices of assets which are less immediate substitutes, such as equities. These are likely to take longer to adjust, as it probably takes a while for portfolio managers to decide how they want to rebalance their portfolios. But, as Chart 2 shows, equity prices rose substantially once QE was actually under way – by around 50% during QE1 and around 10% during QE2. In both cases, the switch from decline to growth coincides with the commencement of asset purchases.

It seems unlikely that all of the recovery in equity prices during these periods was down to our QE. During both phases of the programme, the US Federal Reserve undertook similar policies, and in recent months the ECB has injected large amounts of liquidity through its two longer-term refinancing operations. Equity prices rose in those jurisdictions too. Many of the companies in the equity price indices are international in focus and will be as exposed to developments abroad as in their home market. Moreover, there will have been other factors affecting equity prices, though during the second programme those other factors – slowing growth and the worsening euro-area situation – seem more likely to have depressed equity prices, rather than boosted them.

Given that QE is supposed to operate by driving asset prices up, however, it would seem peculiar not to ascribe some part of the rise to our actions. Econometric studies<sup>4</sup> carried out at the Bank imply that equity prices probably rose by about 20% as a result of the first phase of purchases. Assuming QE2 has proportionately the same effect as QE1, this implies an increase of around 10% as a result of the second phase of purchases. In other words, around half of the rise over the two episodes taken together appears attributable to QE. I should, however, emphasise the considerable uncertainty around these estimates.

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<sup>4</sup> See: Michael Joyce, Ana Lasasosa, Ibrahim Stevens and Matthew Tong (2010), "The financial market impact of quantitative easing", Bank of England Working Paper No.393, August; and Jonathan Bridges and Ryland Thomas (2012), "The impact of QE on the UK economy - some supportive monetarist arithmetic", Bank of England Working Paper No.442, January.

Let me now turn to the question of how this all affects a pension fund. Conceptually we can split the obligations of a Defined Benefit pension scheme into two components: pension obligations to current and former staff that have already been accumulated; and new obligations arising from the additional pension rights earned by the current staff in the current year through additional service and any increase in pay. The first component will dominate in the case of anything other than a very new scheme, so let me concentrate on that for now. In turn, I will consider the impact on: a fund that is balanced and hedged; one that is initially in balance but exposed to market risk; and one that is initially in deficit, as well as being exposed to market risk.

Now the existing pension obligations will typically be for a fixed flow of real income, that is the pension entitlement will be adjusted for inflation. In principle, an employer could therefore exactly match his pension obligations by holding a portfolio comprising indexed government debt of appropriate durations<sup>5</sup>. In this case, a change in the yields on government bonds as a result of QE, or indeed on any other assets, would not alter the position of the fund one iota – its obligations would still be completely covered. In this case, the change in the valuation of the liabilities is exactly matched by a change in the valuation of the assets.

Of course, most pension funds do not seek to match their assets exactly to their obligations in this way. Most will seek to cheapen the cost of meeting their obligations by holding higher yielding assets, such as corporate bonds and equities, rather than just (indexed) government bonds. This implies some extra risk, but is presumably judged acceptable if it reduces the contribution rate sufficiently in most states of the world. A typical pension fund might hold around 40% bonds and 60% equities<sup>6</sup>, and the illustrative figures below assume such a mix.

To begin with, consider a scheme that started off 2007 in balance. To keep the picture simple, I will assume that the liabilities are discounted by the gilt yield, so that the valuation of liabilities moves with this yield; any changes in longevity and the like are ignored so as to focus on the implications of asset price movements. In practice, of course, for accounting purposes many pension fund sponsors use an investment-grade corporate bond rate to discount their liabilities; an annex shows what things look like in this case.

Chart 4 shows how the deficit of this fund evolves, decomposed into the cumulative contributions of the liabilities (green bars) and assets, comprising equities (red bars) and bonds (blue bars). Note that the deficit rises as high as 30% of initial liabilities in early 2009, reflecting the sharp fall in equity prices during the worst of the financial crisis and subsequent recession. The deficit then falls back as equity prices rally strongly. It

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<sup>5</sup> In practice, a scheme is unlikely to be able to protect itself fully from interest rate risk, because there is only a limited range of swaps available to fill gaps in the maturity structure of government debt. I am also abstracting from uncertainty about longevity.

