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# Assessing the Risk of Yield Curve Inversion

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*Any opinions expressed here are my own and do not necessarily reflect those of the  
Federal Open Market Committee.*

# Introduction

# A flattening yield curve

- The Federal Open Market Committee (FOMC) has been increasing the policy rate over the last year, and thus shorter-term interest rates have been rising.
- At the same time, longer-term interest rates in the U.S. have not changed very much.
- Financial market commentary has been addressing this phenomenon, often referred to as a “flattening yield curve.”
- I will discuss current yield curve circumstances and comment on some possible interpretations.

# Key themes in this talk

- There is a material risk of yield curve inversion over the forecast horizon if the FOMC continues on its present course of increases in the policy rate.
- Yield curve inversion is a naturally bearish signal for the economy. This deserves market and policymaker attention.
- It is possible that yield curve inversion will be avoided because longer-term nominal yields will begin to rise in tandem with the policy rate, but this seems unlikely as of today.
- Given below-target U.S. inflation, it is unnecessary to push normalization to such an extent that the yield curve inverts.

# A Flattening U.S. Yield Curve

# The slope of the yield curve

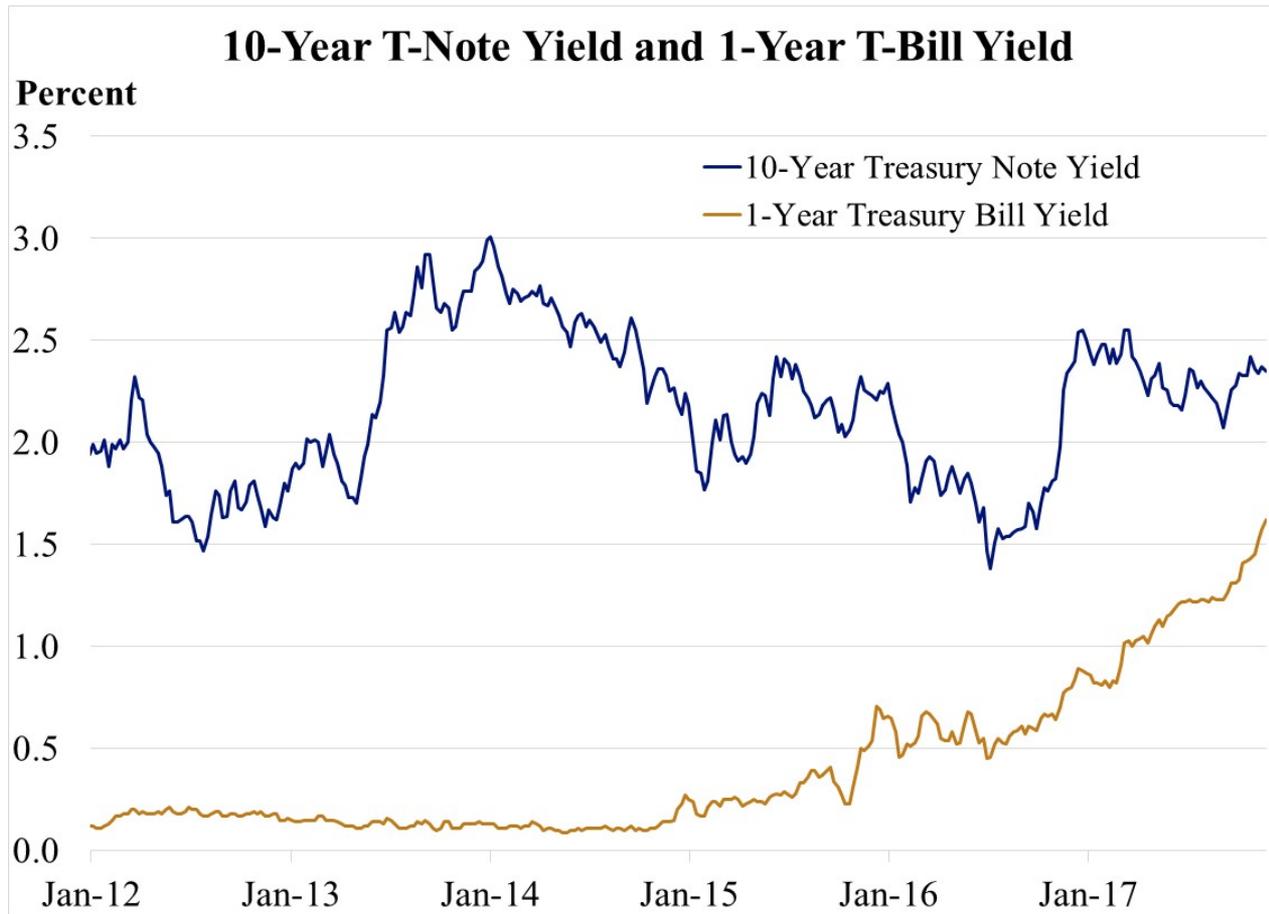
- The U.S. nominal yield curve has been flattening since 2014.
  - The spread between 10-year and one-year Treasury yields was close to 300 basis points at the beginning of 2014.
  - That same spread is currently (Nov. 24) only 73 basis points.
- The flattening is due to rising short-term rates vis-à-vis relatively stable long-term rates.
- There is a material risk that the nominal yield curve will invert over the forecast horizon if the FOMC continues on its current policy path, as suggested in the FOMC's Summary of Economic Projections (SEP).

