A Simple Macro-Finance Measure of Risk Premia in Fed Funds Futures

Anthony M. Diercks[1] & Isfar Munir & Uri Carl

Federal Reserve Board

October 25, 2019

[1] The analysis and conclusions set forth in this paper are those of the author and do not indicate concurrence by other members of the research staff or the Board of Governors of the Federal Reserve System.

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- But risk-neutral signals taken directly from markets are imperfect.
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- To address this issue, we need surveys and models.

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Surveys have the largest relative forecast errors of the federal funds rate.

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  - Mean Reversion II: Often predicts fairly rapid recovery in rates.

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- Add our risk premium to fed funds futures & compute forecast errors.
- Superior forecasts based on our macro-finance measure.

Economic Foundations

- Can show based on standard no-arbitrage condition

$$f_t^{(1)} - E_t\left[r_{t+1}\right] = -Cov_t\left(Y_{t+1}, r_{t+1}\right)$$

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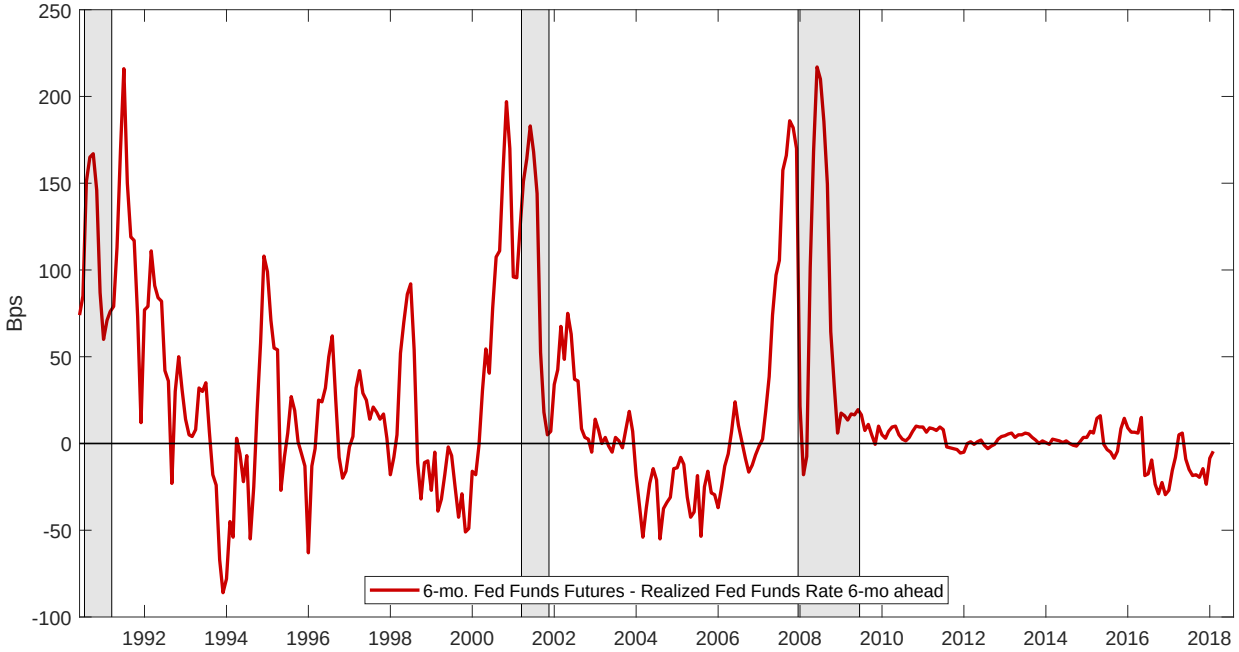
If positive covariance, $\implies$ negative risk premium.

If negative covariance, $\implies$ positive risk premium.

Realized Returns of Fed Funds Futures



Realized return of 6-mo Fed Funds Futures minus 6-mo ahead Funds Rate

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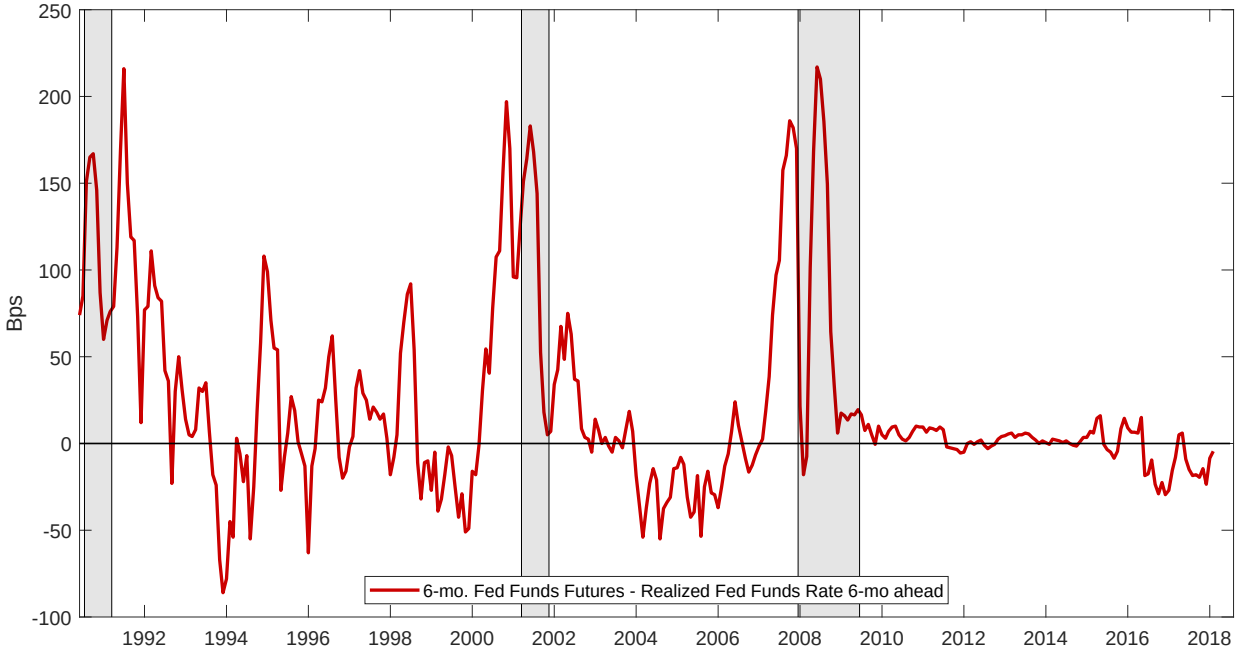

Realized return of 6-mo Fed Funds Futures minus 6-mo ahead Funds Rate

- Large positive excess returns around recessions (insurance)
  - Consistent with presence of negative risk premium on average.

