What can the money data tell us about the impact of QE?

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This article reviews the main influences on broad money growth since the onset of the global crisis, focusing on the impact of the Monetary Policy Committee's asset purchase programme (QE). The underlying weakness in money growth is likely to have reflected a combination of reduced nominal demand and a restructuring of banks' balance sheets. QE has played a key role in offsetting some of this weakness and in a way that has not depended on an increase in bank lending. The first two rounds of QE seem to have had a similar proportionate impact on the money supply, but there is some evidence that the transmission mechanism of QE may have been different over the two episodes.

Introduction

Movements in broad money can be informative about current and future spending in the economy and are an important indicator of inflationary pressure. They can also be useful in assessing the transmission of policies that directly increase the money supply, such as the asset purchases conducted by the Bank of England (also known as 'quantitative easing' or QE) on behalf of the Monetary Policy Committee (MPC). For QE to work, the broad money created by asset purchases should flow through to households and companies and help finance a higher level of spending in the economy.(1) That means broad money can be used, alongside other indicators such as financial yields and prices, to assess the effectiveness of QE.(2)

Broad money growth was weak from the onset of the global financial crisis in 2008 to the middle of 2012. The previous time the rate of money growth was so persistently low was in the 1950s (**Chart 1**). This weakness in broad money growth has happened in spite of significant monetary stimulus: Bank Rate was reduced to 0.5% in March 2009 — the lowest level in its 318-year history — and has remained there ever since; and, between March 2009 and May 2012, the MPC undertook £325 billion worth of asset purchases. Since then, the MPC has expanded its asset purchase programme by a further £50 billion and broad money growth has picked up to an annual rate of around 4%. This latter period is not covered in this article. Instead the focus is on explaining the earlier weakness of broad money.

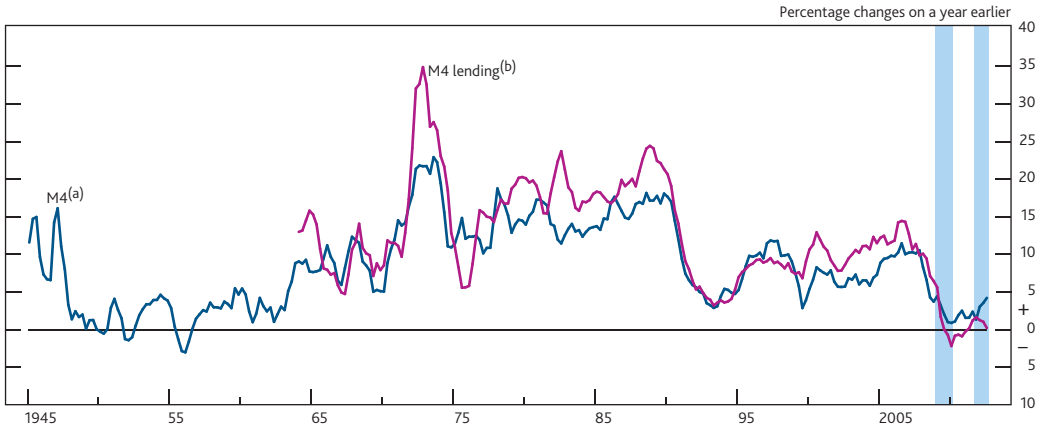
Normally broad money increases when banks(3) lend more to companies and households. But lending growth has been even weaker than money growth since 2009. The recent strength of broad money growth relative to lending growth over the recent past has been unusual. Over the past 30 years, lending growth has typically more than accounted for the increase in broad money. Given the underlying weakness in lending, QE was designed to increase the supply of broad money directly. It does not necessarily lead to (or require) a positive impact on bank lending for it to work. So an increase in broad money relative to bank lending might be one indicator that the transmission mechanism of QE is operating in the expected way.

Previous analyses investigated the weakness in broad money growth between the start of the recession in 2008 and the end of 2010.(4) They concluded that weak broad money growth could be explained by reduced nominal spending and the balance sheet repair carried out by companies and banks. These effects were very large, and were only partly offset by the positive impact from the first round of asset purchases ('QE1').

This article focuses on the weakness in broad money since the start of 2011 during which the second round of asset purchases ('QE2') took place. By lowering the yields on gilts and other assets, QE is likely to have induced other financial market transactions which, in turn, affect how much asset purchases feed in to broad money flows. The analysis in this article suggests that the impact of QE2 looks similar to QE1 — scaled

(1) See Benford *et al* (2009) and Bridges and Thomas (2012).
(2) See Joyce, Tong and Woods (2011) for a discussion of the various methods for assessing the effectiveness of QE.
(3) Throughout this article monetary and financial institutions which form the basis of the standard M4 and M4 lending definitions and include banks and building societies, are referred to as 'banks'.
(4) See Bridges, Rossiter and Thomas (2011) and Bridges and Thomas (2012).

Chart 1 Broad money and lending growth since 1945



Sources: Bank of England, Capie and Webber (1985) and Hills, Thomas and Dimsdale (2010). In this and subsequent charts the blue shaded areas represent periods of MPC asset purchases (QE) unless otherwise stated.

(a) M3 1945–63, M4 1963–98, M4 excluding intermediate 'other financial corporations' (IOFCs) 1998–2012.
(b) M4 lending 1963–98, M4 lending excluding IOFCs 1998–2012. Data are adjusted to exclude the impact of securitisations and loan transfers.

by the amount of gilts purchased — in terms of its effect on broad money and the wider economy.

