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## Spencer Dale: QE – one year on

Speech by Mr Spencer Dale, Executive Director and Chief Economist of the Bank of England, at the Centre for International Macroeconomics and Finance (CIMF) and Money Macro and Finance (MMF) Research Group Conference “New Instruments of Monetary Policy: The Challenges”, Cambridge, 12 March 2010.

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### Introduction

This has been a truly extraordinary year for our economy and for economic policy.

A year ago – almost to this very day – the Monetary Policy Committee (MPC) conducted its first gilt auction as part of its asset purchase programme or its policy of quantitative easing as it became known. The need for policy action was clear. The three months to March 2009 are estimated to have seen the sharpest quarterly contraction in GDP since comparable records began in the 1950s. Manufacturing output was contracting at an annualised rate of close to 20%. Claimant count unemployment was rising at the fastest rate on record.

And financial markets remained in a state of shock. By early March last year, 40% had been wiped off the value of the FTSE companies; corporate bond spreads were at their widest since the 1970s; and banks continued to hoard liquidity, with spreads in the interbank market still around fifteen times higher than their pre-crisis levels.

The financial crisis began in earnest in the summer of 2007, when the burgeoning sub-prime mortgage crisis began to pile pressure on banks. But it intensified dramatically following the failure of Lehman Brothers in September 2008, leading to the most severe banking crisis in living memory. The Monetary Policy Committee responded aggressively, cutting Bank Rate from 5% to 0.5% – its lowest ever level – in just five months.

But the need for further monetary stimulus was clear. In principle, it would have been possible to cut Bank Rate a little further, to zero or even to a small negative number. But the structure of many traditional mortgage lenders' balance sheets meant that lowering Bank Rate even further was likely to eat into their profitability and so intensify the credit crunch. Exactly what the monetary loosening was trying to avoid. Instead, the Bank decided to vary the size and composition of its balance sheet to inject money directly into the economy. And so QE was born.

Since then the economy has stabilised, household and business confidence have recovered, and financial market conditions have improved. Taken at face value, the extraordinary policy measures implemented by the Bank, alongside those enacted by the Government, appear to have been successful in averting a deeper and more severe recession. And the hope now is that a sustained recovery in demand will follow consistent with the objectives of those policies.

But the contribution of our asset purchases in bringing about this stabilisation is still an open question. One year on, what have we learnt about QE? Today, I will address three key questions. What is the theoretical foundation for such a policy? What are the key channels of transmission? And what can we say about its impact to date?

These questions are critical for the operation of monetary policy. But they are equally important for the study of monetary policy. The financial crisis posed questions which the models most commonly used to analyse monetary policy were not well suited to answer.

There is an emerging literature that responds to these shortcomings. It is important – both for the theory and practice of monetary policy – that this continues.

### **The theoretical foundation for unconventional monetary policy**

Let me turn first to the theoretical foundation for quantitative easing.

Over the past 15 years, the canonical New-Keynesian New Classical synthesis model has become the benchmark for economists to study the operation of monetary policy. The attraction of this class of models, as typified for example by Woodford (2003) and Walsh (2003), is that its relative simplicity and tractability means that it can be used to derive clear and precise policy prescriptions. And indeed that is the case when used to analyse monetary policy at the zero bound. The only way policy can gain traction at the lower bound in such a model is through influencing expectations – the most well known reference here being Eggertsson and Woodford (2003).

This result stems from the fact that the economy behaves as if, in effect, there are only two assets in existence, typically modelled as money and bonds. Agents hold more money up to the point at which the marginal benefit from the liquidity services it confers equals the marginal cost: the nominal interest rate. At the zero bound, both the marginal benefit and marginal cost are effectively zero, and money and bonds become perfect substitutes. It follows that exchanging money for bonds at this point has no impact on activity or inflation. The economy is assumed – by construction – to be in a liquidity trap.

As is well known, the optimal policy within this class of models is for the central bank to commit to low interest rates for an extended period and to a temporary overshoot of the inflation target. Exchange rate depreciations (Svensson 2001) and interest rate commitments (Krugman 1998, Woodford 2003) are examples of policy recommendations stemming from this result.

