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INTEREST RATE DERIVATIVES

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FED FUND RATE AND SOFR

What is the Federal Funds Rate?

By law, banks must maintain a reserve equal to a certain percentage (reserve requirement) of their deposits in an account at a Federal Reserve bank.

Any money in their reserve that exceeds the required level is available for lending to other banks that might have a shortfall. The interest rate the lending bank can charge is the federal funds rate, or fed funds rate.

How is the Fed Funds Rate set? Why is it important?

- based on unsecured overnight lending between banks.
- represents the rate at which depository institutions lend excess reserves to one another.

The Fed adjusts the federal funds rate in response to economic conditions:

Lowering the rate:

- When the Fed wants to stimulate economic growth or prevent unemployment from rising.
- This makes borrowing cheaper throughout the economy, encouraging spending and investment.

Raising the rate:

- When the Fed wants to cool down an overheating economy or combat inflation.
- Making borrowing more expensive and encouraging saving.

Holding **steady**:

- In periods of economic stability, the Fed may choose to keep the rate unchanged for extended periods.

The rate also influences short-term interest rates, indirectly. The prime rate, the rate banks charge their most creditworthy borrowers, will be affected.

FED FUND RATE AND SOFR

What is SOFR (Secured Overnight Financing Rate)?

- SOFR replaced LIBOR as the primary U.S. dollar (USD) benchmark rate following LIBOR's phaseout in June 2023.
- Borrower bank gives lender a U.S. Treasury bond as collateral and agrees to buy it back the next day at a slightly higher price (interest rate).
- The SOFR is calculated based on these interest rates using a volume weighted median approach

Comparison between Fed Fund and SOFR

	Fed Fund	SOFR
Calculation	Influenced by monetary policy	Purely market driven
Risk	Affected by factors such as a bank's creditworthiness and liquidity conditions	Backed by federal securities, considered risk-free
Publication Frequency	Daily	Daily

INTEREST RATE DERIVATIVES

What Is an Interest Rate Derivative?

- An interest rate derivative is a financial instrument with a value that is linked to the movements of an interest rate or rates. These may include futures, options, or swaps contracts.

Overview of main types (futures, swaps, options)

- A futures contract:
 - agreement to buy a specified quantity of a commodity or asset at a predetermined price (instead of the floating price) on a future date.
 - allows participants to take a long or short position in the underlying asset.
- Swaps:
 - two counterparties agree to exchange periodic interest payments on a pre-specified notional amount. One party is effectively paying a fixed rate while the other party is effectively paying a floating interest rate e.g. LIBOR + spread
- Options
 - gives the holder the right—but not the obligation—to buy or sell an asset at a predetermined price within a specific time frame.

Call Option	Buy the asset at a fixed price (called the strike price)	If you think the price will go up
Put Option	Sell the asset at the strike price	fl you think the price will go down

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What is a 3-month SOFR future?

- Exchange: Traded on platforms like CME Group, under the code SR3.

Feature	Details
Notional Value	\$2.5 million per contract
Tick Size	0.005 points (≈ \$12.50 per contract)
Contract Months	Quarterly: March, June, September, December
Settlement	Cash-settled (no physical delivery)
Final Price	100 - average SOFR over the 3-month period

Example scenario: ABC Corporation has \$100 million in floating-rate debt tied to SOFR + 2%. The CFO worries about rising rates.

- Current State:
 - Debt: \$100 million at SOFR + 2%
 - Current SOFR: 4.50%
 - Current interest cost: \$6.5 million annually
- The Hedge:
 - Action: Sell 40 SOFR futures contracts (40 × \$2.5M = \$100M exposure)
 - Rationale: If SOFR rises, futures prices fall, generating profits that offset higher interest costs
- Outcome if SOFR rises to 5.50%:
 - New interest cost: \$7.5 million (+\$1 million)
 - Futures profit: ~\$1 million (approximate offset)
 - Net effect: Interest rate exposure is hedged
- Explanation
 - Current interest cost: $\$100\text{M} \times (4.5\% \text{ SOFR} + 2\%) = \6.5M .
 - If SOFR rises to 5.5%, new cost: $\$100\text{M} \times (5.5\% + 2\%) = \7.5M .
 - Futures profit: If each contract gains \$25,000 per 1% rate change, 40 contracts × \$25,000 = \$1M profit.