# Nominal yield curve flattening



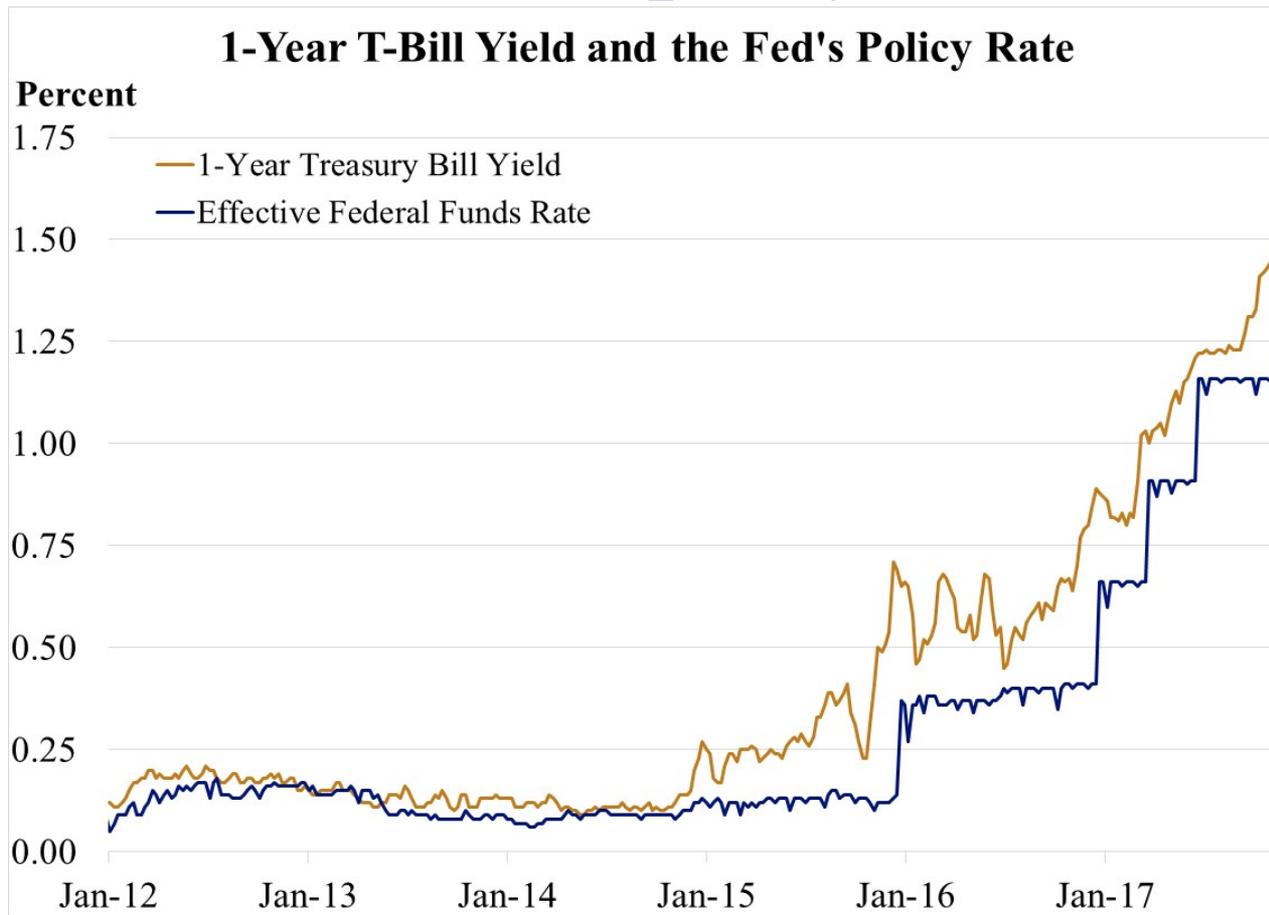
Sources: Federal Reserve Board and author's calculations. Last observation: Week of Nov. 24, 2017.