The crucial insight emphasised by these models is that expectations matter, and provide a mechanism through which policy makers can seek to influence activity at the zero bound. This is an important channel of monetary transmission and one I will return to.

But the argument that monetary policy can work *only* through expectations management is not a robust result. It rests on very particular assumptions. In this class of models, financial markets are assumed to be complete and frictionless and the representative agent is able to arbitrage across all financial markets. As such, all non-aggregate risk in the economy can be hedged perfectly and asset prices depend only on state-contingent payoffs. Under these assumptions, demand curves for financial assets are perfectly elastic.

But in the real world it seems plausible that demand curves for assets, in addition to money, are downward sloping to some degree, in which case changes in their relative supplies can affect their relative prices. It is this which gives quantitative easing its traction.

Half a century ago Tobin (1958), in pioneering work on portfolio allocation, recognised that a range of assets, in addition to money, are likely to be imperfect substitutes. But Tobin did not articulate fully the frictions that could generate such imperfect substitutability.

More recently, there has been rapid development in micro models of the source of financial frictions which can motivate imperfect substitutability. Recent examples include Brunnermeier and Pedersen (2009) and Vayanos and Weill (2008).<sup>1</sup> These models help to explain when and why investors may face un-diversifiable risks when holding specific types of securities, such that they become imperfect substitutes for otherwise similar assets. In Brunnermeier and Pedersen (2009), for example, marketmakers face uncertainty over the

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<sup>1</sup> In addition see Duffie, Gârleanu and Pedersen, (2007).

timing of customers' trades. They are unable to hedge perfectly this liquidity risk because of borrowing constraints, so that less liquid securities are imperfect substitutes for more liquid ones. This liquidity risk leads asset prices to diverge from "fundamentals" determined by underlying cash flows.

Researchers are also beginning to make a number of important contributions that introduce various forms of financial frictions into otherwise standard macro models. For example, in Kiyotaki and Moore (2008), firms face a "liquidity constraint" in financing their investment which arises from a combination of borrowing constraints and a difficulty in selling their illiquid assets. This need for liquidity gives rise to an endogenous demand for money. An important feature of this model is that the central bank can offset the effects of liquidity shocks by purchasing illiquid assets with central bank money.<sup>2</sup> Building on Kiyotaki and Moore's resalability constraint, Gertler and Kiyotaki (2009) introduce a funding friction for banks, whereby banks need to hold capital in order for depositors to be willing to deposit funds. Such a funding friction affords a role for the authorities to lend directly to firms when capital constraints bite on banks. Andrés, López-Salido and Nelson (2004) incorporate imperfect substitutability between short- and long-term bonds. Here the lack of a secondary market for long bonds is the source of the friction. In this model, base money expansion by a central bank can relieve portfolio constraints and lead to an increase in demand for long bonds, thereby raising their prices.

Much of this literature is still in its infancy and there is some way to go before it can be combined within an applied, quantitative model that policy makers can use. But the central message I take from this work is that there are a number of channels through which monetary policy is likely to be able to influence the economy at the zero bound. Unfortunately, the financial crisis meant that we had to put these insights into practice. When doing so at the Bank, we placed weight on three key channels of monetary transmission: the impact of imperfect substitutability and the portfolio rebalancing channel on relative prices, the role of financial market liquidity, and the importance of expectations.

All three channels were important in the design of the Committee's asset purchase programme. Let me take them in turn.

### **Channels of transmission**

To date, the Bank has purchased £200 billion of assets financed by the issuance of central bank reserves, the vast majority of which have been relatively long maturity gilts. The central objective underlying those gilts purchases was to inject a substantial amount of additional money into the economy. The main behavioural assumption underlying this monetary injection was that it would gain traction via a portfolio rebalancing channel.