INTEREST RATE DERIVATIVES

Basic Futures Pricing

- Discrete Compounding

$$F = (S_0 - PV(I) + PV(C)) \times (1 + r)^T$$

- Continuous Compounding

$$F = (S_0 - PV(I) + PV(C)) \times e^{rT}$$

These represent the future value F of an investment or cash flow, where:

S_0 = initial value

I = income (e.g., dividends)

C = carrying costs

r = risk-free interest rate

T = time horizon

$PV(\cdot)$ = present value of a cash flow

INTEREST RATE DERIVATIVES

Margin requirements (initial, variation, maintenance)

- **The initial margin:** the amount a trader must deposit up front to open a position in a futures contract.
 - financial assurance to the broker (and the exchange) that the trader can fulfill their obligations, regardless of market movements.
 - This cost is determined by the exchange and is generally set as a percentage of the contract's notional value.
 - preventing traders from taking positions that are too large in relation to their capital base.
- **The variation margin :** the amount of that must be added to or can be withdrawn from a trader's margin account to reflect the daily changes in the market value of their futures contracts.
 - Mark-to-Market: Futures contracts are marked to market daily. This means the profit or loss from the day's price movement is calculated and settled.
 - Gain Scenario: If the market moves in your favor, the variation margin is credited to your account.
 - Loss Scenario: If the market moves against you, you must deposit additional funds to cover the loss—this is known as a margin call.
 - Suppose you hold a futures contract and the market drops:
 - Day 1: You post an initial margin of \$5,000.
 - Day 2: The contract loses \$800 in value.
 - You must deposit \$800 as variation margin to maintain your position.
 - If you fail to meet this requirement, your broker may liquidate your position to prevent further losses.

INTEREST RATE DERIVATIVES

Margin requirements (initial, variation, maintenance)

- **The maintenance margin** : the minimum amount of equity that must be kept in your margin account after you've opened a futures position.
 - If your account balance falls below this threshold due to market losses, you'll receive a margin call—a demand to deposit more funds or risk having your position liquidated.
 - Example: You open a futures position with an initial margin of \$5,000.
 - The maintenance margin is set at \$4,000.
 - If your account drops to \$3,900 due to adverse price movement:
 - You'll get a margin call for \$1,100 to bring your account back up to the initial margin level.
 - If you don't respond, your broker may close your position to prevent further losses.
- Risk Management: Variation margin protects brokers and exchanges from default risk.
- Transparency: It ensures that all gains and losses are settled daily, keeping the system fair and stable.
- Liquidity Discipline: Traders must maintain sufficient funds to cover potential losses, encouraging responsible leverage use.

Settlement method for futures (physical vs cash)

- Cash settlement : the seller of the financial instrument, not delivering the underlying asset but transfers the Net Cash position.
 - Quick and does not incur extra cost
- Physical Settlement/Delivery: requiring the actual underlying asset to be delivered on the specified delivery date
 - Exchanges ensure the conditions for the contracts which they cover to ensure the contract is executed smoothly.
 - Exchanges also regulate the locations for delivery, especially in the cases of commodities.

INTEREST RATE DERIVATIVES

Rewards

- **Hedging:** not aiming to make a profit directly from the derivative—trying to protect against losses in another position.
 - Examples:
 - A company exposed to oil prices buys oil futures to lock in costs.
 - An investor holding foreign stocks buys currency options to guard against exchange rate swings.
 - A farmer sells grain futures to guarantee a selling price months before harvest.
 - Gains from Hedging:
 - Avoided losses: If the market moves against the underlying asset, the derivative offsets the damage.
 - Stabilized cash flows: Businesses can plan better when they know their costs or revenues won't swing wildly.
 - Preserved profits: Hedging locks in favorable conditions before they change.
- **Speculation:** taking calculated risks to profit from price movements—without necessarily owning the underlying asset.
 - Examples:
 - A trader buys call options expecting a stock to rise.
 - An investor shorts futures contracts anticipating a commodity price drop.
 - A speculator uses swaps to bet on interest rate changes.
 - Gains from Speculation:
 - Leverage: Small upfront investment can control large positions.
 - Directional bets: Profit from both rising and falling markets.
 - Flexibility: Derivatives allow exposure to assets without owning them.
 - Example: A speculator buys a futures contract for 1,000 barrels of oil at \$62. If oil rises to \$80, they profit \$18,000—without ever touching a barrel.