# Flattening due to rising short-term rates



Sources: Federal Reserve Board and author's calculations. Last observation: Week of Nov. 24, 2017.

# Rising short-term rates are closely related to the FOMC policy rate

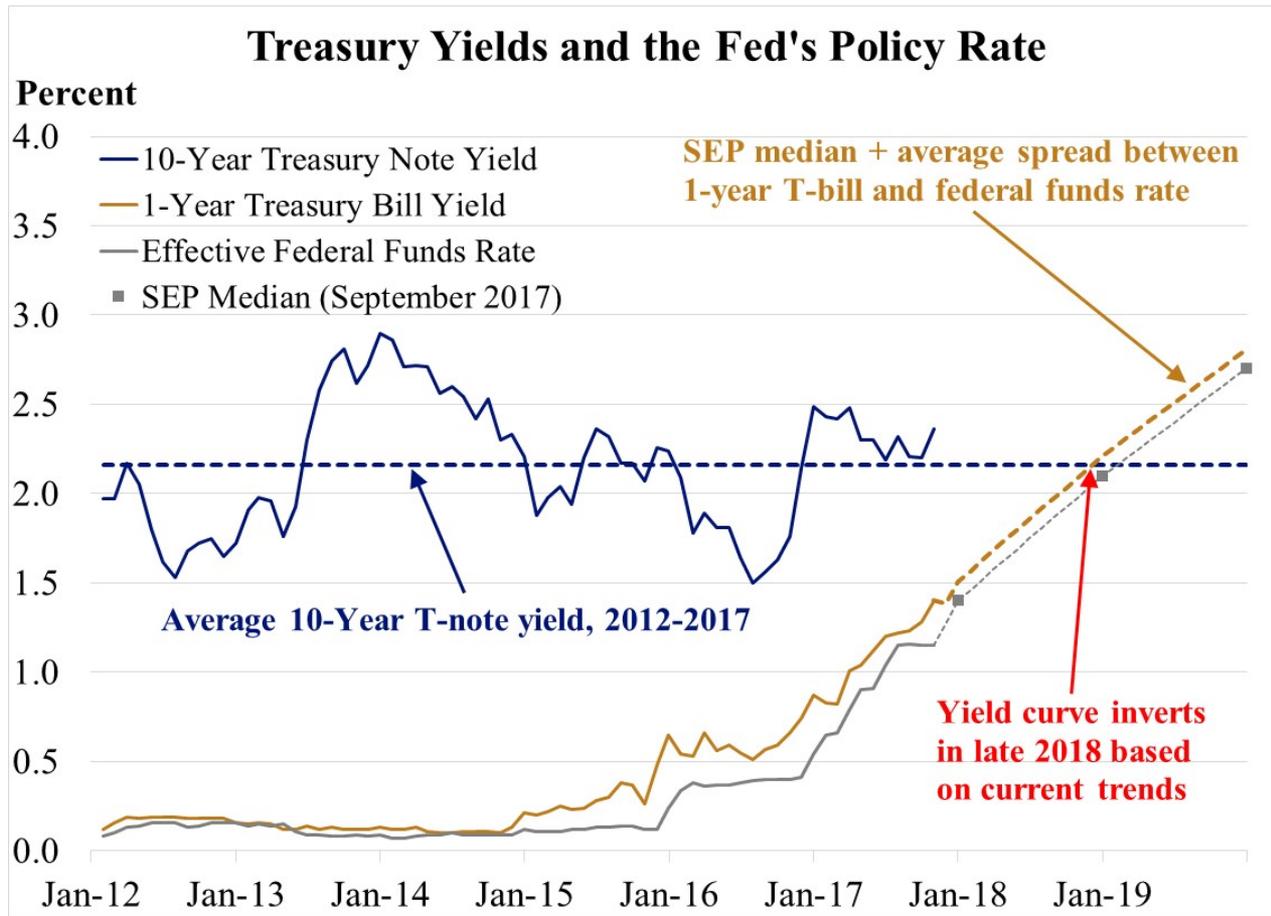


Sources: Federal Reserve Board and author's calculations. Last observation: Week of Nov. 24, 2017.

# The risk of yield curve inversion

- Let's suppose that longer-term yields remain near the average since 2012.
- Let's also suppose that the FOMC remains on track to raise the policy rate at the pace suggested in the SEP.
