



February 2001



Fed Funds Futures

CBOE / CBOT / CME

Risk Management Conference

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Fed Funds Futures - Probabilities

Jan 23, 2001 Market Commentary:

“The Fed Funds Futures are pricing to a 100% probability of a 25bp ease and a 85% probability of a 50bp ease at the Jan 31 FOMC meeting.”

How do we calculate these probabilities correctly?

CALCULATION OF 1/31/01 FOMC PROBABILITY (1/23/01 Close)

Current Target Funds = 6.00%

FEB Fed Funds Contract = 5.575%

Expected Rate at Conclusion of Meeting = 5.575% (FEB Fed Funds Contract)

Best Method:

Y = Prob. of 50 bp Ease

1-Y = Prob of 25 bp Ease

$$5.575 = (Y) * (5.50) + (1 - Y) * (5.75)$$

$$Y = 70\% \quad 1-Y = 30\%$$

Other Method:

Y = Prob. of 50 bp Ease

1-Y = Prob of No Ease

$$5.575 = (Y) * (5.50) + (1 - Y) * (6.00)$$

$$Y = 85\% \quad 1-Y = 15\%$$

CALCULATION OF 3/20/01 FOMC PROBABILITY (1/23/01 Close)

Expected Funds Rate Going Into Meeting = 5.575% (Based on FEB Contract)

April Funds Contract = 5.20%

Expected Rate at Conclusion of Meeting = 5.20% (April Funds Contract)

Y = Prob. Of 50 bp Ease

$1-Y$ = Prob of 25 bp Ease

$$5.20\% = (Y) * (5.575 - .50) + (1-Y) * (5.575 - .25)$$

$$Y = 50\% \quad 1-Y = 50\%$$

Fed Funds Futures - Accurate Predictors of Monetary Policy?

Given our probabilistic pricing method, we can calculate an expected rate for each future FOMC meeting.

Compare the spread:

Expected (Futures) Rate - Actual Rate set at FOMC Meeting

If this spread is positive, the market:

- 1) Overestimated the amount of tightening or
- 2) Underestimated the amount of easings

If the spread is negative, the market:

- 1) Underestimated the amount of tightening or
- 2) Overestimated the amount of easing

Fed Funds Futures - Predictors of Fed Policy

Data broken down into 5 sub-groups, starting with Feb 4, 1994 meeting:

<u>Group</u>	<u># Occurrences¹</u>
Fed Tightenings	13
Fed Easings	6
Hold during Tightening Bias ²	24
Hold during Neutral Bias ²	13
Hold during Easing Bias ²	<u>1</u>
All Meetings	57

Trade Days to FOMC Meetings

-100 to -66 = 3 meetings fwd.

-65 to -33 = 2 meetings fwd.

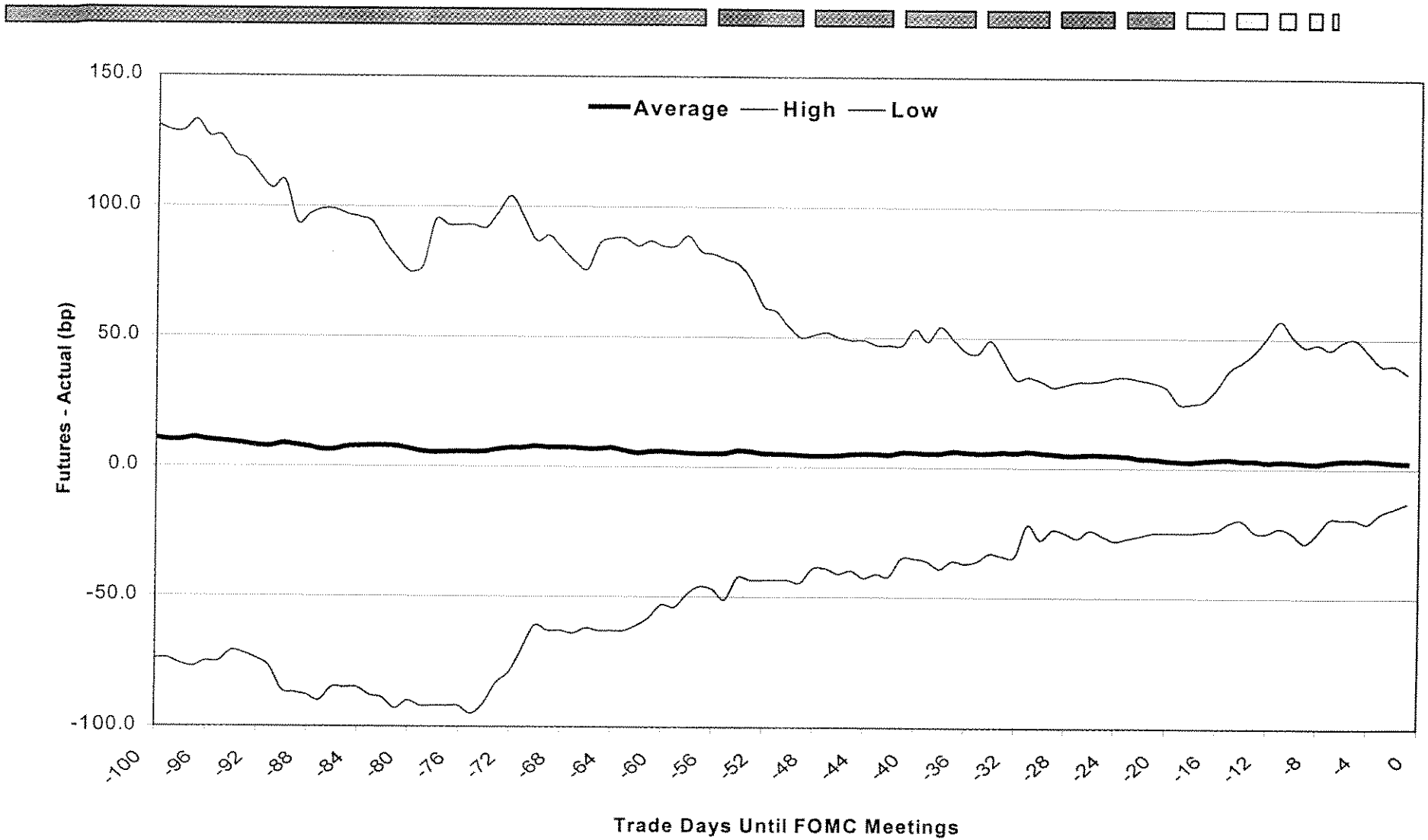
-32 to -1 = 1 meeting fwd.

