

International Money and Banking:

13. Quantitative Easing

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What is QE? Why Do It?

- Quantitative Easing refers to large scale asset purchases by central banks with the purchases paid for via credits to reserve accounts of commercial banks.
- QE programmes have been carried out by the Fed, the Bank of England and, most recently, by the European Central Bank: Central banks have used the programmes to buy assets like government bonds, mortgage-backed securities, corporate bonds and so on.
- Why do this?
- One explanation is from the simply money multiplier theory: Open market purchases increase the monetary base and this is then “multiplied up” into large changes in the broader money supply. This will also mean increases in the supply of credit from banks.
- Many popular accounts of QE focus on these ideas: “Pumping money into the economy” or “Pumping money into banks to increase lending.”
- In practice, central banks did not necessarily believe QE would provide a significant increase in the supply credit. Their main focus instead was on the impact of bond purchases on bond yields.

Lower Bounds on Interest Rates

- Before the last decade, economists regularly wrote about the “zero bound” on interest rates. They believed that people would hold cash rather than invest in negative yielding assets even if they were safe.
- However, as we have discussed previously, it turns out that large investors with huge portfolios do not want to hold billions of dollars or euros in cash in warehouses. There is the risk the warehouses could burn down or thieves could still the money and taking out insurance against these items costs money.
- But there must be a point where interest rates on safe assets cannot be made any more negative because people will choose cash rather than highly negative yielding assets.
- What does a central bank do if it has “run out of room” in setting policy rates as low as possible?
- Well, given the existence of default risk and other costs associated with servicing loans, we should not expect normal private sector interest rates (e.g. those charged by banks) to ever be below zero.
- And it may be possible to intervene in financial markets to lower these rates.

Can Central Banks Influence Other Interest Rates?

- Even at times when short-term money market interest rates are zero or negative, most key interest rates, such as mortgage rates, are not.
- What can the central banks do to get these rates down?
- As we discussed previously, one thing they do to get long-term risk-free rates down is to signal to financial markets that they are planning to keep short-term rates low for a long time. Most of the important central banks have done this at times over the past decade.
- What else? Well according to the models we developed before there isn't anything else.
- Our framework so far has been:
$$N\text{-Year Risky Lending Rate} = N\text{-Year Risk Free Rate (determined by expected short rates)} + \text{Risk Premium (determined by default risk and quality of collateral)}$$
- This formula sets the bond yield and that's it! In practice, however, there are other ways to influence interest rates beyond what's in this formula.

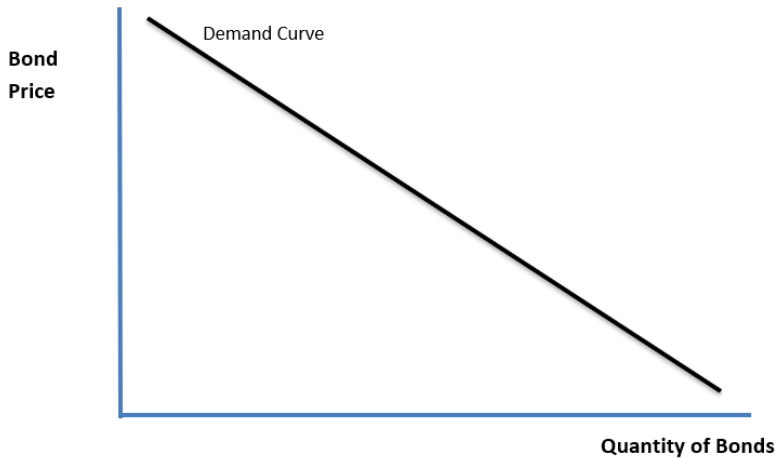
Why There Is a Demand Curve for Bonds

- The “Risk Free Rate Plus Default Risk” effectively assumes that all investors are the same and would only hold a bond if it delivers the interest rate set by this formula.
- In practice, things are a little different. Consider, the case of a bond that was yielding 3% and then, ceteris paribus, it started to yield 2% (The bond price goes up).
- Demand for this bond would fall:
 - 1 All investors have to make a trade-off between risk and return but investors differ in their willingness to take risks. Some investors that may have been comfortable with the risk-return tradeoff when the bond yielded 3% but now view it as too risky at 2%.
 - 2 Investors may differ in their assessment of default risk. At 3% some may have viewed the bond as better value than a risk-free bond. At 2% some of these people may change their mind and view it as worse value.
- What we are describing here is a demand curve. As the price of the bond goes up (yield goes down) there is less demand for it.