<sup>6</sup> This is broadly consistent with the *NAPF Annual Survey* for 2011, which suggests an average mix of 40% fixed income, 40% equities and 20% other assets, the prices of which I have assumed evolve in line with equities. The bonds are assumed to move in line with 15-year gilts, while the equities are assumed to move in line with the UK FTSE All-share index.

then re-emerges in late 2011 and early 2012, reflecting the fall in gilt yields coupled with the more modest movements in equity prices during this episode.

Now consider what the picture might have looked like if the MPC had not undertaken any QE. In constructing this counterfactual experiment, I take the estimates of the asset-price impact for QE1 from the work that I discussed earlier, namely that it reduced gilt yields by a percentage point and raised equity prices by 20%, and then simply pro-rate those effects for QE2. I emphasise again that these are only estimates of the effect of QE and are subject to considerable uncertainty, so the results of this exercise should be treated as illustrative rather than definitive.

Chart 5 shows the result. The value of liabilities (green bars) is lower from early 2009 onwards, which on its own pushes the fund towards surplus, but working against that there is now much less of a recovery in equities, while the value of bond holdings is also lower. The overall path of the deficit is very similar, as can be seen more clearly in Chart 6, which just shows the two deficits together. So the bottom line is that QE is broadly neutral for a fund that starts in balance, with the overall movement in assets broadly matching the movement in liabilities.

Not all funds, however, started 2007 in balance. Indeed, the *Purple Book*, published by the Pension Protection Fund and the Pensions Regulator, suggests that the average pension fund deficit was equal to about 30% of total liabilities, calculated on a full buy-out basis. The consequence of this is to shrink the red and blue bars in Charts 4 and 5 by 30% (the time profiles are otherwise the same), reflecting the shortage of assets to meet such a fund's obligations. The implications for the deficit, with and without QE, are shown in Chart 7. Now QE widens the deficit from the start of our purchases in early 2009 onwards, and by the end of the period has raised it by about 10% of initial liabilities. This is, by the way, of the same order as some calculations of the impact of QE produced by the Pension Corporation late last year<sup>7</sup>.

There are a couple of conclusions I want to draw from this. The first is that while the change in the deficit is certainly not trivial for a substantially underfunded scheme, the impact of QE is nevertheless small compared to the movement in the deficit associated with other factors, such as the collapse in equity prices as a result of the financial crisis and the recession. In particular, it would be an error to attribute the deterioration in pension deficits since the start of the crisis solely to the impact of QE.

The second observation is that QE does not inherently raise pension deficits. It all depends on the initial position of the fund, with the movements in liabilities and assets likely to be broadly comparable when a scheme is fully funded. But the more a scheme is underfunded (overfunded) to begin with, the more it will find its deficit (surplus) increased. This is entirely intuitive. By reducing yields, QE increases the cost of

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<sup>7</sup> See Pension Corporation (2011), "QE's impact on pension fund liabilities", December.

purchasing a given future stream of income. So if a fund starts off relatively “asset poor”, the sponsors will now find it more costly to acquire the assets necessary to match its future obligations.

A corollary of this is that the cost of provisioning against additional pension entitlements being accumulated by currently serving staff unambiguously rises. That does mean that the effective cost of employing labour, when their pension costs are also included, also rises<sup>8</sup>. This is certainly an unwanted side effect of QE. But it needs to be balanced against the higher activity and business profits resulting from QE, as well as the fact that wage growth has recently been exceptionally weak, which work in the opposite direction.

Given that pension funds have for the most part seen deficits widen in recent years, whether it be as a result of the crisis and recession or the result of QE, how should sponsors and trustees respond? It makes little sense to rush to close a deficit that is likely to prove temporary. But if a deficit is likely to persist, then corrective action is required, initially to prevent it continuing to expand and ultimately to close it, though that adjustment could, quite reasonably, be spread out over time. This is all recognised by the Pensions Regulator.

The biggest issue here is not the principles involved, but rather the likely future evolution of yields and asset prices. Here I think it is worth stepping back from recent developments to consider the behaviour of yields over a longer horizon. Chart 8 shows the nominal and real yields on UK and US government debt over the past twenty years. Though yields have dipped recently, the most striking feature of this chart is the general downward trend that was evident for some years even before the financial crisis.