Methodology

Theory

$$f_t^{(1)} - E_t\left[r_{t+1}\right] = -Cov_t\left(Y_{t+1}, r_{t+1}\right)$$

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$k = 1:3$ (3 nominal measures, Fed Funds Rate, CPI-U, PCE-All)

$m = 1:20$ (20 window sizes ranging from 1 to 20 years)

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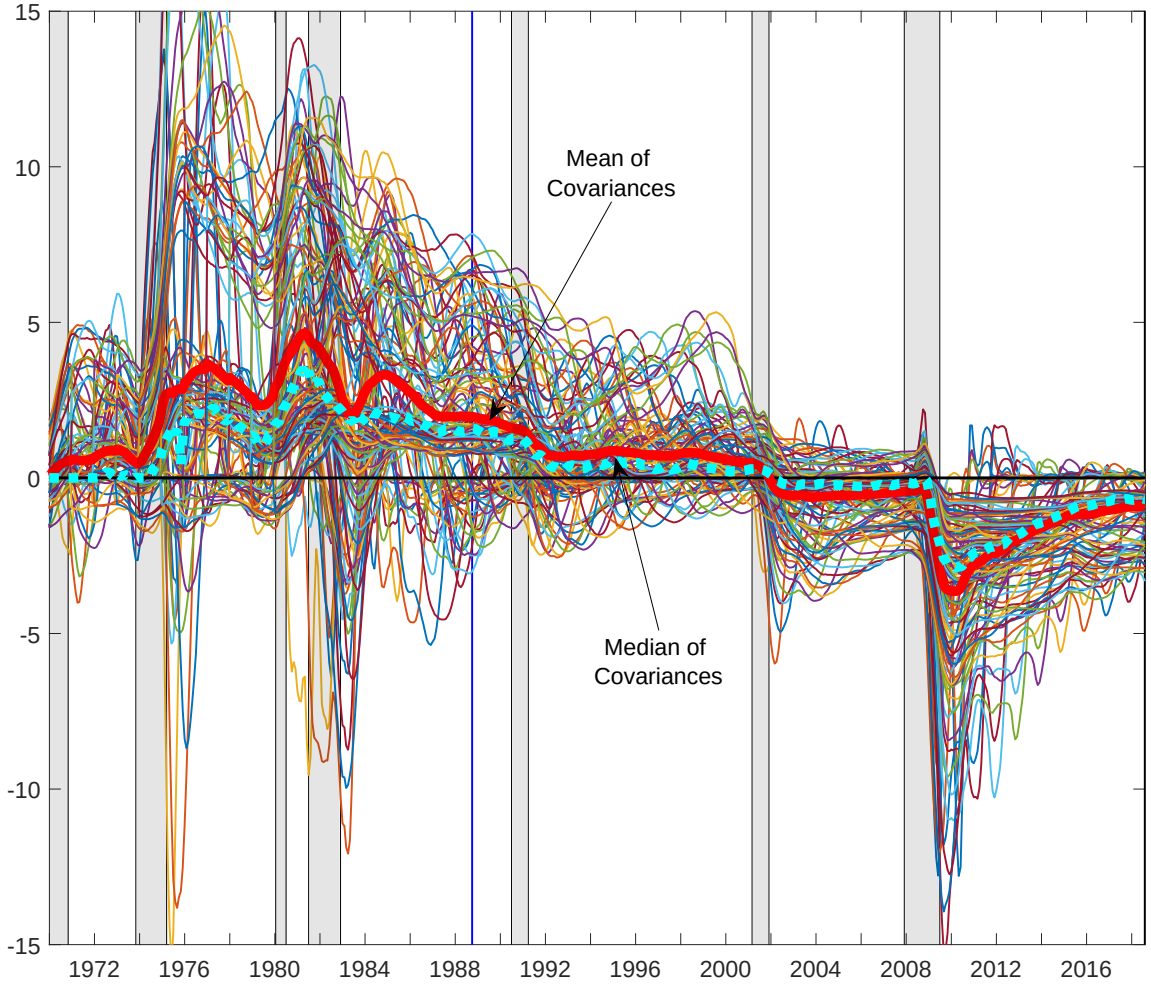
2 x 3 x 20 = 120 possible covariances, 120 regressions

120 Covariances Between Real and Nominal Activity



- Plotting negative covariances as dictated by theory on risk premium

Model Averaging

Benefits of model averaging are largest when

1. Individual forecasts are mis-specified
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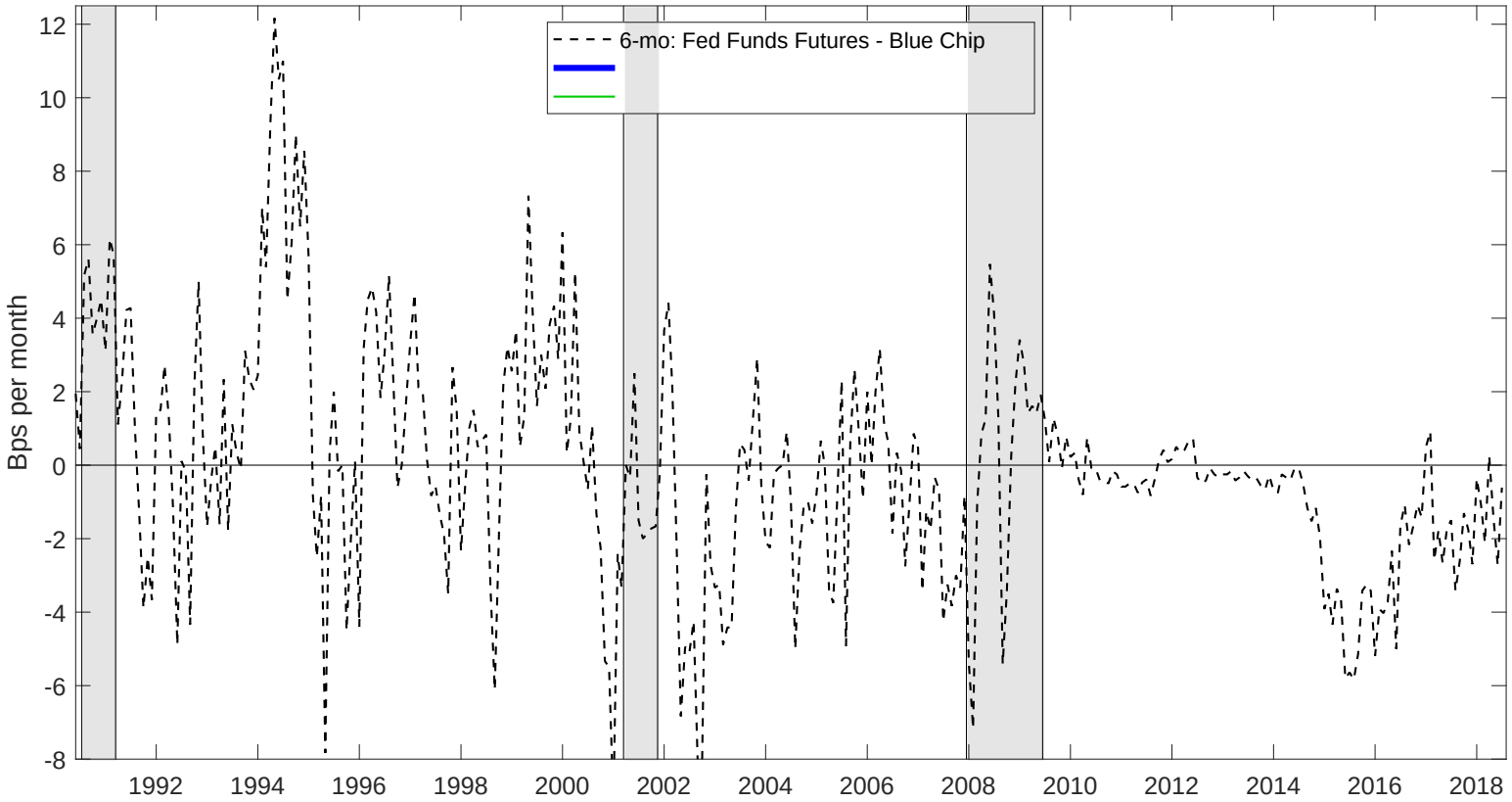
We apply equal weighting to each regression for our model averaging.

