NY Fed Symposium on Inflation

Market-based Measures of Expected Inflation. Threats to Measurement.

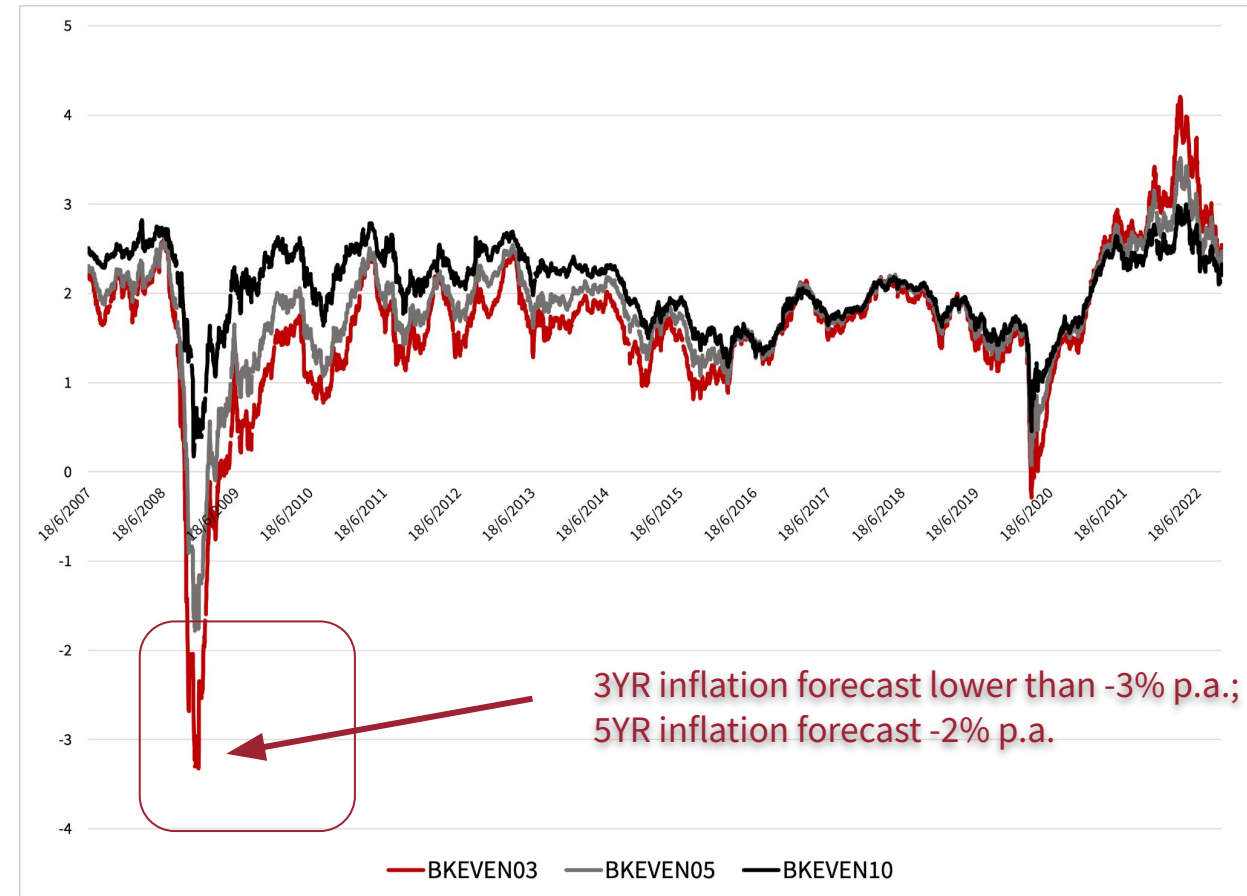STANFORD GRADUATE SCHOOL OF BUSINESS

Market-based measures of inflation

Not the market's best forecast

- Risk-adjusted Inflation forecasts: overweight bad states of the world, and massively overweights very bad states (disasters)
  - Hard to undo risk-adjustment to back out actual forecast.
  - Policymakers change the risk-adjustment.

1. Break-even Inflation rate

$$y_t^{N,Treas} = y_t^{N,TIPS} + \mathbb{E}_t^Q[\pi_{t,T}]$$

Break-evens

3YR inflation forecast lower than -3% p.a.;
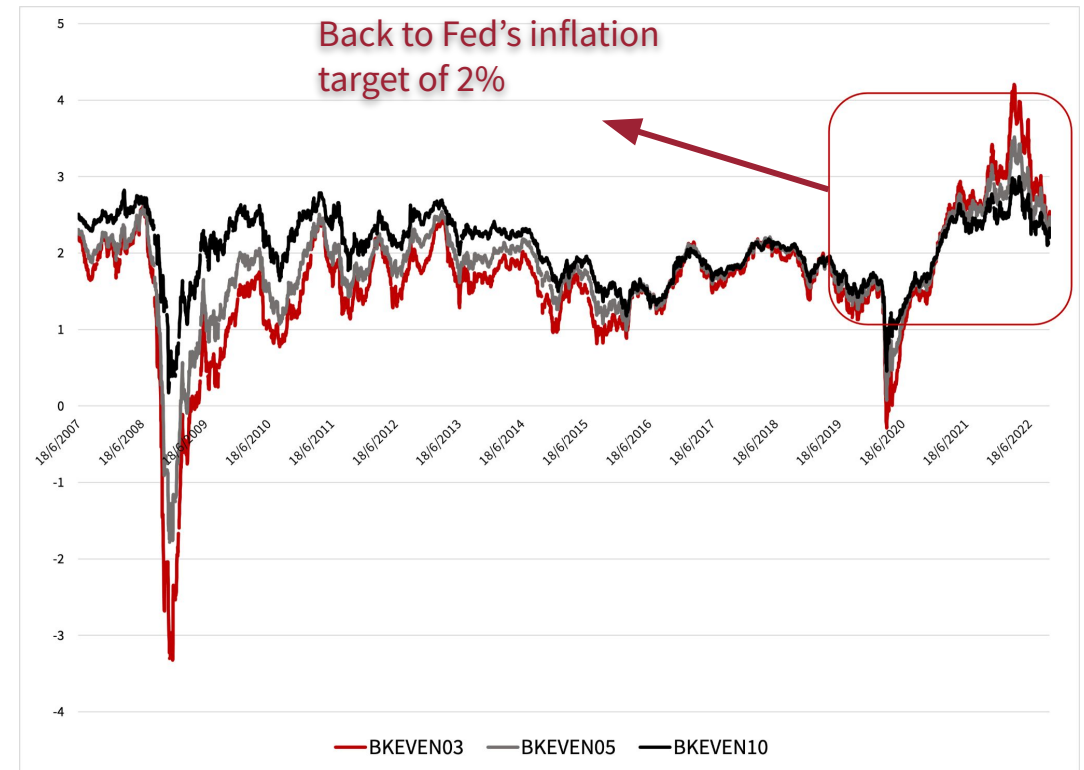5YR inflation forecast -2% p.a.