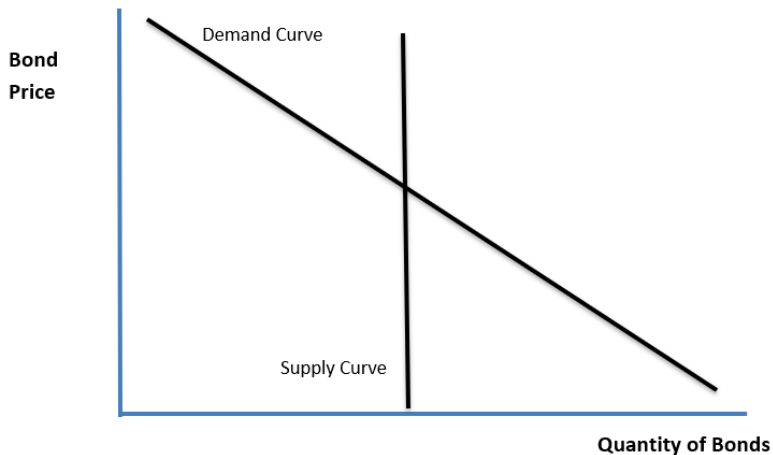
How QE Might Work: Supply and Demand for Bonds

- So how do bond prices get set?
- If there is a fixed supply of the bond and demand is larger the lower the price is (the higher the yield) then the equilibrium bond price is the one that equates supply and demand.
- Now we can see another route through which central banks can affect yields on a particular set of bonds.
- If the central bank decides to purchase a specific quantity of a specific type of bond, then the demand curve for this bond will shift out: This will raise the price of the bond and reduce the yield.
- Alternatively, you could say the “private sector demand curve” is unchanged but the “private sector supply curve” has shifted in, thus raising prices.
- In practice, bond yields are not set by two curves intersecting. They are set on a second-by-second basis by brokers who are matching up those wishing to sell and those wishing to buy.
- But the basic principle still applies: When there is heavy demand to buy the bonds, the broker raises the price to induce people to sell and this lowers the yield.