- More sophisticated weighting schemes are prone to introduce additional errors.

Predicted Risk Premiums



Survey gap risk premium (dashed black)

- Volatile/noisy due to necessary interpolation (qtr to monthly) and idiosyncrasies of surveys (rigidities, timing, sample)

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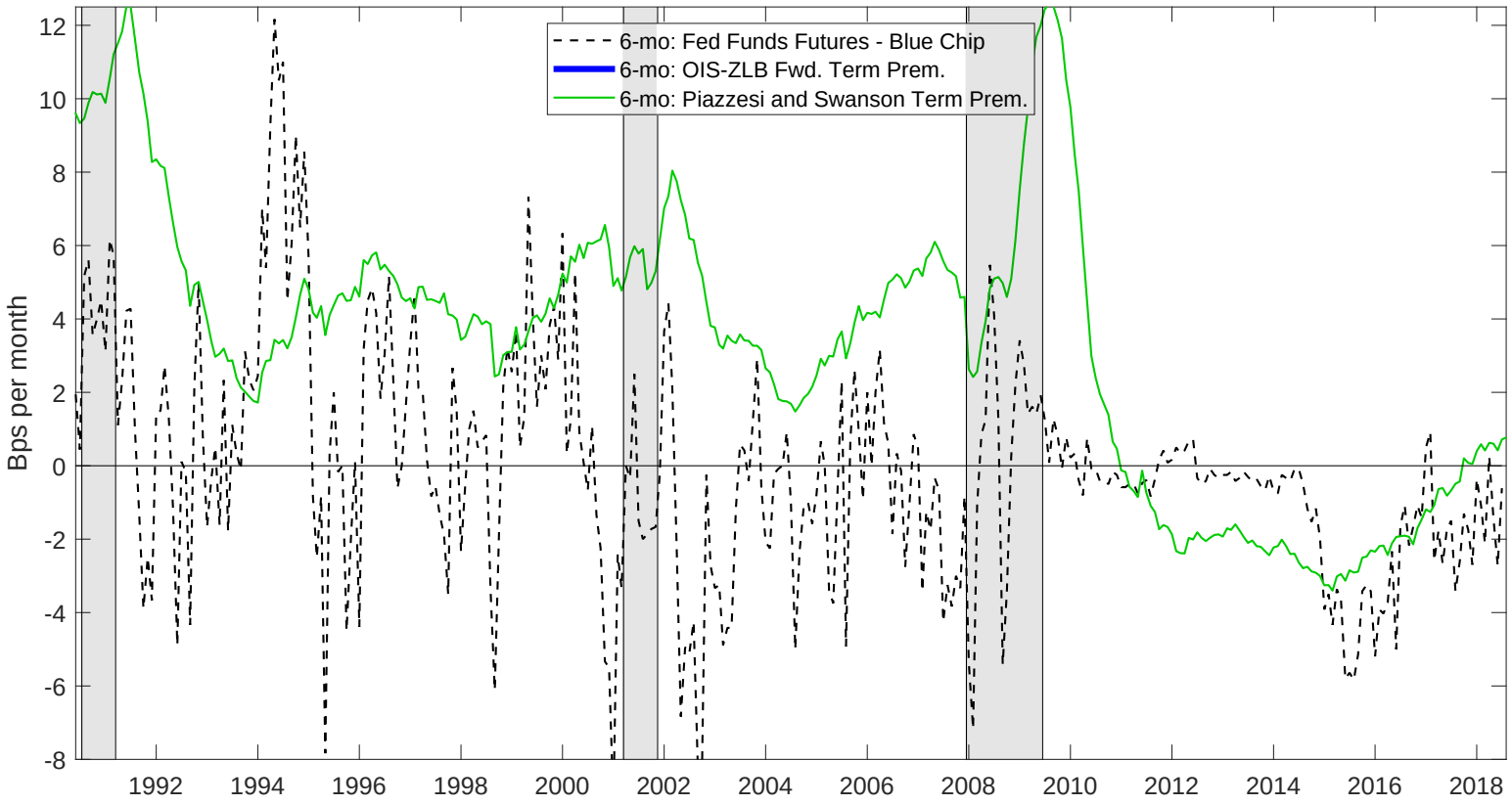

Piazzesi and Swanson (2008) (Green)

$f_t^{(1)} - r_{t+1} = \alpha + \beta \Delta NFP_{t-1} \implies$ LHS is based on realized values