- Under this scenario, the U.S. nominal yield curve would invert in late 2018.
- This scenario would not play out if either (1) the FOMC does not raise the policy rate as aggressively as suggested by the SEP, or (2) longer-term rates begin to rise in tandem with the policy rate.

# The possibility of yield curve inversion



Sources: Federal Reserve Board and author's calculations. Last observation: October 2017.

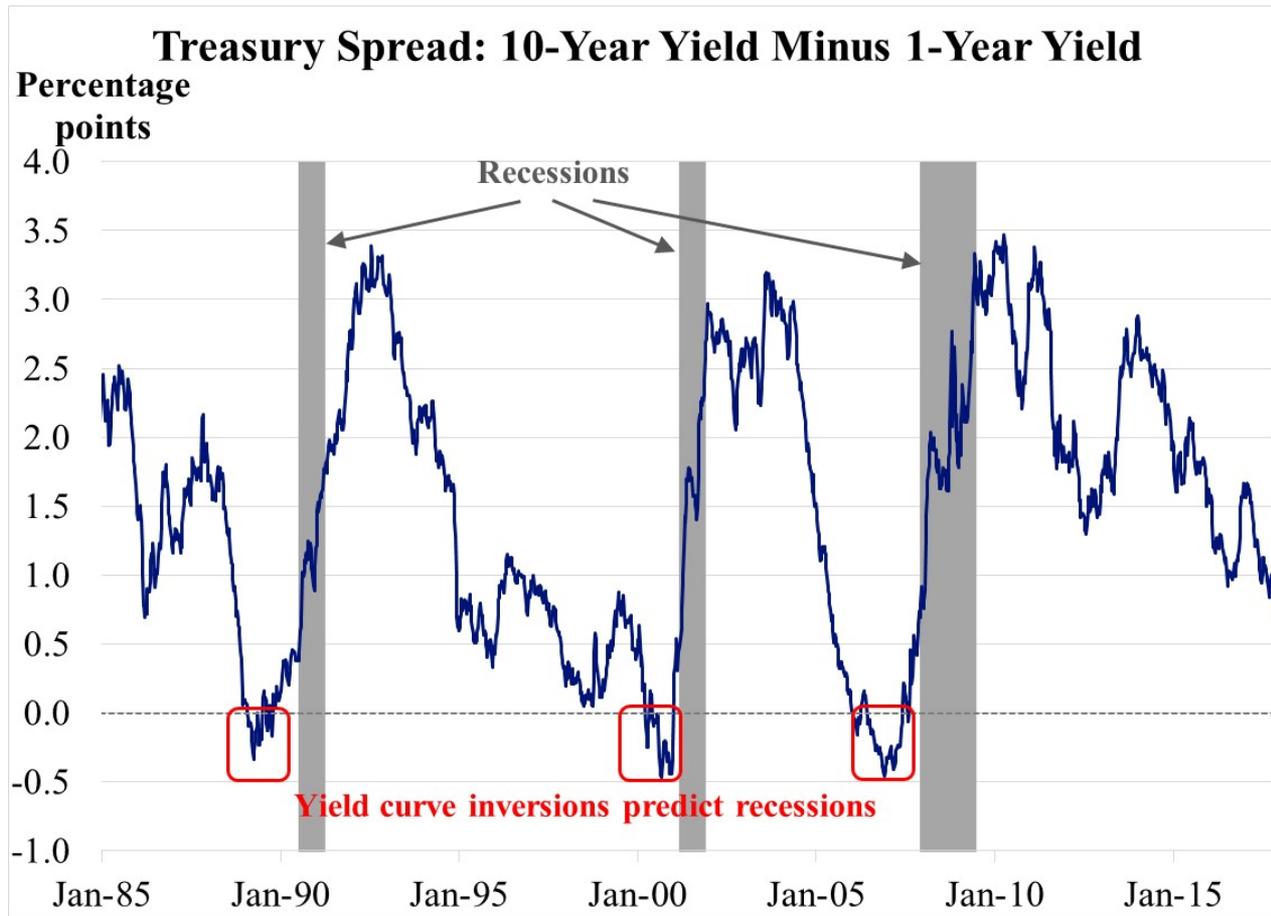
# Consequences of an Inverted U.S. Yield Curve

