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Large-Scale Asset Purchases by Central Banks II: Empirical Evidence

Kerstin Bernoth, Philipp König and Carolin Raab

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Kerstin Bernoth | kbernoth@diw.de | Department of Macroeconomics at DIW Berlin

Philipp König | pkoenig@diw.de | Department of Macroeconomics at DIW Berlin

Carolin Raab | craab@diw.de | Department of Macroeconomics at DIW Berlin

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Not just since the European Central Bank announced the large-scale purchase of government bonds a few weeks ago, large-scale asset purchases have always been a controversially discussed topic. This DIW Roundup summarizes the measures that have been taken by central banks in Japan, USA and UK and the empirical evidence about the impacts of these measures on financial markets and the real economy.

Large-scale asset purchases in Japan, USA and UK

The Bank of Japan (BoJ) was the first central bank embarking on large-scale asset purchases in order to boost economic activity and raise inflation after long years characterized by stagnation and declining prices. Between [2001](#) and 2006 the BoJ purchased long-term Japanese government bonds with the stated aim of increasing its balance sheet size. In 2004, bank reserves had risen from ¥5 trillion to their peak of ¥36 trillion. Two years later the BoJ abandoned this policy as the economy seemed to have recovered. However, as a consequence of the global financial crisis, Japan reintroduced it in [2010](#). Within the framework of the Comprehensive Monetary Easing (CME) program, the BoJ enacted the purchase of government securities, corporate bonds and other private assets in addition to the commitment to keep interest rates near zero until the aim of price stability (inflation in a positive range of 2 percent or lower) would be achieved. Since [2013](#) the Quantitative and Qualitative Monetary Easing program is in operation (see table).

To combat the deflationary and recessionary consequences of the global financial crisis, the [US Federal Reserve \(Fed\)](#), having lowered its policy rate to zero in end 2008, also began to purchase publicly and privately issued assets in a series of asset purchase programs. The first program involved the purchase of housing agency debt, long-term government bonds and other securities amounting to \$600 billion which was raised to \$1.7 trillion four months later. In 2010, the US economy still suffered from the consequences of the crisis, so the Fed introduced QE2 and poured another \$600 billion into the financial markets by buying long-term government bonds. One

year later the Maturity Extension Program (MEP) was introduced, involving the purchase of long-term securities amounting to another \$400 billion accompanied by the sale of short-term securities ([Meaning and Zhu, 2011](#)). Finally, between 2012 and 2014 the Fed bought further \$85 billion per month under QE₃ and announced the gradual phase-out of the program in December 2013.

The UK embarked on their first QE program in [2009](#) by announcing gradually the purchase of government bonds in the amount of £200 billion, which equaled roughly 14 percent of GDP ([Joyce et al., 2011](#)). In [2011](#) and [2012](#) the Bank of England (BoE) agreed on subsequent programs consisting in further purchases of £75 billion and £100 billion, respectively.

Central Bank	Program	Beginning	End	Volume	Type of securities
Bank of Japan	Quantitative Easing Policy	2001	2006	¥0.4 trillion per month, gradually raised to ¥1.2 trillion per month	Long-term government bonds, asset-backed securities (ABS)
Bank of Japan	Comprehensive Monetary Easing	2010	2012	¥35 trillion, gradually raised to ¥101 trillion	Government securities, corporate bonds, commercial paper, exchange-traded funds, real estate investment trusts
Bank of Japan	Quantitative and Qualitative Monetary Easing	2013		¥50 trillion per year, later raised to ¥80 trillion per year	Government bonds, exchange-traded funds
US Federal Reserve	Large-Scale Asset Purchase Program 1 (QE ₁)	2008	2010	\$600 billion, later raised to \$1.7 trillion	Agency mortgage-backed securities (MBS), agency debt, long-term government bonds
US Federal Reserve	Large-Scale Asset Purchase Program 2 (QE ₂)	2010	2011	\$600 billion	Long-term government bonds
US Federal Reserve	Maturity Extension Program	2011	2012	\$400 billion, later raised to \$667 billion	Purchase of long-term government bonds while selling short-term government bonds
US	Large-Scale	2012	2014	\$40 billion	Agency mortgage-

Federal Reserve	Asset Purchase Program 3 (QE3)			per month, later raised to \$85 billion per month	backed securities (MBS), long-term government bonds
Bank of England	Quantitative Easing 1	2009	2011	£75 billion, gradually raised to £200 billion	Medium and long-term government bonds
Bank of England	Quantitative Easing 2	2011	2012	£75 billion	Medium and long-term government bonds
Bank of England	Quantitative Easing 3	2012		£50 billion, later raised to ¥100 billion	Medium and long-term government bonds

