

# Options on CBOT® Fed Funds Futures Reference Guide



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## Introduction

Options on CBOT Fed Funds futures are an important risk management tool for anyone who wants to hedge against, or speculate on, changes in short-term interest rates brought about by changes in Federal Reserve monetary policy. Options on CBOT fed funds futures offer market participants an instrument with defined risk parameters that can be used to express a view on the likelihood of Fed policy changes. It can also be used in a variety of risk management applications. Financial market participants who can benefit from using these options include, but are not limited to, bond traders, hedge fund managers, portfolio managers, corporate treasurers, and bank investment managers.

The salient features of options on CBOT fed funds futures are summarized in Exhibit 1.

<b>Exhibit 1: Salient Features of Options on CBOT Fed Funds Futures</b>	
<b>Trading Unit</b>	An option is for one (1) Fed Funds futures contract of a specified contract month on the Chicago Board of Trade
<b>Price Basis</b>	Option premiums are quoted in basis points
<b>Tick Size</b>	The minimum tick size is one-quarter of one basis point, which is equal to \$10.4175
<b>Daily Price Limits</b>	None
<b>Contract Months</b>	Every month for 2 years
<b>Last Trading Day</b>	Last business day of the calendar month
<b>Expiration</b>	Unexercised options shall expire at 7:00 p.m. (Chicago time) on the first business day following the last trading day
<b>Exercise</b>	American style. The holder can exercise on any business day prior to expiration by giving notice by 6:00 p.m. (Chicago time) to the Board of Trade clearing service provider
<b>Automatic Exercise</b>	Automatic exercise after 6:00 p.m. (Chicago time) on the business day following the last day of trading unless notice to cancel automatic exercise is given to the Board of Trade clearing service provider
<b>Trading Hours</b>	Open auction only: 7:20 a.m. to 2:00 p.m. (Chicago time). Monday through Friday
<b>Ticker Symbols</b>	FFC-Fed Fund calls; FFP-Fed Fund puts



## Potential Users of Options on CBOT Fed Funds Futures

The fact that a variety of short-term interest rate instruments price in terms of the fed funds rate makes these options invaluable risk management and trading tools for a broad range of end users.

### *Commercial paper issuers*

Companies that routinely issue large quantities of commercial paper can reduce their financing costs by writing call options on CBOT fed funds futures against the paper they anticipate issuing, given an opinion on volatility that makes this feasible. This can reduce the cost of issuance by the amount of premium collected on calls. Or it can transform outright short-term rate risk to basis risk between commercial paper rates and the funds rate.

### *Portfolio managers*

Institutional investors who hold large amounts of commercial paper and who see a favorable outlook for fed funds volatility can write calls against their holdings with an eye to enhancing returns. This strategy is roughly analogous to a covered call writing strategy in the equity and equity option markets.

### *Matched book traders*

Dealers in government securities often run large matched books and make loans or borrow money using government securities as collateral. The benchmark rate for these transactions is the fed funds rate. Matched book traders can use options on CBOT fed funds to balance exposure on either side of the market or to hedge exposure to financing tails.

### *Bond dealers*

Bond dealers finance their inventories (both long and short) against the fed funds rate. In addition, bond basis and yield curve trading strategies are highly sensitive to the funds rate. Bond dealers can use options on CBOT fed funds both to manage risks from shifts in the yield curve and to manage the costs of financing basis trades.

### *Hedge fund managers and proprietary traders*

Relative value traders who use eurodollar options to express views on LIBOR volatility can use those options in combination with options on CBOT fed funds futures to trade differentials between these two volatility markets.

### *Interest rate swap users*

Users of interest rate swaps must often deal with timing mismatches between the swap and the hedge instruments they use. These market users will find that options on CBOT fed funds futures can help them control that stub risk.

### *Foreign Exchange Dealers*

Because interest rate differentials are a key determinant of currency rates, foreign exchange dealers have many potential uses of options on CBOT fed funds futures. Conservative users can use options on CBOT fed funds futures to manage the spread between spot and forward rates. Because currency rates are sensitive to changes in interest rate differentials, currency speculators can use options on CBOT fed funds futures to express a view on Federal Reserve monetary policy.