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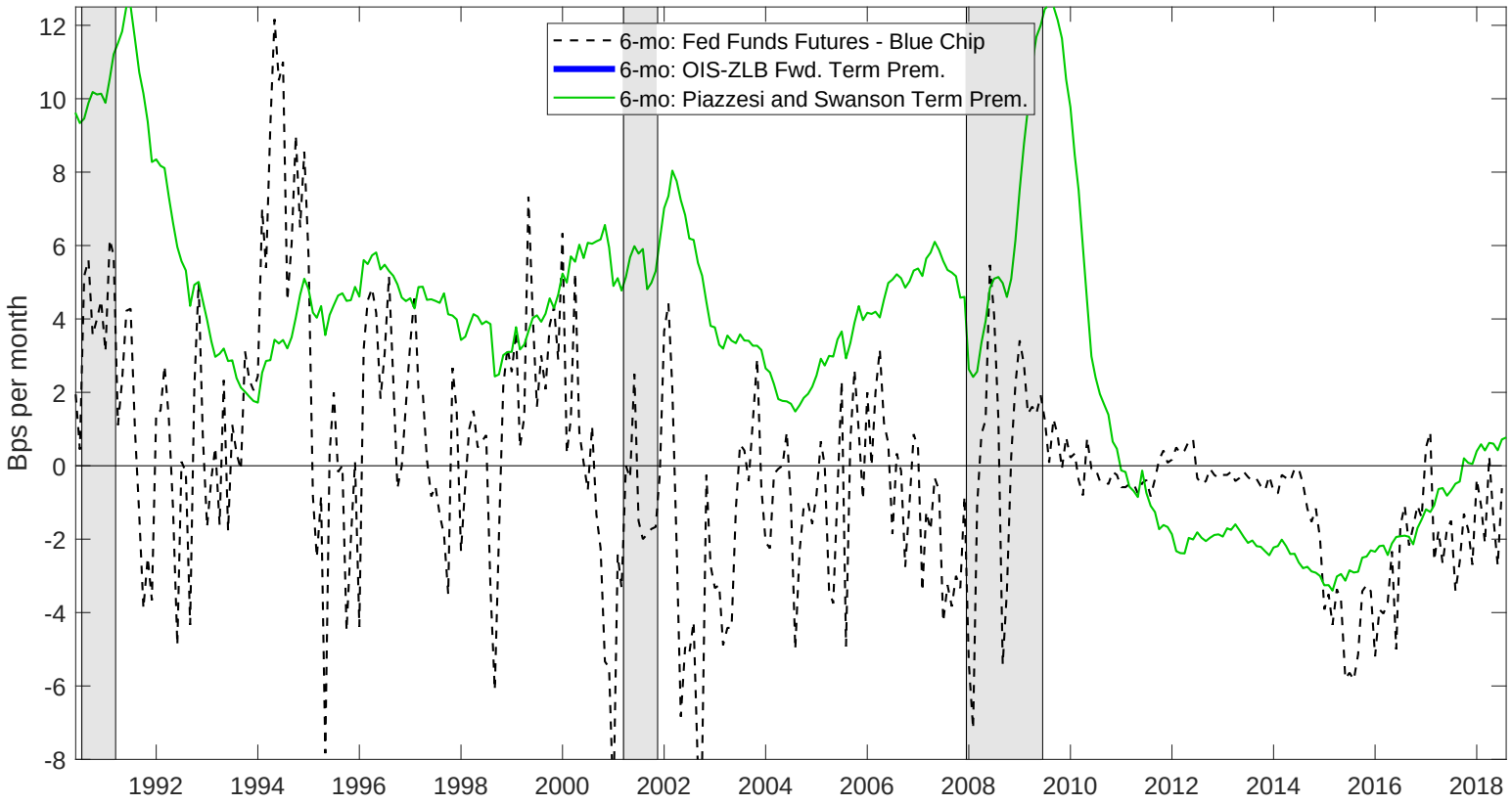

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- Subject to forecast error rather than risk compensation.

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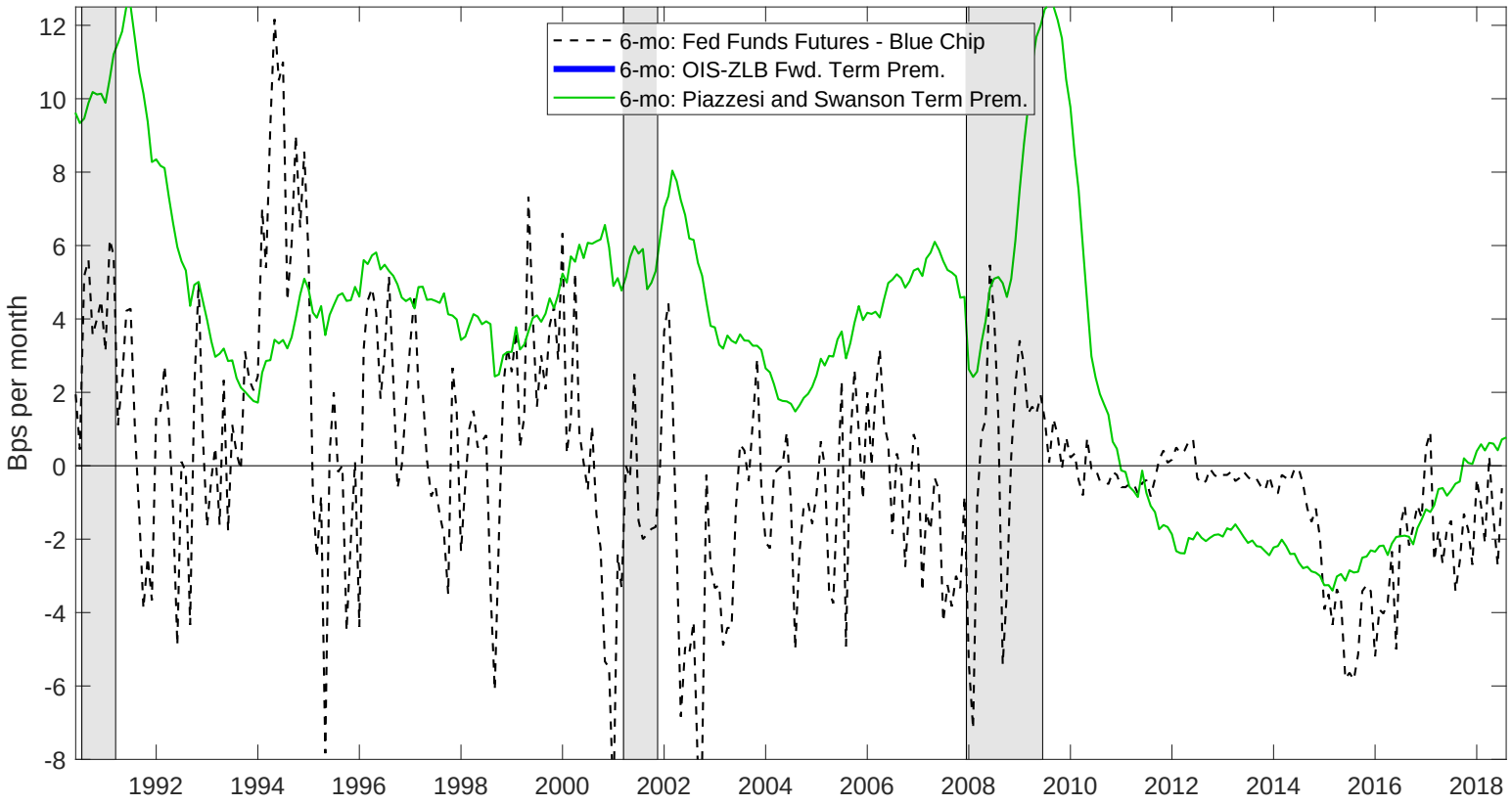

