

International Money and Banking:

14. Real Interest Rates, Lower Bounds and Quantitative Easing

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Part I

Real Interest Rates

Interest Rates and the Economy

- We have described how central banks control short-term interest rates on interbank loans.
- We have also described how longer-term interest rates are affected by expectations about what will happen to short-term rates in the future.
- It is through this mechanism that central banks influence risk-free rates at all maturities.
- Considerations about default risk and collateral then need to be factored in to understand movements in interest rates for risky private sector lending.
- These private sector interest rates have a significant effect on the economy: High interest rates will negatively affect the economy by discouraging spending.
- But what do we mean by a high interest rate?
- Is ten percent a high interest rate? Well, it depends on the level of inflation.

Real Interest Rates and Consumption

- Real interest rates are calculated by subtracting the rate of inflation from the rate of interest (which is also known as the nominal interest rate).
- If the nominal interest rate is 10%, then if inflation is 10%, the real interest rate is zero. If inflation is 5%, then the real interest rate is 5%.
- Consider the decision to save for tomorrow or spend today. The argument for saving is that it can allow you to consume more tomorrow.
- If the real interest rate is negative, then this means that you will be able to purchase less tomorrow with the money that you set aside. For instance, if the interest rate is 5% but inflation is 10%, then you receive 5% in interest but your savings have eroded in value by more than that.
- So low real interest rates discourage savings and high real interest rates encourage it.

Real Interest Rates and Business Investment

- Consider a firm that is thinking about buying capital equipment and suppose the interest rate is 10%.
 - ▶ If the firm is borrowing the money, they need to consider whether the investment will generate enough new profit income to justify paying back the amount borrowed (the principal) and the interest.
 - ▶ If the firm has spare money available, they need to consider whether they would be better off putting the money in the bank at the prevailing interest rate rather than buying the machine.
- Either way, the higher the interest rate, the less likely the firm is to buy the equipment.
- Again, inflation matters when thinking about whether the interest rate is considered high. If inflation is 10%, then the firm can expect that its profits will be increasing by that much and a 10% interest rate won't seem so high. But if prices are falling, then a 10% interest rate on borrowings will seem very high.
- Low real interest rates encourage business investment and high real interest rates discourage it.