## **Key Benefits of Using Options on CBOT Fed Funds Futures**

Users of options on CBOT fed funds futures stand to gain key benefits including the contract design, their proximity to other CBOT interest rate contracts, the transparency of CBOT markets, and the backing of the Board of Trade clearing service provider.

### *Design*

The design of options on CBOT fed funds futures took into consideration the input of a wide range of market professionals in both the cash and futures markets. As a result, the design specifications efficiently capture the market's need for an instrument that attempts to accurately reflect Federal Reserve monetary policy.

### *Credit*

Users of options on CBOT fed funds futures benefit from the Board of Trade clearing service provider. This makes CBOT contracts comparable to the strongest credits and greatly preferable to lower-quality credits. The use of these options also reduces the need for cumbersome bilateral collateralization agreements.

### *Proximity to other CBOT products*

The fact that options on CBOT fed funds futures trade in the Treasury bond options pit and are in close proximity to the other Treasury options provides more opportunities for spreading against the most liquid markets at the exchange.

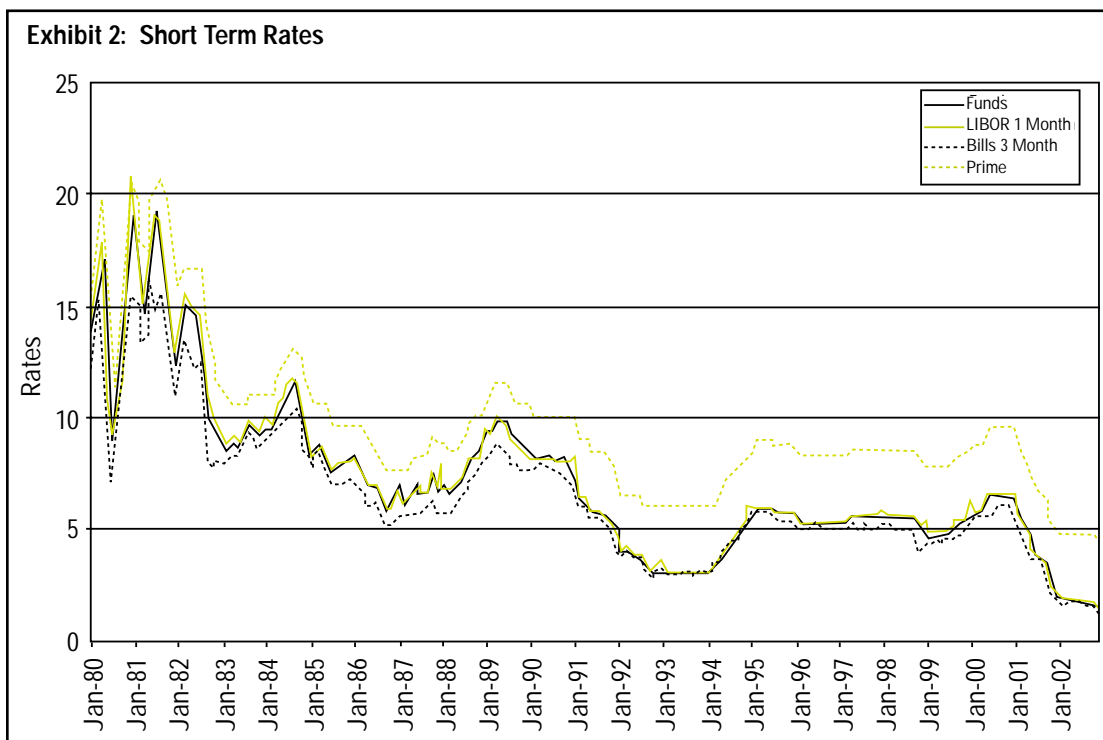
### *Transparency*

Easy access to CBOT markets means that many players with differing information and opinions can bring their orders to the market and easily find the market-clearing price. This reduces search and other transaction costs and makes them among the most transparent markets there are.