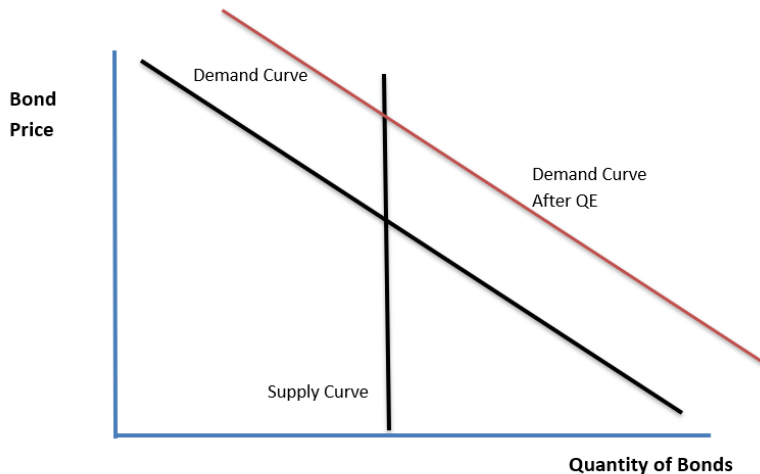
A Demand Curve For Bonds



Bond Prices Set By Supply and Demand



QE Increasing Bond Prices and Reducing Yields

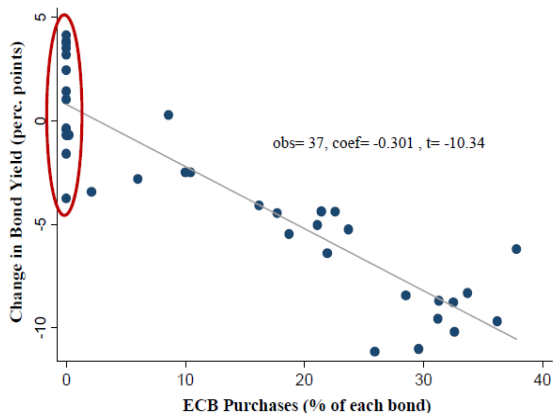


An Example of How Bond Buying Works

- It can be hard to find “clean” examples of how QE bond buying works.
- Interest rates tend to move lower after QE but this could be because QE purchases send a signal that policy rates are going to be lower, i.e. it acts as a kind of forward guidance.
- The next page shows a picture from a great research paper by Christoph Trebesch and Jeromin Zettelmeyer that helps to answer this question.
- It shows the change in yields for a set of Greek government bonds between May 7, 2010 and May 17, 2010. This is when the ECB began purchasing Greek bonds with its Securities Market Program.
- The data points circled by the red line correspond to bond issues that were not purchased by the ECB, while the rest of the data points correspond to bonds that had some ECB purchases.
- The striking result is that only bonds that were purchased by the ECB saw falling average yields. And the more the ECB bought, the more the yields fell.
- See my blog post “How Does QE Work? A Picture Worth a Thousand Words” for more discussion.

How ECB Bond Purchases Affected Greek Bond Yields

Panel A: Drop in yields between
May 7 and May 17 (1 week later)



The Fed's Quantitative Easing

- Both the Federal Reserve and the Bank of England have undertaken large bond purchase programmes in recent times in an attempt to reduce longer-term interest rates.
- These programmes have become known as “quantitative easing.” It’s not a great term: The idea is that it is monetary easing, not by reducing the short-term rate, but by buying large quantities of long-term securities:
 - ▶ **QE1:** From March 2009 until March 2010, the Federal Reserve reserve purchased \$1.25 trillion in mortgage-backed securities, in an attempt to reduce mortgage rates. They also purchased \$300 billion in long-term Treasury securities (i.e US federal government debt).
 - ▶ **QE2:** From November 2010 until June 2011, the Fed purchased an additional \$600 billion in long-term Treasury securities
 - ▶ **Operation Twist:** In late 2011, the Fed began selling short-term bonds and using the proceeds buying long-term ones. This purpose was to get long-term rates down.
 - ▶ **QE3:** The final QE operation began in September 2012.
 - ▶ **The Taper:** In late 2013, the Fed began reducing its QE purchases (“tapering off”) and finished buying bonds in late 2014.

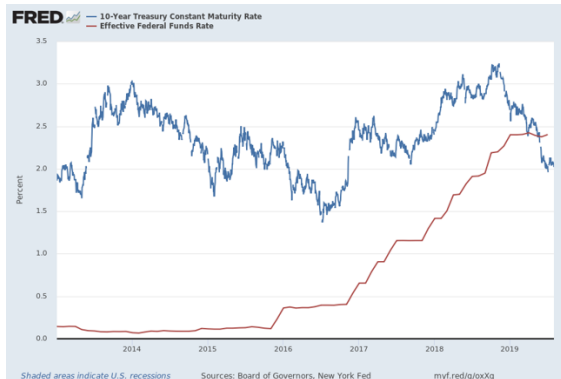
Evidence on the Effects of the Fed's QE

- Given uncertainty about how it works (Ben Bernanke joked “The problem with QE is it works in practice, but it doesn't work in theory”) were Fed officials right to believe the QE programmes have an effect?
- The performance of the US economy was pretty mediocre for most of the time QE purchases were happening.
- However, on its own, this doesn't mean the QE programmes were ineffective. Perhaps long-term interest rates would have been higher, and the economy weaker, without the QE programmes.
- Fed economists have now conducted a number of research studies to analyse the effects of the QE programmes. Their results have suggested that the programmes do reduce long-term interest rates.
- I've linked to two of the Fed studies on the effects of QE on the class website. One of them (Gagnon et al) concludes “the reduction in the 10-year term premium appears to be somewhere between 30 and 100 basis points.”
- So while the QE programmes can have an impact on interest rates, it is clear that it takes very large amounts of “money printing” in the form of QE to obtain a relatively small impact on long-term rates.