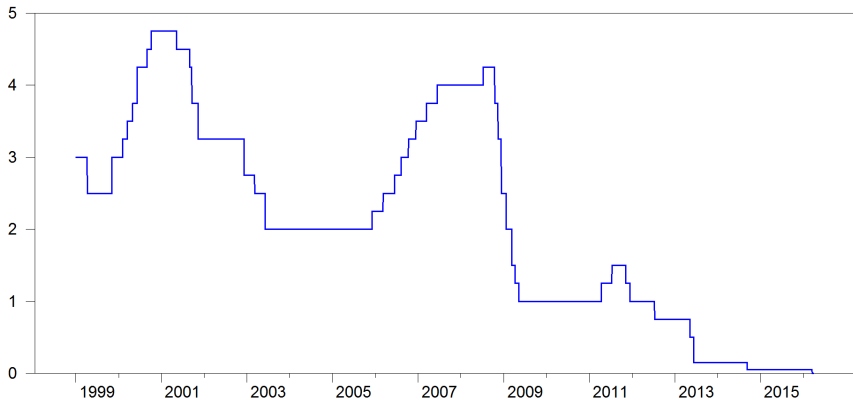
Part II

Deflation and Liquidity Traps

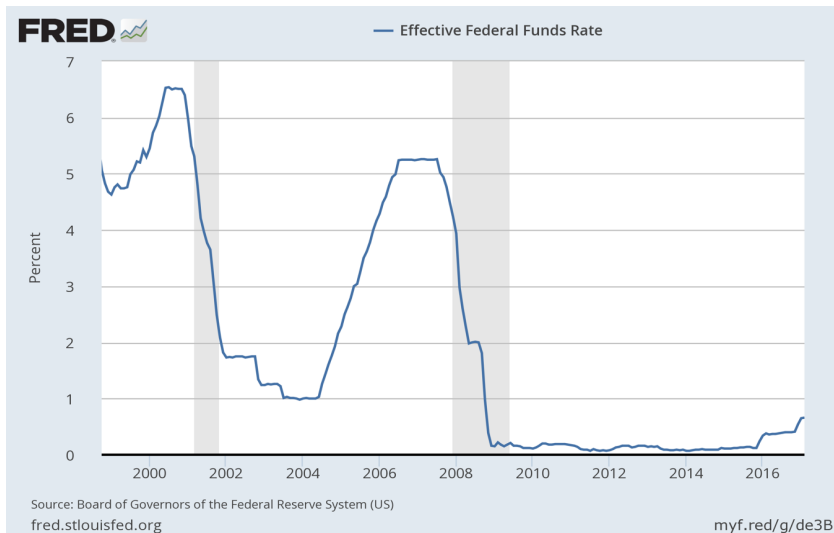
Lower Bounds on Interest Rates and Deflation

- In the US, UK and Euro area, short-term money market rates are near zero and, as we discussed before, yields on some government bonds are now negative. In this sense, the idea of a “zero bound on interest rates” has not been entirely correct.
- However, there limits to how far below zero these yields will go. And we should not expect normal private sector interest rates (e.g. those charged by banks) to ever be below zero: We cannot expect banks to make loans and ask for less than the principal back. They would be better off to just not make the loans.
- Do near-zero interest rates this mean the Fed and ECB are providing unprecedented levels of stimulus to their economies?
- No. Real interest rates are not at historically low levels because inflation is currently very low in both the US and euro area. In fact, prices have fallen over the past year in the Euro Area.
- Low inflation (or deflation) can make real interest rates high even when nominal interest rates are zero (Interest rate minus inflation will be positive when interest rate is zero and inflation is negative.)

