



The Federal Reserve and Interest Rates

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Summary

Interest rates are fundamentally the result of desires of suppliers (borrowers) and demanders (lenders) of financial instruments. The prices of financial instruments, or interest rates, are market determined. Moreover these are not just local markets, but international markets. That a single entity, even a large entity, can control prices, given the size of the rest of the market has no historical precedent. Thus, when you read in the press that the Federal Reserve is going to raise or lower interest rates you should take it with a large helping of salt.

However, the Federal Reserve does play a role in the market for financial instruments. They do set the interest rate they pay banks to hold reserves, currently at 0.25%, and they influence the over-night borrowing rate for banks, the so-called Fed-Funds rate. They hold some 35% of all Fannie Mae and Freddie Mac mortgage-backed securities and almost 20% of all publicly held federal debt. What they don't control is all United States or foreign private debt issues. Thus, while we should be concerned about the policies of such a large player in financial markets, we should at the same time recognize their limited ability to determine the rate of interest.

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Interest Rates and Markets

Interest rates are prices, and because they are prices, supply and demand must have something to do with the level of interest rates. On the one hand borrowers, the suppliers of instruments that pay interest, like interest rates to be low. On the other hand lenders, the demanders of instruments that pay interest, like interest rates to be high. How do these conflicting desires concerning the level of interest rates work to get to the interest rates as we see them?

Well, just as with any other price, say the price of flat screen TVs, the price in the market depends on the willingness of buyers to pay and producers to accept the price that makes the quantity of flat screens produced equal to the quantity that consumers want to buy. Producers always want higher prices and buyers always want to pay less. But ultimately, the market determines the actual price producers receive and buyers pay. The real lesson here is that neither the producers nor the buyers can set the price. Recent events have made this point as the glut in oil supplies has dramatically reduced crude oil prices in spite of OPEC attempts to set this price.

Importantly, since interest rates are prices, no one can set them unilaterally; not the Federal Reserve or any government. So when you read in the press the question concerning when the Federal Reserve is going to raise the interest rate you should immediately wonder how they would or could do that.

Federal Reserve: Policy Objective or Market Control?

The reporting in the press leaves the distinct impression that the Fed controls the market interest rate, or at the minimum that its influence dictates not only the interest rate it directly controls, but the broader market as well.

Economics students learn that the Federal

Reserve conducts monetary policy through the market for Treasury Securities. Federal Reserve purchases of Treasuries put money into the economy and Federal Reserve sales of Treasuries take money out of the economy. Thus, the Federal Reserve affects the price level through this expansion and contraction of the money supply. The Federal Reserve can also affect the banking system through changes in bank reserve requirements and the interest rate it charges banks on short term loans.

This last tool often leads to the conclusion that the Federal Reserve sets the interest rate. This conclusion seems to be corroborated by the fact that Federal Reserve actions continue to be couched in terms of interest rate targets. The ability of the Federal Reserve to control the growth in the money supply does give it control over the rate of inflation. Further, because nominal interest rates are a combination of the inflation rate and the real interest rate, the Federal Reserve can control the nominal interest rate. What the Federal Reserve cannot influence is the economy's underlying real interest rate. Real interest rates are determined by market forces that are beyond the Federal Reserve's control.

The Federal Funds rate (the rate that banks pay one another for overnight use of reserves) is the interest rate most commonly referred to as the target rate. Figure 1 shows the Federal Reserve effective rate for the Fed Funds market and the yield on 90-day T-bills. The two rates move together but there is no clear view that one leads the other. The question is whether the Federal Reserve Fed Funds rate simply reflects the market for short-term interest rates?

The press equates the relation between Federal Reserve intentions and market interest rates as if the Federal Reserve is somehow in charge of the level of all interest rates. However, historically there has been only one interest rate directly under the control of the Federal Reserve and that is the discount rate, the rate charged to banks that borrow from the

