# Decomposition of the nominal and real yield curve, term premium dynamics, and inflation forecasting: Brazilian Case

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# Agenda

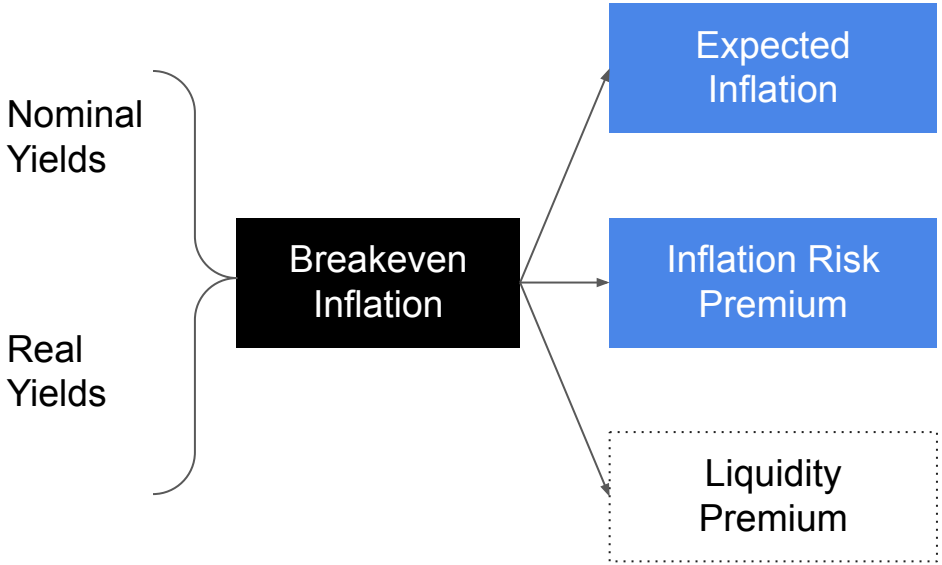
1. Introduction
2. Model
3. Data set
4. Statistical Evaluation
5. Final Remarks

# Introduction

- Breakeven Inflation - the difference between nominal interest and real interest for a given maturity - reflects inflation expectations but is subject to distortions, for instance, risk and liquidity premium;
- Among several studies in the literature, Adrian *et al.* (2013) and Abrahams *et al.* (2016) present contributions to decomposing Breakeven for the US and UK;
- We use this method to estimate premiums in Brazilian yield curves and use inflation expectations for inflation forecasting;
- The results suggest that premiums are positive and time-varying. Also, the model-implied expected inflation is a competitive predictor of inflation.

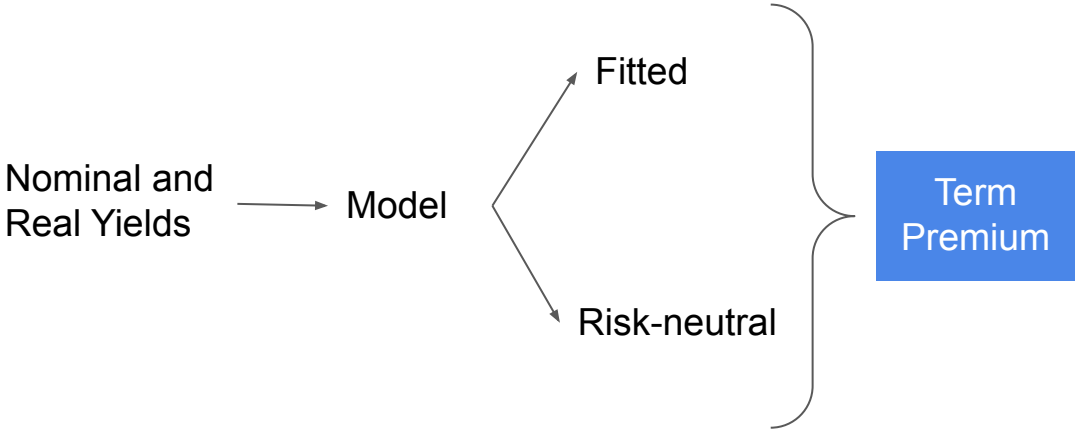
# Introduction

- Breakeven decomposition to Brazilian yields curves: **Expected Inflation** and **Inflation Risk Premium**;



