

Handout for:

Funding Quantitative Easing to Target Inflation

by

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Goal:

Discuss Quantitative Easing (QE) policies in advanced central banks in the past and in the future from the perspective of:

- (i) the liabilities of the central bank (the money in monetary policy);
- (ii) the inflation leg of the mandate (the inflation in inflation targeting).

Why needed?

Because most of the debate and research on QE has been about:

- (i) the assets bought;
- (ii) financial stability and stimulating real activity.

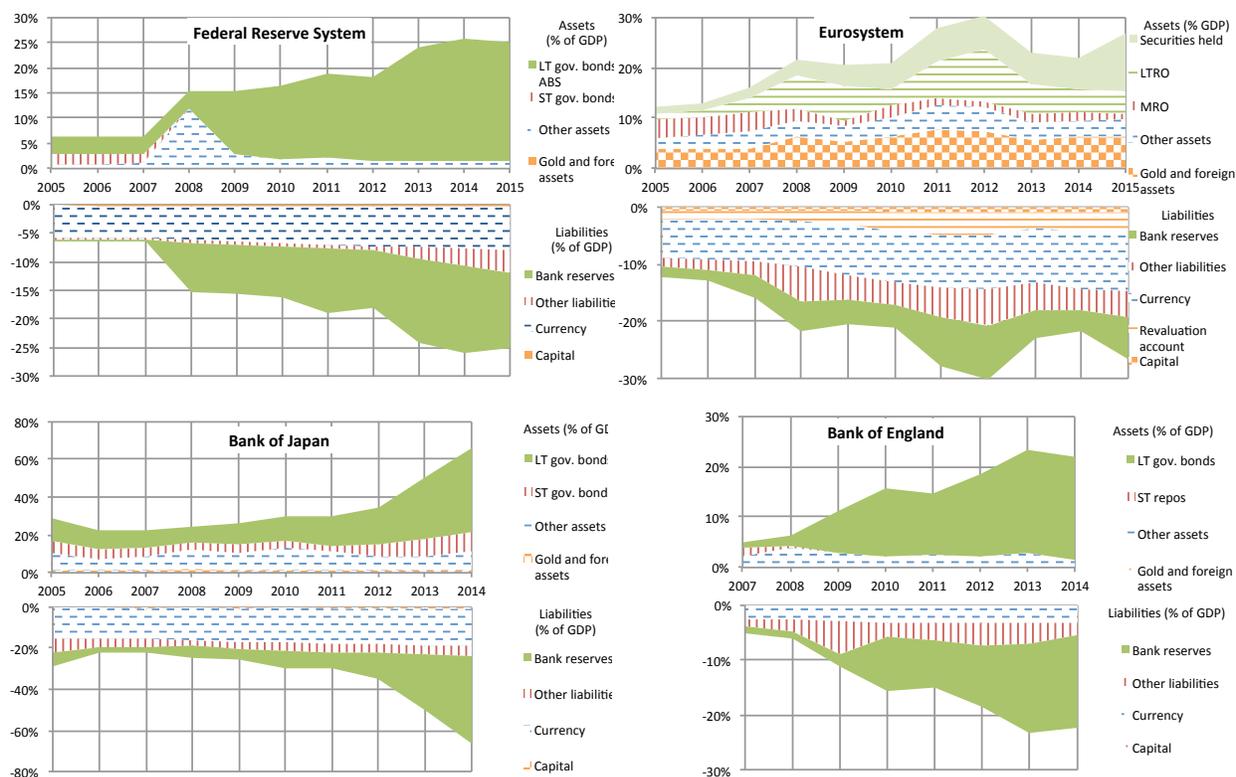
Conclude:

Keeping reserves at current levels (or at half their size, but not less) allows the Federal Reserve to control inflation by using as its policy tool the interest paid on reserves. It can choose that interest rate similarly to the way it targeted Federal funds rate in the past. If necessary, in the future, it can take more radical steps like changing the remuneration or maturity of the reserves issued. Still, it can keep inflation on target, and should be taken to task if it misses the target. Issuing more reserves, or further QE, has little to no effect on inflation. Staying at current levels of reserves has small risks for solvency that can be almost eliminated by a reverse operation twist.