INTEREST RATE DERIVATIVES

Risks

Risk Type	Description	Common in...
Leverage Risk	Small margin, large exposure	Futures, options
Market Risk	Price moves against position	All derivatives
Counterparty Risk	Other party defaults	OTC contracts
Liquidity Risk	Hard to exit position	Exotic derivatives
Complexity Risk	Misunderstanding structure	Structured products
Systemic Risk	Chain reaction across institutions	Swaps, CDS
Operational Risk	Execution or settlement errors	All trading environments
Legal Risk	Regulatory changes or disputes	Cross-border contracts

INTEREST RATE DERIVATIVES

Risk evaluation metric: DV01

- DV01 stands for "Dollar Value of 01", also known as PV01 (Present Value of 01). It measures the change in the value of a financial instrument (typically a bond or interest rate derivative) for a 1 basis point (0.01%) change in yield/ Interest rate.

$$DV01 = \frac{\Delta P}{\Delta y}$$

- Where:
- ΔP = Change in price of the instrument
- Δy = Change in yield (typically 0.01% or 1 basis point)

- Alternatively,

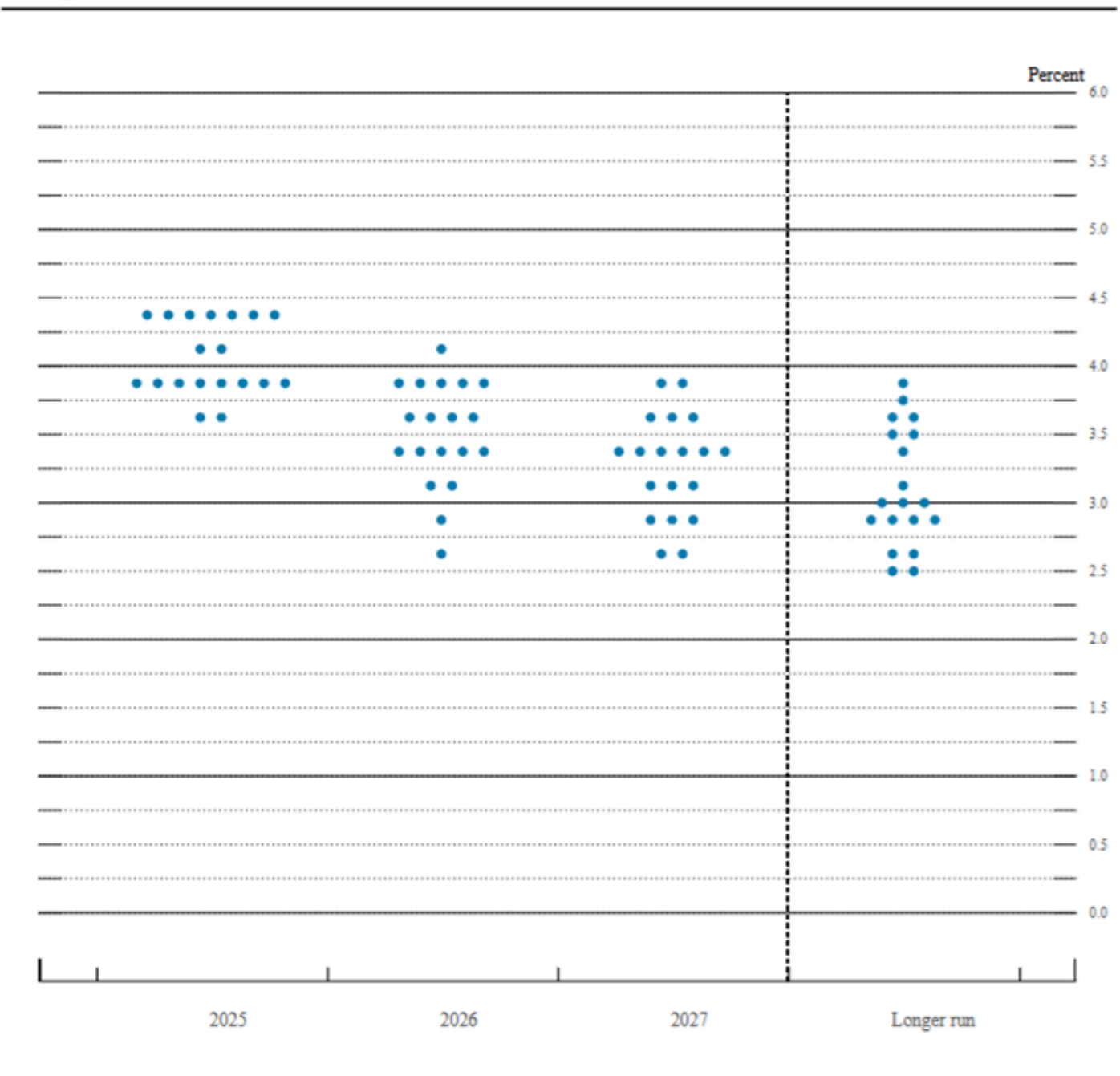
$$DV01 = \text{Modified Duration} \times \text{Market Value} \times 0.0001$$