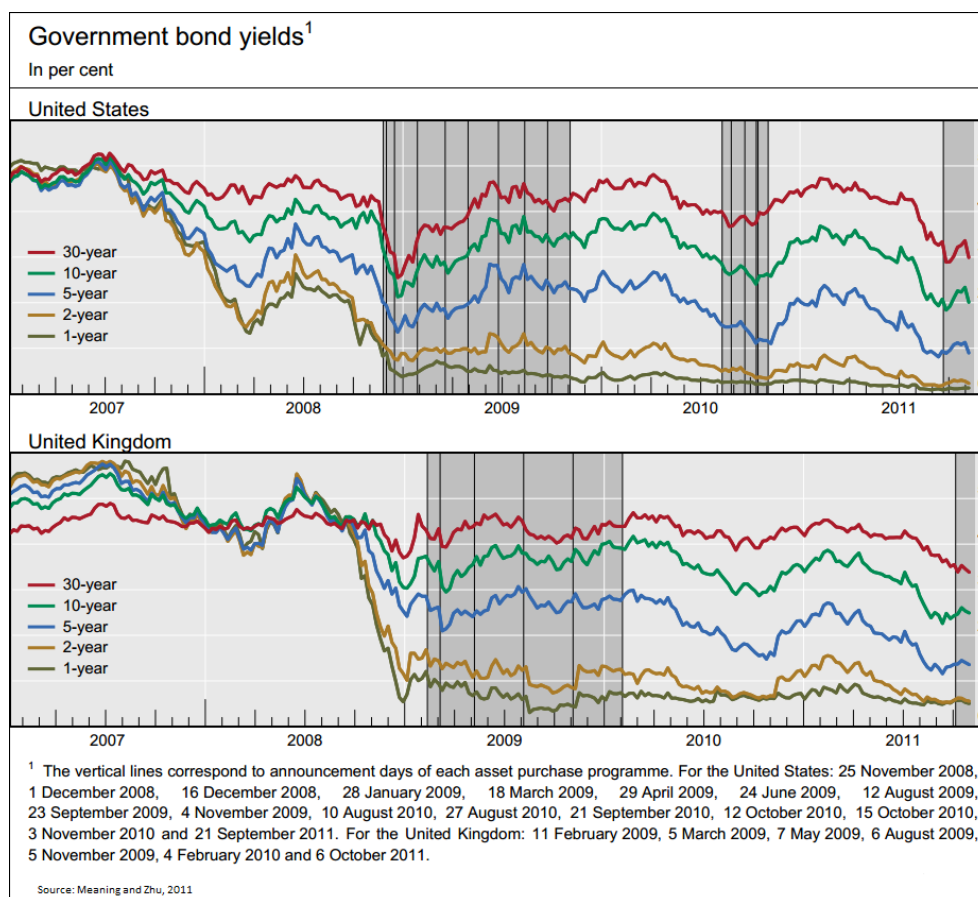
Effects on government bond yields

The main objective of these asset purchase programs has been the reduction of interest rates, especially for long-term assets. Lower interest rates should then impose a stimulation of the real economy and the price level.. Whether the programs had a statistically and economically significant effect on interest rates has been analyzed in various studies using different empirical approaches. [Gagnon et al. \(2011\)](#) use event studies in order to evaluate the outcome of QE in the US and the UK. They analyze the direct effects of the announcements of the QE measures by studying the changes in several financial indicators within one- and two-day event windows. For 10-year government bond yields they find a cumulative reduction of 91 basis points over all ten announcements made by the Fed about QE1 within a one-day window. [Meaning and Zhu \(2011\)](#) report a total decrease of 80 basis points for 10-year bond yields in the USA. The 1-year bond rate however decreased by only around 30 basis points, showing that government bonds with shorter maturities appeared to be less affected by QE, probably because their yields were already at a very low level. For the UK, they find that the 10-year government bond rate dropped by around 50 basis points in total over all announcements on QE1 made by the BoE, a result that is also supported by. [Glick and Leduc \(2011\)](#). Using a two-day-window, [Lam \(2011\)](#) finds after the announcement of CME a reduction of 24 basis points for 10-year Japanese government bond yields.

