

## Handout for Fed Funds Futures

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### I. Contract Specification

Remember that when you “buy a futures contract” you enter into a contract to buy something for a price that you agree on now. When you “sell a futures contract” you enter into a contract to sell something for a price that you agree on now.

It is a little bit tricky with the federal funds futures as there is technically no underlying asset. For this reason the settlement must always be in cash—based on a notional security. The contract specifies that this notional underlying security is the interest payment on a \$5 million, 1-month note, based on the average of the realized federal funds rate during the month. The contract also specifies that this interest payment will be based on a 30/360 payment convention. That is,  $\frac{1}{12}$  of a year. The price is quoted as  $100 - 100 \cdot \bar{r}$ . Where  $\bar{r}$  is the average of the realized federal funds rate during the month.

Thus, if you enter a long position in the December 2016 contract at 98.5, you are agreeing to pay \$41.67 for every basis point that the actual average federal funds rate in December 2016 exceeds 1.5%, and to receive \$41.67 for every basis point that the actual average federal funds rate in December 2016 is less than 1.5%. The \$41.67 is the value of a basis point on this contract—computed by  $.0001 \times 5,000,000 \div 12$ .

A futures contract is in 0 net supply, and the price is determined so that the contract has a value of zero when entered. Futures contracts trade on organized exchanges such as the Chicago Mercantile Exchange. A feature of such exchanges is that they break the link between counterparties to a transaction. Thus, when I enter a futures contract, I don’t even know who the counterparty is. This is accomplished by establishing a clearinghouse. So effectively the counterparty on a futures transaction is the clearinghouse. The clearinghouse insures that contracts will be fulfilled by requiring the parties to a transaction to maintain a margin account. The exchange

determines the initial margin requirement for each contract. This is determined by the contract's volatility.

Futures positions are marked-to-market at the end of each day—in the margin account. If the margin account drops below the secondary margin requirement for the contract, then the account must restore the initial margin amount.

## II. Inferring “Market Beliefs”

The Fed Funds futures contract allows analysts to directly observe market expectations about Federal Reserve policy. This is important for both substantive and methodological reasons.

Since the contract depends only on the average federal funds rate during the specified month, the futures implied rate is the market's expectation of this average. The easiest way to extract market beliefs about Fed policy are in the following scenario:

1. The next FOMC meeting is on the first day of a future month. (Example: Today is January 27, 2016, and the next FOMC meeting is March 1, 2016.)
2. We assume that the “Fed” (i.e., FOMC) will only change its target on a scheduled meeting date.
3. We assume that the average federal funds rate in any period will equal the Fed's target rate for that period.

So extending this example, suppose that the target rate on January 27, 2016 is 75 basis points and the price of the March 2016 fed funds futures contract is:

1. 99.125?
2. 99.25?
3. 99.375?
4. 99?

In this setting we can infer what the market expects the target to be at the March 1 meeting.

Of course the Fed will not set a target rate of 57.6 basis points. All targets have been on a 25 basis point grid, and it is reasonable to expect this to characterize future policy decisions.

So with this assumption, we can also translate an expected rate into a probabilistic statement about the Fed's actions. Let's suppose that the March fed funds futures contract price is 99.125. So as we saw, this means that the expected fed funds rate target in March is 87.5 basis points. Since the current target is 75 basis points, one way of achieving the market's expectations is if the market assigns a 50% probability to the Fed increasing its target fed funds rate from 75 basis points to 1%.

This approach must be tempered with some imprecision. For example what do we say about expected Fed policy if the futures price in this example is 99?

Of course it is rare when the FOMC meets on the first day of a month. In cases where the FOMC meets on another day, then the analysis must also take into account the averaging of the target across the two segments within the month. So let's stick with the above example, but instead of March 1, the FOMC meeting is scheduled for March 15, 2016. Then we would assume that the average fed funds rate will be 75 basis points in the period March 1 through March 14, and the average fed funds rate from March 15 through March 31 will be the Fed's new target rate. All of the logic and intuition still holds, the algebra just gets a little more complicated.

So let's analyze the market's expectations about future Fed policy in this situation where the fed funds rate futures price is 99.2.

1. Does the market think it more likely that the Fed will: a) lower its target, b) leave its target unchanged, or c) raise its target?
2. What is the market's expected fed funds rate for March?
3. What can we say about expected Fed policy?