The causes of this downward trend are still not well understood. Some have pointed to a global “savings glut” associated with unusually high levels of savings in some emerging economies<sup>9</sup>, especially China, which have been more than enough to finance the high levels of investment there. That was reflected in downward pressure on global safe interest rates, as well as the pattern of current account imbalances. While the Chinese surplus has fallen in recent years, reflecting in part efforts to stimulate domestic demand, that has been offset by a widening in the surplus of the major oil producers as increased revenues resulting from high oil prices are largely saved rather than spent. While one might expect the Chinese economy to continue to rebalance towards greater reliance on domestic demand and lower savings, that process is likely to take many years to play out, so an early reversal of that factor holding down yields seems unlikely.

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<sup>8</sup> For instance, if an employer is putting aside an additional 15% of the wage bill to cover accumulating pension liabilities and the price of buying a given stream of future income rises by 20%, then he would now need to put aside an additional 3% of the wage bill to meet those obligations.

<sup>9</sup> See Ben Bernanke (2005), “The Global Saving Glut and the US Current Account Deficit”, Sandridge Lecture, Virginia Association of Economics, Richmond, Virginia, 10 March.

Another possibility is a shortage of high-quality safe assets<sup>10</sup>, with countries like China accumulating reserves particularly in the form of US Treasuries. That in turn will also have increased the demand for substitutes, including the government debt of other advanced economies. But recent events in the euro area have highlighted the fact that the debt of some sovereigns is not as safe as market participants thought. That has led to increased demand for the debt of those sovereigns that are still regarded as safe, including that of the United Kingdom. How long such a “safe-haven discount” persists depends not only on what happens in this country but also what happens abroad: the demand for one country’s bonds as a safe haven depends in part on how risky those of other countries are thought to be.

Since the financial crisis and subsequent recession, another factor likely to have contributed to depressing yields is the sharp decline in investment, prompted by the deterioration in the outlook and heightened uncertainty. To date the recovery has been painfully slow, with negligible growth in the United Kingdom over the past year and a half. And though there is some variation in the pace of recovery across countries, in general growth has been weaker than after a normal cyclical downturn. In part that reflects the fact that recoveries after financial crises tend to be weaker and more drawn out as balance sheets are repaired, but also it probably reflects the exceptional uncertainty in the aftermath of the financial crisis. It is consequently hard to know when the animal spirits of businesses, and with it the propensity to invest, are likely to revive.

Certainly the impact of QE on yields should ultimately reverse when the economic environment improves and we start to sell the gilts back to the market in order to withdraw the present exceptional monetary stimulus. Unfortunately, with the present heightened uncertainty associated with the problems in the euro area, the likely future date for us to commence selling gilts has receded somewhat. And if conditions do deteriorate significantly, we may need to re-start the programme of purchases. Indeed, as the minutes released earlier today reveal, the decision at our May meeting not to extend the programme was already quite finely balanced. So, in conclusion, while there are reasons to expect yields to return towards historically more normal levels at some stage, it is difficult to know when that will be and how quickly it will occur.

There is no doubt that this is a challenging time for pension funds and their sponsors. Low yields reduce the scope for harnessing the magic of compound interest to provide generous future pensions at a moderate current cost. It may be tempting to conclude that the current abnormally low yields are primarily a consequence of QE, and that the right approach is just to look through the associated rise in deficits. But I hope that what I have said today has persuaded you that this may not, in fact, be the most prudent course to take. Pension funds and their sponsors may, I am afraid, have to contend with low yields for some considerable time yet.

Thank you!

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<sup>10</sup> See Ricardo Caballero, Emmanuel Farhi and Pierre-Olivier Gourinchas (2008), “An Equilibrium Model of Global Imbalances and Low Interest Rates”, *American Economic Review*, pp.358-393.

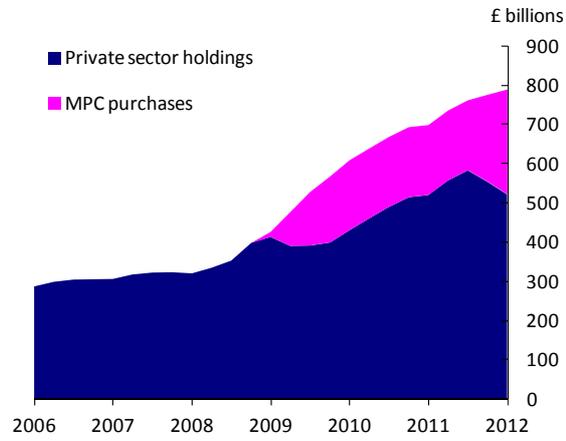
## **ANNEX: EFFECT OF DISCOUNTING BY A CORPORATE BOND RATE**

Accounting standard FRS17 dictates that pension fund liabilities should be discounted by an investment-grade (AA) corporate bond rate, rather than the gilt yield. During the period of the financial crisis that may, however, provide a misleading impression of the position of pension funds. Corporate bond yields carry a premium over gilt yields in part because of the risk of default. Discounting the flow of future pension liabilities by a corporate bond rate only makes sense if the fund is no longer required to meet those liabilities in the states of the world where the bond defaults. But this is not generally the case: broadly speaking, the fund needs to meet its liabilities whatever happens.