# Slope of the yield curve as a predictor of economic activity

- The slope of the yield curve is considered a good predictor of future real economic activity.\*
- This is true both in empirical academic research and in more casual assessments, such as the next chart.

*\* For example, see A. Estrella and G.A. Hardouvelis, “The Term Structure as a Predictor of Real Economic Activity,” *Journal of Finance*, June 1991, 46(2), 555–76, and J.H. Wright, “The Yield Curve and Predicting Recessions,” *Federal Reserve Board FEDS Working Paper No. 2006-07*, February 2006. [A. Estrella’s bibliography](#) provides a comprehensive list of references on the topic.*

# An inverted yield curve helps predict recessions



Sources: Federal Reserve Board and author's calculations. Last observation: Week of Nov. 24, 2017.  
The shaded areas indicate NBER recessions.

# Caveats on the empirical evidence

- The empirical proposition that an inverted yield curve helps predict recessions makes sense to the extent that lower longer-term nominal interest rates may be a harbinger of both lower growth prospects and lower inflation in the future.
- To be sure, yield curve information is not infallible and inversion could be driven by other factors unrelated to future macroeconomic performance.
- Nevertheless, the empirical evidence is relatively strong. Therefore, both policymakers and market professionals need to take the possibility of a yield curve inversion seriously.

# How Could Yield Curve Inversion Be Avoided?

# Policymaker caution

- The simplest way to avoid yield curve inversion in the near term is for policymakers to be cautious in raising the policy rate.
- The St. Louis Fed's policy rate recommendation is flat over the forecast horizon, meaning no planned policy rate increases—provided the economy continues to perform about as expected.