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- Implies risk premium is at times up to 75 basis points, 6 months out

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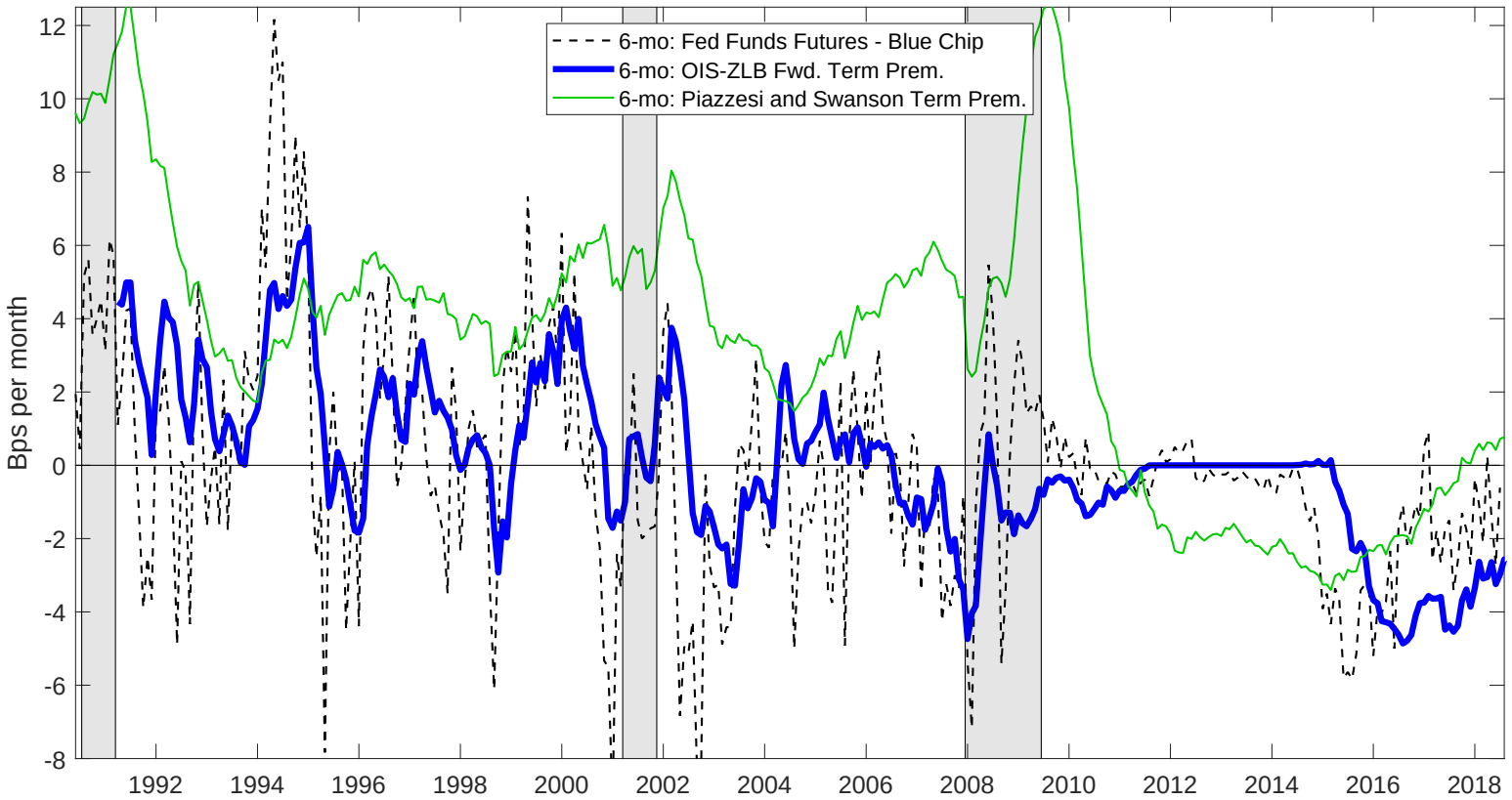
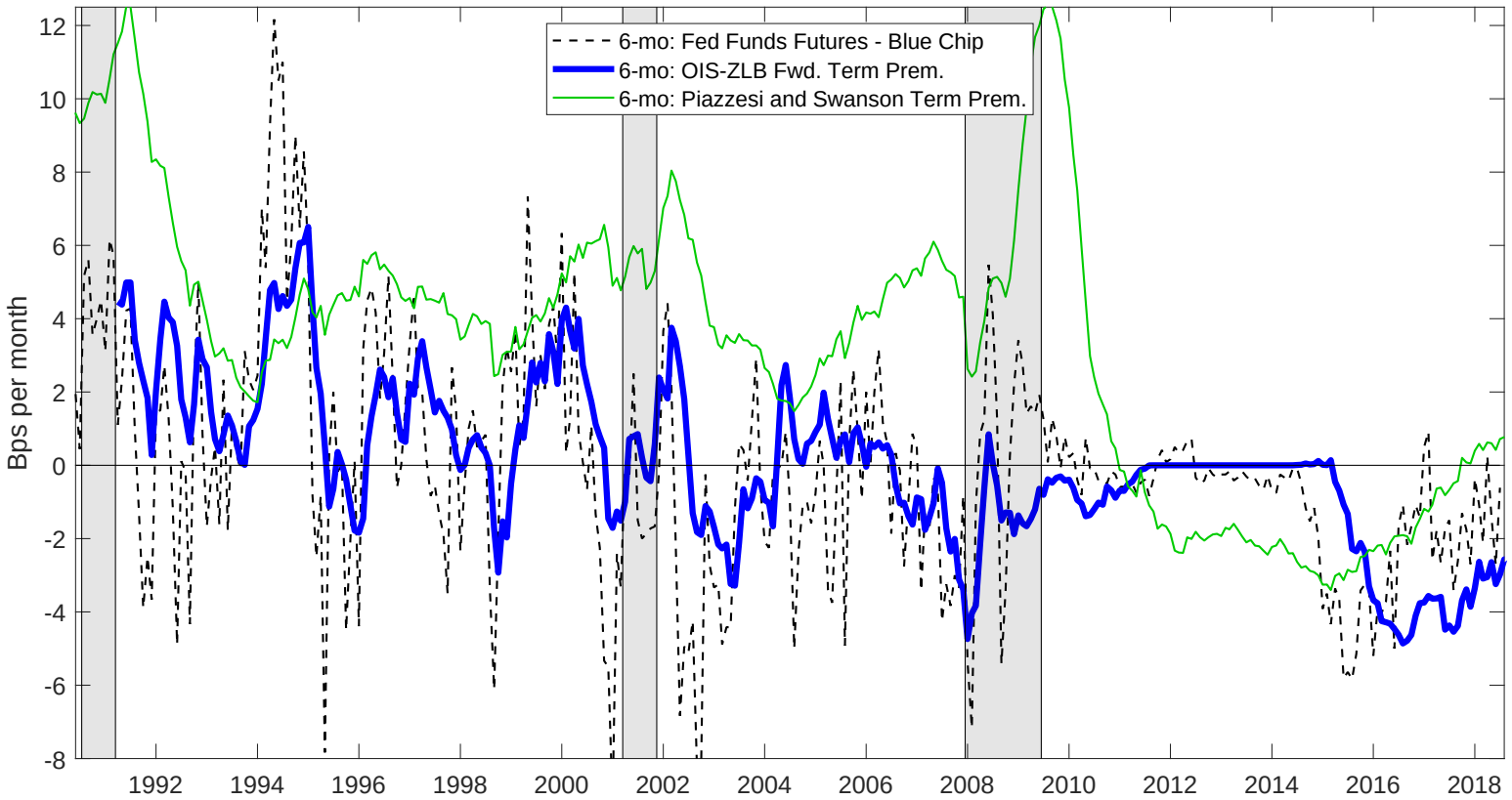