In normal times, this does not matter very much as the spread of investment-grade bonds over gilt yields is pretty small and does not vary very much. But during the peak of the crisis, the spread – even for investment-grade bonds – rose significantly (Chart A). Consequently, when standard accounting conventions are followed an additional factor needs to be added to Charts 4 and 5, reflecting the impact of changes in the corporate bond spread. That is shown by the mauve bars in Charts B and C respectively; the profiles of the other components of the deficit are unchanged. The main consequence of this is that the value of liabilities falls markedly during the period up to early 2009, indeed so much so that it counteracts the loss in asset value due to the fall in equity prices and pushes the fund into surplus. But it would be unwise for the sponsors and trustees of a pension fund to take comfort from this, given that the fall in the value of liabilities was merely an artefact of an increased probability of default on corporate bonds!

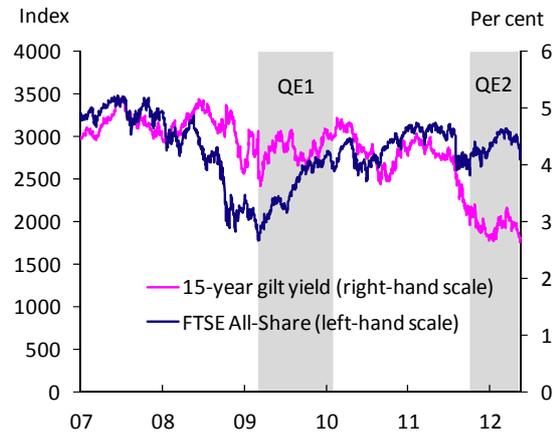
Reworking the analysis of the text does not, however, affect the main conclusions regarding the impact of QE. Charts D and E are the equivalents of Charts 6 and 7, showing the calculated deficits with and without QE for a fully funded and a 30% underfunded pension scheme respectively. As before, QE makes little difference in the case of a fully funded scheme, but moves it towards deficit in the case of a significantly underfunded one.

**Chart 1: Stock of conventional gilts**



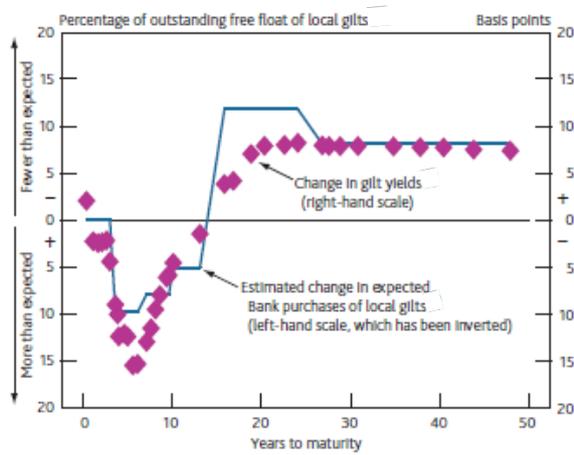
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**Chart 2: Gilt yields and equity prices**