Market-based measures of inflation

Not the market's best forecast

- Risk-adjusted Inflation forecasts:

1. Break-even Inflation rate

$$y_t^{N,Treas} = y_t^{N,TIPS} + \mathbb{E}_t^Q[\pi_{t,T}]$$

Break-evens

Back to Fed's inflation target of 2%

Market-based measures of inflation

Forecasting Inflation

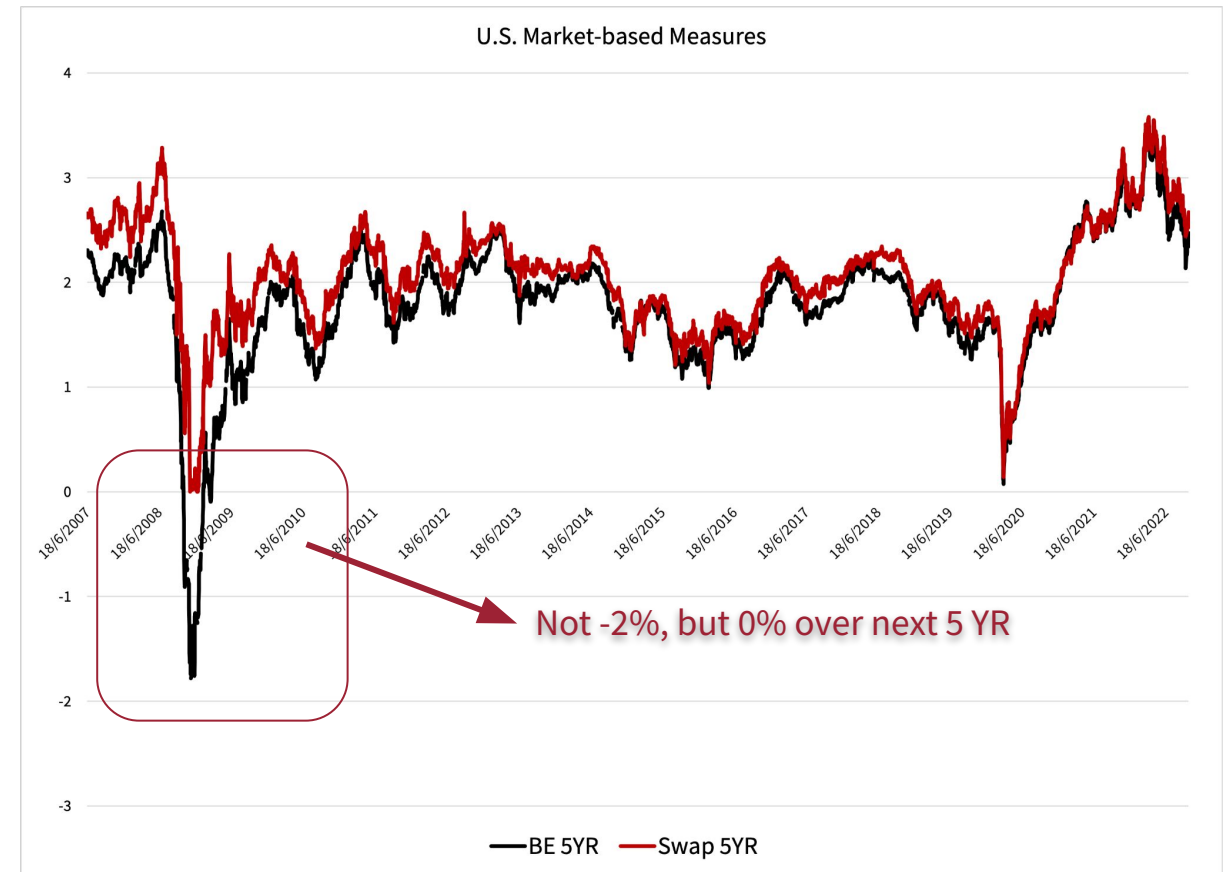Inflation forecasts under *risk-neutral measure* :