The remainder of this article is organised into two sections. The first section reviews the key factors that are likely to have driven broad money growth since 2009, focusing particularly on the impact of QE. The second quantifies the impact of these factors using a money accounting framework (which is explained in a box on page 324). It compares the QE1 and QE2 periods and discusses what this tells us about the monetary impact of QE in both episodes, as well as the 'underlying' evolution of broad money in the absence of QE. A box on pages 328–29 puts these in perspective by analysing the behaviour of disaggregated money holdings over recent years. And a box on page 326 discusses the relationship between QE and bank lending.

Broad money and QE

The supply of broad money is determined by transactions between the banking sector (including the central bank) and the non-bank private sector (non-bank companies and households).(1) The most important of these transactions has tended to be the provision of credit by the banking sector to the non-bank private sector, which automatically creates a deposit (either for the borrower or for the recipient of the borrower's expenditure). But, in general, any transaction between the banking sector and the non-bank private sector will involve the creation or destruction of bank deposits and so will affect the supply of broad money. That includes the MPC's asset purchases.(2)

There have been three rounds of asset purchases since the launch of the programme. 'QE1' refers to the first £200 billion of assets, purchased between March 2009 and January 2010. These were followed by an additional £125 billion of assets purchased during 'QE2' between October 2011 and May 2012. A third round ('QE3') was announced in July 2012 but, as noted earlier, is not covered in this article. The MPC's asset purchase programme has been a key driver of broad money in recent years. To examine this impact, it is useful to distinguish between its direct and indirect effects.

The direct effect of asset purchases on money

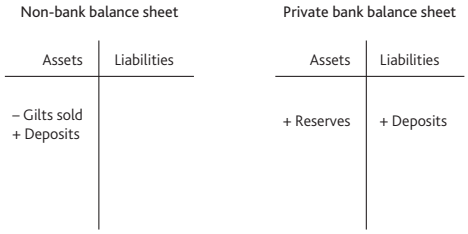
Asset purchases directly increase broad money if they boost deposits held by the UK non-bank private sector in banks and building societies. **Figure 1** illustrates how asset purchases by the Asset Purchase Facility (APF)(3) affect the balance sheets of the non-bank private sector (from whom it is likely that most of the purchases have been made)(4) and of private banks. The non-bank private sector executes these transactions via the Bank of England's counterparties, who are mostly banks:(5) they sell gilts to banks and their deposit accounts are credited with the proceeds from the sale. In turn, these banks sell gilts to the APF and their accounts are credited with reserves. So the direct impact of QE involves an increase in reserves on the asset side of the banking system's balance sheet and an increase in deposits — broad money — on the liability side.

The indirect effect of asset purchases on money: portfolio rebalancing

A key channel through which QE affects *the economy* is by kick-starting a chain of transactions — 'portfolio rebalancing' — that reduce the cost of borrowing in capital markets and

(1) Broad money is the sum of the sterling notes and coins and the sterling bank and building society deposits held by the UK non-bank private sector. See Burgess and Janssen (2007) for more information.
(2) For further discussion, see Bridges, Rossiter and Thomas (2011).
(3) QE purchases have been implemented through the Asset Purchase Facility, which obtains loans from the Bank of England with which to buy the assets. See Benford *et al* (2009) for more detail.
(4) As is shown later in **Chart 3**, the non-bank private sector sold gilts during QE1 and QE2 when they would have been expected to have been net purchasers given public sector debt issuance over this period. See Bridges, Rossiter and Thomas (2011) for more discussion.
(5) The Bank of England's APF gilt operation counterparties are henceforth referred to as banks.

Figure 1 QE and the direct effects on broad money



boost asset prices and nominal spending. This occurs because the ultimate (non-bank private sector) investors who sell gilts to the APF are likely to view the bank deposits they receive in exchange as a poor substitute for those gilts. As a result, they are likely to reinvest these proceeds into riskier assets that offer a higher return, such as corporate bonds and equities, causing the prices of those assets to rise and their yields to fall.(1) Spending in the economy then rises as companies respond to the lower cost of borrowing in capital markets and both companies and households react to higher asset prices, which increase the value of their financial asset holdings.

This portfolio rebalancing can also have an indirect impact on *broad money*, depending on how investors choose to reinvest the proceeds from their asset sales. Although a large part of the money created by QE may just circulate within the non-bank private sector, **the effect of QE on gilt and other financial market yields might induce certain transactions which can effectively 'destroy' some of the money created by the gilts purchased by the APF**. In this article, these transactions are referred to as 'leakages'. Some of them are discussed below.

- First, investors may choose to invest in corporate debt or equity, resulting in ***corporate substitution from bank loans to capital market finance***. As yields on corporate debt fall and equity prices rise, this would lower the cost of borrowing for companies in capital markets. That may encourage corporates to use this cheaper source of funding to repay existing loans from banks, thus reducing the level of bank lending in the economy.(2) The non-bank purchasers of corporate debt and equity would ultimately have to pay for this by reducing their deposits with banks, reducing the supply of money.

- Second, investors may make ***purchases of debt and equity issued by banks***. Higher prices and lower yields on bank-issued debt and equity might lead to lower funding costs for banks and increased lending in the long run. But increased bond and equity issuance by banks would reduce the money supply in the short run, as the domestic purchasers of bank bonds and equities would ultimately have to pay for these by lowering their deposits with the UK banking system. This would be reflected in a shift between deposit and non-deposit instruments on the liability side of banks' balance sheets.