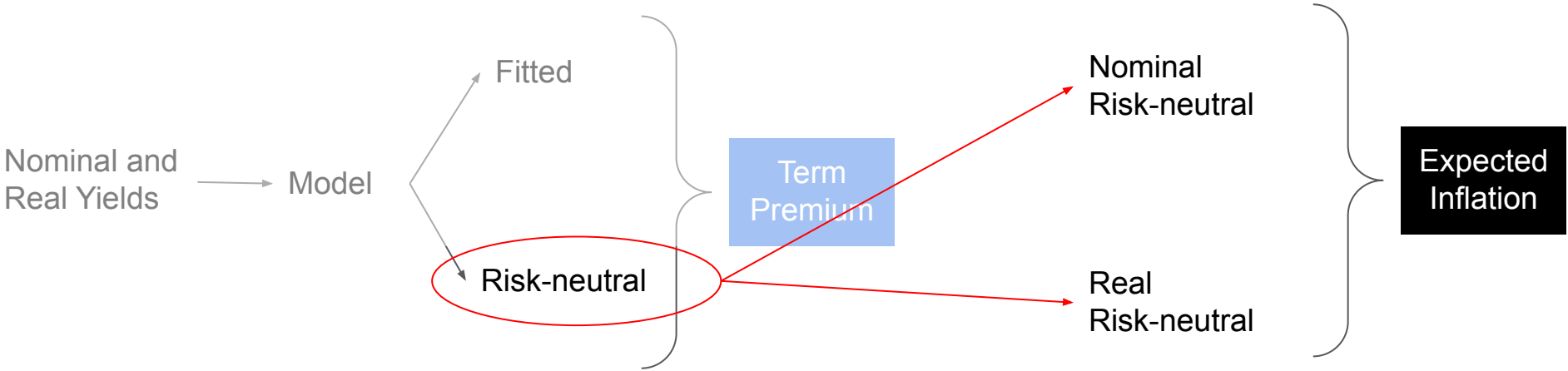
# Model

1. Decomposition of real and nominal yield curves in **risk-neutral**;



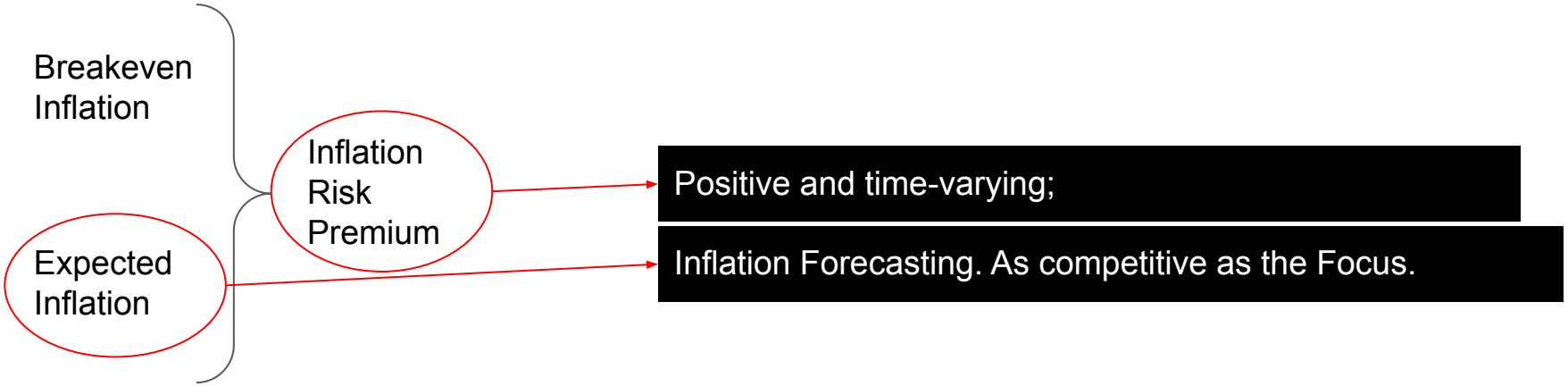
# Model

1. Decomposition of real and nominal yield curves in **risk-neutral**;
2. Then calculation of **Expected Inflation.**



# Model

- Breakeven decomposition to Brazilian yields curves: **Expected Inflation** and **Inflation Risk Premium**;