1. Introduction: from assets to liabilities

In recent past, asset side was interesting but so was liabilities side. New dominant item is voluntarily-held interest-paying bank reserves at the central bank (reserves for short)

Figure 1. Balance Sheets of Four Major Central Banks 2005-15



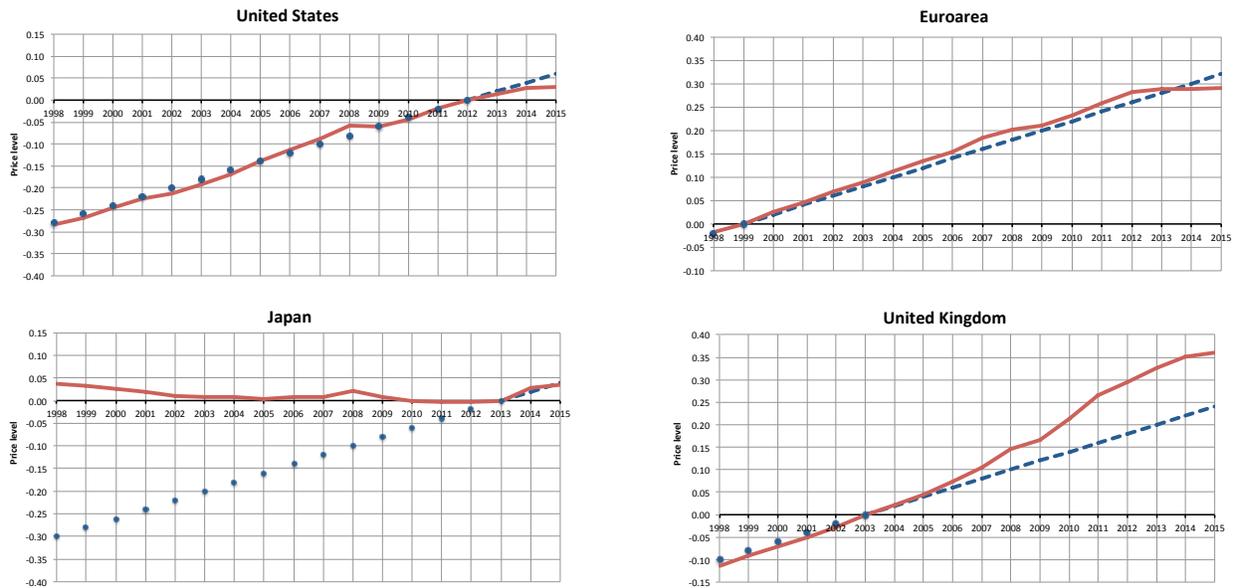
Voluntary interest-paying reserves are:

- (i) historically unprecedented in the United States;
- (ii) economically distinct from currency;
- (iii) new government asset in banks' portfolio, twice larger weight than Treasuries (2015)
- (iv) one of the largest traded securities outstanding with common issuer and maturity;
- (v) for monetary policy, allows choice of both quantity and interest paid on it.

1. Introduction: from financial and economic stability to inflation

Inflation has been slipping below target in the recent past and the expected near future.

Figure 2. Target and Actual Price Level 1998-2015



Notes: For all countries, the target price level is in the dashed blue line from the date of the announcement of the target forward, circles extend it backwards for an hypothetical target, and the actual price level is in the solid red line, with both normalized to equal to zero at the date of adoption of the target. For the United States, the inflation target was adopted in January of 2012 using the personal consumption expenditures deflator as the reference measure. For the Euro area, the target was adopted in January of 1999 for the harmonized consumer price index. For Japan, the target for the consumer price index was adopted in January of 2013. For the Bank of England, the target for the consumer price index target was adopted in December of 2003 (replacing an old target for the retail price index of 2.5%). The target for all four is a 2% annual growth in the price level. The vertical axis is in a log scale, and the range is the same for all four regions to ease comparisons.

2. The market for reserves becomes saturated

Around QE1, U.S. economy became saturated with reserves. Supply was large enough that it intersected the demand curve for reserves at horizontal segment, and reserves are today a normal financial asset that banks hold in their portfolio for their return relative to other assets. Many banks hold large reserves well in excess of requirements, and interest on reserves pins down other short-term rates.