- Third, portfolio rebalancing by banks themselves may lead to ***bank sales of government debt***. As yields fall (and prices rise) on gilts, banks may be induced to change the composition of their liquid asset holdings. If banks sell gilts to the non-bank private sector, this will increase non-bank private sector gilt holdings and, in aggregate, draw down their deposits, reducing the supply of money.(3)

- Fourth, investors may make ***purchases of assets from overseas residents***. This would reduce the deposits of UK residents (which are counted in the headline measure of broad money, $M4^{ex}$)(4) and increase overseas residents' deposits (which are not included in $M4^{ex}$). So the overall stock of deposits on banks' balance sheets would be unchanged but the headline measure of broad money would be reduced.

In summary, the overall impact of QE on broad money is a combination of the direct effect, and the indirect effects that arise from portfolio rebalancing.

Of course, factors other than QE have also affected broad money growth in recent years. The banking system's efforts to repair its balance sheet by improving its capital, funding and liquidity positions (over and above the effects that may have been induced by QE) may have had an impact on broad money, in both directions (see Bridges, Rossiter and Thomas (2011)). And the weakness in underlying nominal spending and the associated tightening in bank credit conditions (see Bell and Young (2010)) would also have been expected to lead to weak underlying credit and money growth over the recent past. These other factors determine the 'underlying' or 'counterfactual' path for broad money that would have been expected in the absence of QE.

In the next section an attempt is made to quantify and compare the direct and indirect effects of QE1 and QE2 on broad money. These then imply an underlying path for broad money that would have occurred in the absence of asset purchases. The plausibility of this 'counterfactual' is then assessed using various metrics.

How much of broad money growth can be accounted for by QE?

A useful starting point for quantifying the monetary impact of QE is to examine the balance sheet counterparts of broad

(1) This 'hot potato' mechanism is discussed in more detail in Bridges and Thomas (2012).
(2) It is worth noting that while this would reduce lending and thus change the composition of firms' financing, total finance raised by companies, which includes issuance of debt and equity, would not necessarily be affected. The box on page 326 discusses how QE could affect bank lending.
(3) So far, this assumes that all purchases of gilts by the APF are from the non-bank private sector. But this channel would also operate if initial APF purchases of gilts were from banks, rather than the non-bank private sector.
(4) M4 excluding intermediate 'other financial corporations'. See Burgess and Janssen (2007) for more details.

The counterparts framework for analysis of changes in broad money

In order to understand movements in broad money supply, it is useful to view them in the context of the balance sheet of the UK banking sector (see **Table 1**), drawing on the identity that total assets must equal total liabilities. Specifically, examining changes in the counterparts to broad money can help with interpreting a given change in broad money growth.

Table 1 Components of the balance sheet for the UK banking sector[a][b]

Assets	Liabilities
Lending ($M4Lx^{ex}$)	Broad money ($M4^{ex}$)
Sterling loans to IOFCs	Sterling deposits of IOFCs
Sterling lending to non-residents	Sterling deposits of non-residents
Sterling lending to the public sector	Sterling deposits of the public sector
Other sterling assets	Other sterling liabilities
Foreign currency assets	Foreign currency liabilities

(a) UK banking sector includes the central bank.
(b) Lending ($M4Lx^{ex}$) and broad money ($M4^{ex}$) are defined as M4 lending and M4 excluding IOFCs.

Broad money, which principally includes notes and coins in circulation and bank deposits of UK households and non-bank companies, is a major component of the **liabilities side** of banks' balance sheets. The other liabilities denominated in sterling comprise sterling deposits from intermediate other financial corporations (IOFCs), non-residents and the public sector as well as non-deposit liabilities, such as long-term debt and equity.

The **asset side** of the UK banking sector balance sheet comprises lending to the non-bank private sector ($M4Lx^{ex}$) and, to a lesser extent, lending to IOFCs, non-residents and the public sector. Other sterling assets include banks' holdings of other financial assets (long-term debt and equity instruments).

The remainder of the banking sector balance sheet is denominated in foreign currency and may typically be less relevant for explaining movements in broad money. The gross foreign currency assets and liabilities of the banking sector are large, reflecting the international operations of the largest UK banks. It is their net position that is relevant in accounting for movements in broad money. And banks appear to keep their net currency exposures fairly stable over time.

Using this stylised balance sheet, changes in broad money can be mechanically accounted for by changes in the other components of the banking sector's balance sheet:[1]

$$\Delta\text{Broad money } (M4^{ex}) \equiv \Delta\text{Lending to non-bank private sector } (M4Lx^{ex}) + \Delta\text{Net sterling lending to IOFCs} + \Delta\text{Net sterling lending to non-residents} + \Delta\text{Net sterling lending to public sector} + \Delta\text{Net other sterling assets} + \Delta\text{Net foreign currency assets}$$

This framework can be used to decompose the flow into broad money over any given time period. It can therefore provide an insight into the factors affecting broad money supply since the onset of recession.

(1) Net changes are defined as changes in lending or other assets minus changes in deposits or other liabilities.

money growth. Broad money enters as a liability in the banking system's balance sheet. Using the identity that total assets must equal total liabilities, the counterparts framework decomposes movements in broad money in terms of changes in all the other assets and liabilities on banks' balance sheets. So, in an accounting sense, changes in broad money are equal to changes in lending and the other assets held by banks, net of any changes in their non-monetary liabilities, which include long-term debt and equity and any deposits outside the $M4^{ex}$ definition (such as those of overseas residents). The box above discusses the counterparts framework in more detail.