Term Structure Model Priebsch (2017) (Blue)

- Implies large negative risk premia more recently.

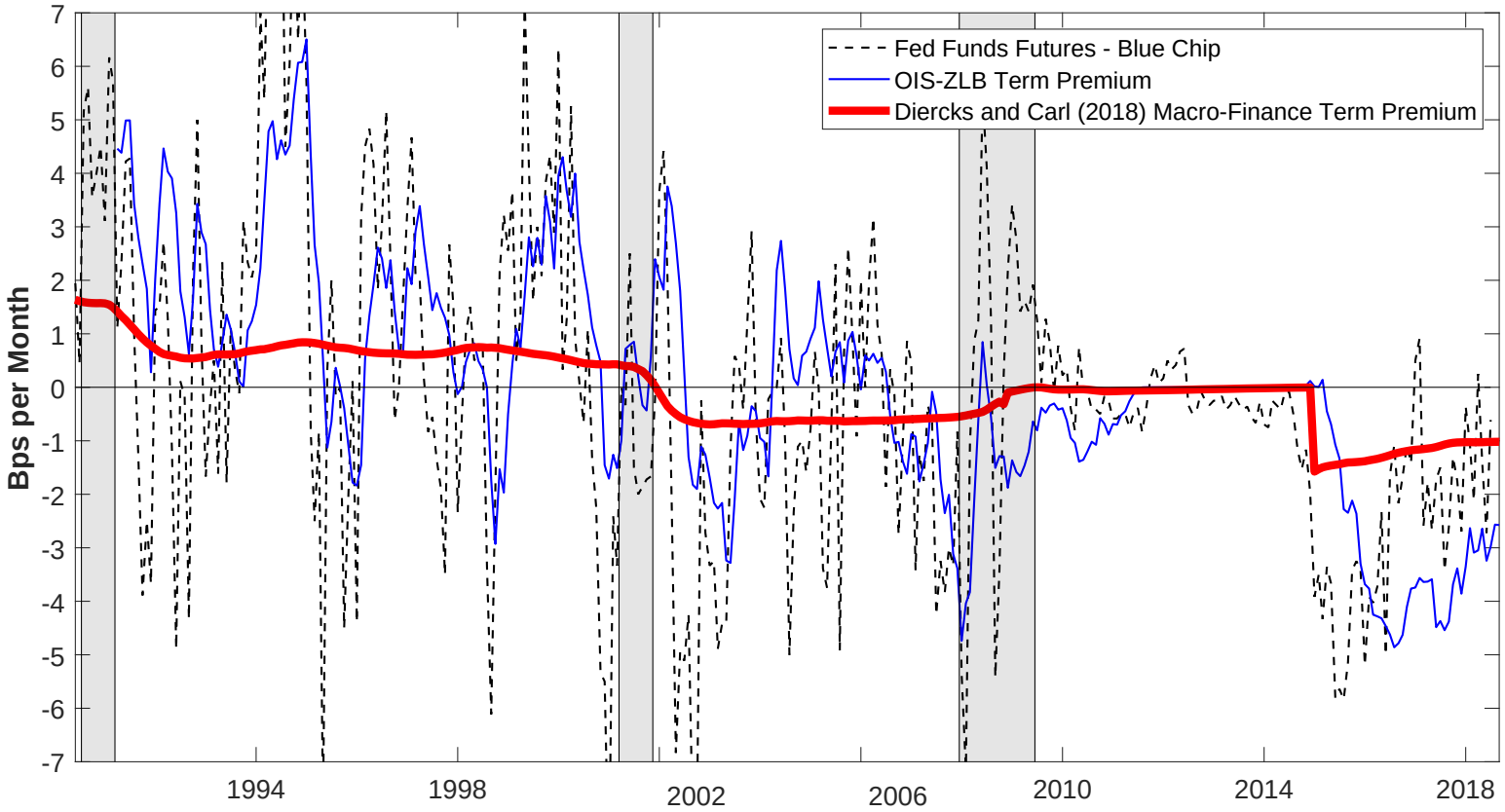
Predicted Risk Premiums



Term Structure Model Priebsch (2017) (Blue)

- Large negative RP due to mean reversion to high terminal rate.