1. Break-even Inflation rate

$$y_t^{N,Treas} = y_t^{N,TIPS} + \mathbb{E}_t^Q[\pi_{t,T}]$$

2. Rate on Inflation Swaps

$$\mathbb{E}_t^Q[\pi_{t,T}]$$

Inflation Swaps

U.S. Market-based Measures

Not -2%, but 0% over next 5 YR

— BE 5YR — Swap 5YR

Treasurys are always Expensive

Ketchup Economics

- We can take TIPS, add zero-coupon inflation swaps to swap indexed into fixed payments, and manufacture a *synthetic Treasury*
  - LOP implies synthetic and actual Treasurys have some price
- Synthetic Treasurys tend to be cheap relative to an *actual Treasury*
- Yields on Treasurys are too low relative to yields on TIPS
- *Break-even inflation is lower than inflation swap rate*
  - Gap increases during times of dislocation in financial markets (e.g. GFC) (Fleckenstein, Longstaff, and Lustig, 2014)
- Demand for safety and liquidity benefits mainly Treasurys, not TIPS
  - Treasurys earn larger safety and liquidity convenience yields (Krishnamurthy and Vissing-Jorgensen, 2012) than TIPS

U.S. Market-based Measures

BE 5YR — Swap 5YR

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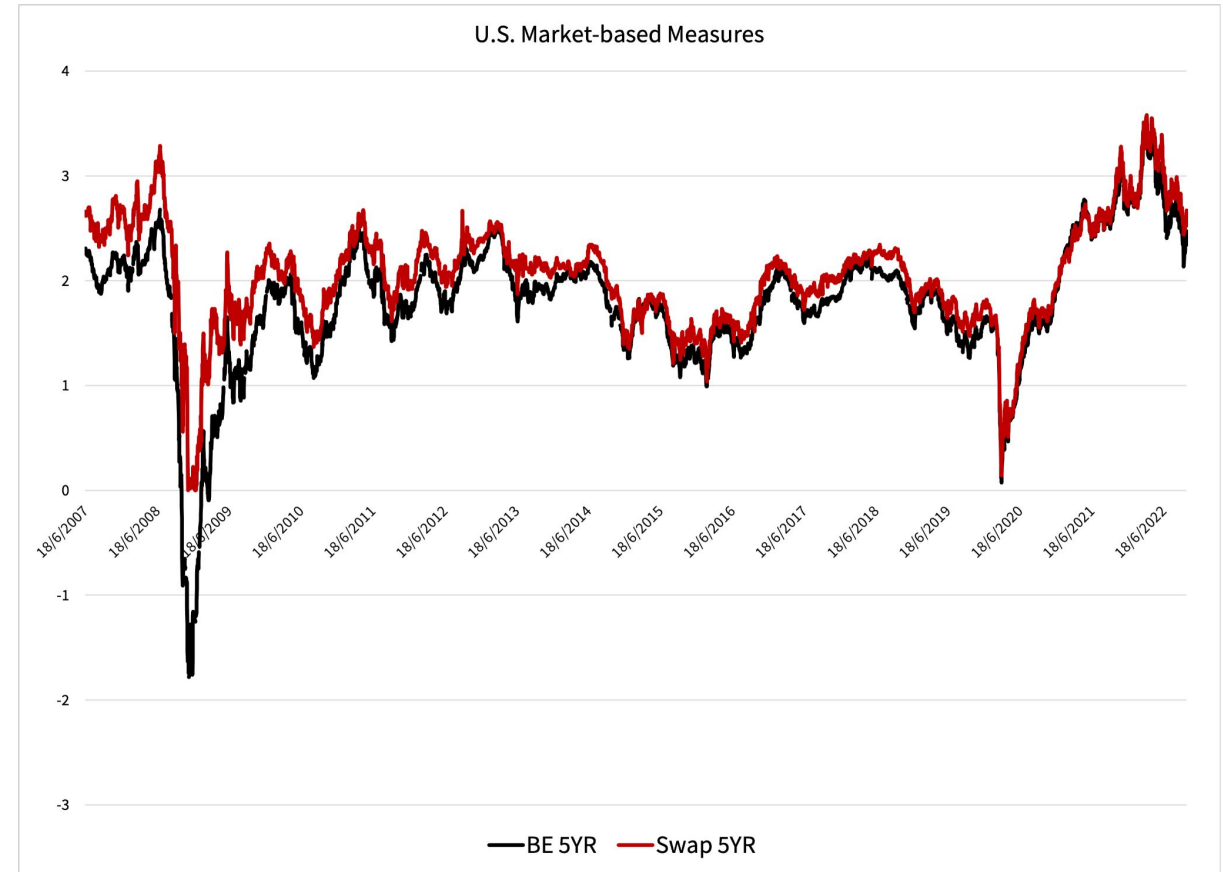
Breakeven vs Inflation Swap in U.K.
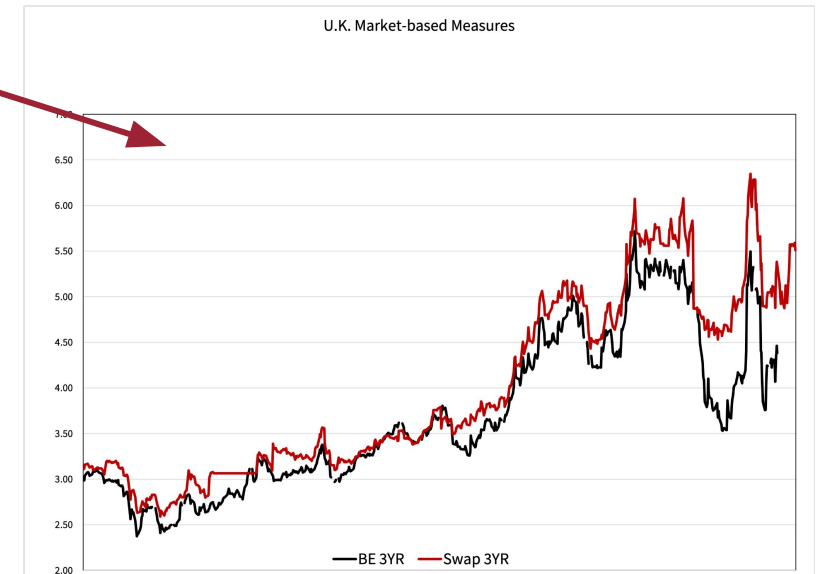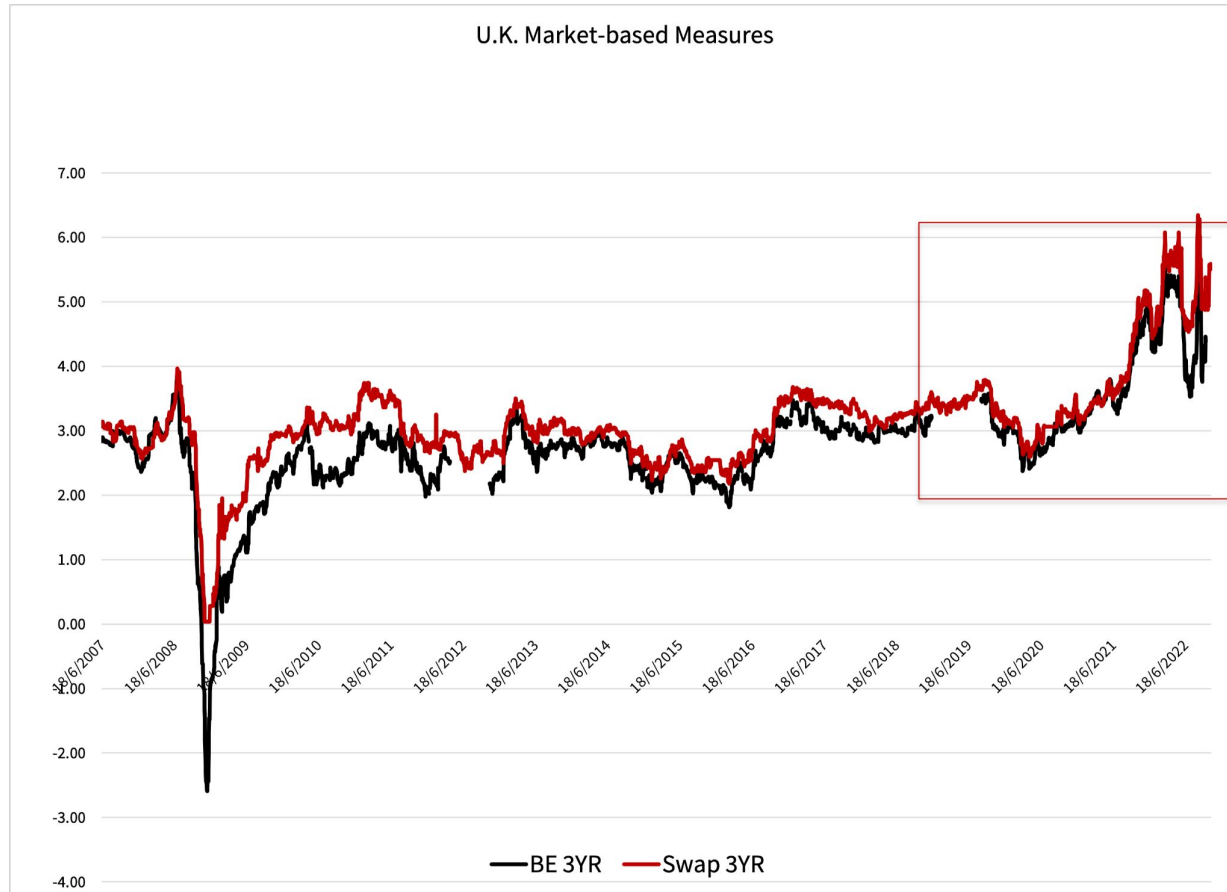
Challenges to Measurement