# Model - Equations

Groundwork: Abrahams *et al.* (2016):

$$\log P_t^{(n)} = A_n + B_n' X_t$$

$$X_{t+1} - \mu_X = \Phi(X_t - \mu_X) + \nu_{t+1}$$

$$A_n = A_{n-1} + B_{n-1}'\tilde{\mu} + \tfrac{1}{2} B_{n-1}'\Sigma B_{n-1} - \delta_0, \quad A_0 = 0$$

$$B_n' = B_{n-1}'\tilde{\Phi} - \delta_1', \quad B_0 = 0_{K\times 1}.$$

$$\tilde{\mu} = (I_K - \Phi)\mu_X - \lambda_0, \quad \tilde{\Phi} = \Phi - \lambda_1.$$

$$\pi_t^{(n)} = y_t^{(n)} - y_{t,R}^{(n)} = -\frac{1}{n}\left[A_n + B_n' X_t - \left(A_{n,R} + B_{n,R}' X_t\right)\right]$$

Pricing recursions for real yields

# Data set

**Data set:**

- Nominal and Real Yield Curves:

  2006:01 - 2022:04. 186 monthly observations;

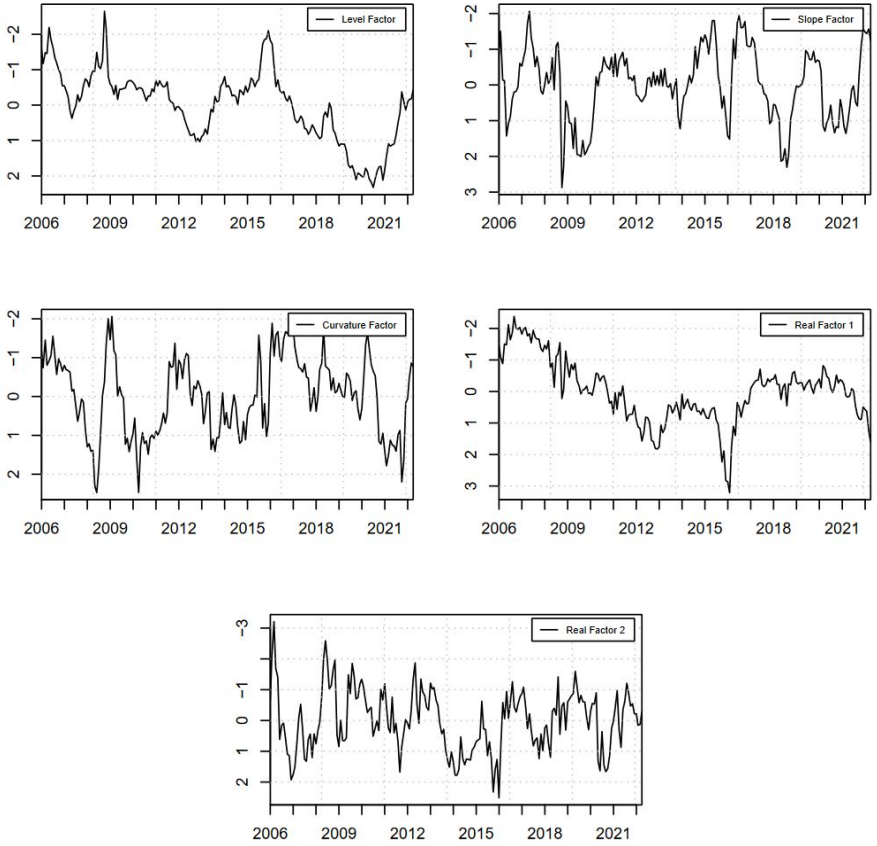
  - “Learning period”: 2006:01–2016:06;
  - Forecasting over the period 2016:07–2022:04.