Most UK government bonds are held by non-bank financial sector companies (OFCs), such as pension funds and insurance companies.<sup>3</sup> As long as these investors do not regard money as a perfect substitute for gilts, they will attempt to reduce the additional money holdings associated with gilt purchases by switching into other assets. This process of portfolio rebalancing will continue until the yields on gilts and on alternative assets, such as corporate bonds and equities, have fallen sufficiently to compensate investors for holding the higher level of money balances. The degree of stimulus associated with the monetary

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<sup>2</sup> Del Negro, Eggertsson, Ferrero and Kiyotaki (2009) extend this framework to analyse monetary policy at zero bound.

<sup>3</sup> At the end of 2008, prior to the commencement of the asset purchase programme, almost 60% of outstanding gilts were held by OFCs (of which 40% were held by insurance companies and pension funds), and 35% were held by overseas investors. UK banks and building societies held only 4% of gilts.

injection will be greater the lower the substitutability between money and gilts, and the higher the substitutability between gilts and other assets.

Trying to estimate the likely size of these effects is very difficult, not least because a policy of this form and scale has never been implemented in the UK. There is a natural limit to what can be learnt from past time-series relationships. A standard portfolio model of OFC's money demand, in which money holdings are jointly modelled with movements in asset prices and relative rates of return, would suggest that asset purchases on the scale seen might increase asset prices by the order of 20–30%.<sup>4</sup> At first blush, this impact may seem surprisingly large. But it is important to remember that the scale of the asset purchases made over the past year is truly substantial, amounting to some 14% of nominal GDP. But there are obviously huge uncertainty bands surrounding this type of estimate and I would not be surprised if it was revised, perhaps significantly, as we learn more about the impact of our current policy.

These higher asset prices should help to stimulate increases in consumption and investment via wealth and cost-of-capital channels. But the transmission of the monetary stimulus through to higher nominal spending may occur only gradually. This suggests that a significant impact from our asset purchases is still to come through.

An important issue when thinking about the likely channels of monetary transmission is the state of the banking system. In normal times, a key channel through which asset purchases might be expected to operate is by increasing banks' stocks of liquid assets, which may encourage them to extend new loans. But we are not in normal times. Banks are pulling back on their lending as they seek to strengthen their balance sheets and reduce their leverage. For this reason, when making an assessment of the likely impact of asset purchases, the Committee did not factor in a material expansion of bank lending.

Indeed, our asset purchases were designed to facilitate a disintermediation of corporate financing away from banks and toward capital markets. This disintermediation was supported in part by the portfolio rebalancing triggered by our gilt purchases. As investors' demand for alternative assets such as corporate bonds and equities increased, the ability of businesses to raise finance in capital markets improved and the cost fell.

This disintermediation was reinforced by the Bank's operations to improve the functioning of corporate credit markets. The financial market dislocation in the immediate aftermath of the crisis hindered the functioning of the commercial paper and corporate bond markets and led to substantial increases in liquidity premia. In response, the Bank established facilities to make small regular purchases of corporate bonds and commercial paper, with the aim of aiding secondary market liquidity. The significance of these purchases of private sector debt should not be judged by their scale, which was tiny in comparison to gilt purchases. The purpose of these operations was not to purchase a specific quantity of assets, but rather to improve the functioning of those markets. In that respect, the knowledge that the Bank stands ready to purchase assets may be as beneficial as actual purchases.<sup>5</sup>

The importance of expectations also played a central role in the design of our asset purchase programme. It was vitally important that the Monetary Policy Committee was able to introduce a new policy instrument at the point at which Bank Rate reached its effective lower bound. This instrument had to be credible, both in terms of its economic impact and the willingness of the Committee to use the instrument in force. My own view is that the speed with which the asset purchase programme was introduced and the scale of the programme played an important role in reaffirming the MPC's commitment to achieving the inflation target and reinforcing the belief in our ability to do so.

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<sup>4</sup> See, for example, Thomas (1997).

<sup>5</sup> See Fisher (2010) for a more detailed discussion of these operations.

## Estimating the effects so far

So what impact have our asset purchases had to date?

That's the two hundred billion pound question. Unfortunately, it is hard to provide a definitive answer. To be clear this is no different from our inability to assess precisely the impact of the reduction in Bank Rate from 5% to 0.5%. Or indeed of any macroeconomic policy measure. Without knowing what would have happened in the absence of a policy action, it is not possible to identify its incremental impact. But what is different is that this policy instrument is relatively untried and untested. So the demand to provide some insight into its impact is that much greater. This demand is quite understandable, but difficult to satisfy.