01   **Treasurys as Safe Assets: Impact of Convenience Yields on Treasurys.**

02   **Treasurys as CB Policy Target and Tool.**

03   **Excess Sensitivity of long end: What about Term Structure of Expected Inflation?**

Convenience Yields on Treasurys

Complicate Inference

- Suppose Treasurys earn (safety and liquidity) convenience yields but TIPS don't:

$$y_t^{N,Treas} = \mathbb{E}_t^Q[e^{-r_{t,t+N}}] - \lambda_t^N$$

- Suppose convenience yields on Treasurys increase (e.g. in response to volatility in markets)

$$y_t^{N,Treas} \searrow = y_t^{N,TIPS} + BE_t^N \searrow$$

  - If convenience yields on TIPS don't increase, then the break-even decreases
  - Treasurys become more special relative to TIPS and Break-evens decline,
  - We mistakenly infer that expected inflation declines under Q

$$y_t^{N,Treas} \searrow \nrightarrow y_t^{N,TIPS} + \mathbb{E}_t^Q[\pi_{t+N}] \searrow$$

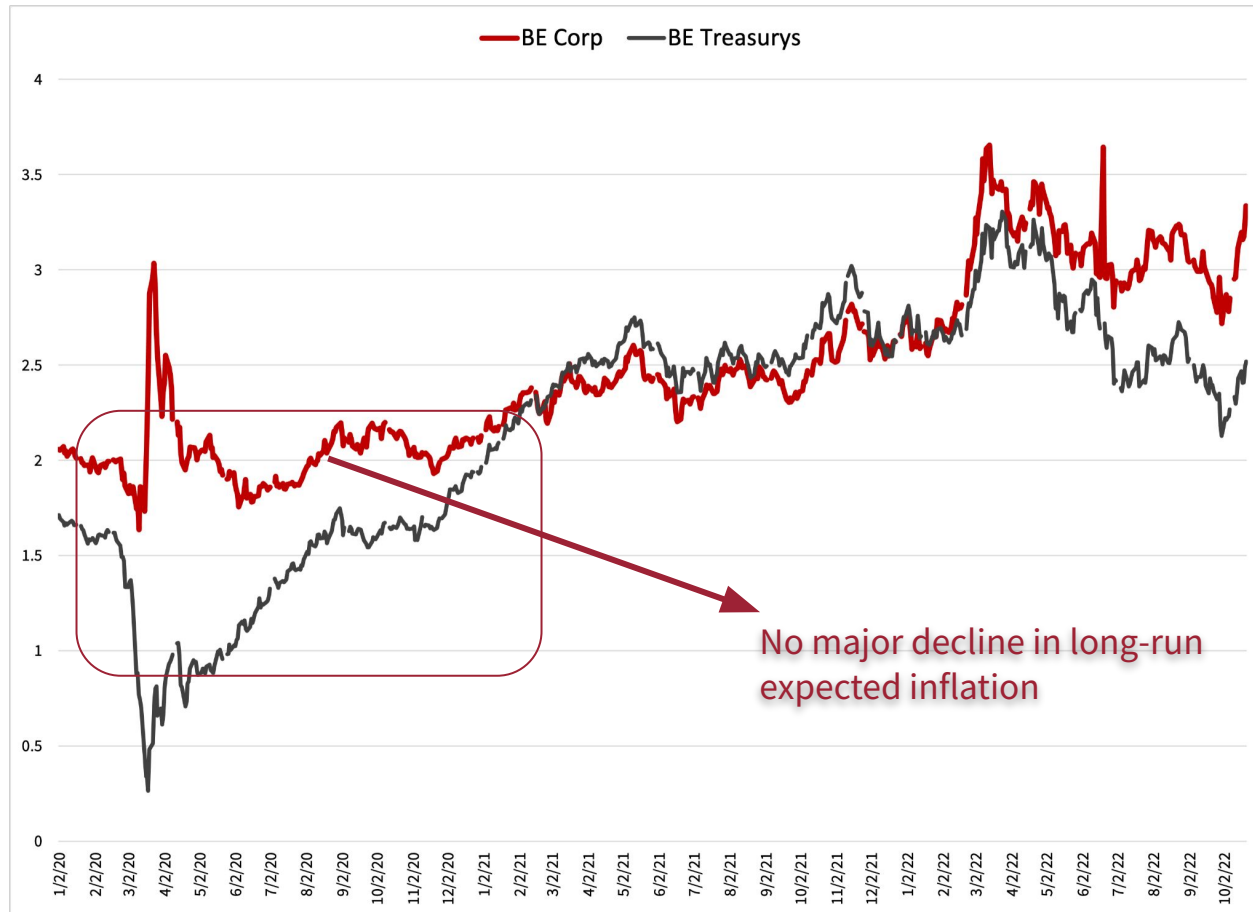## Large decline in BE since April