**Statistical Evaluation:**

CSFE, RMSFE, GW

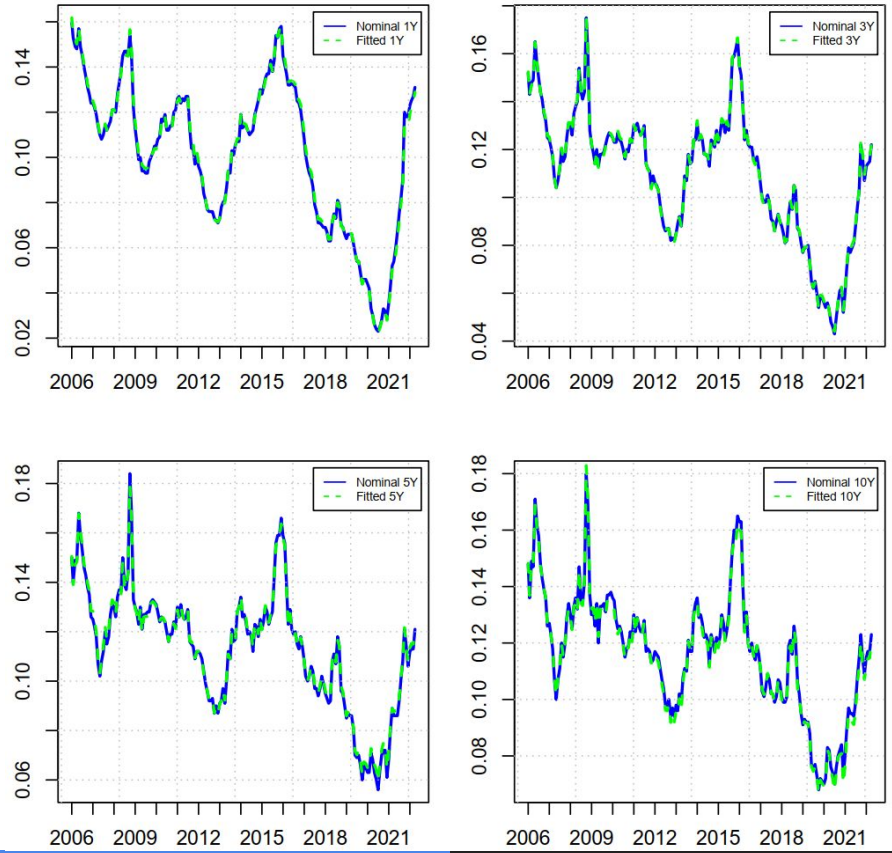
# Results - Factors

Figure 1: Pricing factors



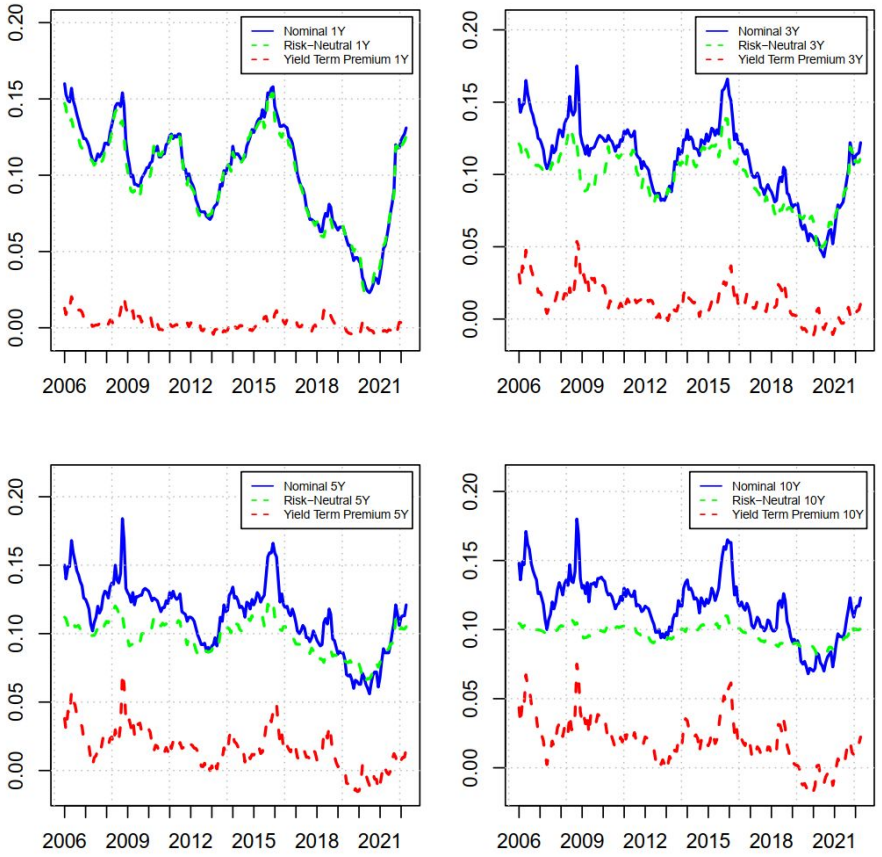
# Results - Fitted Nominal Yields

Figure 2: Fitted Nominal Model-Implied



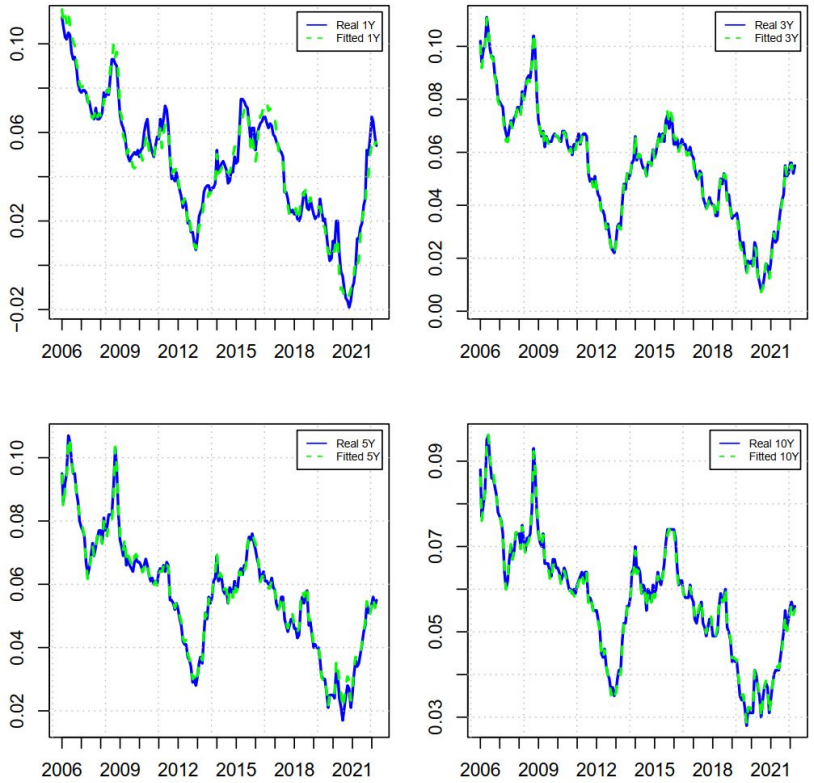
# Results - Nominal Term Premium

Figure 3: Nominal Term Premium and Risk-Neutral



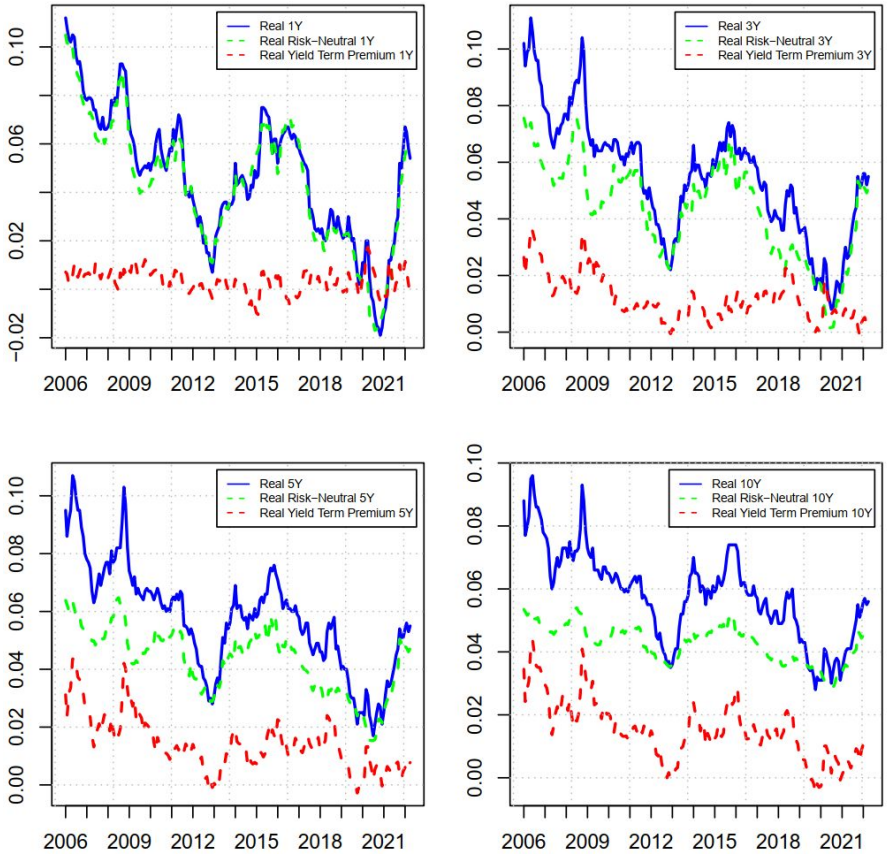
# Results - Fitted Real Yields

Figure 4: Fitted Nominal Model-Implied



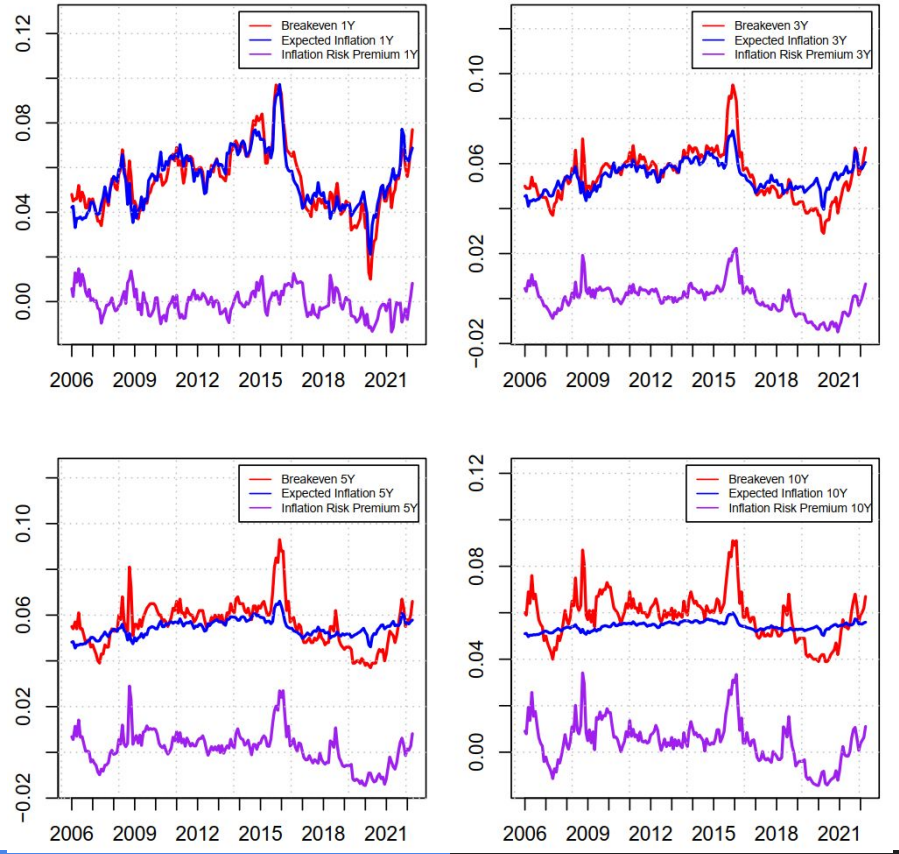
# Results - Real Term Premium

Figure 5: Real Term Premium and Risk-Neutral