These counterpart movements will reflect, but not entirely reveal, the various transactions associated with QE. By considering each of the main counterparts in turn, it is possible to make inferences about how much of the observed changes in broad money over the QE1 and QE2 periods can be attributed to the direct impact of QE; the indirect effects of QE arising from portfolio rebalancing; and other (non QE–related) factors.

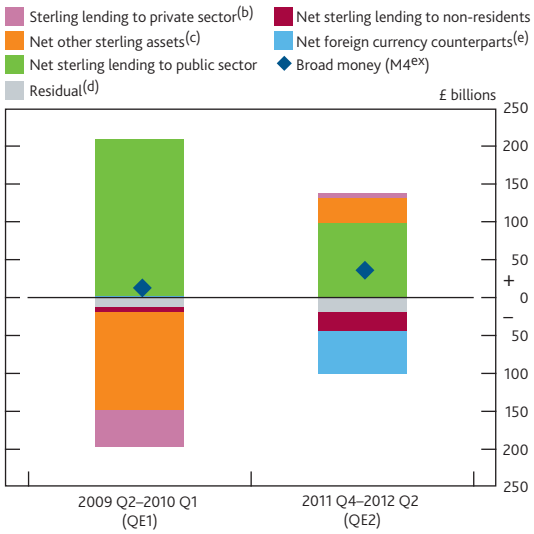
Chart 2 shows broad money growth during QE1 and QE2 and its balance sheet counterparts. As noted earlier, broad money growth was relatively weak in both periods. The major positive counterpart to broad money was net sterling lending to the public sector. This component largely represents purchases of government debt by the central bank and so reflects the positive impact of APF asset purchases on broad money in each period — that is, the direct effect of QE1 and QE2.

But there were also significant *drags* to broad money growth from other balance sheet counterparts during both QE1 and QE2. And these differed substantially between each episode. Below an assessment is made of the extent to which these counterpart movements are the indirect result of the portfolio rebalancing effects of QE — that is, the extent to which they are QE 'leakages'.

QE leakages during QE1

There were two main negative counterparts to broad money during QE1: first, a fall in 'net other sterling assets' of around £130 billion (orange segment in **Chart 2**), largely driven by a

Chart 2 Counterparts to changes in broad money[a]



Sources: Bank of England and Bank calculations.

(a) Net changes are defined as changes in lending or other assets minus changes in deposits or other liabilities.
(b) M4 lending excluding intermediate 'other financial corporations' and excluding the impact of securitisations and loan transfers.
(c) Net sterling lending to intermediate 'other financial corporations' plus sterling assets not elsewhere included, less equity capital, long-term debt securities and other sterling liabilities not elsewhere included.
(d) The sum of the balance sheet components does not add exactly to the total due to the method of seasonal adjustment used.
(e) Change in net foreign currency position of UK banks (including Bank of England) and building societies.

rise in non-deposit liabilities; second, a £50 billion fall in lending (pink segment in **Chart 2**), reflecting repayments of bank debt by the non-bank private sector. These drags on M4^{ex} are likely to have been partly an indirect effect of QE itself. As discussed earlier, the fall in capital market yields induced by QE[1] is likely to have induced increased issuance of bank equity and long-term debt liabilities — which shows up as a fall in net other sterling assets — and a substitution by corporates away from bank loans and into capital market finance — reducing lending and broad money. The box on page 326 discusses some of the potential links between QE and bank lending in more detail.

Bridges and Thomas (2012) estimated that around £80 billion of the £180 billion drag from these counterparts was the indirect result of asset purchases. This figure was based on estimating the extent to which the balance sheet repair by banks and corporates would have been expected to occur regardless of QE, given the financial crisis and the experience in previous recessions. That implies a total increase in broad money of around £120 billion that is attributable to QE — that is, around 60% of the £200 billion of asset purchases carried out during this period.

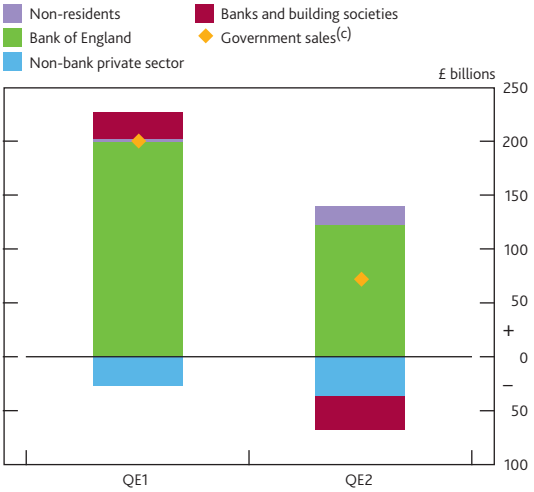
Although these leakages reduce the impact of QE on broad money, they may have some beneficial impact on the wider economy.[2] For example, bank debt and equity issuance may have been necessary during QE1 to strengthen the UK banking system, which in turn may have improved its lending capacity to the real economy in the longer term. And non-financial corporates may benefit if the interest burden on capital market debt is lower than for bank debt, which would improve their level of income gearing. But these benefits are difficult to quantify.

QE leakages during QE2

In contrast with QE1, bank issuance of long-term debt and equity instruments was minimal during QE2. And although there was some substitution by corporates from bank loans to capital markets, there was little overall repayment of bank debt by the non-bank private sector during QE2.