- Modified duration measures the percentage change in a bond's price for a 1% change in yield.

MARKET OUTLOOK FOR THE NEXT 6-12 MONTHS ON RATE MOVEMENT

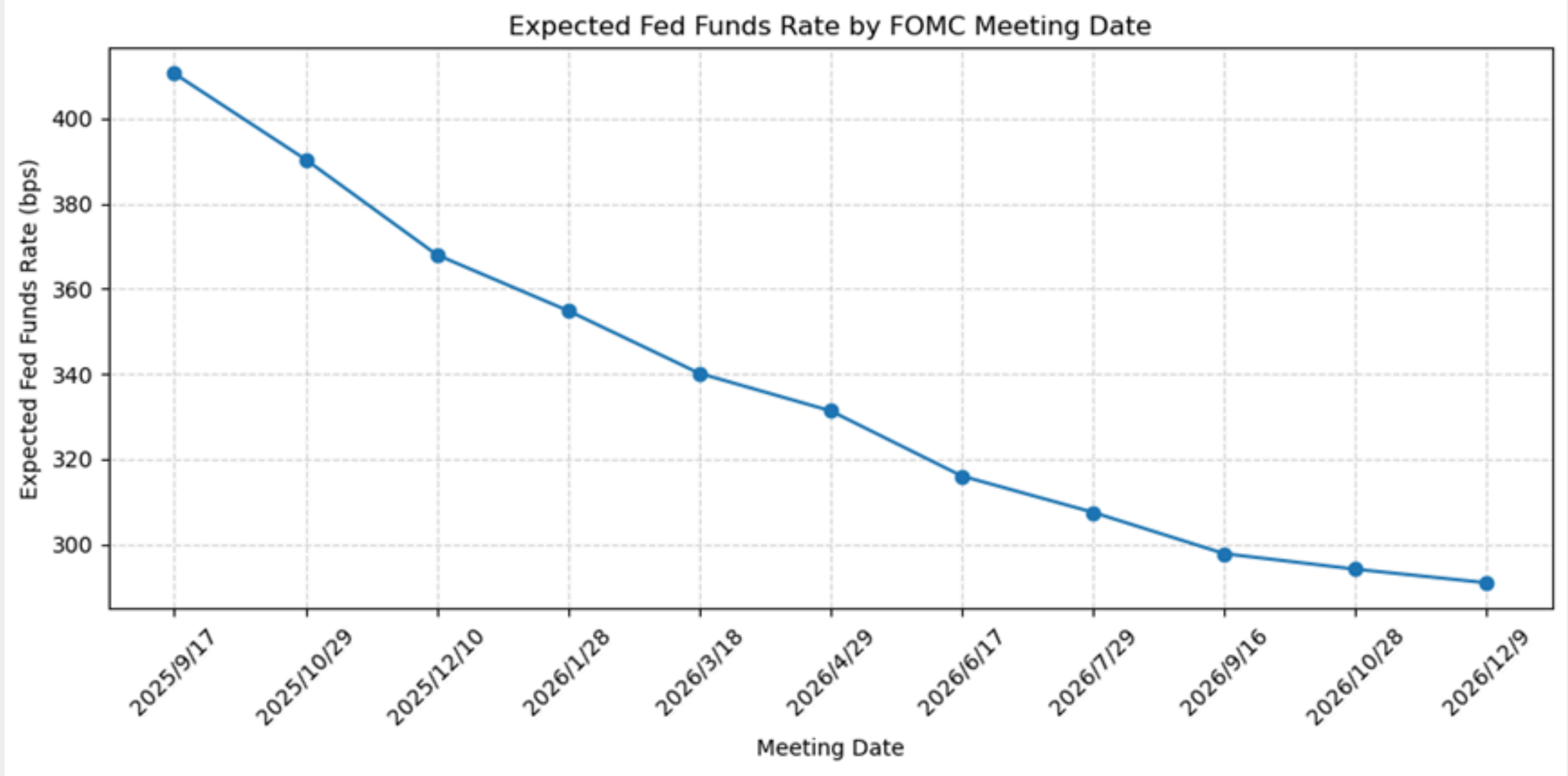
FOMC dot plot

Figure 2. FOMC participants' assessments of appropriate monetary policy: Midpoint of target range or target level for the federal funds rate



- The majority of officials expect the rate to be cut in 2025 and remain steady after that.
- The unemployment rate is expected to rise to 4.5 percent in 2025, even higher than its current level of 4.2 percent. The U.S. economy is expected to grow 1.4 percent in 2025, weaker than the 1.7 percent projected growth rate in the Fed's previous estimates. This explains the Fed's expectation to reduce the Fed interest rates.

MARKET OUTLOOK FOR THE NEXT 6-12 MONTHS ON RATE MOVEMENT



Similarly the data from FedWatch – CME Group predicts a reduction of interest rates in the 6-12 months market outlook.

APPROPRIATE TRADING STRATEGIES

Strategies

- Buy Bonds or Bond Futures
 - Future prices move inversely to interest rates. When rates fall, future prices rise.
 - Example: Buy 30-Day Fed Funds Futures (ZQ) or 3-Month SOFR Futures (SR3).
 - Goal: Lock in higher implied rates now and profit as actual rates drop.
- Receive-Fixed Interest Rate Swaps
 - Mechanism: You receive a fixed rate and pay a floating rate.