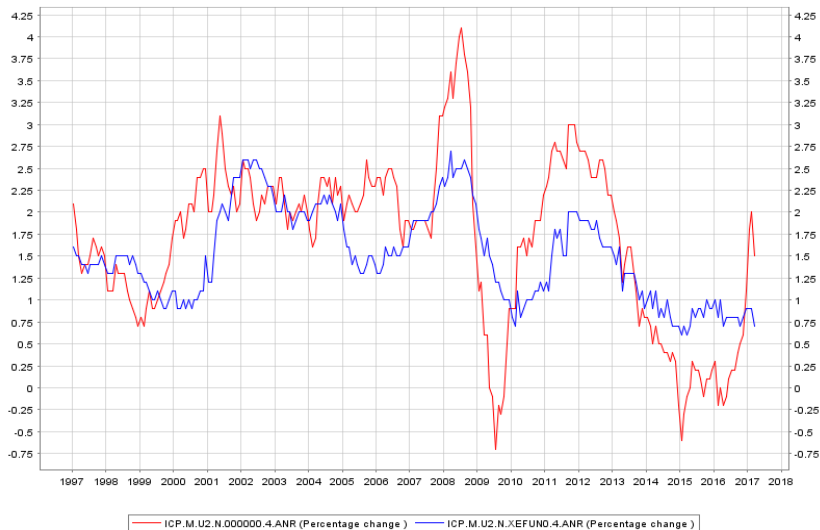
ECB Main Refinancing Rate



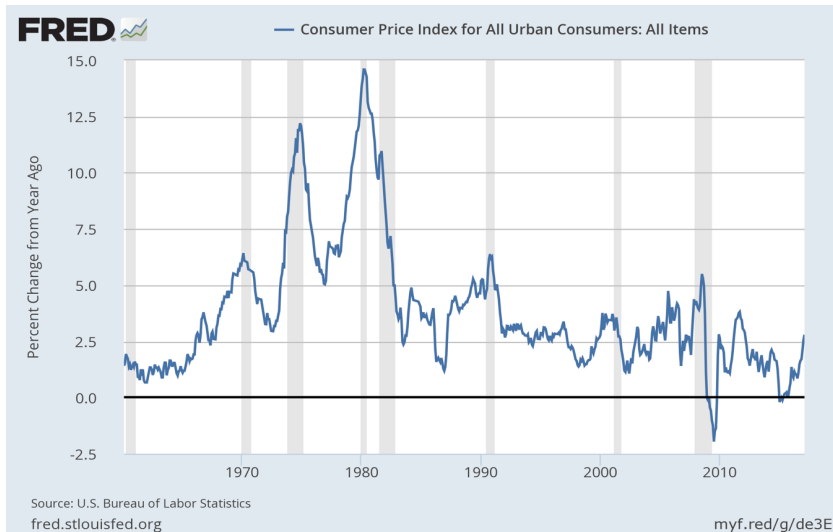
The Federal Funds Rate



Euro Area Consumer Price Inflation: Total (Red) and Core (Blue)



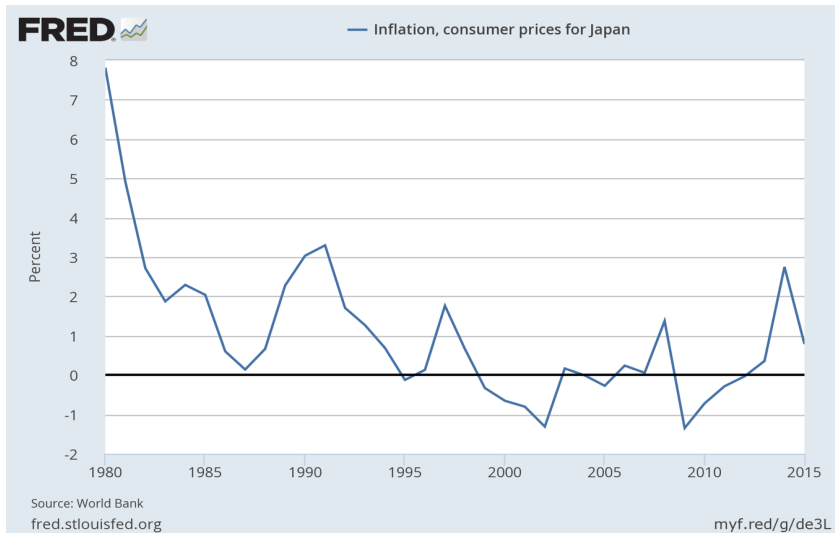
US Consumer Price Inflation



The Liquidity Trap

- Consider the case in which nominal interest rates are zero but real interest rates are high because of deflation (i.e. prices are falling).
- Because the central bank can't cut short-term interest rates any more, the economy may get stuck in this situation: High real interest rates keep the economy depressed and the economy being depressed keeps prices falling, which keeps real interest rates high.
- This is known as a *liquidity trap*. It's called this because it's a situation where no matter how easy credit is—no matter how much liquidity is provided by the central bank—the economy stays depressed.
- Can this happen in reality? History says yes.
- Japan has experienced conditions that approximate the liquidity trap for much of the period since the early 1990s: Low inflation or falling prices, low interest rates, and depressed economic activity.
- Japan has been close to deflation since the mid-1990s and growth has been very poor despite very low nominal interest rates.

Inflation in Japan



Getting Out of The Liquidity Trap: Forward Guidance

- Even when the short-term rates that are set by central banks are zero, that does not mean that all interest rates are zero. For example, longer-term “risk-free” rates may still be well above zero because investors anticipate that short-term rates will eventually rise above zero again.
- An important step that central banks can take in this situation is to signal to financial markets that short-term interest rates will stay low for a long time. This can reduce longer-term interest rates on government bonds or other safe investments and then be passed on to interest rates on mortgages and business loans.
- All of the major central banks have provided forms of “forward guidance” of this sort in recent years but the results have been mixed.
- Imprecise statements such as “we expect short rates to be low a considerable period of time” raise questions about the meaning of terms like “considerable period”.
- But more precise guidelines can also cause trouble. In 2013/14, the Fed and Bank of England both stepped away from commitments to begin tightening monetary policy when a specific economic event occurred (unemployment reaching 6.5% in the Fed’s case).