One possible approach to assessing the impact of our asset purchases is to consider the growth of broad money. A key principle underlying the asset purchase programme is the belief in a causal mechanism running from increased money balances into higher asset prices and nominal spending. This mechanism can be expressed in terms of a process of portfolio rebalancing in which yields of different assets adjust in order for the higher level of money balances to be willingly held. But the same mechanism could be expressed in terms of a monetarist approach, in which asset purchases work through measures of money disequilibrium which in turn spur additional spending. These different frameworks are sometimes presented as conflicting models of the transmission of asset purchases. But I view them as essentially two sides of the same coin. Importantly, they share the same fundamental assumption about why monetary policy at the zero bound can stimulate nominal spending: namely, imperfect substitutability between money and other assets.

Over the past year, despite money-financed asset purchases totalling £200 billion, broad money has increased by just £8 billion.<sup>6</sup> What should we make of this weakness? In part it speaks to the counterfactual. The falls in nominal spending and the desire by banks to reduce leverage means that, absent the monetary injection, broad money would have almost certainly been far weaker. But it is also symptomatic of the scale of the new equity and debt raised by UK banks over this period which, together with retained profits, totals more than £85 billion. Given that the non-bank private sector is likely to have been the source for much of this funding, this is likely to have squeezed broad money growth. But the counterpart to this fall in private sector deposits is a strengthening in banks balance sheets which should in turn aid the recovery by improving the availability of bank lending. So the monetary impulse still operates.

One approach to help mitigate the counterfactual problem is to use event studies which consider the impact of QE announcements on asset prices over relatively short windows.<sup>7</sup> Gilt yields may respond to such policy announcements both because of the impact gilt purchases have on the yields at which investors are willing to hold the reduced supply of gilts – the portfolio balance effect – and because of the information the announcement may be perceived to contain about the future stance of monetary policy – one element of the expectations channel.

It is possible to get some indication of the size of the portfolio effect by considering movements in the spread of gilt yields to Overnight Indexed Swap (OIS) rates, which should not be affected by changes in the relative supply of gilts. Although precise estimates vary according to the maturity of the gilts and the size of the window, summing movements in gilt-OIS spreads following our announcements suggests that the portfolio balance effect may have reduced gilt yields by around 100 basis points. Again, a pretty sizeable effect.

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<sup>6</sup> This excludes the money holdings of intermediate OFCs. See the box on page 13 of the May 2009 *Inflation Report* for discussion of the reasons for excluding intermediate OFCs in measures of broad money.

<sup>7</sup> This is in a similar spirit to Bernanke, Reinhart and Sack (2004).

Similarly, movements in OIS rates following policy announcements may provide a guide to the extent to which the announcements affected expectations about the future stance of monetary policy. OIS rates fell sharply following the initial announcements of QE, particularly at short horizons, suggesting these announcements caused market participants to revise down the expected future path of Bank Rate. However, perhaps not surprisingly, as QE has become better understood, OIS rates have responded less to more recent announcements. This is consistent with market participants increasingly viewing QE as part of the systematic component of monetary policy. To the extent that gilt yields and other asset prices have moved in response to this systematic component, these movements would not be captured by event studies and hence looking only at announcement effects may tend to understate the impact of QE.

Gilts make up a relatively small proportion of total assets held by the private sector. As such, when assessing the overall impact of our asset purchases it is important to consider the increase in other asset prices. Since we started QE, equity prices have increased by more than 50%, and corporate bond yields have fallen by over 400 basis points. These movements have been very beneficial for the economy and, when starting our asset purchases a year ago, I would have been more than willing to have settled for such an outcome.

However, it is difficult to identify the incremental role of QE in driving these improvements. These other asset prices may respond less quickly to asset purchase announcements and so are less easily isolated using event studies. Moreover, these movements coincided with a global rally in financial markets, which further complicates the task of isolating UK-specific effects. However, it is important to see this global rally in the context of the similar policy strategies adopted by a number of the world's most important central banks: official interest rates were cut to very low levels and central banks' balance sheets in many parts of the world were greatly expanded. The fact that UK capital markets moved in line with global markets during this period does not suggest that domestic policy had little impact.