BKEVEN03   BKEVEN05   BKEVEN10
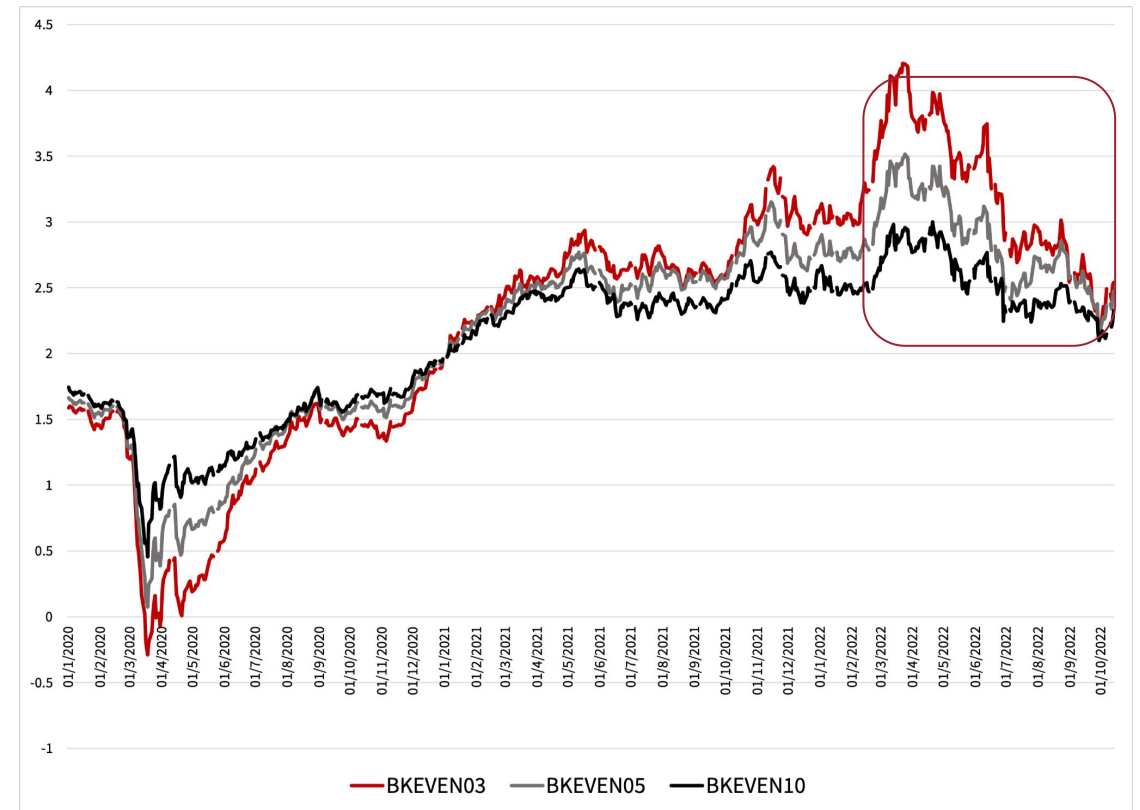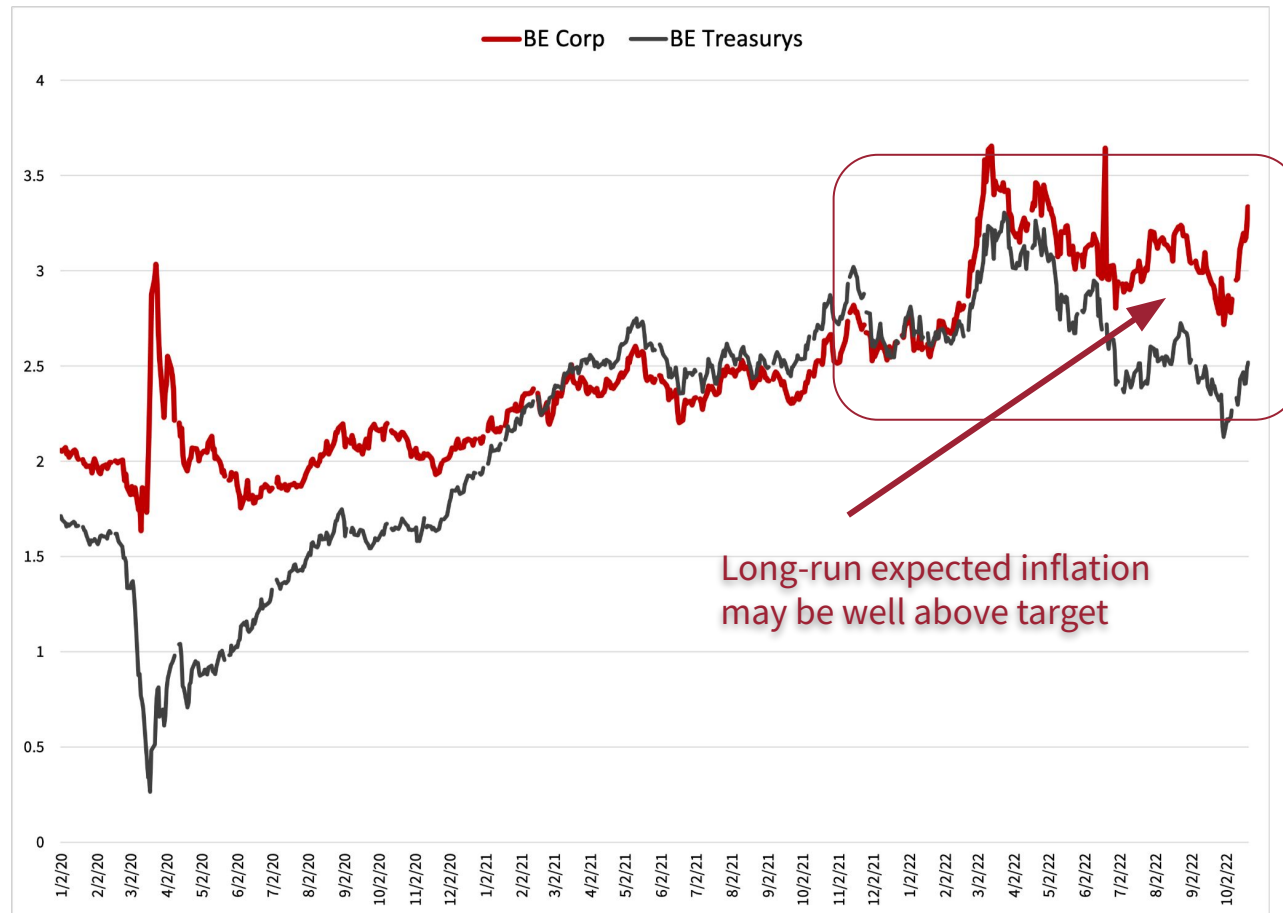
Corporate vs. Treasury Breakeven

Purging Convenience Yields from Break-evens

- Construct a *synthetic Treasury* from investment grade bond using CDS
- Then compute the break-even
  - Markit CDX Investment grade
  - Matched duration of CDX spread to duration of Bloomberg US Corporate Investment Grade Index
  - Recompute Corp. Break-even as Credit-hedged Corp. minus TIPS
- Currently duration is 7 yrs

Corporate vs. Treasury Breakeven

Purging Convenience Yields

Long-run expected inflation may be well above target

- Construct a *synthetic Treasury* from investment grade bond using CDS
- Then compute the break-even
  - Used Markit CDX Investment grade
  - Matched duration of CDX spread to duration of Bloomberg US Corporate Investment Grade Index
  - Recompute Corp. Break-even as Credit-hedged Corp. minus TIPS