Getting Out of The Liquidity Trap: Raising Inflation

- If there are limits to how far nominal interest rates can be cut, another approach is to lower real interest rates by raising inflation.
- If nominal rates are low because the economy is depressed then it may be difficult to take steps to raise inflation.
- One method is to raise indirect taxes.
- Another method is to convince the public that the central bank is going to target a higher rate of inflation. Conservative central bankers often don't like this idea but something like this is now going on in Japan.
- In 2013, the new Japanese government lead by Shinzo Abe insisted that the central bank raise its target inflation rate from 1 percent to 2 percent. While a relatively small change, there is evidence that this move has raised inflation expectations. The Bank of Japan has also committed to a large increase in the monetary base to support this higher rate of inflation.
- Time will tell if this is a successful policy but signs so far are mixed.

Part III

Quantitative Easing

Can Central Banks Influence Other Interest Rates?

- Short-term money market interest rates may be zero but most key rates, for instance 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 been doing this for some time.
- What else? Well according to the models we developed before there isn't much 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 down (yield goes up) there is greater demand for it.

How QE Might Work: Supply and Demand for Bonds

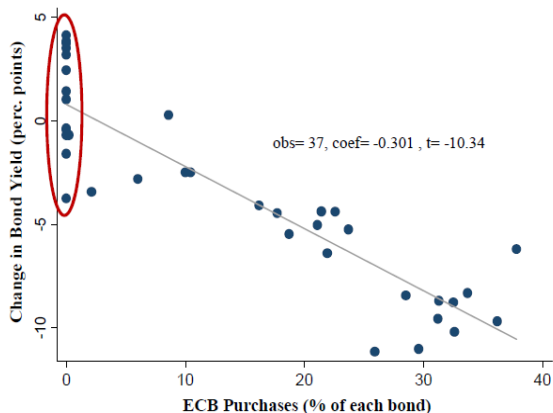
- So how do bond prices get set?
- If there is a fixed supply of the bond and demand is larger the lower the price is (the higher the yield) then the equilibrium bond price is the one that equates supply and demand.
- Now we can see another route through which central banks can affect yields on a particular 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.

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 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.

Getting Out of The Liquidity Trap: Fiscal Policy

- One way to get out of the liquidity trap is to use fiscal policy to stimulate the economy.
- Japan has done this during its deflationary period but now has a very high debt-to-GDP ratio. Some have argued that this shows that expansionary fiscal policy may be of limited use.
- Alternatively, others have pointed to the stop-start nature of Japanese fiscal expansion as undermining the potential success of this approach. Others argue that the Japanese economy did better during its slump than the euro area is doing today and the difference may reflect the different approach taken to fiscal policy.
- Whichever is true, there is no political willingness in Europe, the UK or US to pursue expansionary fiscal policy even though all three areas could certainly do so given the low borrowing rates on government bonds.

Recap: Key Points from Part 14

Things you need to understand from these notes:

- 1 Definition of real interest rate.
- 2 Why real interest rates matter for consumption.
- 3 Why real interest rates matter for business capital investment.
- 4 What is meant by the zero bound problem.
- 5 The liquidity trap.
- 6 Forward guidance as a way out of the liquidity trap.
- 7 Raising inflation expectations as a way out of the liquidity trap.
- 8 Why there is a demand curve for bonds.
- 9 Details on the Fed's quantitative easing programme.
- 10 Evidence on the effects of bond buying on interest rates.
- 11 Fiscal expansion as a way out of the liquidity trap.