(on average)

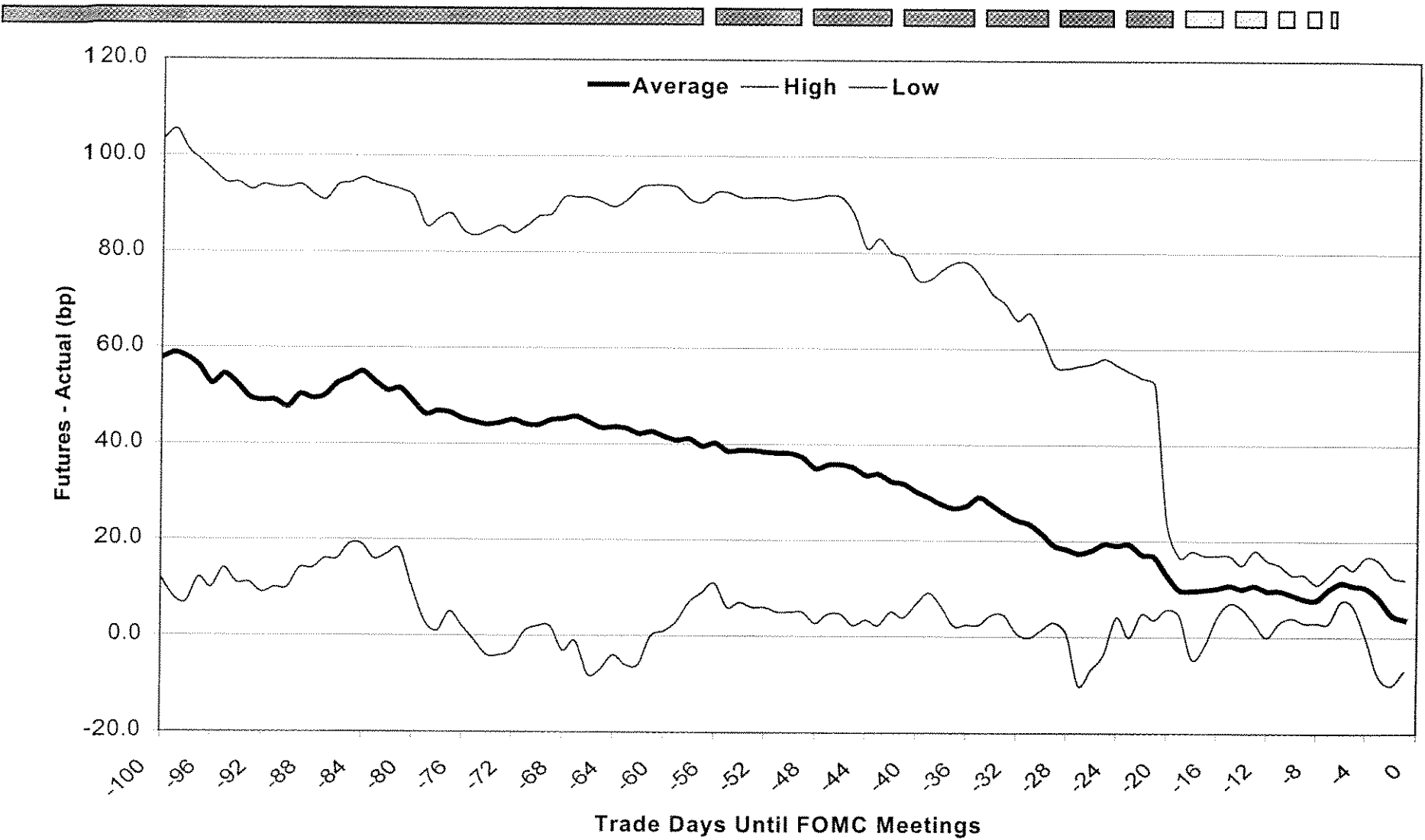
100 Trade Days = 4 1/2 months

- 1) Does not include intermeeting actions
- 2) Bias or Risk - applies to that adopted at the meeting date

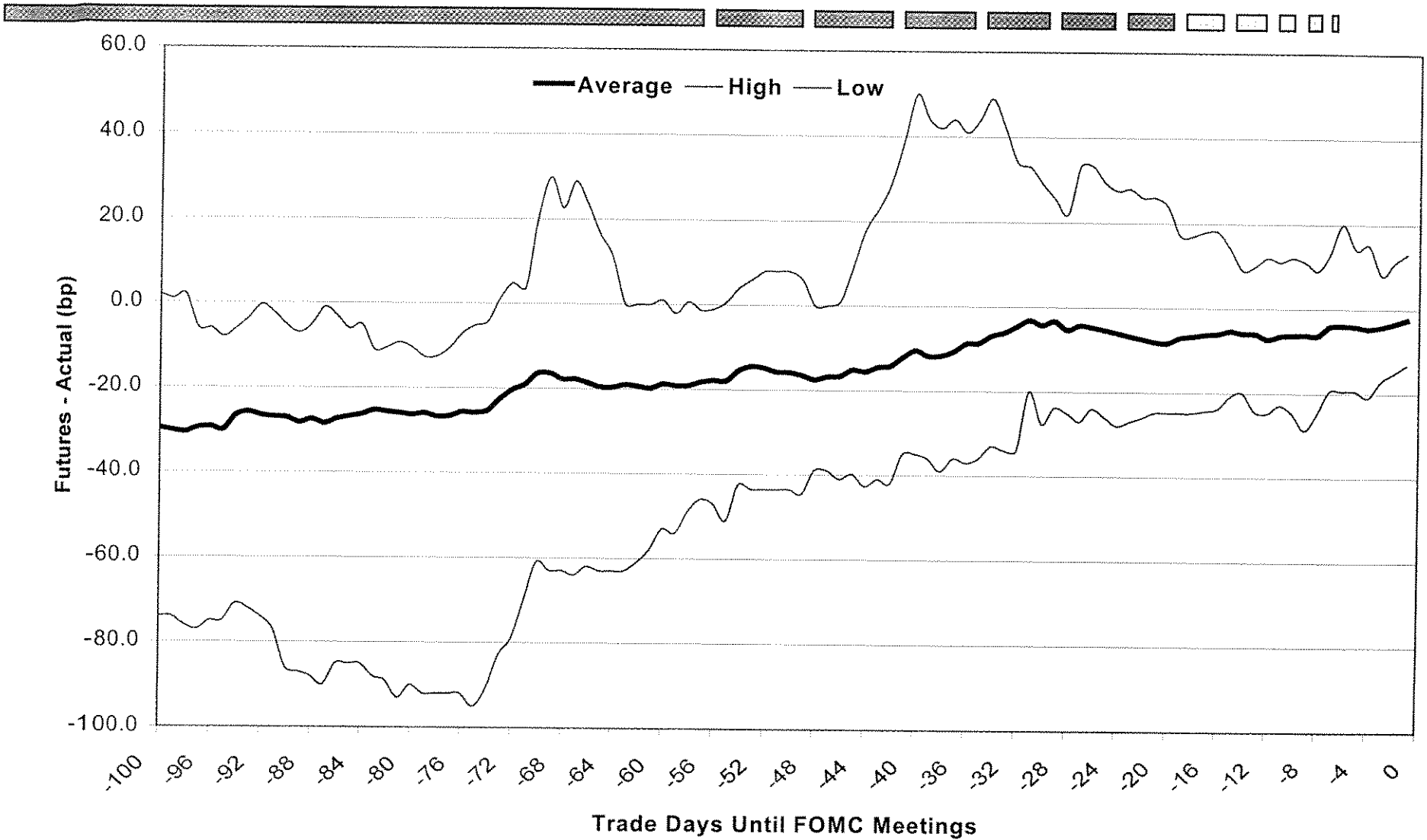
All Fed Meetings (57 Total Meetings)