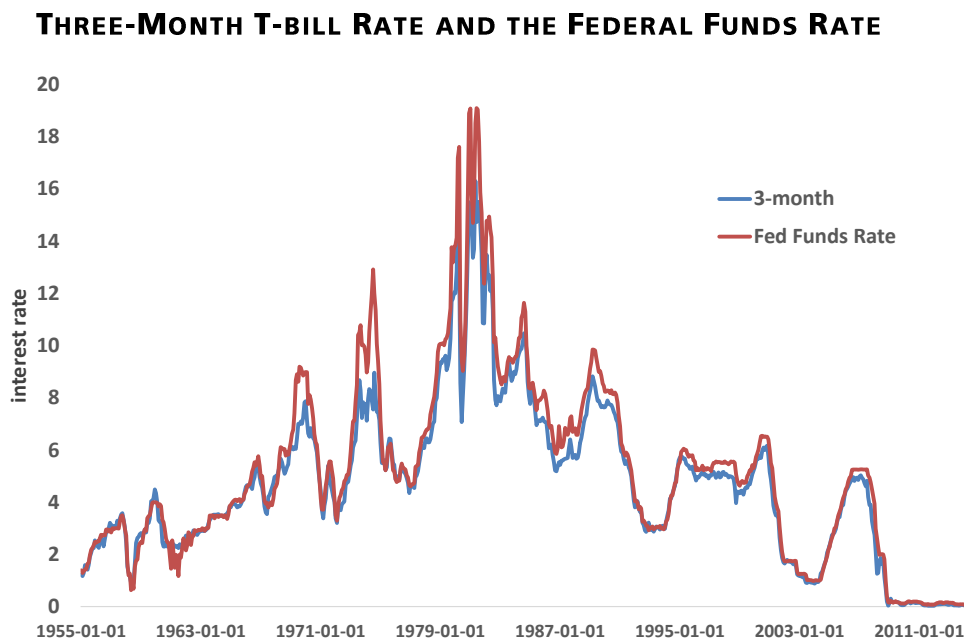
Federal Reserve.

The transmission mechanism of Federal Reserve actions and the Fed Funds rate is typically through the sale or purchase of Treasuries. At least this would have been true before the beginning of 2008 and thus during much of the period depicted in the below figure. A sale of Treasuries, or any other financial asset such as Mortgage Backed Securities (MBS), takes money out of the banking system and reduces reserves. A reduction in reserves makes them scarcer and

by changing the level of Treasuries or other financial assets in the market it affects their supply. For example, the purchase of Treasuries by the Federal Reserve reduces the supply of Treasuries, increases the price of Treasuries and lowers yields. Second, this same purchase of Treasuries increases reserves at banks and allows the system to expand loans which also reduces the rate of interest on such loans.

Let us assume for the moment that the Federal Reserve wants to control a particular

FIGURE 1



Source: Federal Reserve Economic Data, St. Louis Federal Reserve Bank.

increases the overnight borrowing rate. A purchase of Treasuries or other financial assets puts money in the banking system and increases reserves making them less scarce and as a result decreases the overnight borrowing rate.

These same operations also affect financial markets by making the banking system expand or contract their loan portfolio with resulting changes in market interest rates. In this sense the Federal Reserve can influence interest rates and it does so in two ways. First,

interest rate. How would such control be achieved? We know how central banks across the world maintain the exchange rate between their currency and the dollar. Here the banks have dollar reserves so that when there is pressure on the exchange rate they either buy or sell dollars into the foreign exchange market. The only hitch in these plans is when their government finances its expenditures by printing money and inflation occurs, the demand for dollars will rise and ultimately the central bank will run out of dollar reserves.

When that happens the exchange rate must and will change in order to reflect the new level of prices in each country.

In a similar vein assume that the Federal Reserve wants to raise the interest rate on one-year securities to the average rate of 3.47% that existed prior to 2008. (Currently the one-year Treasury yield is 10 basis points (0.1%) so that one-year Treasuries at issue are selling for \$999.) Assume that the Fed does this first buying the one-year Treasuries and then offering to sell unlimited quantities of one-year securities with a yield of 3.47%. Essentially they are offering to sell unlimited quantities of an instrument for \$966 that in one-year will be redeemed for \$1,000.

You can't control the yield on one-year securities by only accepting US buyers. A policy that reduces the market price of one-year securities raises the yield on these securities. Just imagine the influx of buyers from around the world, remember the financial markets are international. This action simply floods the one-year security market, and as a result reduces the one-year security price which in turn raises the one-year security yield. Financial markets are in this sense no different than the market for any consumer good, and flooding the market with goods lowers prices.