How Markets Reacted to the End of the Fed's QE

- One way to see that bond yields were affected by QE is to look at what happened when the Fed announced it was going to end the programme.
- The Fed's third and largest round of asset purchases began in September 2012. By Spring 2013, the US economy was improving and the unemployment rate had fallen to about 7.5 percent.
- In June 2013, Chairman Bernanke says *"If the incoming data are broadly consistent with this forecast, the Committee currently anticipates that it would be appropriate to moderate the monthly pace of purchases later this year."*
- The bond market reacted violently. By the time the Fed actually started to taper QE purchases in January 2014, the ten-year Treasury yield had reached 3 percent, almost doubling from the previous May. This resulted in a far larger tightening in financing conditions than the Fed had intended.
- It is clear now that financial markets over-reacted to the Fed's QE announcements. Rather than signalling a rapid tightening of monetary policy, the Fed waited almost two years after it began tapering its QE purchases to increase the federal funds rate and then did so very slowly. Indeed, by February 2015, the ten-year rate was back to 1.7 percent, reversing all of the increase that occurred during what became known as the "taper tantrum".

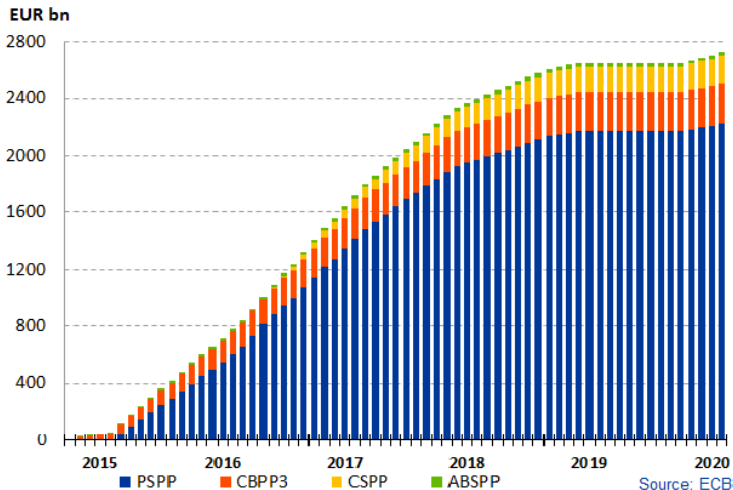
Spot the Taper Tantrum!



The ECB's QE Programme (the APP)

- From late 2014 until late 2018, the ECB operating its Asset Purchase Programme (APP) and purchased about €2.6 trillion in assets across four different sub-programmes
 - ① The Corporate Sector Purchase Programme (CSPP)
 - ② The Public Sector Purchase Programme (PSPP)
 - ③ The Asset-Backed Securities Purchase Programme (ABSPP)
 - ④ The Third Covered Bond Purchase Programme (CBPP3)
- By far the biggest was the PSPP, which bought mostly euro-area sovereign bonds.
- The ECB purchased 8 percent of the assets, with the remaining 92 percent being bought by NCBs in line with capital keys. NCBs purchased sovereign bonds issued by their own national governments.
- The programme had many rules such as those relating to limits on how much of each bond issue could be purchased and whether negative yielding bonds could be purchased. The size and scope of the programme evolved over time.
- The ECB announced in September 2019 that it would start its asset purchases again, though at a slower rate than previously.