The main counterparts acting as a drag on broad money over the QE2 period are shown in the blue and red segments in **Chart 2**: net foreign currency counterparts and net sterling lending to non-residents. Also, banks sold around £30 billion of UK government debt (**Chart 3**), partly offsetting the monetary impact of the APF purchases. This explains why net sterling lending to the public sector (the green segment in **Chart 2**) increased by less than the amount of asset purchases during QE2. As with QE1, it is important to assess the extent to which these counterpart movements might be the indirect result of QE itself and to what extent they would have occurred anyway. The rest of this section discusses the main QE2 counterparts.

Chart 3 Changes in UK government debt holdings[a][b]



Sources: Bank of England, Debt Management Office and Bank calculations.

(a) Non seasonally adjusted.
(b) The QE1 period covers March 2009 to January 2010. The QE2 period covers October 2011 to April 2012.
(c) Net issuance of gilts and Treasury bills by the Debt Management Office minus net purchases by local government and public corporations.

Bank sales of government debt

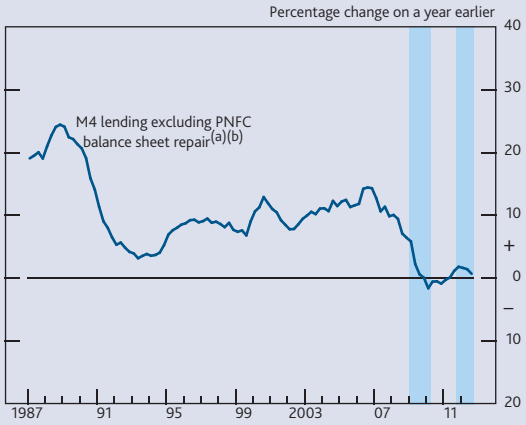
The low yields that occurred both in anticipation of, and throughout, the QE2 period may have induced banks to sell UK government debt. As discussed earlier, gilt sales by banks to non-banks correspond to a drawing down of non-bank

(1) See Joyce, Tong and Woods (2011) and Banerjee *et al* (2012) for evidence on the impact on financial yields.
(2) See Bridges, Rossiter and Thomas (2011) for more detail.

QE and lending to the real economy

QE boosts broad money without directly leading to, or requiring, a boost to bank lending. One criticism of QE has been that it has failed to encourage banks to lend in large quantities. And bank lending has been weak since 2008, including during the QE1 and QE2 periods (**Chart A**),(1) But increasing the provision of credit from the banking sector was not central to the policy as designed in the United Kingdom.(2) Instead, QE mainly works by going around the lending behaviour of the banking sector. It aims to increase private sector spending directly by raising asset prices and reducing the cost of borrowing from capital markets.

Chart A Bank lending and QE



Sources: Bank of England and Bank calculations. Periods of MPC asset purchases (QE) are shaded in blue.

(a) M4 lending 1963–98, M4 lending excluding intermediate 'other financial corporations' 1998–2012. Data are adjusted to exclude the impact of securitisations and loan transfers.
(b) The estimated effects of repayments of loans by corporates, which are attributed to QE (see **Table A** on page 329), have been removed.

Although QE does not need to boost bank lending directly, it may affect it indirectly through several channels.

As discussed earlier, QE may actually decrease the demand for bank lending slightly by decreasing firms' cost of borrowing from capital markets.(3) But this could be partly offset by other factors. For example, the cost of borrowing at fixed rates from banks may also fall slightly if falls in gilt yields caused by QE reduced the cost of banks' interest rate swap instruments and this was passed on to lending rates.(4) To the extent that this occurred, it may have increased applications for credit from households and firms.

Another way in which QE might indirectly boost bank lending is via its beneficial impact on employment and output. That would result in higher average incomes and higher company profits in future. In turn that may reduce the riskiness of making loans to the real economy and might encourage banks to lend more than otherwise.

QE could also indirectly boost the supply of bank lending for a given level of risk. This could occur if the overall increase in liquid assets in the banking system — resulting from the reserves created by QE — encouraged banks to lend. But it is not clear that an increase in reserves, on its own, would be enough to lead banks to lend more to the real economy. There are at least two reasons for this:

(i) First, it is a bank's stock of liquid assets relative to their liquidity needs, rather than the amount of liquid assets *per se,* that matters for lending. The reserves created by QE already have a liability against them — the bank deposits held by the non-bank private sector. If these were largely held by portfolio investors who might easily withdraw or transfer these deposits, then an individual bank may not feel that its overall liquidity position has improved sufficiently.

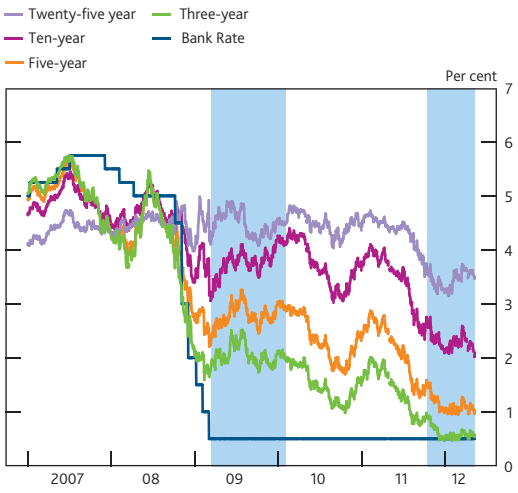
(ii) In order to increase the provision of bank lending, QE would need to directly incentivise the banking system to add not only more loans to its balance sheet, but also more liabilities. When banks lend, they automatically create additional liabilities. But for a bank to want to expand its lending it would also need to be content with the expected price of the additional liabilities. This could happen if portfolio rebalancing by the non-bank private sector reduced the costs of funding additional loans, through lowering the yields on bank debt and equity. But banks might face other constraints that may prevent them from increasing lending.