Interestingly, a common finding of these studies is that the initial announcement of an introduction of a QE program had very significant effects on bond yields, while later statements or announcements had a much smaller impact. [Berkmen \(2012\)](#) concludes that the commitment of the central bank to ensure price stability is an effective tool in order to adjust expectations with the aim of reducing long-term real

interest rates and increasing inflation. A related finding of the present studies is that the first QE program always led to bigger decreases in bond yields than subsequent programs did. According to [Krishnamurthy and Vissing-Jorgensen \(2011\)](#) 10-year US bond yields fell by only 18 basis points after all announcements of QE2 while [Meaning and Zhu \(2011\)](#) even report a slight increase in yields. This is also the case in the UK where bond yields for all maturities increased after the announcement of UK QE2 and fell only marginally in response to the announcement of QE3. [Martin and Milas \(2012\)](#) explain that at the time, when subsequent QE programs were introduced, bond yields have been already at a very low level and could not decrease much further. Furthermore, they argue that it is likely that the commitment effect was only effective during the first round of QE. When sufficient announcements by the central bank are made, agents believe that the central bank will make an effort to ensure price stability in the future and anticipate that further measures will be taken. The graph below, taken from [Meaning and Zhu \(2011\)](#), shows that the most pronounced movements in bond rates occurred outside periods of QE. This indicates that agents expected the respective measures and priced them into their expectations before any actual purchases were undertaken. Furthermore, the graph also highlights that large-scale asset purchases did not seem to have a long-lasting effect on bond yields. Following the termination of the purchase programs the yields in US and UK had approximately reached their pre-program levels again.

Effects on yields of other asset segments



There exists only little evidence about the impact of QE on other asset classes and money market rates than the one, in which the central bank intervenes. Several studies find a considerably negative effect of QE on equity yields ([Joyce et al., 2011](#)) and on corporate bond yields ([Lam, 2011](#) and [Krishnamurthy and Vissing-Jorgensen, 2011](#)). [Neely \(2010\)](#) examines the effect on foreign currency and finds that purchases led the USD to depreciate by around 4-11% (depending on the currency) in sum over the five buy dates of QE1. In addition to that, he discovers correlations in government bond yields up to 0.69 (for the German-UK bond return), associated with important spill-over effects between countries. He finds that US QE1 which reduced 10 year US bond yields by 107 basis points, lead to declines in 10 year foreign bond yields of around 53 basis points on average. This theory is confirmed by [Glick and Leduc \(2011\)](#) who estimate that US QE1 reduced UK government bond yields by around 46 basis points which equals approximately the effect of UK's own QE1 program on UK bond yields. However, the effect in the opposite direction is rather small, [Christensen and Rudebusch \(2012\)](#) only find minor impacts of UK programs on US assets due to "institutional and investor differences" between the US and UK. [Fratzscher et al. \(2012\)](#) report that the spill-over effects from US QE affected mainly economies with weak institutions and led to capital flows into emerging markets.

Effects on the real economy

Vector autoregressive models (VAR) are commonly used to assess the impact of QE on the real economy. Econometric studies using VAR models tend to find only minor effects of QE on both financial markets and the real economy. Several studies ([Fujiwara, 2004](#) and [Berkmen, 2012](#)) report small positive changes in economic growth and core inflation caused by QE in Japan, however these effects are not statistically significant. [Schenkelberg and Watzka \(2011\)](#) find that long-term interest rates in Japan declined and output was stimulated but nevertheless the goal of an increase in inflation has not been achieved. Impaired balance sheets and massive corporate deleveraging had led to a malfunctioning credit channel which weakened the potential impact of QE ([Berkmen, 2012](#)).

For the US and the UK, the results of time-series estimates are more reassuring. Using a counterfactual scenario analysis, [Baumeister and Benati \(2010\)](#) compare the impact of QE on the real economy with the potential economic situation in the absence of central bank intervention. Their result is that QE clearly prevented both the US and the UK from a deeper recession and deflation. [Kapetanios et al. \(2012\)](#) report that the effects of QE on GDP and inflation arise after around six to nine months and one year, respectively. On average, QE in the UK raised CPI inflation by at most 1.2 percentage points and boosted GDP by at most 1.4 percent. However, [Martin and Milas \(2012\)](#) caution that large-scale asset purchases have usually been implemented along with other economic policy measures such as fiscal and regulatory policy which also had an effect on the economy, thus the impact of QE alone is difficult to determine.

Conclusion

In summary, there is no clear and unambiguous evidence on the effectiveness of asset purchases as a means to stimulate the economy and to increase inflation. Event studies find that QE has been effective in reducing long-term government bond yields significantly, with announcement effects being bigger than the actual implementation effects. Furthermore, subsequent QE programs have had less impact on the economy than the initial measures. In the US and the UK, QE appears to have stimulated the economy and to have prevented the price level from declining whereas the Bank of Japan was less successful in stimulating both economy and inflation rates due to impaired balance sheets and corporate deleveraging. This shows that the effectiveness of QE is heavily dependent of the circumstances under which it is applied. After all, the phase-out of QE might become an important issue in the future if central banks decide to start reselling the purchased assets on a grand scale.

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DIW Berlin – Deutsches Institut
für Wirtschaftsforschung
Mohrenstraße 58, 10117 Berlin

Tel. +49 (30) 897 89-0
Fax +49 (30) 897 89-200
<http://www.diw.de>

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