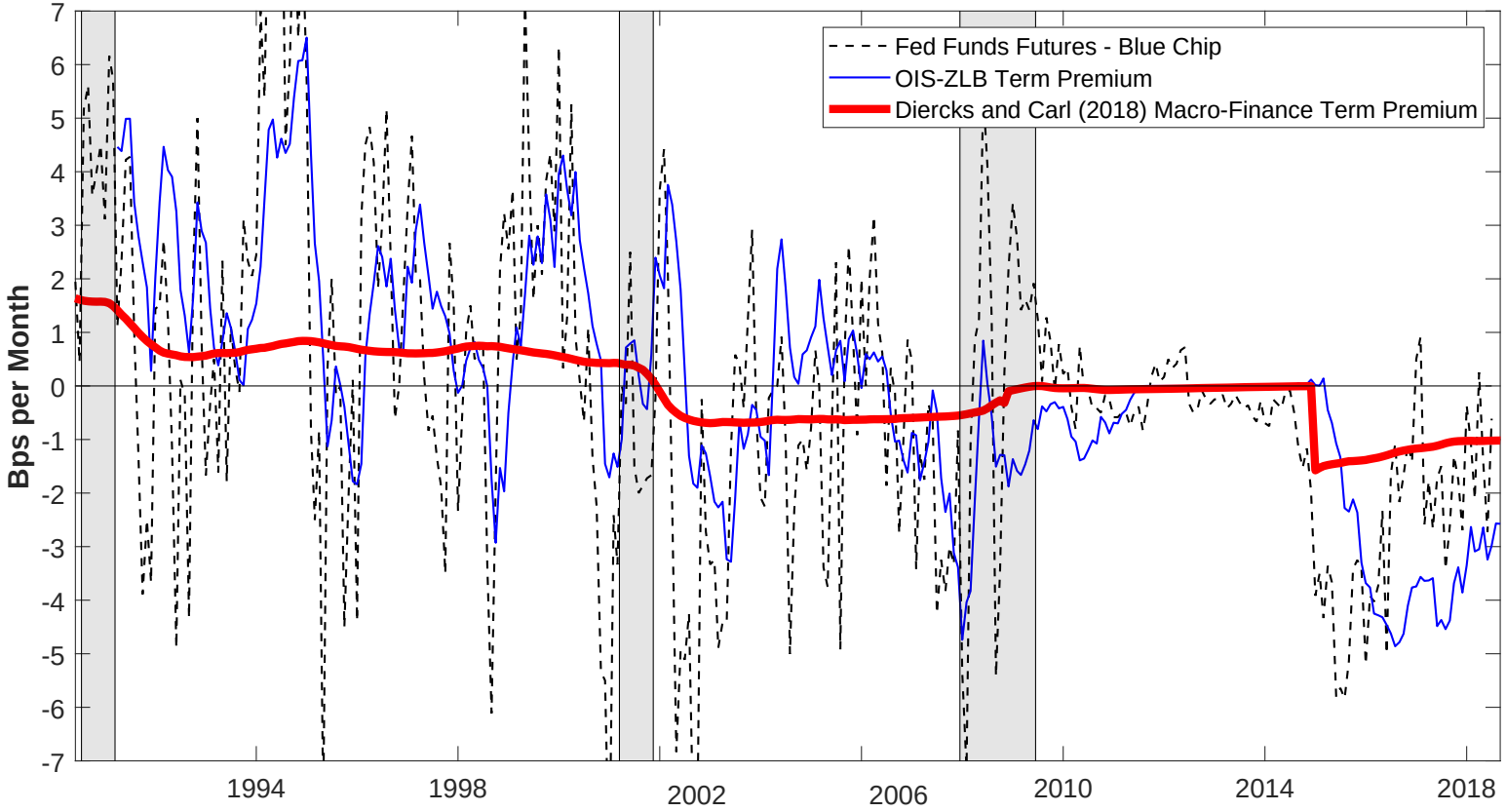
Predicted Risk Premiums: Macro-Finance Measure



Diercks, Munir, and Carl (2019) (Red)

- Suggests a positive 1 bp adjustment was reasonable in the 1990s (Kohn Rule)

Predicted Risk Premiums: Macro-Finance Measure



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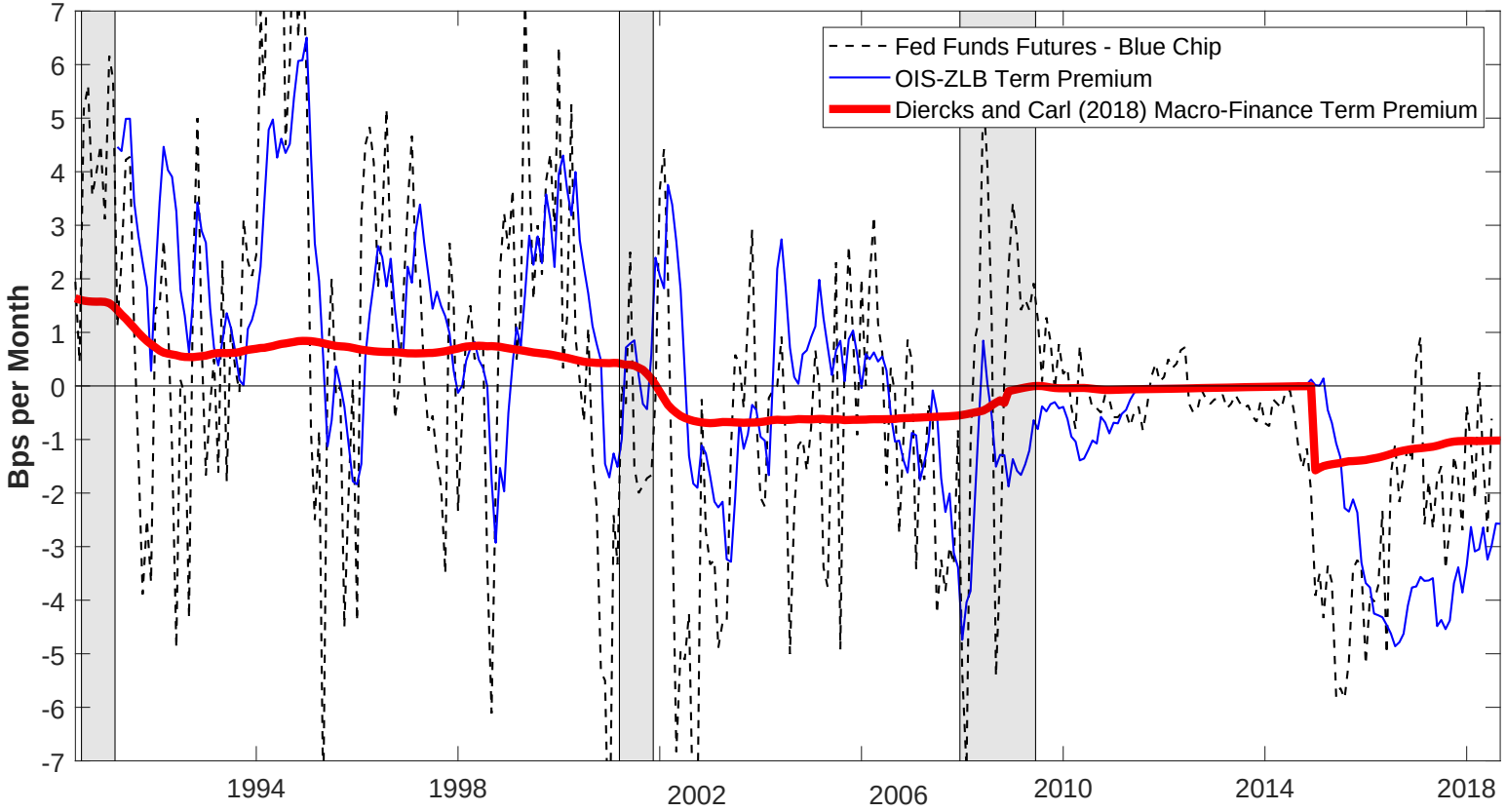
- Shifted signs in 2000, returned to zero over forward guidance period.