Overall, there are several ways in which QE may have indirectly affected bank lending. But it is not yet clear that these would have had large effects (and some could actually have decreased lending). This does not mean that QE is not working, as these channels were not expected to be key parts of its transmission mechanism.

(1) It is possible, however, that lending may have been even weaker in the absence of QE.
(2) This is in contrast to the Funding for Lending Scheme, which was designed to directly increase the supply of lending by banks. This Scheme is discussed in a separate article by Churm *et al* (2012) on pages 306–20 in this *Bulletin*.
(3) It is worth noting that while this would reduce lending and thus change the composition of firms' financing, total finance raised by companies, which includes issuance of debt and equity, would not necessarily be affected.
(4) See Button, Pezzini and Rossiter (2010) for more detail on the price charged by banks on new lending.

private sector deposits, hence a fall in broad money. Short-dated yields (less than three years) fell to levels close to, or even below, Bank Rate over this period (**Chart 4**). These yields were substantially lower than during QE1. That may have encouraged banks to sell some of the gilts they purchased prior to QE2 and would explain why similar sales of government debt by banks were not observed during QE1. It seems reasonable to assume that most of these sales were related to QE.

Chart 4 UK nominal spot gilt yields and Bank Rate[a]



Sources: Bloomberg and Bank calculations.

(a) Zero-coupon yield.

Non-residents' deposits

Investors who sold government debt to the APF may have used the proceeds to purchase sterling assets owned by overseas residents. These transactions lead to a fall in broad money as they reduce UK-residents' deposits (which are included in M4^{ex}) and increase non-residents' sterling deposits (which are excluded from M4^{ex}) by the same amount.

This leakage might explain some of the negative red segment (net sterling lending to non-residents) in **Chart 2**. In particular, during QE2, non-residents' sterling deposits started increasing, after falling for much of the period since the start of the financial crisis (**Chart 5**). If the periods before and after QE2 are taken as a guide to the underlying trend, it suggests that QE may have accounted for around £15 billion of the pickup in non-resident sterling deposits. The rest of this pickup could be explained by underlying factors, which may have included safe-haven inflows from non-residents.

Although purchases of assets by the UK non-bank private sector from non-residents represent a direct leakage from broad money, they do not necessarily imply a lower overall monetary impact from QE. For example, if overseas investors were to reinvest the proceeds of their asset sales into other sterling assets, that would still push up on sterling asset prices.

Chart 5 Cumulative flow of non-resident sterling deposits[a]

Sources: Bank of England and Bank calculations.

(a) Deposits with UK banks and building societies.

And those proceeds may ultimately find their way back into broad money if those subsequent asset purchases were made from UK residents.

Net sterling other assets and net foreign currency counterparts

The two significant remaining counterparts to broad money during QE2 are the positive net other sterling assets and negative foreign currency counterparts (orange and blue segments in **Chart 2**). These movements were not observed during QE1 and are difficult to attribute directly to any transactions arising from QE.

The negative foreign currency counterpart might suggest that investors have used the proceeds from asset sales to buy foreign currency assets. That would have led to a leakage from M4^{ex} into foreign currency deposits (held by either UK or overseas residents) which may have had implications for the exchange rate. But an analysis of the different subcomponents suggests both the foreign currency and net other sterling assets counterparts reflect large and offsetting movements associated with the revaluation of sterling and foreign currency derivative trades as well as other movements in banks' foreign currency capital. These movements are often quite volatile and typically reflect the hedging strategy and other trading activities of banks.[1] In the absence of strong evidence that such transactions are related to the portfolio rebalancing effects of QE, these counterparts are treated as part of the 'counterfactual' path for money, which is discussed later in the next section.

(1) Also, these often reflect specific intragroup transactions (with non-resident entities that are part of the same company) with no wider macroeconomic significance.

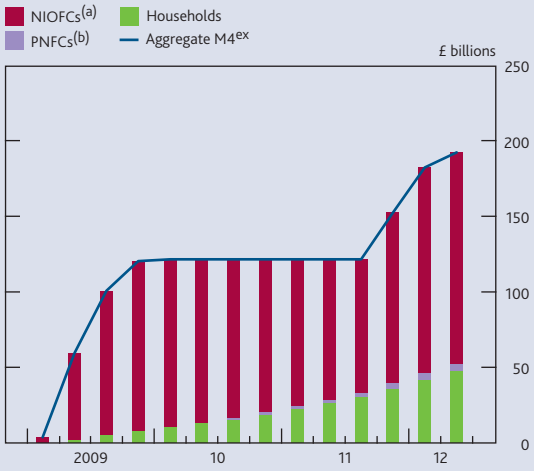
The QE impact and the counterfactual path for broad money in context

This box assesses the estimates of the quantitative impact of QE discussed in the main text of the article and the implied 'counterfactual path' for broad money by analysing the behaviour of disaggregated money holdings. First, the counterfactual behaviour of sectoral money balances is investigated to see if it is consistent with the lags with which QE affects the economy. And, second, the data on different types of money holdings are analysed, as the transmission mechanism of QE also implies a lagged impact on different measures of money. This collective evidence supports the conclusion in the main text that our estimates for the impact of QE and the implied counterfactual path for broad money do not look unreasonable.

Does the counterfactual behaviour of sectoral money holdings look plausible?