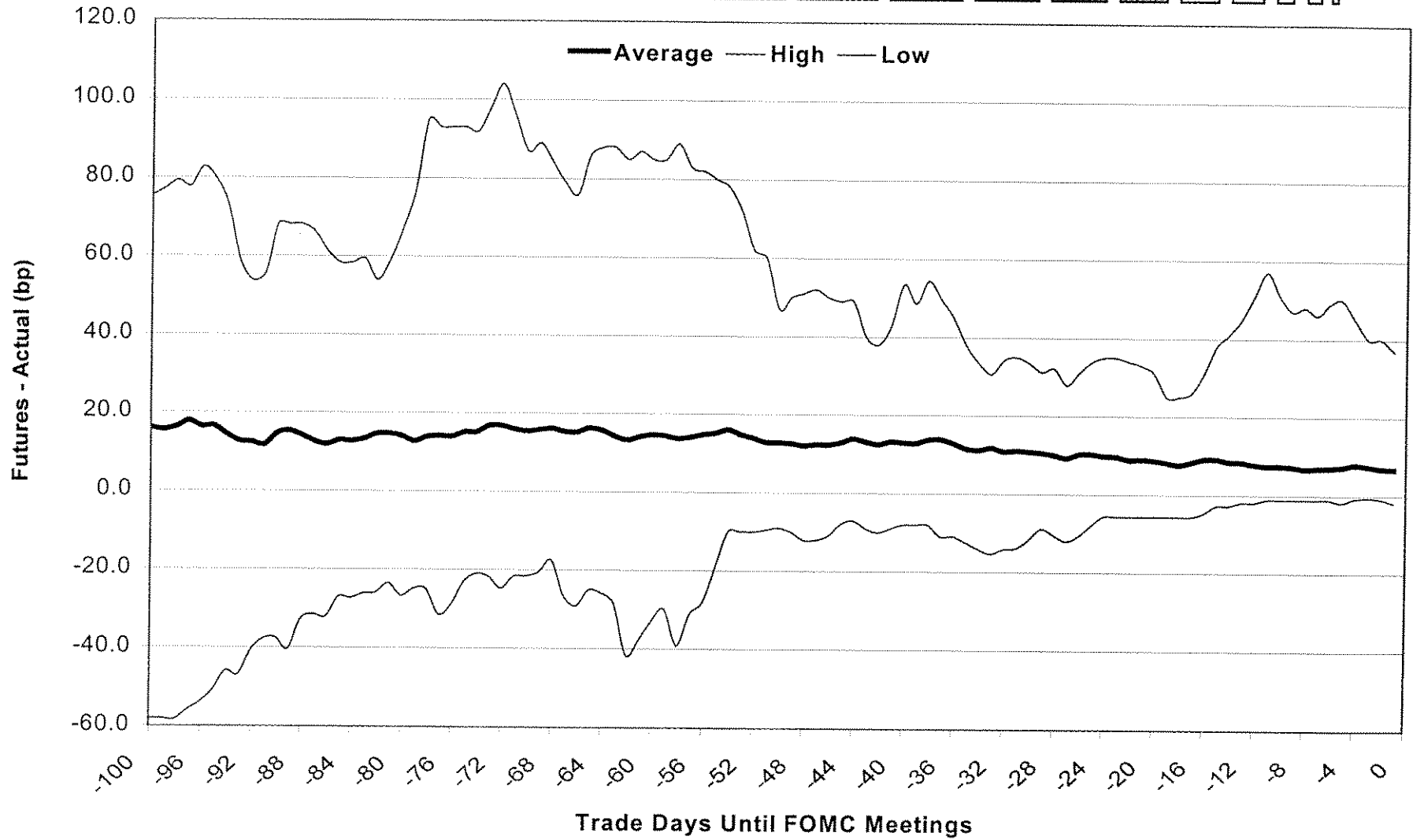
Fed Easings (6 Easings)



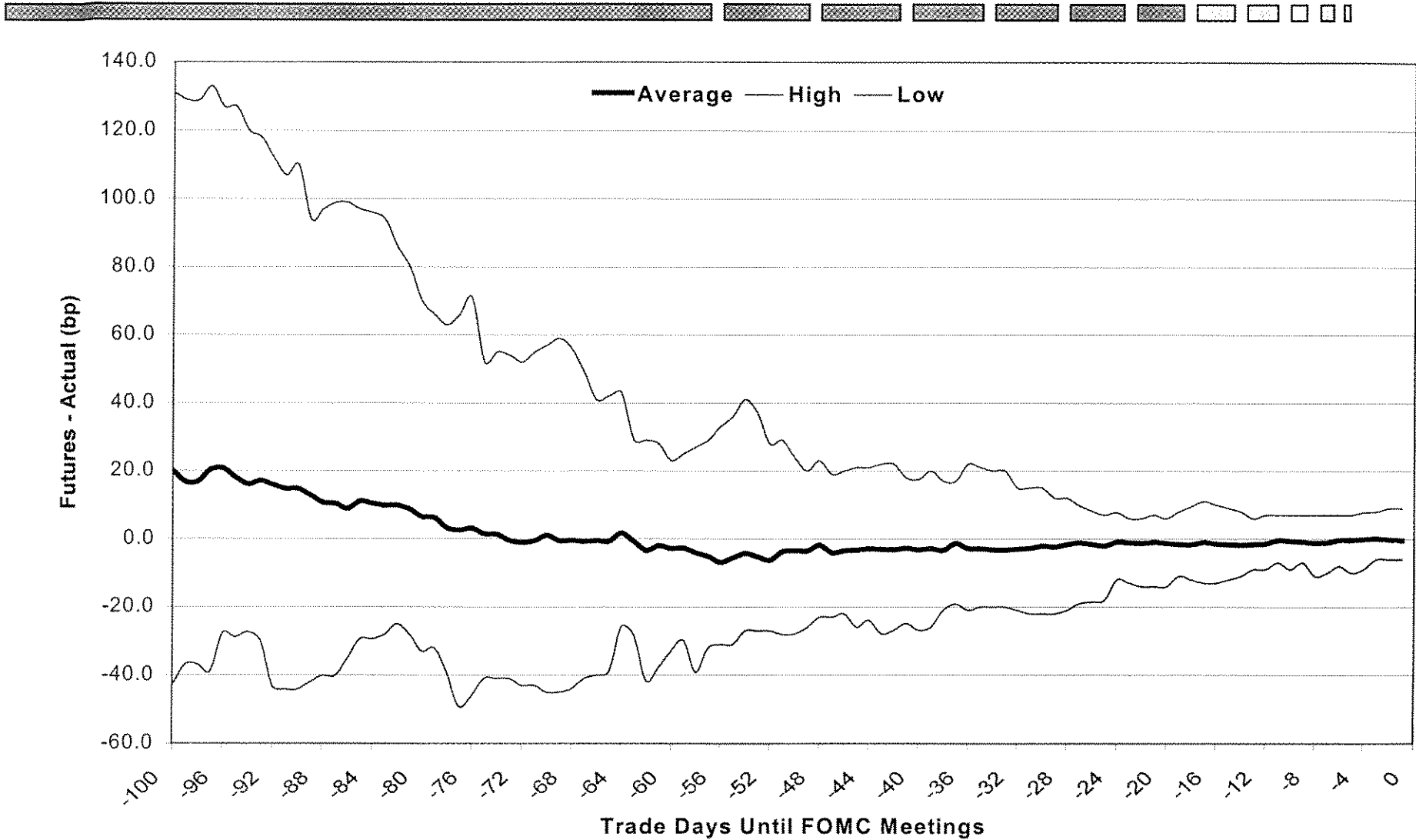
Fed Tightenings (13 Tightenings)