But what are the consequences of such an action? In particular, who will come up with the difference between the selling price and the one-year redemption value? There are only two choices. First, the Federal Reserve just prints money to make up the difference. Or, second, the Treasury must pay the difference. Ultimately taxpayers are on the hook either in terms of the inflation that would happen in response to the increase in the money supply or in the taxes necessary to pay the interest on this new debt. Essentially, there is simply no way to separate the central bank from the Treasury.

Suppose the Federal Reserve has enough assets in its portfolio to provide the resources necessary to flood the market. Doesn't this mean that taxpayers are off the hook? Well, no, since the revenue from the assets held by the Federal Reserve are transferred to the Treasury, and as such, reduce the burden on taxpayers. As a result, when these assets are

sold the revenue to the Treasury is lost and must be replaced by taxpayers. This real link between the actions of the central bank and the fiscal arm of the government indicates that the two are permanently intertwined.

It is helpful to place the recent low inflation rates and low real interest rates in the context of the previous past high inflation rates' impacts on realized interest rates on longer term notes. Figure 2 gives us a picture of the relation of immediate past year inflation, current 10-year yield and the realized real yield. It is clear from Figure 2 that rising inflation rates result in falling realized yields as current market rates lag the inflation trend. The period of negative realized real yields from 1963 to 1973 was characterized by just such a period of rising inflation rates as past year inflation rose from 1.75% to 14%. Once market yields adjust to the inflation rate, positive real yields return. In fact, at the peak of current market yields in late 1981 at more than 15%, the real yields obtained by investors rose to unprecedented levels as inflation subsequently fell.

Is there a lesson in all this discussion of nominal interest rates and inflation? In one sense it relates to the general belief, at least in the current popular press, that the Fed has the power to determine interest rates. Such a belief is hard to justify given the data from Figure 2. Are the movements of yields on the 10-year Treasuries depicted due to the Fed setting the interest rate? Clearly, the Federal Reserve's influence over interest rates diminishes with the length of the period to maturity with realized yields largely a result of future inflation rates.

Accepting that interest rates are market determined, what, if anything, can the Federal Reserve do to affect interest rates? The Federal Reserve is now paying interest on reserves and has complete control over this interest rate. Given that the member banks' alternative to holding reserves is buying securities or making loans, the interest rate on reserves sets a lower bound on the yield they will accept on any alternative.

With the advent of interest on reserves the question now is whether the Federal Reserve determines the interest rate or whether it must

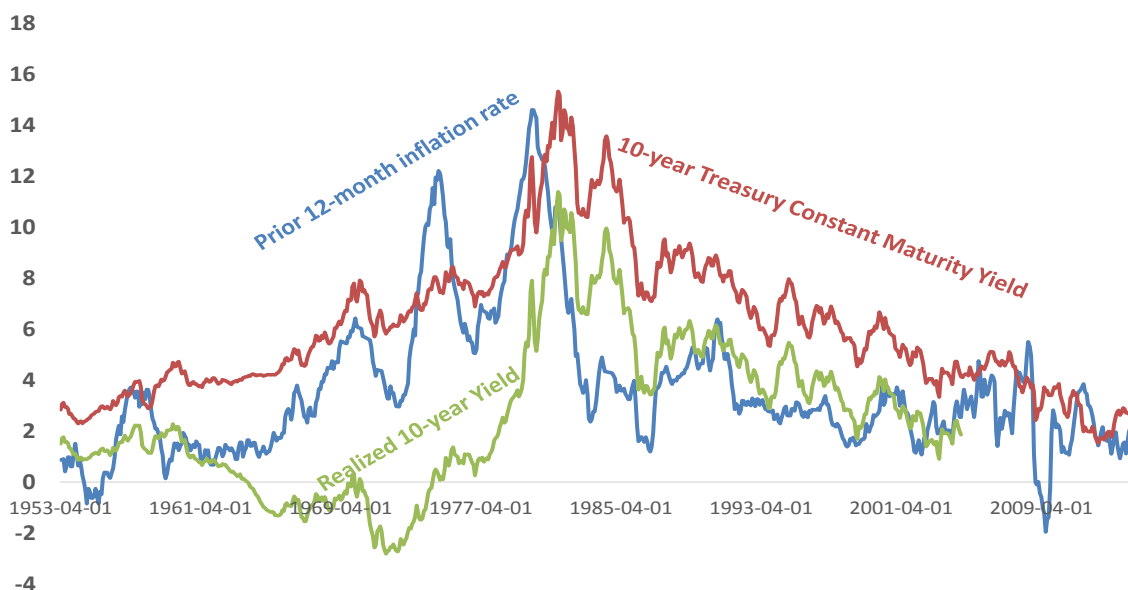
respond to the market level of interest rates. If the Federal Reserve desires to keep the banking system holding the entire amount of reserves, essentially having a banking system with 100% reserve banking, then it must pay an interest rate on reserves that is equal to or greater than the alternative investment available to banks. Here the Federal Reserve is an interest rate taker rather than the force that determines interest rates.