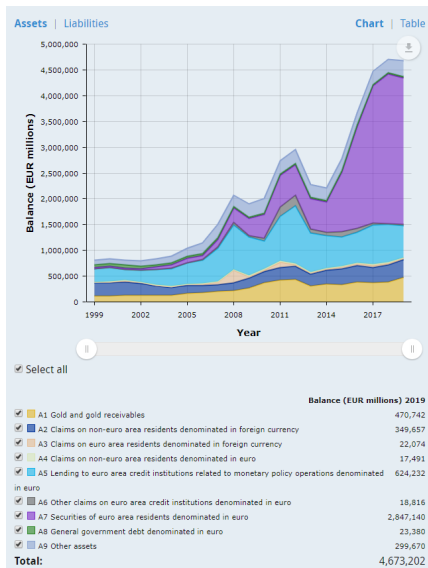
The ECB's Asset Purchases



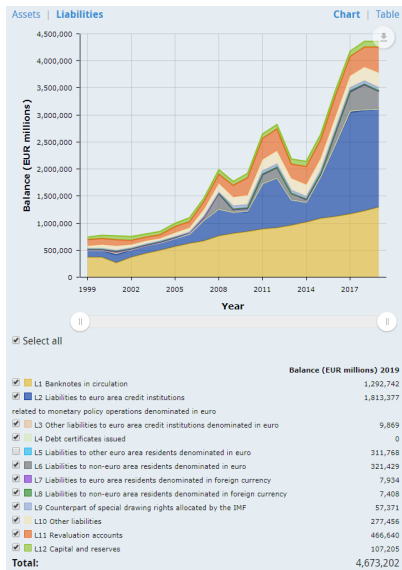
QE & Balance Sheets of Eurosystem and Private Banks

- The QE programme has had a big effect on the size of the Eurosystem's balance sheet, seeing it almost double in size.
- On the “liability” side of the balance sheet, there has been a big increase in “liabilities to euro area credit institutions.” Note however that these deposits by banks with the Eurosystem currently have a negative interest rate, so in addition to earning income from its new assets, the Eurosystem is also making money from its liabilities.
- That said, this much larger portfolio of assets carries with it higher credit risk than other assets on the Eurosystem's balance sheet, such as loans to banks, which are well collateralised.
- The balance sheets of commercial banks have also been affected. The huge creation of central bank reserves means many banks now have far higher reserves-to-assets ratios than before.
- In research I have done with Ellen Ryan, we report evidence that many banks are trying to replace negative-yielding reserves with higher-yielding (though still possibly negative) bonds. The negative yield thus probably reinforces the effect of QE on bond yields.

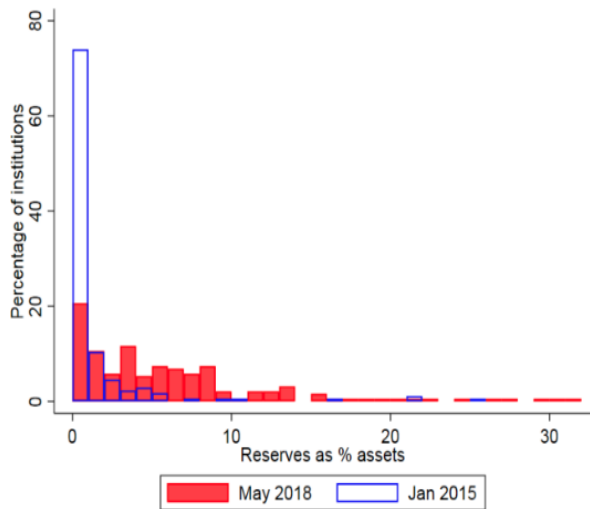
The Eurosystem's Assets



How the Eurosystem Created Money via QE



The Changing Distribution of Reserves-to-Asset Ratios of Commercial Banks



Recap: Key Points from Part 13

Things you need to understand from these notes:

- 1 Why there is a lower bound for short-term monetary policy rates.
- 2 Why there is a demand curve for bonds.
- 3 How the ECB's bond purchases affect yields on Greek bonds
- 4 Details on the Fed's quantitative easing programme.
- 5 Evidence on the effects of the Fed's QE programme on interest rates.
- 6 How bond markets responded to the announcement of the end of QE.
- 7 Details on the ECB's quantitative easing programme.
- 8 How the ECB's QE programme has affected the balance sheets of European banks.
- 9 Why a large supply of negative-yielding reserves may reduce bond yields.