Figure 3. Equilibrium in the market for reserves

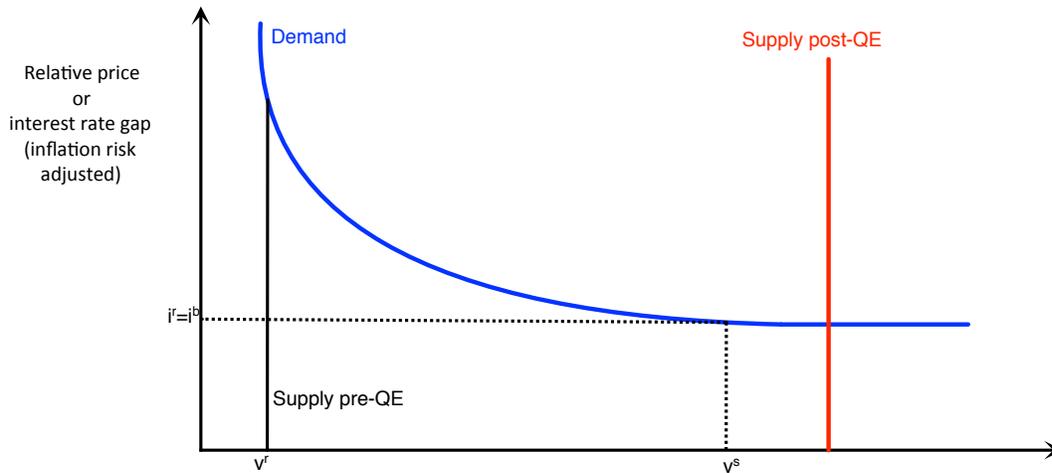
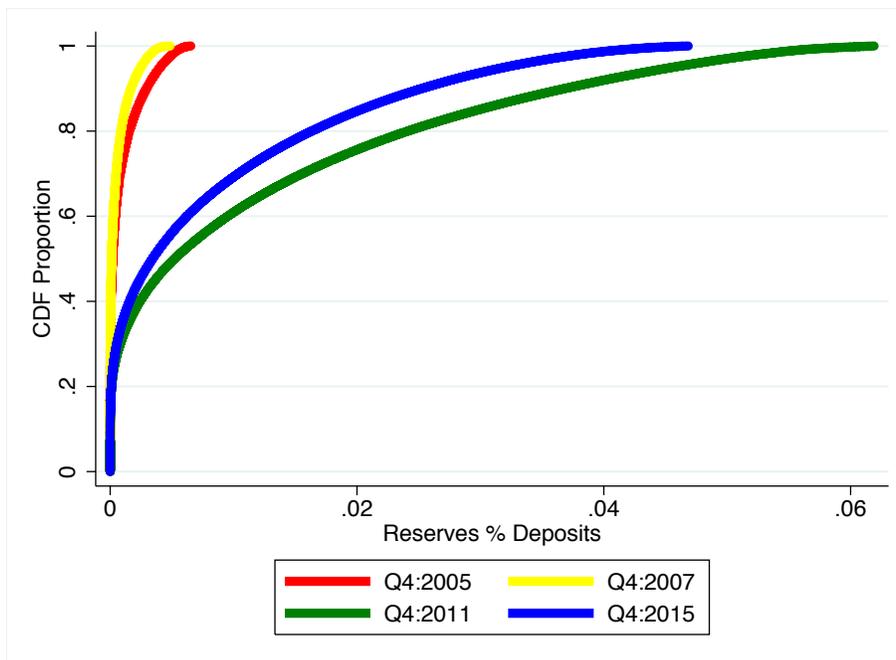