balanced budget world taxpayers are on the hook.¹

Despite the lament “When is the Fed going to raise rates?” heard often in the financial press, does the Federal Reserve have any power to change the interest rate? As we have seen above the answer is yes and no. Yes, in that the Fed can conduct policies that influence interest rates and indeed can set some interest rates directly, but not market

FIGURE 2

CONSTANT 10-YEAR TREASURY YIELD, 1-YEAR INFLATION RATE, AND REALIZED REAL YIELD



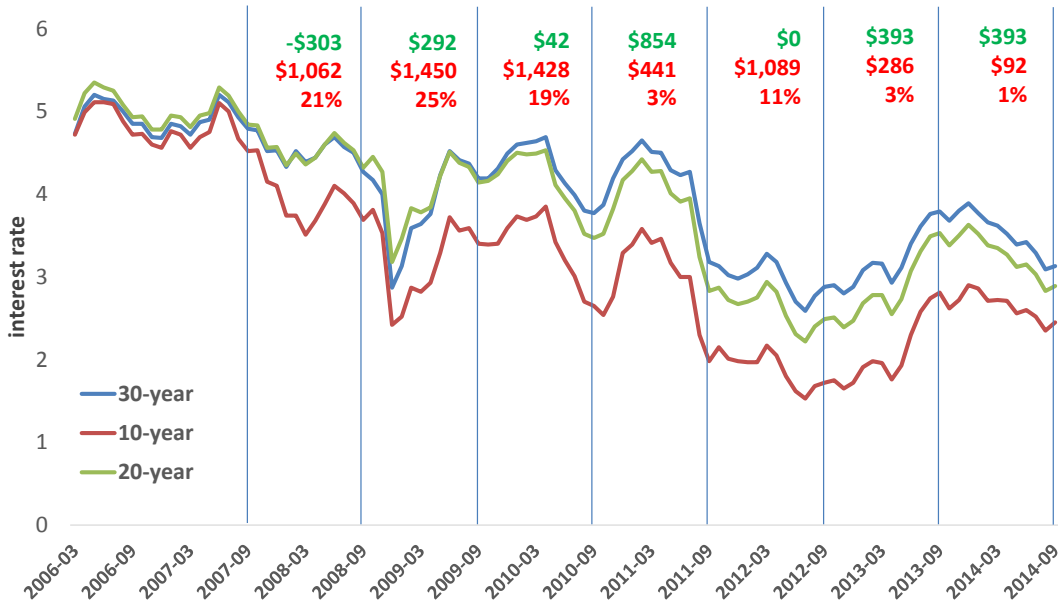
Source: Federal Reserve Economic Data, St. Louis Federal Reserve Bank.

These interest payments on reserves are for all practical purposes the creation of a new form of federal debt by the Federal Reserve. Just because the earnings on the Federal Reserve’s current portfolio are more than adequate to fund the interest payments on reserves does not change this fact. Federal Reserve earnings are transferred to the Treasury and these earnings are reduced by the amount of interest payments on reserves. In effect, interest payments on reserves are equivalent to Federal Reserve sales of assets in their effect on the economy. In either case the servicing costs of the federal debt rise and in a

rates of interest. And most importantly, interest rates are essentially market prices, and as with any market, it is supply and demand that ultimately determine price. But what is the demand and supply that determines the interest rate?