 - Benefit: As floating rates decline, your payments decrease while you still receive the fixed leg.
- Use Options on Futures
 - Strategy: Buy calls on Fed Funds or SOFR futures.
 - Why: Futures prices rise when rates fall, so calls profit from that move.

APPROPRIATE TRADING STRATEGIES

Precautions

- Tariffs and inflation:
 - Tariffs raise import costs, potentially fueling inflation. The Fed now expects inflation to be slightly hotter than previously projected. The PCE index is forecast to rise 3.0% year-over-year in Q4 2025, up from the prior 2.7% estimate. Core inflation, which excludes food and energy, is projected to hit 3.1%, also higher than the earlier 2.8% forecast.
 - Some officials argue tariff inflation is transitory and not worth tightening over. Others worry it could become entrenched.
 - Reports show households cutting back due to tariff-induced price hikes, which could justify easing to stimulate spending
- “Predictions” from dot plots
 - Officials want the flexibility to be “data-dependent” and respond to new information about the economy as it comes in. But being highly reactionary means forecasts –the dots--will likely change.
 - “You have to remember with the dot plot that this is, in many ways, officials’ base case scenario — if everything unfolds the way they expect,” says Sarah House, managing director and senior economist at Wells Fargo. “More than anything, it’s changing very rapidly.”