## Market Background

Because the Federal Reserve uses the funds rate to conduct monetary policy, it is one of the most important interest-rate benchmarks in the United States. Since the dollar is the world's reserve currency, the fed funds rate is arguably one of the most important rates in the world. Not only is the fed funds market extremely large; it can be quite volatile. Exhibit 2 illustrates both how volatile the funds rate can be and how well correlated it is with the rates of other short-term instruments. Over the last 20 years, the fed funds rate has traded higher than 20% and as low as 1.25%. The volume of trading is enormous. On a typical day during 2002, Treasury dealers traded over \$1.25 *trillion* in fed funds as they financed positions.<sup>1</sup>



In October of 1988, the CBOT introduced its fed funds futures contract, giving traders a mechanism for speculating or hedging against changes in Federal Reserve policy and its attendant ripple effects. The CBOT fed funds contract represents the average daily fed funds effective rate for a given calendar

<sup>1</sup> See <http://www.ny.frb.org/pihome/statistics/>

month as reported by the New York Fed in its weekly H.15 release. The contract has a notional value of 5 million dollars (\$5,000,000). The CBOT fed funds contract is quoted on an index basis. The interest rate is the difference between the index price and 100. For instance, an index price of 98.5 implies a 1.5% rate ( $100 - 98.5 = 1.5$ ). The contract is quoted in increments of one-half of one basis point (0.005), with 100 basis points equaling a full percentage point. For instance, if the market were quoted 98.745-98.755 the bid-ask would be 1.255% -1.245%.

Options on CBOT fed funds futures give holders the right to buy or sell the underlying futures contract at a specified price within a specified time period. Strike prices for these options are set in increments of 6.25 basis points bracketing the nearest "at the money" fed funds futures price, rounded to the nearest one-quarter of one percentage point. For instance, if fed funds futures were trading at 98.05, available strikes would bracket 98.00, as Exhibit 3 shows.



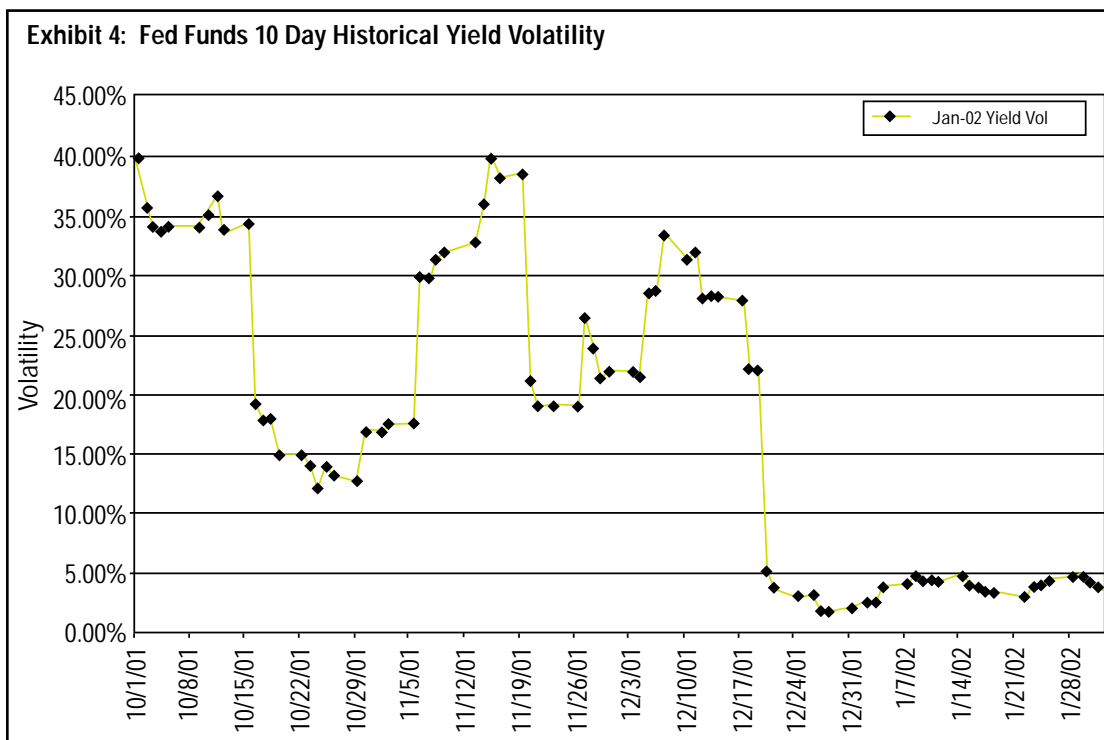
<b>Exhibit 3: Available Strike Prices</b>	
<i>Fed Funds Price</i>	<i>Strike Prices</i>
	98.2500
	98.1875
	98.1250
	98.0625
98.050	98.000
	97.9375
	97.8750
	97.8125
	97.7500