Fed Holds During a Tightening Bias (24 Holds)



Fed Holds During a Neutral Bias (13 Holds)



Standard Deviation of Fed Fund Futures Mispricing

Standard Deviation  Absolute measure of dispersion about the mean (Actual Funds Rate):

+/- 1 Std Dev = 68% occurrences

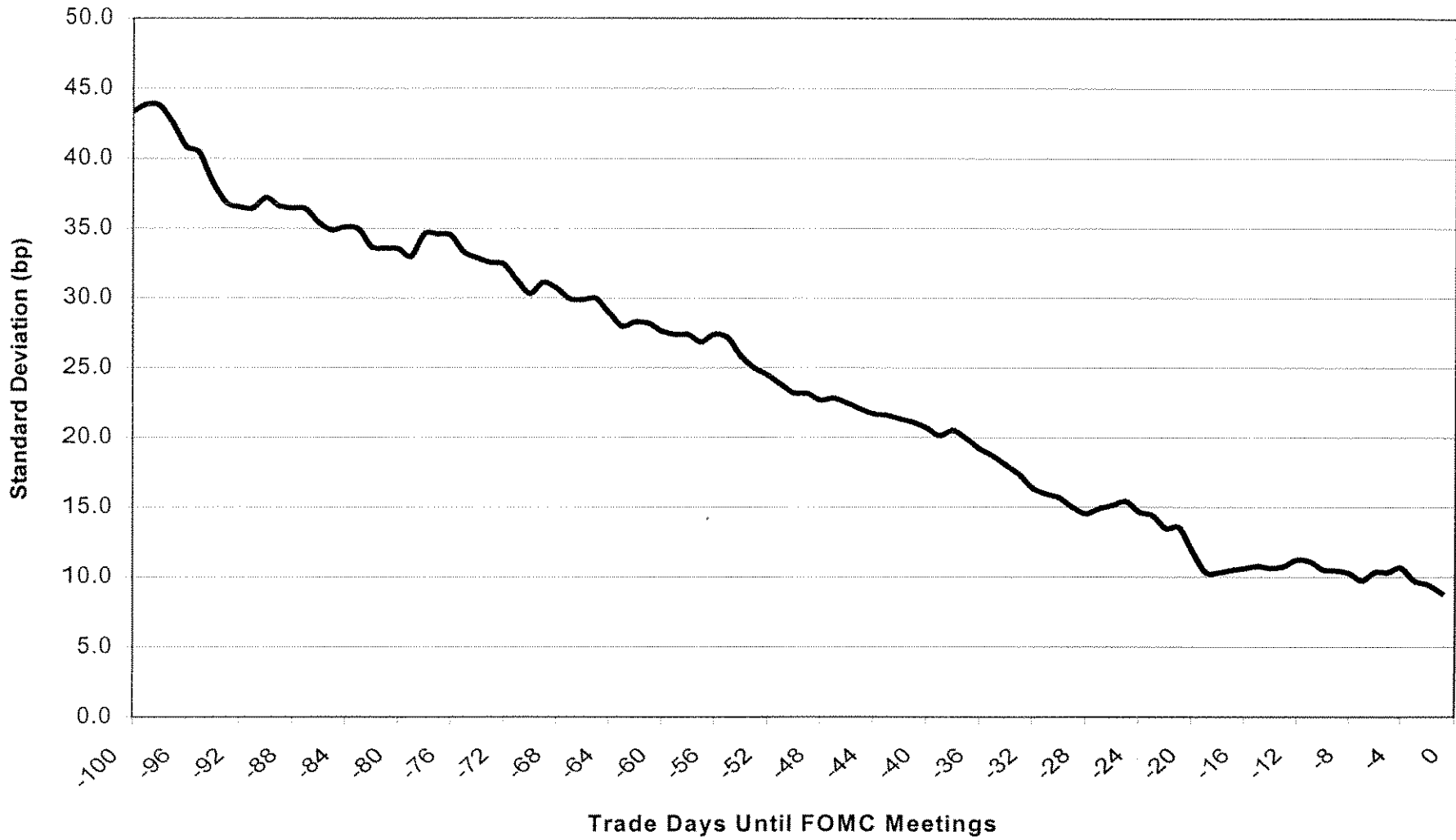
+/- 2 Std Dev = 96% occurrences

+/- 3 Std Dev = 99+0% occurrences

Standard Deviation steadily declines as FOMC date approaches due to less uncertainty.

1-Month prior to FOMC, Std Dev is about 10bp.

Standard Deviation of All Fed Meetings



1-Day before FOMC Meetings

Fed Fund Futures are excellent predictors:

<u>Absolute Value of Futures-Actual Spread</u>	<u># Occurrences</u>	<u>%</u>
< 6 bp	38	67%
6 - 12 bp	12	21%
12 + bp	7	12%

Only 2 total misses in the last 57 meetings.

(>25bp error, both in the fall of 1994, when Fed remained on hold)

Fed Fund Futures - Prediction Summary

Fed Tightenings = Mkt consistently underestimates the actual amount of tightenings.