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Challenges to Measurement

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Purchases of U.S. Treasurys
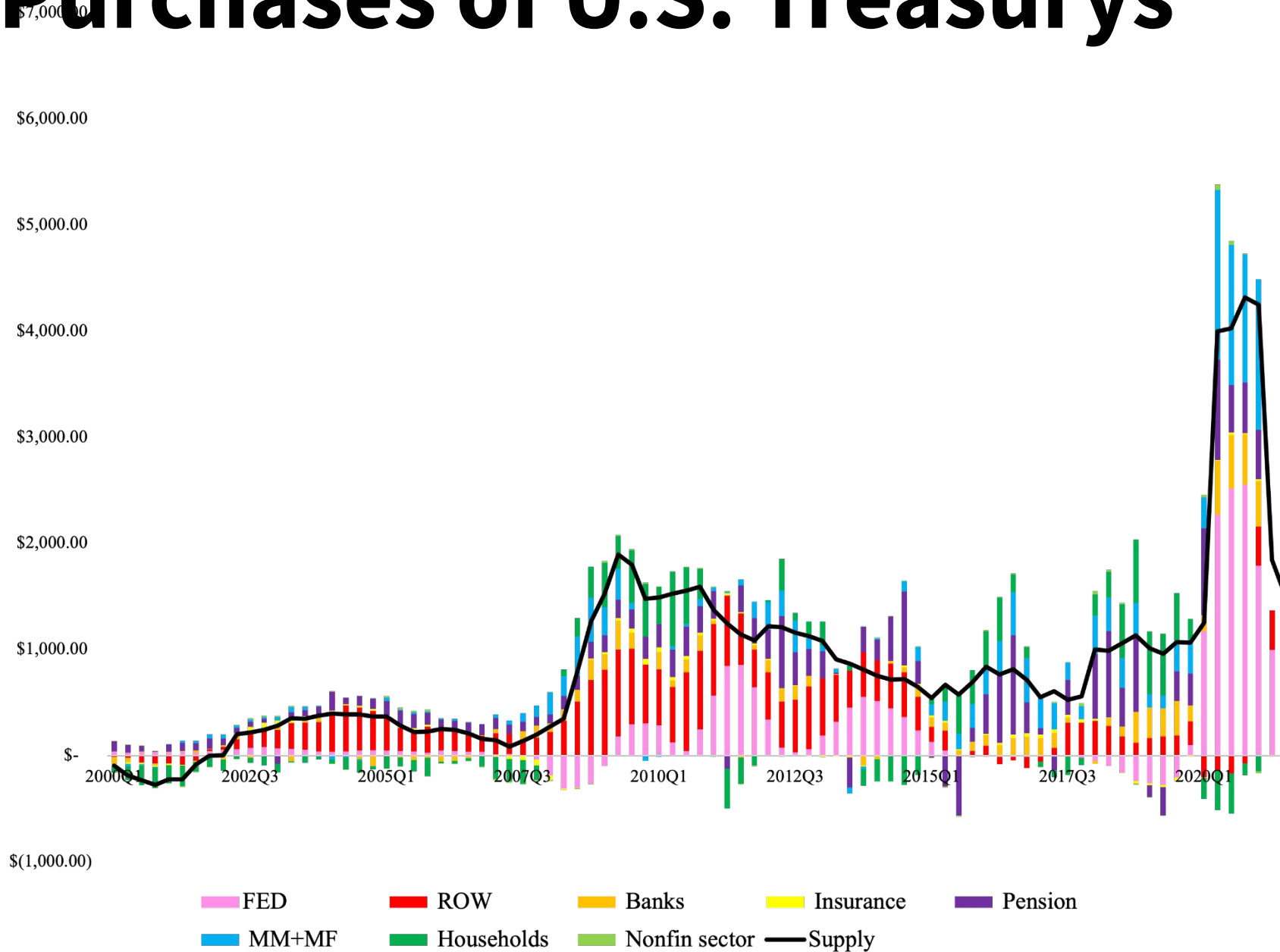
Large Scale Asset Purchases

LSAPS decrease *measured expected inflation*

- Fed buys mostly Notes and Bonds, not TIPS (only 1.4% of holdings)
- Suppose convenience yields on Treasurys increase in response to large scale asset purchases

$$y_t^{N,Treas} = \mathbb{E}_t^Q[e^{-r_{t,t+N}}] - \lambda_t^N$$

- If convenience yields on TIPS don't increase, then expected inflation under risk-neutral measure decreases

$$y_t^{N,Treas} \searrow = y_t^{N,TIPS} + BE_t^N \searrow$$

- When Fed buys Treasurys, they become more special relative to TIPS

- LSAPs mechanically decrease measured expected inflation; opposite of the effect it's supposed to have

Large Scale Asset Purchases

LSAPS decrease *measured expected inflation*

- **Nominal duration risk channel**

  - Fed removes nominal interest rate risk from market by buying Treasurys (not TIPS)
  - Larger decline in nominal yields than in real yields
    - QE changes the risk-neutral measure by removing nominal interest rate risk from the market
    - Fed is changing the risk-neutral measure , not expected inflation (under the actual measure)

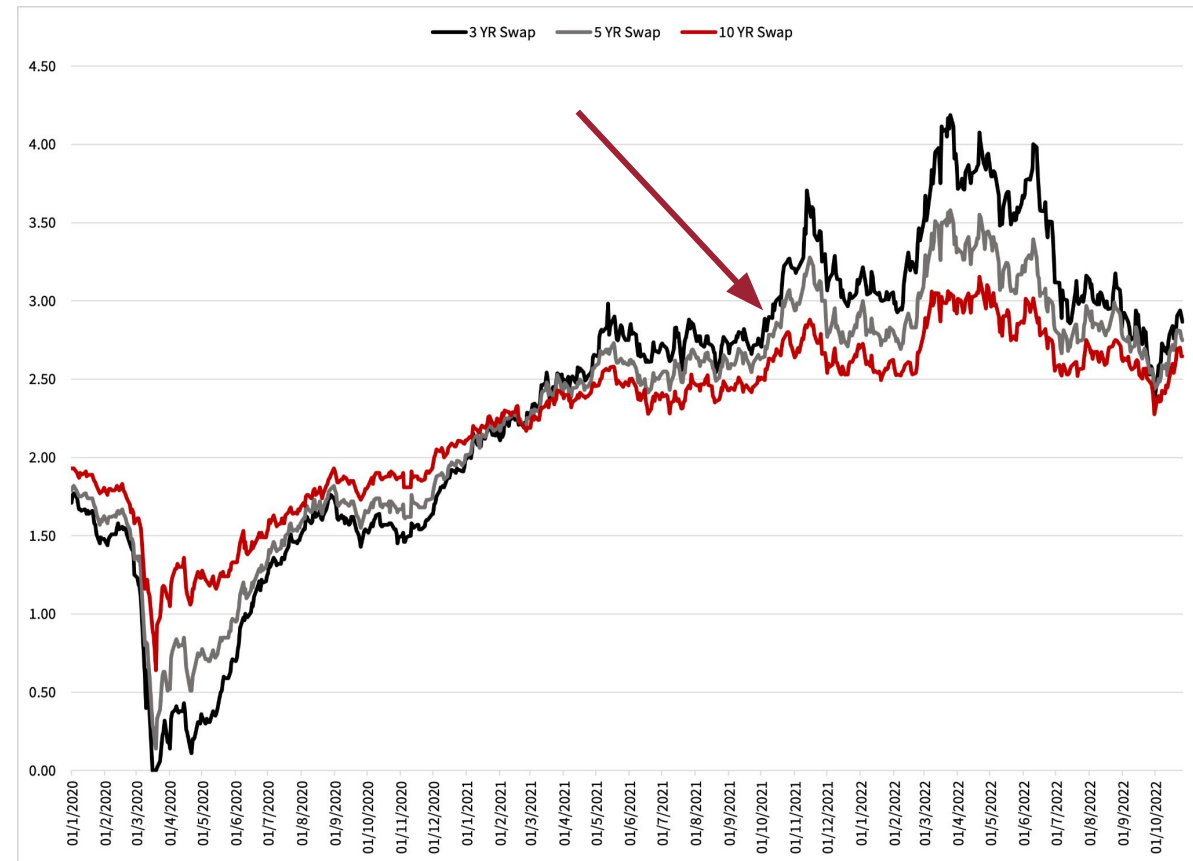 - Measure of expected inflation declines mechanically