In simple economics jargon, increasing the returns to investing makes the public, the ultimate supplier of funds, willing to forego current consumption in favor of future consumption and put their money in the market. They do this by demanding bonds issued by corporations and/or governments. In a sense the public supplies funds by increasing

FIGURE 3
CONSTANT MATURITY TREASURY YIELDS, 30, 20, AND 10-YEAR
FED PURCHASES IN GREEN, NET TREASURY SALES IN RED



Source: Federal Reserve Economic Data, St. Louis Federal Reserve Bank.

their deposits at investment houses or by directly demanding the bonds of corporations and governments. An increase in the demand for bonds increases their price and reduces interest rates.

Now consider the other side of the market, the suppliers. Essentially the suppliers of bonds to the market are demanders of funds. These demanders run the gamut of the population. There are individuals who want to purchase cars, appliances or houses. There is the federal government that wants to finance increased expenditure or falling revenues. There are firms with market opportunities that want to fund expansion. All these components make up the supply of bonds to the market. In the end it is the balancing of the supply of funds to the market and the demand for these funds that determines the market interest rate.

The Federal Reserve's Recent Purchases and Sales

With this picture of the market for funds in mind how can the current level of

historically low interest rates be explained? We know that throughout the developed world governments have financed large deficits by supplying bonds to the market. If the demand for bonds was unrelated to government finances this dramatic increase in the supply of bonds would have lowered the price of bonds and led to increases in the interest rate. But the opposite occurred. Just as all governments incurred deficits and financed these deficits with bond issues interest rates fell. For example, the yield on U.S. Treasury 10-year Notes fell from 5.1% in mid-2007 to a low of 1.53% in mid-2012. While rates have recovered the 10-year Treasuries were at 2.31% in mid-October 2014 and well below their mid-2007 level. Thus, the unprecedented increase in the supply of Treasuries beginning in 2008 has not resulted in a falling price of these securities.

Figure 3 shows the path of long-term interest rates expressed as 30, 20 and 10 year constant maturity yields from the beginning of 2006 to September 2014. Since the beginning of the recession the federal government has run large deficits financed through the sale of

Treasuries. During the same period the Federal Reserve was operating in the Treasury market. The figure shows in green for each fiscal year the net changes in the Federal Reserve holdings of Treasuries. The Federal Reserve was removing Treasuries from the market so that the net supply increase in the Treasuries market is the difference between new Treasury issues and Federal Reserve purchases. Since all Treasuries are marketable there is no distinction between existing and newly issued securities. As a result, the change in the net Federal Reserve purchases should be measured by the extent to which the existing supply is augmented by new issues. The net increase in marketable Treasuries is measured as the ratio of the new net issue and the existing publicly held debt. This percent change is reported in the red % numbers for each fiscal year.

From the beginning of 2006 through mid-2007, 10, 20, and 30 year Treasury yields remained at about 5%. Then in fiscal year 2008, the first year of large federal deficits, the net increase in the stock of outside-the-government Treasuries was more than 20 percent. Part of the increase was the result of the Federal Reserve replacing \$303 billion of their Treasury holdings with commercial financial assets in response to the 2008 liquidity crisis. Such a remarkable increase in the stock of marketable Treasuries should have resulted in falling prices of Treasuries and a resulting increase in interest rates. However, what actually happened was a decline in interest rates implying that the demand for Treasuries rose even faster than the supply.

During 2009 we saw an even larger increase in the stock of Treasuries in spite of the Federal Reserve restoring their position in Treasuries. While interest rates were very volatile that year at the close of the fiscal year, they remained essentially unchanged from their close of fiscal 2008 levels. Thus, the demand for Treasuries increased significantly to offset the net 25% increase in supply.

The stock of Treasuries increased by double digits during 2010 but without any increase in Treasury yields. In fact interest rates at the close of fiscal 2010 were lower than the close of the previous fiscal year. Then in

2011 the Federal Reserve covered about 20% of the federal deficit so that the increase in the supply of Treasuries to the market fell to 3%. However because of the previous growth, that 3% still accounted for an increase in the supply of \$440 billion.

During 2012, the Federal Reserve was totally out of the Treasury market, with no purchases, so that the entire federal deficit resulted in an increase of over \$1 trillion in the stock of Treasuries and a return to double digit increases. Remarkably this surge in the supply of Treasuries was accompanied by a continued rise in the price of Treasuries and a resulting fall in yields, just of opposite of what one might expect.