Fed Easings = Mkt consistently underestimates the actual amount of easings

“Market does not overshoot actual changes in policy”

Hold during Tightening Bias = Overestimates Fed Tightening

Hold during Neutral Bias = Correctly predicts Fed on Hold (3-mos prior)

All Meetings = On average, Futures are excellent predictors, but with wide range.

Fed Fund futures - Why are they such good predictors?



1) Greater Fed Transparency and Signaling

Bias or Risk Announcements, Speeches

2) Fed needs to consider market expectations (as based on Fed Fund futures).

Otherwise, Fed runs the risk of disappointing the markets, resulting in an adverse market reaction and the resulting impact of these reactions on the real economy.

3) "Behavioral Regularity" or Predictability (W. Poole)

By exerting guidance over the markets, the Fed can rely on market adjustments to accomplish much of the stabilization work, giving the Fed leeway to wait before changing rates.

4) We are all looking at the same data.

As such, markets should be able to accurately predict monetary policy.

Two-Way Street



Fed signals the market and the market tells the Fed,
via Fed Funds Futures



“Pricing Front End Carry Spreads”

2-Yr Carry Spreads

Question:

Are 2-Yr yields really disconnected from Fed expectations, as derived from Fed Funds Futures Strip?

—**NO!**

- 2-Yr yields are closely correlated to Fed Funds Futures.
- Just need to follow the right contract/ FOMC meeting to predict the 2-Yr Yield.

Pricing the Front End (2Yr Carry Spread)

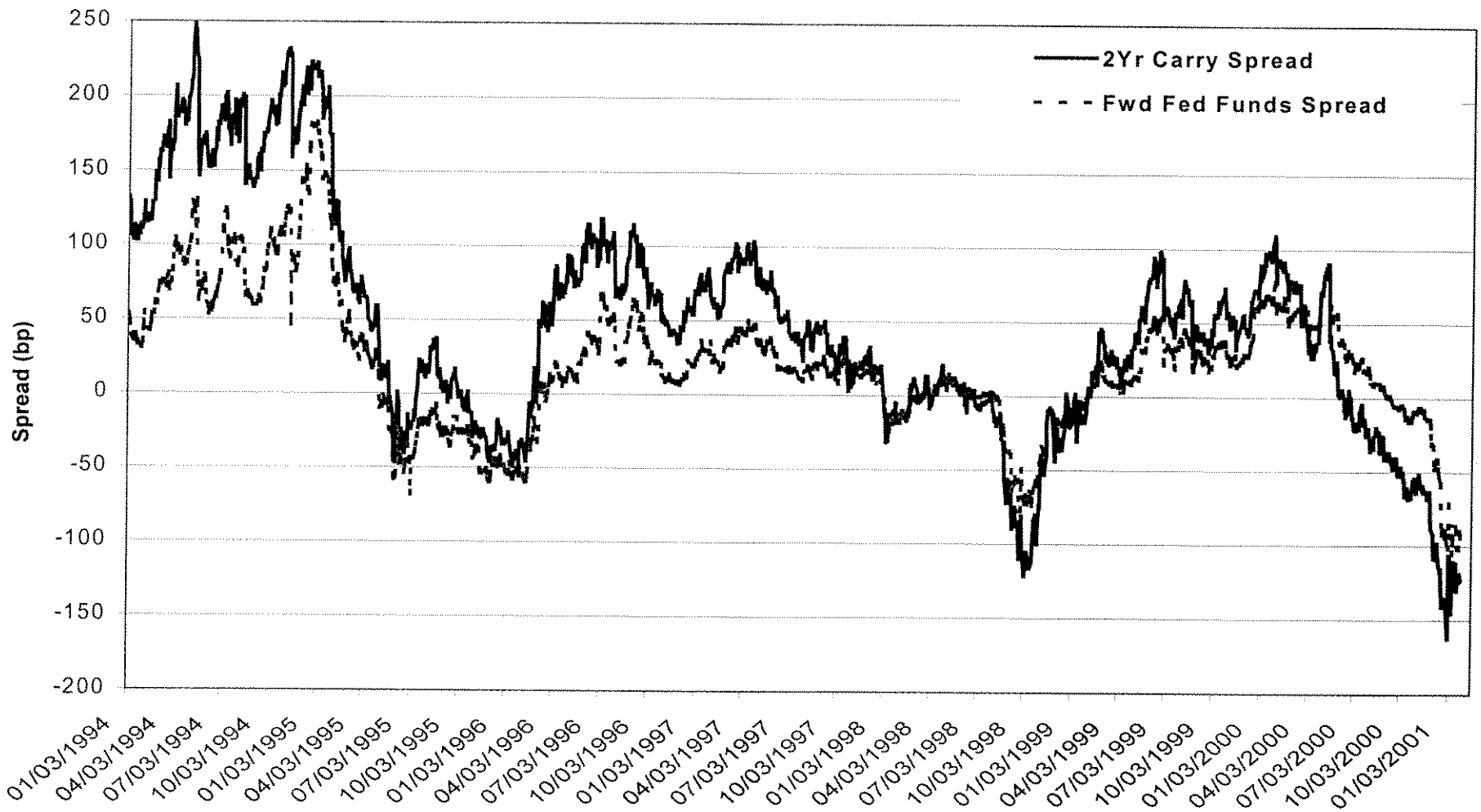


$$2\text{Yr Carry Spread} = 2\text{Yr "Current" Yield} - \text{Target Fed Funds}$$

- Expectations Dominate Front End - Primary Factor for Determining 2-Yr Carry Spread
- Risk Premium Dominates Back End, but is present throughout the Curve

1) Expectations Proxy = Fwd Funds Spread
= Expected Funds Rate @ 3rd Meeting - Target Funds

2-Yr Carry Spread vs. Fwd Fed Funds Spread



- 2-Yr Yields closely correlated with expectations for Fed policy ($R^2=90\%$)

2-Yr Carry Spreads vs Fwd Funds

Difference between 2-Yr Carry Spread and Fwd Funds spread is due to:

- 1) Expectations for further Fed action past the 3rd meeting.
- 2) Market risk premium or Trsy scarcity Premium (2000).

Need a 2nd factor to account for time varying Risk Premium → 5-Yr minus 2-Yr spread.