$$y_t^{N,Treas} \searrow \searrow = y_t^{N,TIPS} \searrow + BE_t^N \searrow \searrow$$

- not just about current interventions, but the signaled commitment to future interventions

CB Intervention

Price Discovery Impaired

- Bond markets did not do a great job of forecasting the recent inflation spike (only towards the end of 2021)
- CB interventions may not improve the functioning of bond markets, but in fact may actively hamper price discovery.
- Speculators may have less of an incentive to invest in learning about fundamentals as soon central banks decide to intervene based on the bond price. (JoF, Bond and Goldstein , 2015)
- version of Lucas critique

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Term Structure

Excess Sensitivity

- Longer tenors seem excessively sensitive to news (mean reversion!)
  - Note how strongly 5Y (even 10Y) comoves with 3Y for example

- Hard to reconcile with large class of no-arbitrage models that feature mean reversion (Kelly and Giglio, QJE, 2018)

Inflation Swaps
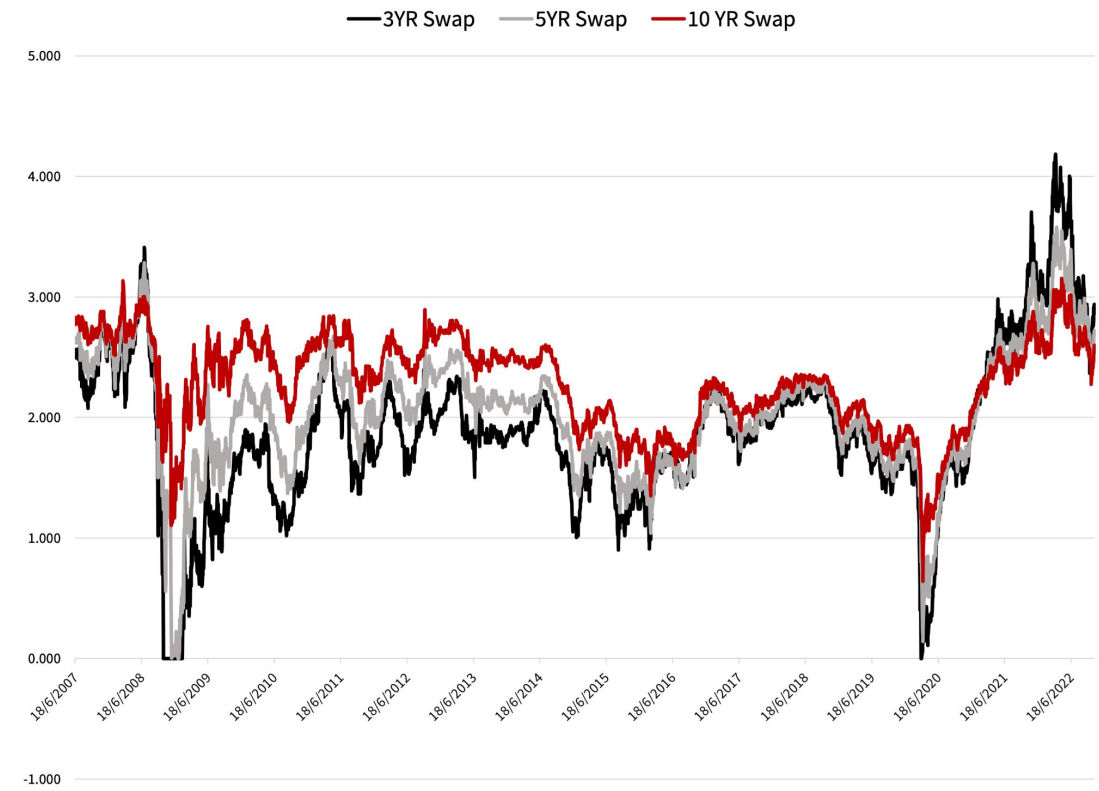
Summary

Market-based measures of Future Inflation.

- Decrease when safe asset demand for Treasurys increases.

- Decrease when Fed engages in LSAPs by buying Treasurys.

- May be less reliable because of Impaired Price Discovery in Bond Market

Implications for Today

Current market-based measures of Future Inflation.

- Currently, may be lowered by safe asset demand for Treasurys (last 4 months).

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