Indeed, I have little doubt that our asset purchases contributed substantially to these movements, via the channels I have discussed. Through a portfolio rebalancing effect, as both retail and institutional investors switched out of gilts into alternative assets, such as corporate bonds and equities. Through improvements to market liquidity, aided by our purchases of commercial paper and corporate bonds. And through their impact on expectations, as asset purchases demonstrated our commitment to act, boosted confidence in the economic environment and so reduced the likelihood of further large falls in asset prices.

The ultimate success of QE will depend on whether the monetary injection and increased asset prices stimulate nominal spending and so help achieve the 2% inflation target in the medium term. Much of the impact of our asset purchases to date is to still to come through and so it is too early to judge their final impact. However, in that respect, it is perhaps noteworthy that nominal GDP in the UK grew at an annualised rate of around 4% during the third and fourth quarters of 2009. These estimates are still relatively early and so subject to considerable uncertainty. But there are perhaps some tentative signs that nominal spending in our economy is starting to accelerate.

## **Conclusion**

It is exactly a year since the MPC started its programme of large-scale asset purchases. The move to quantitative easing met with mixed reactions. Some commentators claimed that it would end in inflationary tears. Many academics questioned whether it would have any impact at all.

From the outside, you may imagine that this was a difficult decision for a committee of nine, conservative central bankers to reach. In fact, from my perspective the decision was

relatively straightforward. The inflation target provides a clear, numerical objective for policy. The outlook for inflation suggested further monetary stimulus was necessary to achieve that target. With Bank Rate close to its lower bound, this stimulus had to be implemented via alternative means. And there are clear and convincing economic arguments why – in the real world – injecting money directly into the economy is likely to provide a means of achieving that stimulus.

One year on, there is a range of evidence – some relatively hard, some more circumstantial – that quantitative easing is having its desired effect. Asset prices have increased substantially, companies have made record recourse to debt and equity markets, confidence has recovered and inflation expectations remain firmly anchored. But there is still a long way to go. The bulk of our asset purchases have been made only over the last 9 months or so. Much of their effect on nominal spending and inflation is still to come through. We are likely to learn a lot about the transmission of those purchases and about their ultimate impact over the course of the next year.

As you know, at its meetings in February and March, the Committee decided to maintain Bank Rate at 0.5% and to maintain the stock of asset purchases at £200 billion. It is worth emphasising two important considerations underlying these most recent decisions. First, the portfolio balance channel implies that the primary stimulus from QE stems from the stock of past purchases, not the flow of additional ones. As such, maintaining the stock of asset purchases, together with the low level of Bank Rate, should continue to impart a substantial stimulus to the economy for some time to come.

Second, the Committee stands ready to make further asset purchases should the outlook warrant them. Just as with movements in Bank Rate in more normal times, a pause in monetary loosening does not necessarily mean that loosening has come to an end. It will all depend on how the outlook for inflation evolves.

Looking further ahead, the Committee at some point will need to reduce the current exceptional degree of monetary stimulus. Some commentators have suggested that the MPC has been less forthcoming than other central banks in explaining its exit strategy. But to a large extent this reflects the fact that we have less to communicate. The Committee has two instruments through which it can withdraw the stimulus, raising Bank Rate and selling assets. Unlike some other central banks which need to create new instruments to drain excess reserves or alter the terms of existing facilities, the structure of the Bank's operating framework means these two instruments can be used at any time, in any order. And the strategy guiding our policy decisions will be unchanged – monetary policy will continue to be determined by the outlook for inflation relative to target. The most difficult decision will be to decide the timing of the withdrawal, but that is always the case.

The aftermath of the financial crisis posed many questions for the theory and practice of monetary policy. One year on from reaching the effective lower bound of interest rates and starting a policy of quantitative easing, there is still much for academics and policy makers to learn. I hope today's conference will mark another step in that collaboration.

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