2-Yr Carry Spread — 2 Factor Model

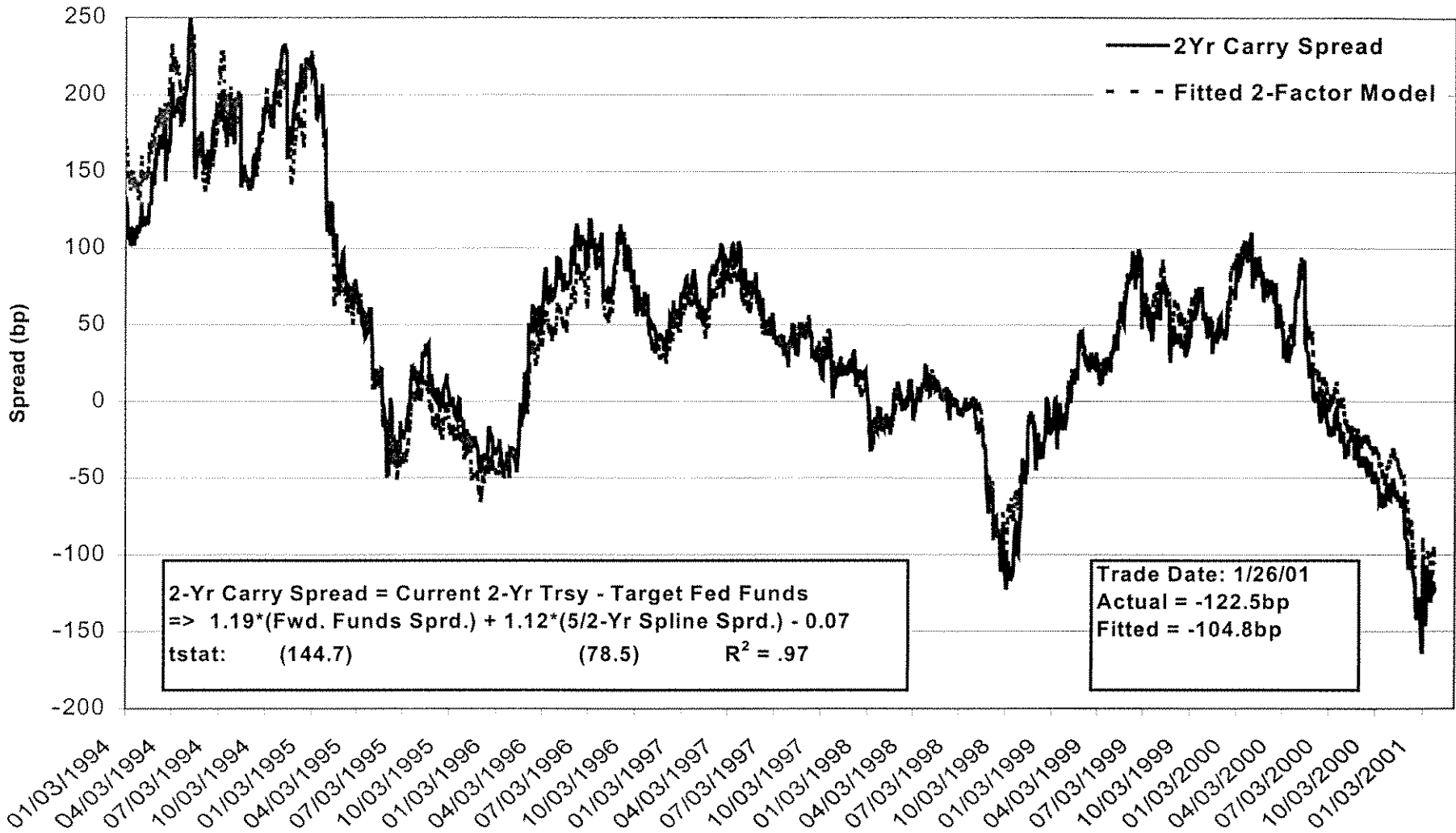
Two-Factors:

- 1) Expectations → Fwd Funds - Target Funds
- 2) Time Varying Risk Premium → 5/2-Yr Spread

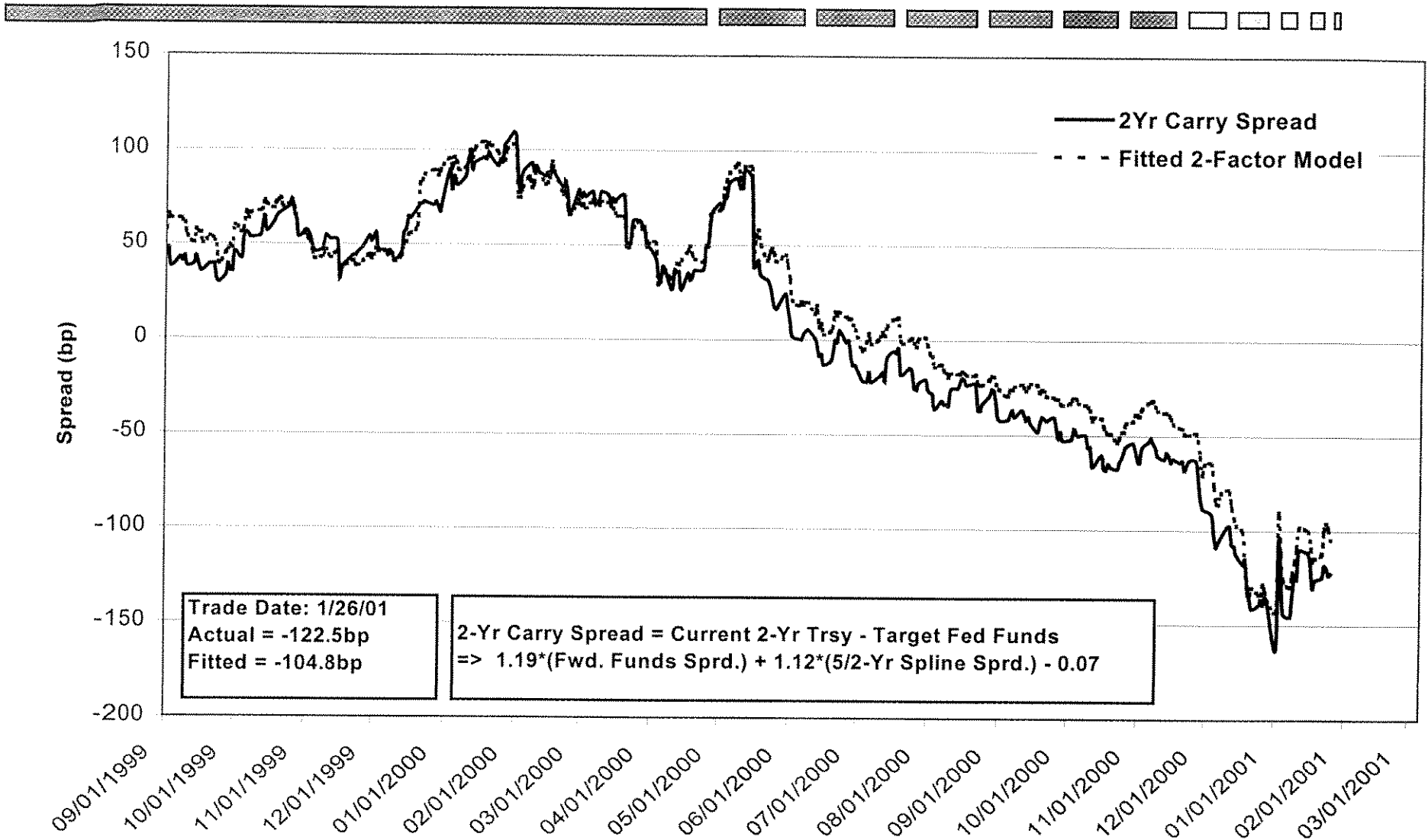
2-Yr Carry Spread			
Ind. Var =>	Fed Funds	5/2-Yr	Fed Funds + 5/2-Yr
R^2	90%	56%	97%