While prices of fed funds futures can be quoted with a minimum spread of one-half a basis point, options on fed funds futures can be quoted with a minimum spread of only one-quarter of one basis point. The one-quarter basis point tick value is worth \$10.4175 per contract.

## CBOT Fed Funds Volatility Characteristics

The volatility of the underlying futures contract is the basis for pricing the companion options. There are some important characteristics of the CBOT fed funds futures contract that affect volatility. This futures contract is based on a monthly average of daily effective fed funds rates reported by the New York Federal Reserve. This has the effect of dampening the volatility normally associated with day-to-day moves in interest rates. Moreover, since 1994, the Federal Reserve has adopted a policy of announcing rate changes on days of regularly scheduled Federal Open Market Committee (FOMC) meetings. This has added transparency and reduced uncertainty as to the course of monetary policy.

The volatility of fed funds futures (and the related options) tends to vary widely over time.<sup>2</sup> A good way to see this is to examine the volatility of a CBOT fed funds futures contract as it progresses over time toward expiration. Exhibit 4 presents these data for the January 2002 fed funds contract from October 2001 through the January 2002 expiration.



Source: Bloomberg, PLC

<sup>2</sup> Volatility is a measure of the change in price over time. It is generally expressed as the annualized logarithm of the standard deviation of day-to-day price changes for a set period of time. The volatility measure employed here uses ten-day samples, assumes 220 trading days in the year, and is calculated using Bloomberg analytics.



It is important to remember that it is yield volatility, not price volatility, that is being examined. Because the base numbers used in the calculations are relatively small, seemingly small changes can generate large swings in yield volatility. Another factor that the graph illustrates is that, all else equal, volatility will have a tendency to drop once a contract becomes the spot month. Before a contract is the spot month, changes in Federal Reserve policy are likely to be embedded in the pricing structure of back contract months. But rapid decay of volatility once a contract becomes the spot month is apparent from the graph. For instance, for the January 2002 fed funds contract, October volatility averaged 24.7%; November volatility averaged 26.7%, and December volatility averaged 18.8%. January volatility averaged only 3.91%.

However, because fed funds futures prices are averaged over all the days of the spot month for settlement purposes, the effects of FOMC policy changes will be attenuated by previous daily closes in the spot month. This is especially true when the FOMC meets late in the month (as they did in January of 2002) or not at all. This is illustrated in Exhibit 5 which shows high, low, and closing implied yields for the January Fed Funds contract for October 2001 through January 2002, with FOMC meeting dates highlighted. The FOMC met early in October, November, and December but late in January, which in part explains why volatility fell off so rapidly after the December 2001 meeting.