Last year the Federal Reserve returned as a major player in the market for Treasuries. Both in fiscal years 2013 and 2014 the Federal Reserve increased its purchases of Treasuries by \$393 billion. These purchases financed more than 57% of the federal deficit in 2013 and more than 80% in 2014.

The much smaller increase in the supply of Treasuries in 2013 was accompanied by a fall in the price of Treasuries, and a rise in Treasury yields, again the opposite of what would have happened if demand had remained constant. Then in 2014 Federal Reserve purchases of Treasuries reduced the addition to the outstanding stock of Treasuries to their lowest level since the beginning of the Great Recession. In this case the price of Treasuries rose and yields fell, a result that is at least consistent with our usual view of how these markets work.

The problem with the preceding discussion is that it is only about the supply of Treasuries. But markets are about supply and demand, not just supply. Moreover, there is no information presented on the supply of substitutes for Treasuries. Specifically the equivalent of U.S. Treasuries from other countries in the developed world were also increasing in supply throughout the period.

The market for Treasuries does not operate in a vacuum. In addition to other government's bonds playing a role, long-term private securities also compete for funds in this market. Specifically, Mortgage Backed Securities (MBSs) are substitutes for Treasuries

in any financial portfolio. Importantly, it is these securities that have been the subject of major purchases by the Federal Reserve. During fiscal year 2013 the Federal Reserve purchased just over \$500 billion MBSs and this year over \$350 billion. When added to the Federal Reserve's purchases of Treasuries these purchases more than offset the net sale of Treasuries.

It is clear that there is considerably more going on in the market for securities than actions by the Federal Reserve. All this raises serious questions concerning the Federal Reserve's ability to control interest rates.² With this in mind, why are interest rates at historic lows? It must be one of two reasons.

First, consumers, the ultimate suppliers of funds to the market, are so worried about the future that they are willing to give up current consumption and set aside funds for a future of doom, thus, increasing the supply of funds to the market.

Second, firms with market opportunities, the demanders of funds, have so little confidence in the future that even near-zero borrowing costs will not match the hurdle rate required to go ahead with their projects for the future, reducing the demand for funds. The evidence is that both of these hypotheses carry weight.

The facts of the matter are that the Fed, in setting its target for the federal funds rate, just follows the market. It has limited power to set interest rates and once we understand that markets determine interest rates, what would we want the market interest rate to be? From the perspective of the future we would want investment opportunities to be so abundant that firms would be willing to pay dearly for the available funds, i.e., we would want interest rates to be high, at least in real terms.

Conclusion

Interest rates are low, even in nominal terms, making them even lower in real terms. Such rates cannot exist without a lack of real capital investment opportunities. This lack of investment opportunities is the result of considerable uncertainty concerning the future costs of production, and is not based on

the usual level of uncertainty about the economy, but rather about future government policy. When the future is uncertain, you don't build permanent structures and hire permanent labor; in their stead you put up tents that are easy and almost costless to dismantle and hire temps.

The cost of these historic low real rates of interest is that they make the consumption of capital cheap. Cheap cost of capital consumption means that as a nation we will consume capital by not maintaining it. Further, it means that the demand for capital for personal consumption, such as housing and automobiles for example, will expand, while capital for investment will decline.

Ultimately, markets determine interest rates in spite of the message to the contrary expressed in the financial press. In simplistic terms, as with all markets, it's all about supply and demand. The suppliers of funds to the market, the public, must meet the demanders of these funds, investors and the federal government.

We should not waste our time arguing that the Fed should allow interest rates to rise since they have no real way to affect the real rate of return on capital. And if they could, we would want the Fed to make it higher so as to stimulate economic growth. Let's rather correct the political process and restore stability to the marketplace, as least as far as government policy is concerned.

References

¹For an excellent discussion of the implications of "interest on reserves" as a monetary policy see John H. Cochrane, "Monetary Policy with Interest on Reserves," *Journal of Economic Dynamics and Control*, December 2014, pp. 74-108.

²A thorough empirical analysis of the Federal Reserve's influence on interest rates is found in: Eugene Fama, "Does the Fed Control Interest Rates?" *The Review of Asset Pricing Studies*, December 2013.