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

Anthony M. Diercks¹ & Isfar Munir & Uri Carl

Federal Reserve Board

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¹The 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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- Why? MP surprises have large effects (e.g. BK, 2005)
- Smaller than expected rate cut $\implies$ Opposite of intended effect.

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Surveys have the largest relative forecast errors of the federal funds rate.
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- Mean Reversion I: Estimated terminal rate may be outdated.
- Mean Reversion II: Often predicts fairly rapid recovery in rates.
What we do

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- Extract movements in survey gap that can be explained by rolling covariances between real and nominal activity

Theory suggests covariances are key. Regress survey gap onto rolling covariances and extract predicted component. Numerous ways to compute rolling covariances. Use model averaging to combine predicted components. Add our risk premium to fed funds futures & compute forecast errors. Superior forecasts based on our macro-finance measure.
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If positive covariance, \( \implies \) negative risk premium.

If negative covariance, \( \implies \) positive risk premium.
Realized returns of 6-month Fed Funds Futures minus 6-month ahead Funds Rate

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

Theory

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

- Theory does not dictate which proxies to use for RHS

Empirics

\[ f_t^{(1)} - E_t [r_{t+1}] = \alpha + \beta_i, k, m Cov_i, k, m (Y_i t, R_k t) \]

\( i = 1 : 2 \) (2 real activity measures, 12-mo chg. in IP and NFP)

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

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

\( 2 \times 3 \times 20 = 120 \) possible covariances, 120 regressions
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Plotting negative covariances as dictated by theory on risk premium
Benefits of model averaging are largest when

1. Individual forecasts are mis-specified
2. Unstable forecasting environment / past track records unreliable.
3. Time sample is relatively short.
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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.
Survey gap risk premium (dashed black)

- Volatile/noisy due to necessary interpolation (qtr to monthly) and idiosyncrasies of surveys (rigidities, timing, sample)
Piazzesi and Swanson (2008) (Green)

\[ f_t^{(1)} - r_{t+1} = \alpha + \beta \Delta NFP_{t-1} \]

\( \Rightarrow \) LHS is based on realized values
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- Subject to forecast error rather than risk compensation.
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\[ f_t^{(1)} - r_{t+1} = \alpha + \beta \Delta NFP_{t-1} \implies \text{LHS is based on realized values} \]

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

- Implies large negative risk premia more recently.
Large negative RP due to mean reversion to high terminal rate.
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

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

- Shifted signs in 2000, returned to zero over forward guidance period.
Predicted Risk Premiums: Macro-Finance Measure

- 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

Diercks, Carl and Munir (2019) has lowest OOS RMSE, outperformance is even greater post 2005 (not shown)
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<table>
<thead>
<tr>
<th>Table 1</th>
<th>RMSE Out-of-Sample Performance</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>3-mo</td>
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<tr>
<td>Diercks et. al (2019)</td>
<td>28.2</td>
</tr>
<tr>
<td>Federal Funds Futures</td>
<td>28.5</td>
</tr>
<tr>
<td>Blue Chip Median</td>
<td>30.7</td>
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<tr>
<td>OIS-ZLB In Sample</td>
<td>28.9</td>
</tr>
<tr>
<td>Piazzesi &amp; Swanson</td>
<td>31.6</td>
</tr>
</tbody>
</table>

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
  - 1.20%, 2 and a half cuts
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- Risk-Adjusted 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.
The views expressed here are those of the authors and do not reflect the views of the Board of Governors.

Expected Path of Fed Funds: 2019-10-24 (solid) vs. 2019-09-17 (dashed)

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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Conclusion

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- Taking into account risk premium is an important step in deciphering market-based signals.
Market-based measures of expectations are crucial for the proper conduct of monetary policy and the management of expectations. Taking into account risk premium is an important step in deciphering market-based signals. We propose a 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.