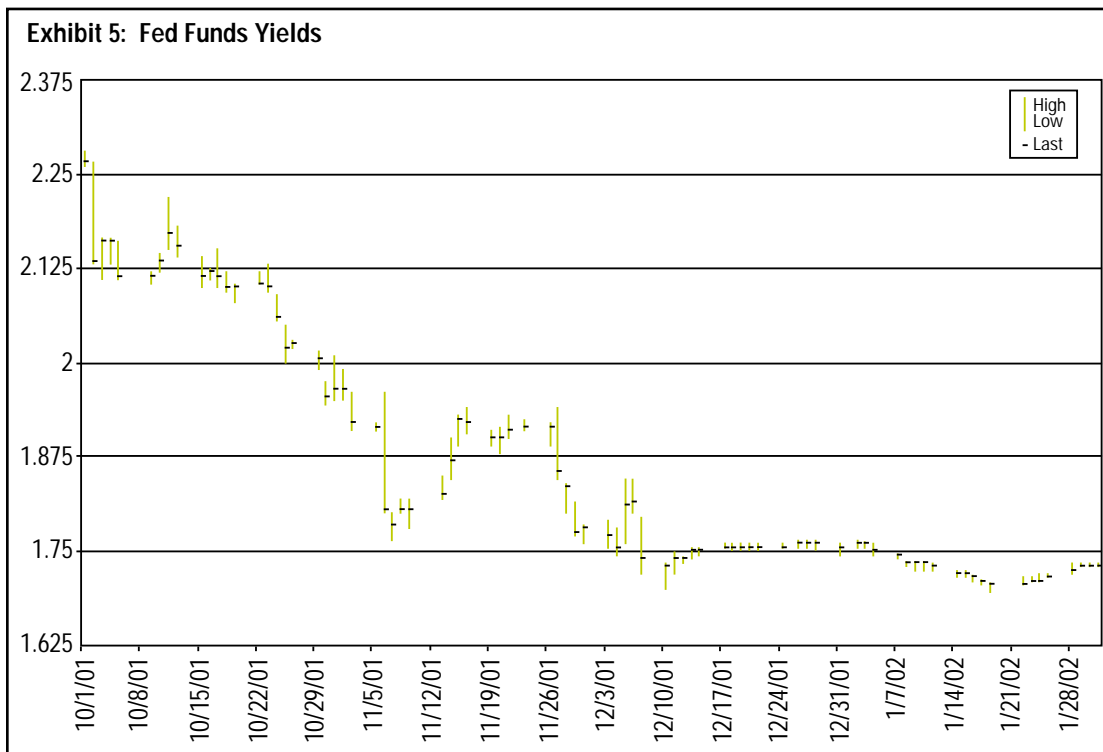


Exhibit 6 generalizes these observations by tracking fed funds futures historical volatility means, highs, and lows throughout 2002.

<b>Exhibit 6: CBOT Fed Funds Futures – 20 Day Historical Volatility (2002)</b>						
	FF1	FF2	FF3	FF4	FF5	FF6
Mean	14.8	20.6	26.8	36.6	44.5	49.9
High	59.4	45.3	48.3	57.8	59.9	68.0
Low	0.0	3.6	6.0	14.0	21.0	33.1

Source: Bloomberg, PLC

On the table of Exhibit 6, the FF1 column captures front month volatility for all the months. FF2 captures the volatility of the next month out. Thus, in February 2002, FF1 would have been the volatility of the February fed funds contract. In March, FF1 would have been the volatility of the March contract. In February, FF2 would have been the volatility of the March contract. In March, FF2 would have been the volatility of the April contract, and so on through the year.

This exhibit shows that the volatility of deferred months is much greater than that of nearby months. However, note that the range of volatilities observed is much greater in the front months than in the back, or deferred, months.

Because of the unique volatility character of options on CBOT fed funds futures, traders cannot use the same assumptions about volatility patterns that serve them in other markets. They will need to give careful thought to the matter of which expirations and strike prices they trade.

### Areas of Application

Because the FOMC uses the fed funds rate to set monetary policy, it is the benchmark money market rate in the United States financial system. It affects short-term financing costs throughout the economy. Bank loans, commercial paper, and retailers' inventories, all feel the impact of changes in the fed funds rate.

Not only is the fed funds rate the benchmark for US money markets; it is one of the most important rates in the international financial system because the US dollar is the world's reserve currency. Indeed, many sovereign nations have established currency boards to directly tie their nations' currency to the dollar.

Because CBOT fed funds futures tend to be highly correlated with other short-term interest rates, options on CBOT fed funds futures can be used either speculatively to anticipate changes in monetary policy, or they can be used more conservatively to hedge inventory financing risk across many different markets. As a result, options on CBOT fed funds futures can serve a wide spectrum of potential users and uses.

### For More Information

To learn more about options on CBOT fed funds futures, call 312-341-7955 or visit [www.cbot.com](http://www.cbot.com).

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