Two Factor Model – $R^2 = 0.97$	
2-Yr Carry Spread = 2-Yr Tsy – Target Fed Funds	
→ $1.19 * (\text{Fwd. Funds Sprd.}) + 1.12 * (\text{5/2-Yr Sprd.}) - 0.07$	
t stat:	(145) (79)

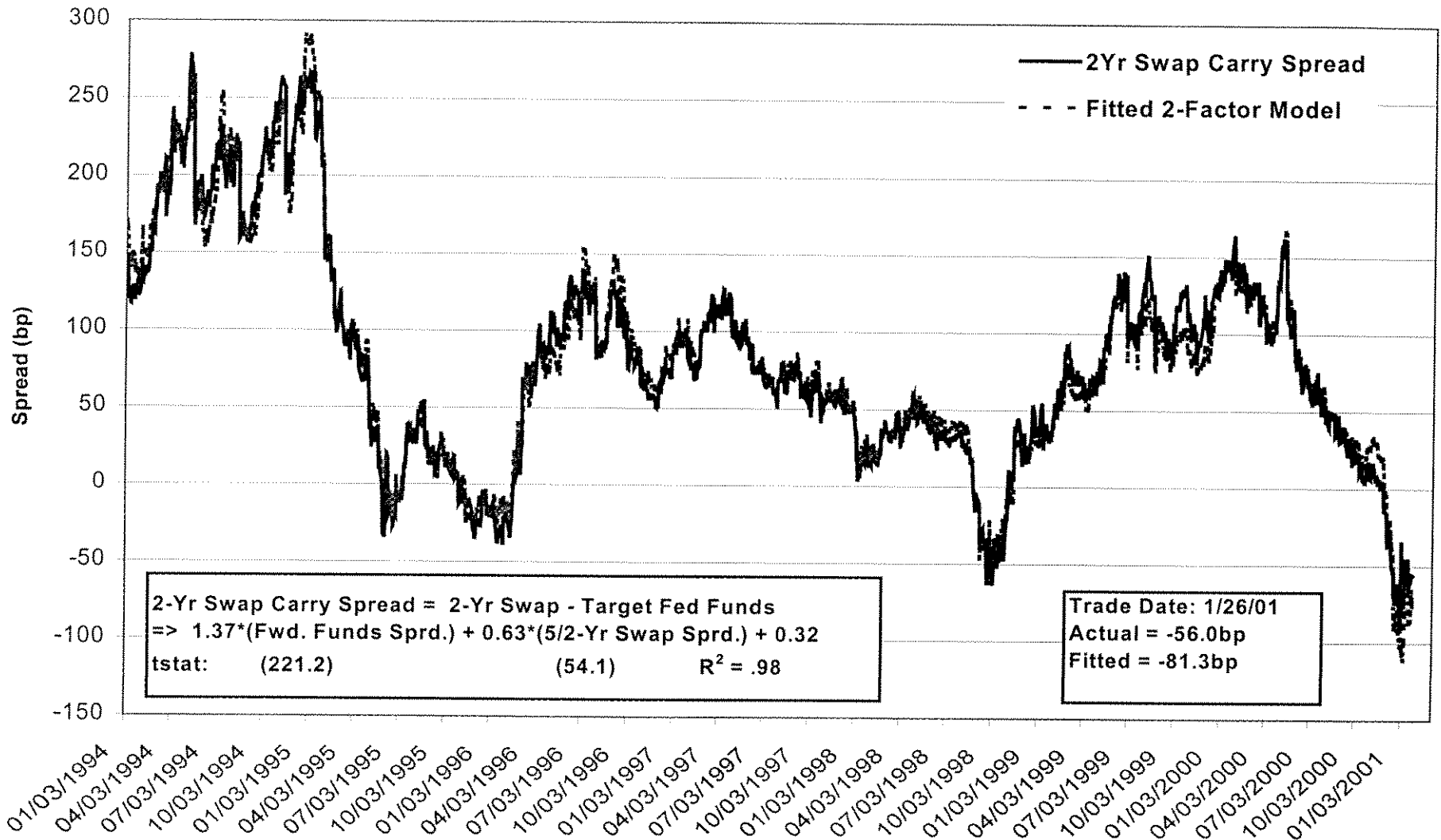
2Yr Carry Spread vs Fitted 2-Factor Model

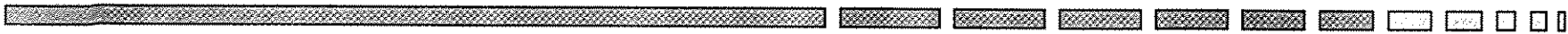


2Yr Carry Spread vs Fitted 2-Factor Model (9/1/99 - Present)