Figure 5. Distribution functions of reserves/deposits across banks

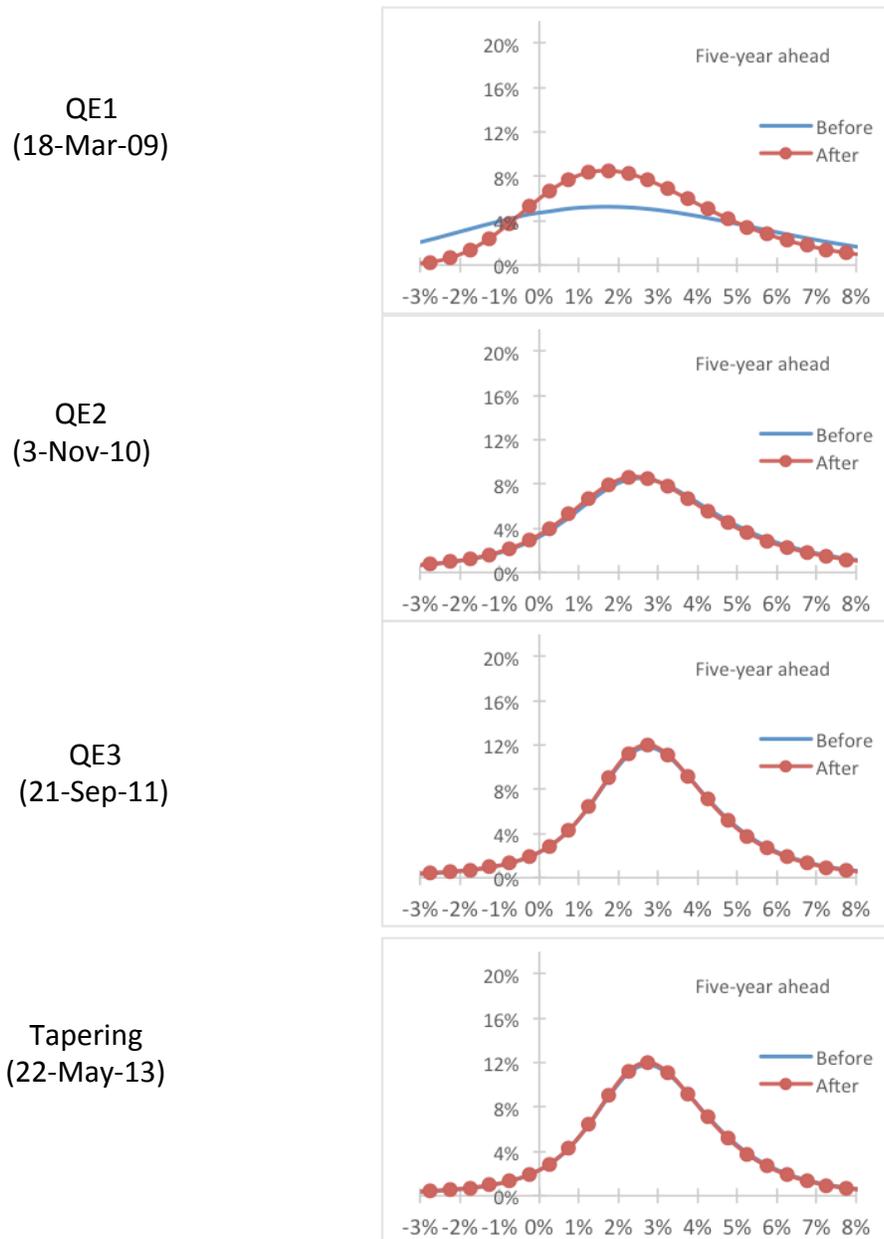


3. The quantity of reserves and the interest on reserves are *independent* tools.

The interest on reserves controls inflation, replacing previous open-market operations of targets for the federal funds rate.

The quantity of reserves has no effect on inflation. So, further QE, whether it purchases government bonds or mortgage-backed securities, whether it extends or contracts maturities, whether markets misinterpret tapering or not, should have approximately no effect on inflation expectations. Inflation options data strongly confirms this neutrality of QE all the way back to 2010 or earlier.

Figure 9. Options-implied density functions for inflation



4. Can the level of reserves stay at its current level? Can it grow further?

The main risk is that the central bank becomes insolvent: when issuing reserves becomes a Ponzi scheme, banks no longer want to hold them, their value collapses, hyperinflation ensues. This happens when the fiscal authority does not recapitalize the central bank following income losses.

If the assets bought by QE are short-term government bonds, income losses are very likely. With long-term securities being held, an unexpected steepening of the yield curve is the main risk.

At an extreme, the central bank can rely on the seignorage from printing banknotes to back reserves. Estimates of the present value of seignorage give a solvency upper bound. It is well in excess of the current level of reserves, and suggest it would likely take a doubling of the current size of the balance sheet before solvency was at risk.