# Results - Breakeven Decomposition

Figure 6: Breakeven, Expected Inflation, and Inflation Risk Premium



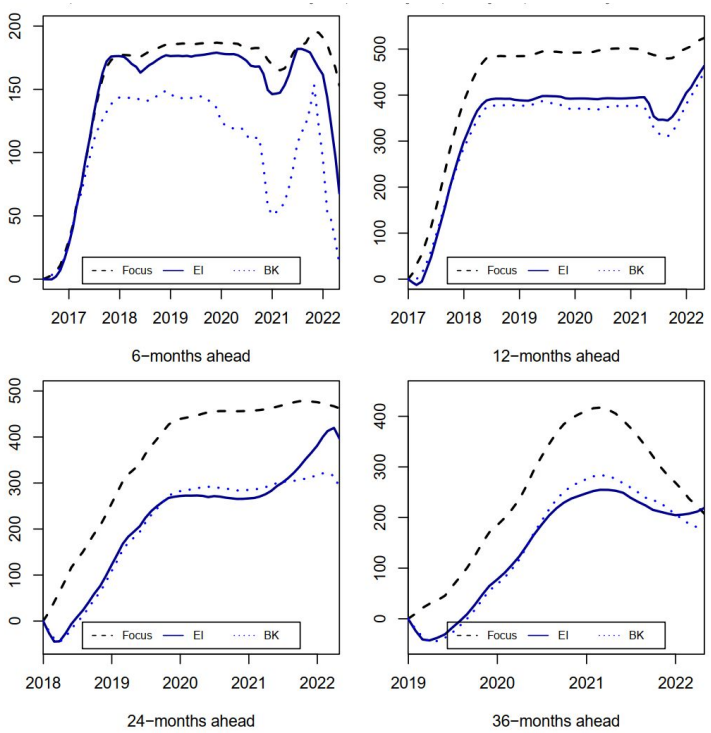
# Results - Inflation Forecasting

Table 1: Root Mean Squared Error for Predicting Future Inflation

| Model | Horizon | | | |
|---|---|---|---|---|
| | n = 6 | n = 12 | n = 24 | n = 36 |
| RandonWalk | 2.743 | 4.320 | 4.487 | 4.295 |
| Focus | **0.842** | **0.749** | **0.747** | **0.848** |
| Modelforecast | 0.933 | 0.782 | **0.788** | 0.839 |
| Breakevens | 0.989 | 0.788 | 0.850 | 0.873 |

# Results - Inflation Forecasting

Figure 7: CSFE against RW



# Final Remarks

- Based on Abrahams et al. (2016), Breakeven Decomposition for Brazilian yield curves.
- Results suggest **expected inflation** follows closely breakeven in short maturities;
- Also, suggest that the **inflation risk premium** is positive most of the time;
- For longer maturities, the **expected inflation** is around 5%;
- **Model-implied expected inflation forecasting** is as competitive as Focus, mainly in intermediate horizons.

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# Comments:

## “Fiscal Multipliers in Brazil through the MIDAS Lens”

Andreza Palma

Discussant: Werley Cordeiro

# Comments: “Fiscal Multipliers in Brazil through the MIDAS Lens”

1. Macroeconomic effects of government spending shocks on activity in Brazil;
2. Gap: MIDAS-VAR (mixed-data sampling VAR) - method not applied for Brazil yet;
3. **Results:**
   a. The fiscal multipliers of primary spending found here are less than one;
   b. The Investment multiplier was close to zero.
4. **Comments:**
   a. Robustness exercises;
   b. Include confidence interval in results.