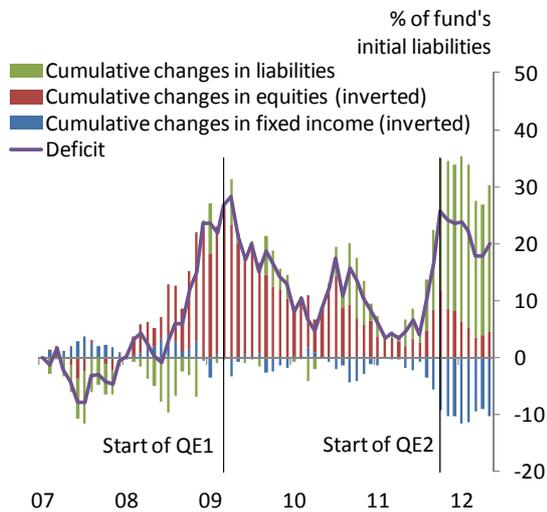


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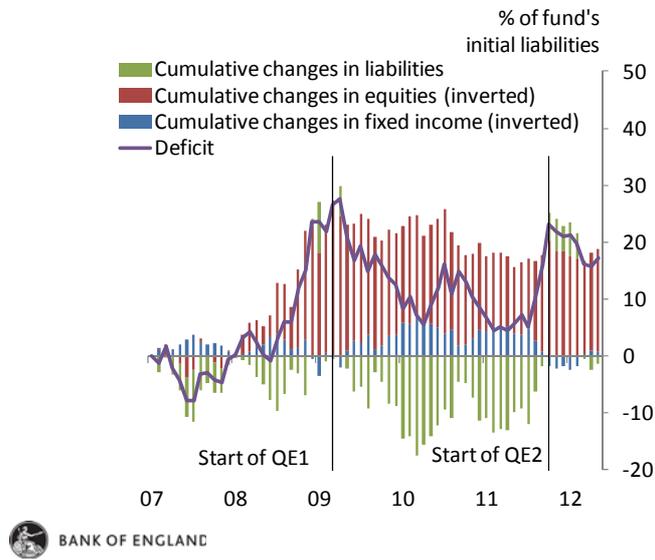
**Chart 3: Changes in gilt yields & purchases around 9/2/2012**



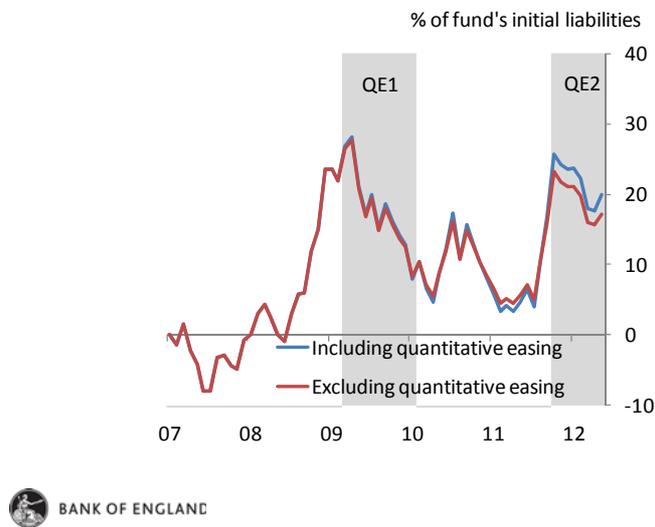
**Chart 4: Simulated fund deficit (100% funded in 2007)**



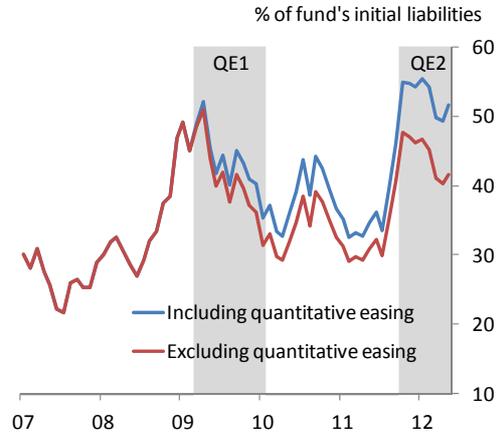
**Chart 5: Simulated fund deficit (100% funded in 2007), ex QE**