Table 4. The solvency upper bound for QE by the Fed

	Estimation method			
	Partial equilibrium		General equilibrium	
Discounting	Reduced-form	Structural	Reduced-form	Structural
Historical	19.0	16.4	13.8	19.0
Climate-change	25.8	22.5	25.8	18.7
Market-based	32.5	28.4	32.5	23.7

Notes: All numbers expressed as % of 2013 GDP

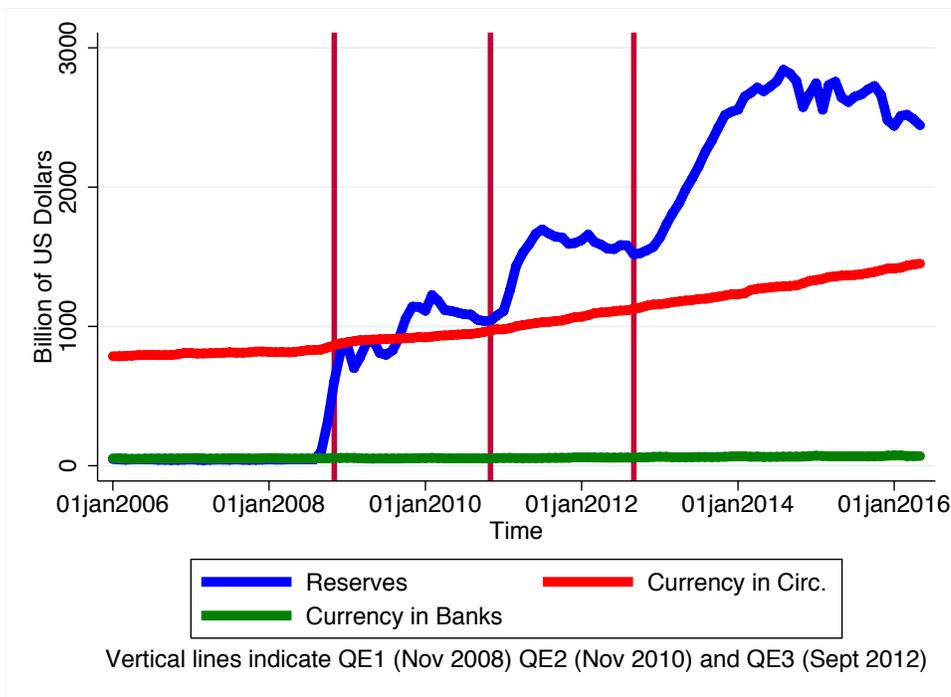
5. Helicopter drops of currency are not QE

Printing banknotes instead of issuing reserves has very different effects on inflation.

In fact, an effective helicopter drop would likely require the end of QE, with a dramatic shrinkage of the quantity of reserves.

While QE is consistent with keeping inflation tightly under control using interest-rate feedback rules, not so differently from the past of monetary policy, helicopter drops would likely come with large and unstable shifts in the demand for currency and would require very large financial repression.

Figure 4. QE and the liabilities of the Federal Reserve



6. The central bank is not out of firepower to control inflation.

Keeping the balance sheet at its current size (and beyond), it can use forward guidance about the short-term interest rate on reserves.

If this fails, it could innovate to keep inflation on target by directly trying to affect nominal and real yield curves.

Two radical suggestions are:

- 1) issue reserves that have payments indexed to the price level. Give some control over inflation forward curve.
- 2) issue reserves that are of longer maturities than one day. Give some direct control over yield curve.

Both can be set following feedback rules (or not) with an inflation target.

Neither of the two may be advisable right now, but they are available for the future.

They serve as examples that QE widened the arsenal of weapons of the central bank.

7. Conclusion

New-style central banking. Focus on:

- (i) reserves
- (ii) fighting too low inflation.

Theory and evidence suggest that:

- (1) First round of QE saturated US market for reserves.
- (2) Further rounds of QE had no effect on inflation, and neither will future rounds, but keeping reserves at high level will allow Fed to use interest rate on reserves to steer inflation.
- (3) Current level of reserves can be maintained with small risk of solvency, and a large-scale reverse operation twist that re-populated the asset side of the balance sheet with short-term government bonds would eliminate almost any income risk.
- (4) Helicopter drops of currency are not compatible with QE unless they came with very high financial repression. They would raise inflation, but to levels hard to estimate.
- (5) Innovating on the maturity and remuneration of reserves are further (extreme) options to raise inflation, made possible by keeping a large (but not too much larger) central bank balance sheet.