2Yr Swap Carry Spread vs Fitted 2-Factor Model





Pricing the 2/30 Treasury Curve

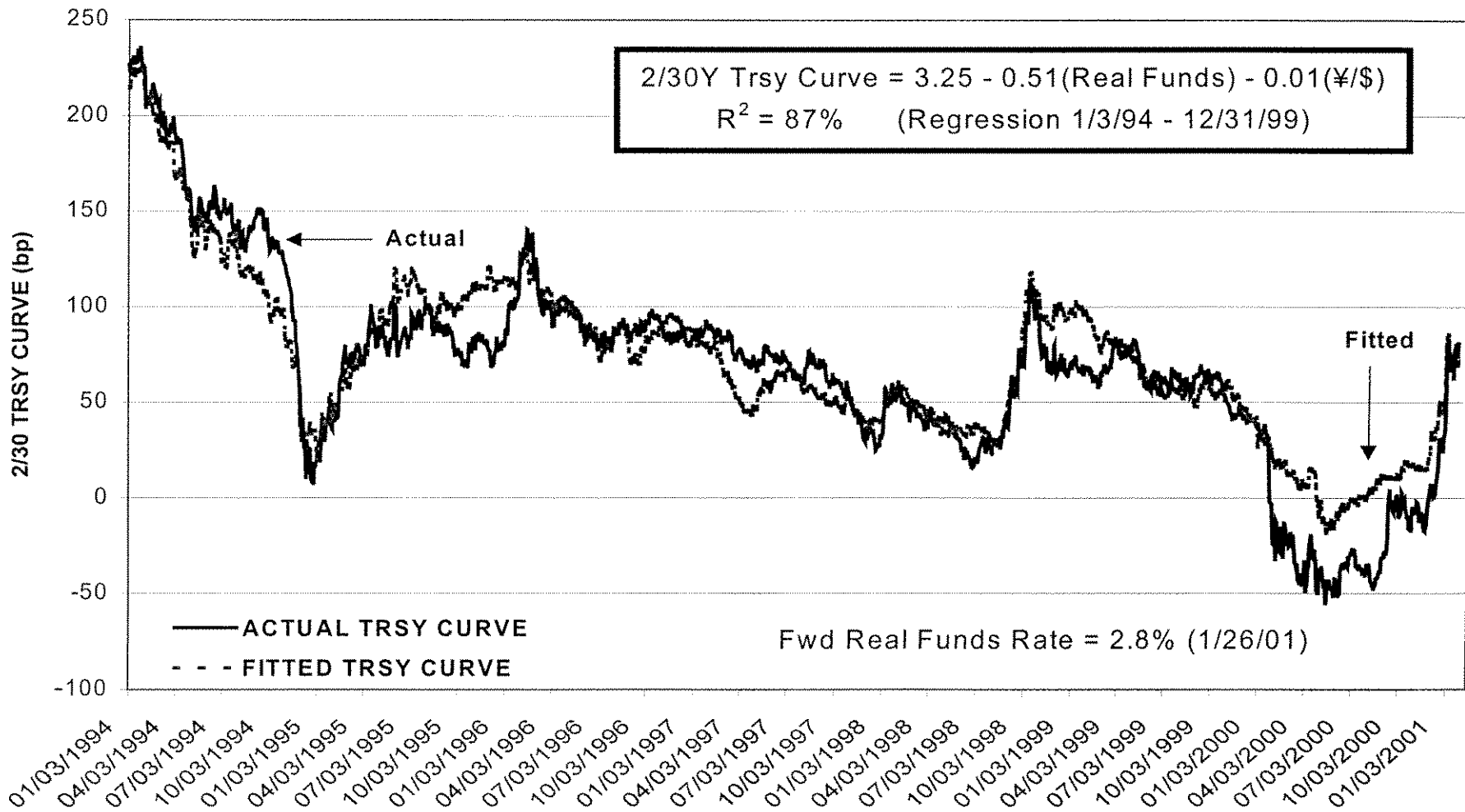
Fed Funds vs 2/30 Curve

Real Funds Rate (Fed Funds - Core CPI) determines how restrictive or accommodative the Fed's monetary policy really is.

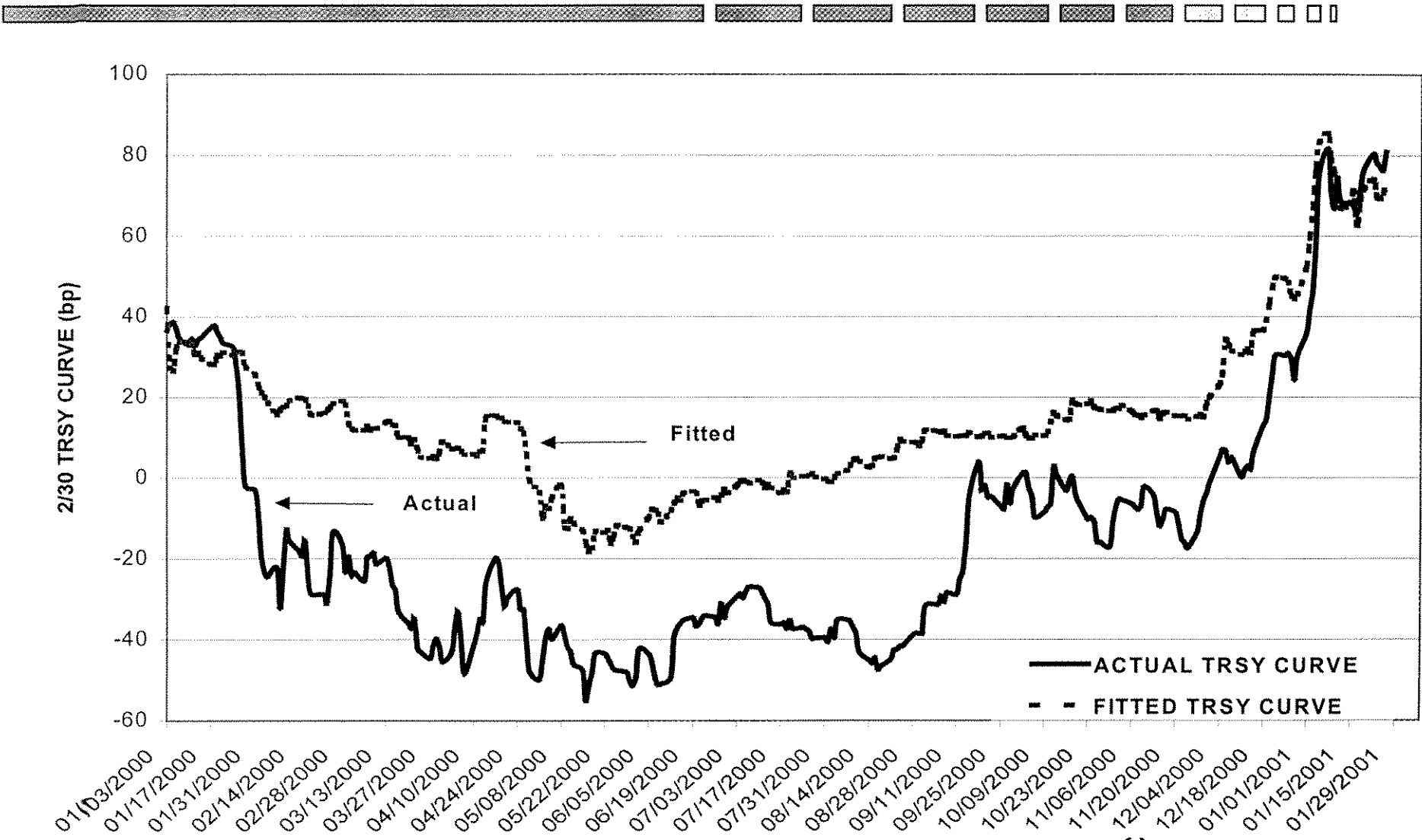
To model the curve, use the Fed Funds Futures (3rd meeting), not Target Funds.

Lower Real Funds Rate → Steeper the Curve
Higher Real Funds Rate → Flatter the Curve

Actual 2/30 Spline Trsy Curve vs 2-Factor Model (Expected Real Funds and ¥/\$)



Actual 2/30 Spline Trsy Curve vs 2-Factor Model (Expected Real Funds and ¥/\$)



Summary

Fed Funds Futures are a valuable contract for:

- 1) Forecasting Fed Policy
- 2) Modeling the Yield Curve