The behaviour of sectoral money holdings might provide a plausibility check on the impact of QE. As non-bank financial companies sell gilts to the Bank of England, the share of their holdings of broad money should rise. This share should decline over time as companies and households respond to higher asset prices by increasing their spending. **Chart A** shows what the aggregate net impact of QE1 and QE2 on broad money (estimated in **Table A** on page 329) would imply for the distribution of money holdings by sector, using the models discussed in Bridges and Thomas (2012).

Chart A Estimated cumulative impact of QE on sectoral money holdings since 2009 Q1

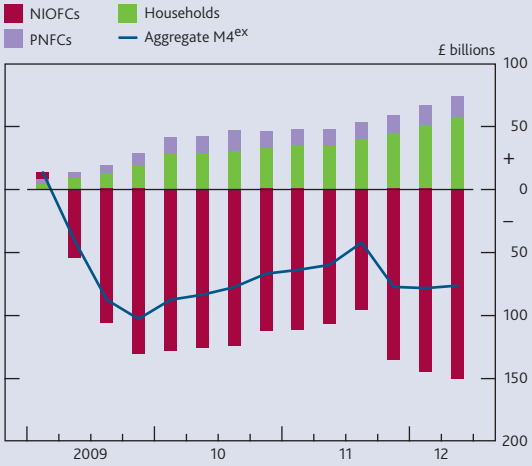


Sources: Bank of England, Bridges and Thomas (2012) and Bank calculations. The aggregate impact reflects the combined estimates of the impact of QE1 and QE2 net of the indirect leakages shown in **Table A** on page 329.

(a) Non-intermediate other financial corporations.
(b) Private non-financial corporations.

The plausibility of the counterfactual path for sectoral money holdings can be assessed by subtracting these implied sectoral QE effects from the data. This is shown in **Chart B**. It suggests that, in the absence of QE, money holdings by financial corporations (specifically, non-intermediate other financial corporations (NIOFCs)) would have fallen since 2009, partly offset by an increase in households' and private non-financial corporations' (PNFCs') holdings.

Chart B Counterfactual cumulative increase in sectoral money holdings since 2009 Q1



Sources: Bank of England, Bridges and Thomas (2012) and Bank calculations.

Much of the weakness in the *underlying* path for NIOFCs' money in 2009 and 2010 (shown in **Chart B**) is likely to reflect the absorption of long-term debt and equity issuance of the banking sector that is not attributed to QE. The rest may reflect some sectoral shift in money holdings as observed in previous recessions. For example, the government usually runs a cyclical deficit in recessions, as benefit payments to households and PNFCs increase and the average tax rates they pay tend to decrease ('automatic stabilisers'). The government partly finances this deficit by issuing bonds to the NIOFC sector which, in part, will be financed by running down their money holdings. So the existence of a large public sector deficit may explain some of this shift in deposits from NIOFCs to the other sectors. Also, increased uncertainty in a recession may make households less willing to hold risky investments. So they may invest less than usual in risky assets and keep more in the form of bank deposits. That, too, could explain some of the shift between NIOFCs' and households' money in the counterfactual.

Does the breakdown of money holdings by instrument support the analysis?

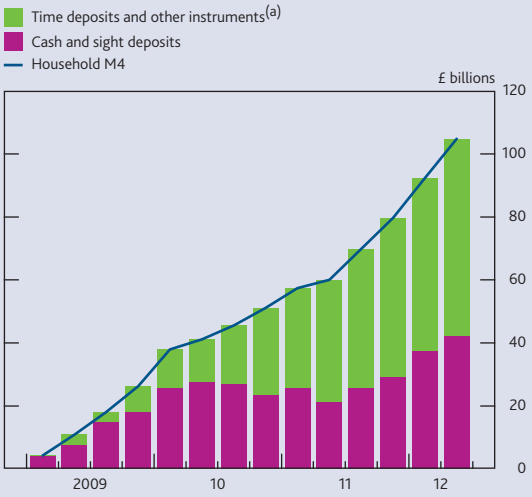
An instrument breakdown of broad money may also help validate whether the impact of QE and the implied counterfactual look plausible. The transmission mechanism of QE should also imply that different components of money should be affected at different times. If the past effects of QE1 are still affecting nominal spending, some increase in money

used for transactions such as notes, coins and sight deposits should be evident in the data. Indeed, **Chart C** shows that just under half of the increase in household deposits between 2009 Q1 and 2012 Q2 was accounted for by cash and sight deposits. A risk to this conclusion is that the pickup in cash and sight deposits may also be related to the current environment of low deposit rates and increased uncertainty, where the gain in liquidity from holding cash and sight deposits exceeds the extra interest offered by saving instruments such as time deposits and cash ISAs.

Conclusion

The behaviour of sectoral money in the absence of QE — namely the shift of deposits from financial corporations to other sectors — seems plausible given a number of features which could be associated with the recent recession, such as the government's cyclical deficit and increased uncertainty. And the breakdown of household money holdings by instrument shows an increase in money used for transactions over recent years, which is consistent with the lags implied by the transmission mechanism of QE. Taken together, both pieces of evidence suggest that our estimates for the impact of QE and the implied counterfactual path for broad money do not look implausible.

Chart C Cumulative increase in household M4 by instrument since 2009 Q1



Sources: Bank of England and Bank calculations.

(a) Includes a small seasonal adjustment residual.