**Chart 6: Deficits with and without QE (100% funded in 2007)**

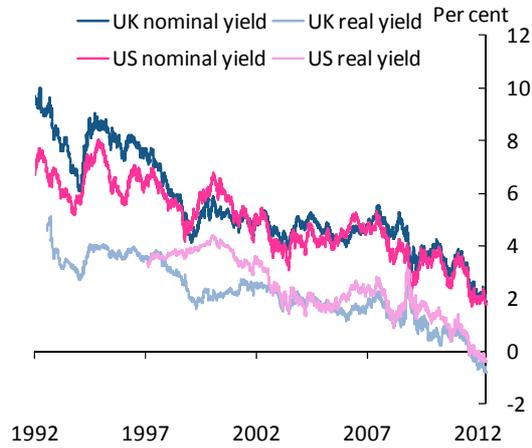


**Chart 7: Deficits with and without QE (70% funded in 2007)**



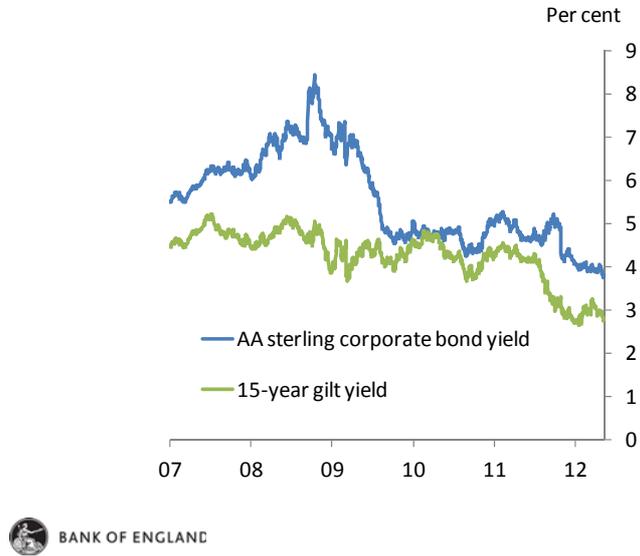
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**Chart 8: International 10-year sovereign bond yields**

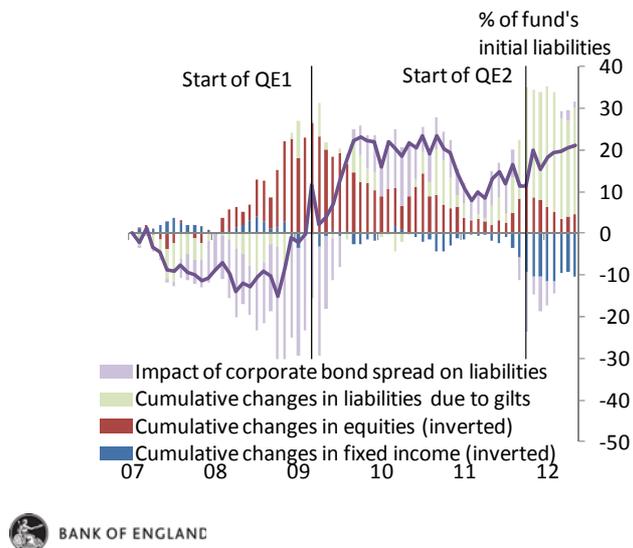


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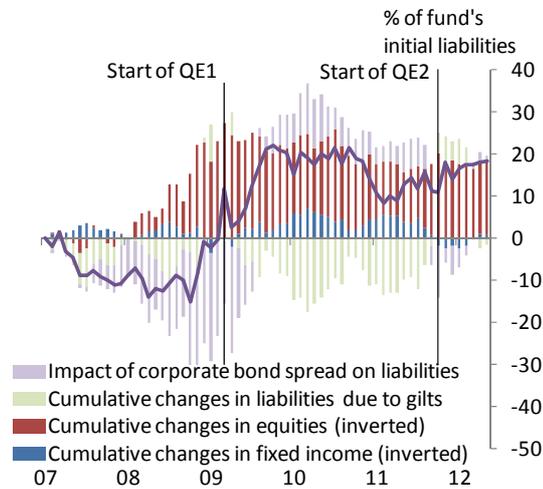
**Chart A: Gilt yields and corporate bond yields**



**Chart B: Simulated fund deficit (100% funded in 2007, liabilities discounted by AA corporate bond yield)**

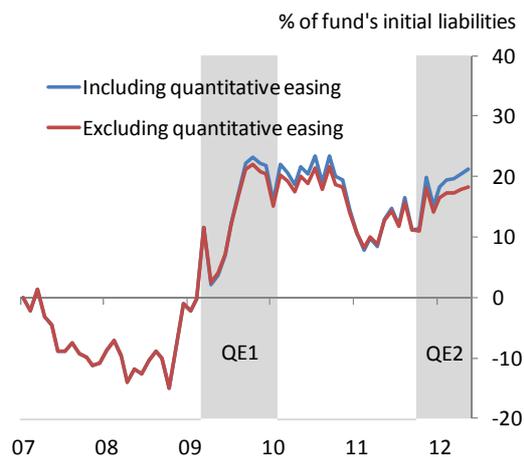


**Chart C: Simulated fund deficit (100% funded in 2007, liabilities discounted by AA corporate bond yield), ex QE**



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**Chart D: Deficits with and without QE (100% funded in 2007, liabilities discounted by AA corporate bond yield)**



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**Chart E: Deficits with and without QE (70% funded in 2007, liabilities discounted by AA corporate bond yield)**