Predicted Risk Premiums: Macro-Finance Measure



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- Measure is now near -1.5 bps per month.

Out of Sample Forecasts

- One way to evaluate different models is to compare out-of-sample forecasts

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Table 1
RMSE Out-of-Sample Performance

	3-mo	4-mo	5-mo	6-mo	7-mo	8-mo	9-mo
Diercks et. al (2019)	**28.2**	**37.2**	**46.6**	**56.2**	**66.7**	**73.4**	**80.6**
Federal Funds Futures	28.5	37.7	47.7	57.8	68.5	74.6	82.5
Blue Chip Median	30.7	40.7	51.0	61.6	72.4	83.1	93.7
OIS-ZLB In Sample	28.9	38.2	47.8	57.2	68.1	74.1	82.1
Piazzesi & Swanson	31.6	43.4	54.7	63.3	68.9	79.7	84.1

This table compares out of-sample performance based on root mean squared errors (RMSE) through 2018:08. The training window is from 1988:10 through 1991:03. The OIS-ZLB model's term premia are based on in-sample estimates.

- Diercks, Carl and Munir (2019) has lowest OOS RMSE, outperformance is even greater post 2005 (not shown)

Implications for Current Path

- Fed Funds Futures by End of 2020
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- Term Structure Expected Rate by End of 2020
  - 1.88%, No cuts

For the Fed, which path you believe matters.

ThePolicyPath.com

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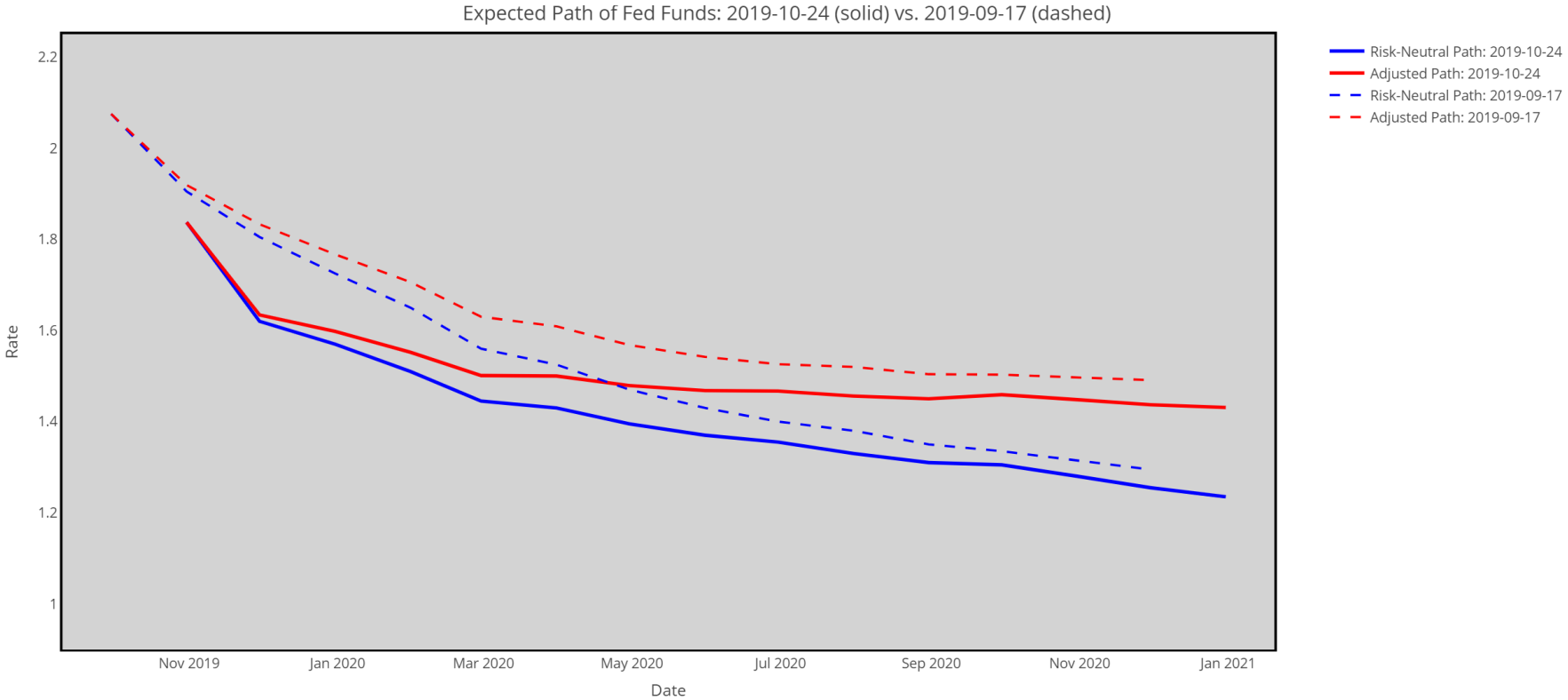
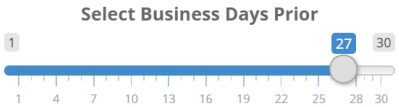


Hover over time series chart to see expected federal funds rate on a specific date.



Daily updated measure of the policy path

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- Taking into account risk premium is an important step in deciphering market based signals.
- We propose new measure that does not suffer from mean reversion and filters out idiosyncrasies in surveys to provide an economically motivated risk-adjusted path of policy.
- Path is updated daily at ThePolicyPath.com