A summary of the quantitative effects

Table A summarises the impact of QE1 and QE2 on broad money. The estimated increase in broad money, net of leakages, resulting from QE2 (£70 billion) represents just under 60% of the amount of assets purchased in QE2 (£125 billion). **So, when the indirect effects of QE are taken into account, the monetary impact of QE2 appears similar to that of QE1 when scaled by the volume of asset purchases in the two episodes.** But there are risks around this conclusion.

First, on the upside, non-resident sterling deposits may be equally important as UK-residents' holdings in the transmission mechanism of QE, even if they are not included in the headline measure of broad money. Including these deposits in the QE2 accounting would imply a slightly larger monetary impact than QE1, of around 70% of total QE2 asset purchases.

Second, on the downside, the monetary leakages during QE2 were different to QE1. In particular, the main QE2 leakage came from sales of government debt by banks, as opposed to through bank balance sheet repair, which was the case during QE1. Bank balance sheet repair may have a beneficial side effect on the economy — given it should increase the long-term capacity of banks to lend — whereas this is less clear for banks' sales of gilts.

Table A Estimated impact of QE1 and QE2 on broad money(a)

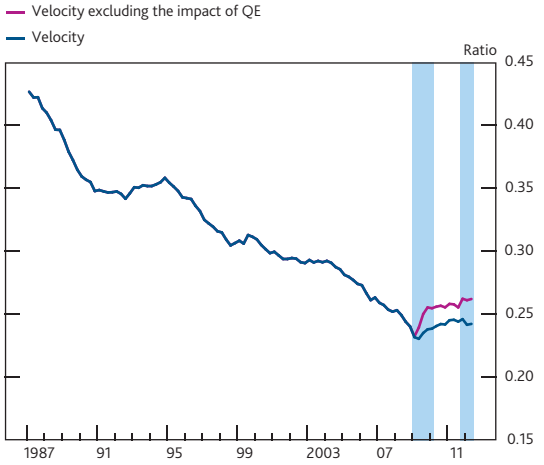
Factor	QE1(b) (£ billions)	QE2(c) (£ billions)
Direct effect of asset purchases	200	125
minus corporate substitution from bank loans to capital markets attributable to QE	*16*	*8*
minus purchases of debt and equity issued by banks attributable to QE	*62*	*0*
minus purchases of non-resident assets attributable to QE	*0*	*16*
minus bank sales of government debt attributable to QE	*0*	*31*
Estimated impact of QE net of indirect leakages	122	70
Impact of QE on broad money as a percentage of asset purchases	**61%**	**56%**
Actual broad money flow	13	31
Implied counterfactual flow	-109	-38

Sources: Bank of England, Bridges and Thomas (2012) and Bank calculations.

(a) $M4^{ex}$ — that is M4 excluding intermediate 'other financial corporations'.
(b) The period covers 2009 Q2 to 2010 Q1 as monthly data were not available.
(c) The period covers October 2011 to April 2012.

Finally, it is important to assess whether the implied underlying growth rate of money looks sensible. One way of assessing its plausibility is by comparing the behaviour of velocity — the ratio of nominal spending to broad money — in the absence of asset purchases to what would have been expected during a recession. Based on the analysis of this article, broad money flows would have been negative

Chart 6 Velocity of broad money[a][b]



Sources: Bank of England, Bridges and Thomas (2012), ONS and Bank calculations.

(a) Nominal GDP is measured at market prices.
(b) Defined as quarterly nominal GDP divided by the outstanding stock of broad money.

(-£109 billion in QE1 and -£38 billion in QE2) in the absence of asset purchases. And, based on the estimates of Bridges and Thomas (2012), nominal spending would have been around 5% lower than otherwise by mid-2012.[1] This suggests that 'underlying' velocity (excluding QE) would have been increasing slightly in 2011 and 2012 (the magenta line in **Chart 6**).[2] A flat to gently rising profile for velocity has indeed been a feature of previous UK recessions, such as in the early 1990s.[3] So the implied 'underlying' path for velocity provides some support to the estimates of the QE effect and the broad money counterfactual. The box on pages 328–29 discusses the plausibility of the counterfactual further by exploring the behaviour of money holdings at a more disaggregated level. It also concludes that our estimates for the impact of QE and the implied counterfactual path for broad money do not look implausible.

Conclusion

The monetary impact of QE2 looks very similar to that of QE1. Our estimates suggest that just under 60% of asset purchases have fed through into the headline measure of broad money. And, although not covered in this article, the pickup in broad money growth during the latest round of asset purchases ('QE3') would also appear to indicate a positive effect of asset purchases. But the monetary leakages during QE2 were very different to QE1. In particular, during QE2 banks sold government debt and carried out little balance sheet repair compared to QE1. To the extent these leakages had different effects, this suggests that the transmission mechanism of QE may have varied over time.

(1) These are comparable to the range of estimates of QE's impact on the economy discussed in Joyce, Tong and Woods (2011).
(2) As discussed in Bridges and Thomas (2012), QE would be expected to lower velocity temporarily in the near term given that the increase in broad money will take time to affect nominal spending. That implies each round of asset purchases will introduce a 'V'-shape into the path of velocity. That can be seen in **Chart 6** where QE1 and QE2 both initially push down on velocity relative to its underlying path. Bridges, Rossiter and Thomas (2011) also discuss the short-lived 'V'-shaped profile of underlying velocity in 2009.
(3) This is in contrast to the downward trend observed in velocity since the 1980s, which largely reflected an increase in financial liberalisation and competitiveness within the banking sector. This is discussed further in Bridges, Rossiter and Thomas (2011).

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