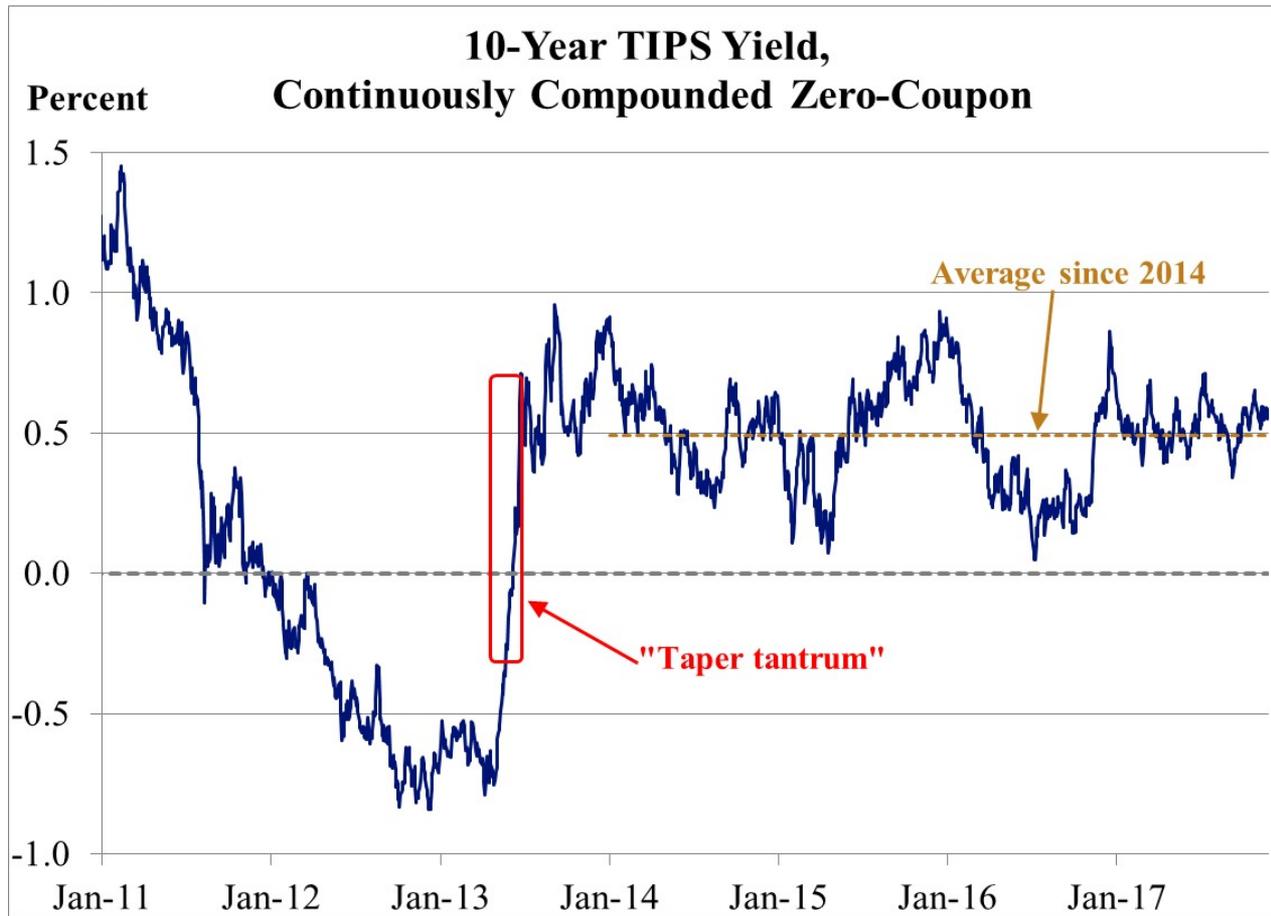
# Will longer-term rates begin to rise?

- Another way to avoid yield curve inversion would be for longer-term nominal interest rates to begin to rise in tandem with policy rate increases.
- What are the prospects for increases in longer-term nominal yields?
- I will make two remarks on this possibility.
  - First, longer-term nominal yields could begin increasing because the real rate component begins to increase. However, I see little prospect of this at the moment.
  - Second, the inflation expectations component could increase. But longer-term inflation expectations remain relatively low.

# Will longer-term real rates rise?

- Let's begin with the possibility that longer-term real interest rates will begin to rise.
- This may be the case if investors perceive greater growth prospects for the U.S. economy going forward.
- However, it does not currently appear that there is any trend toward higher real interest rates over a 10-year horizon.
- In addition, global real interest rates are low, so U.S. rates are low in part due to the nature of the global equilibrium.

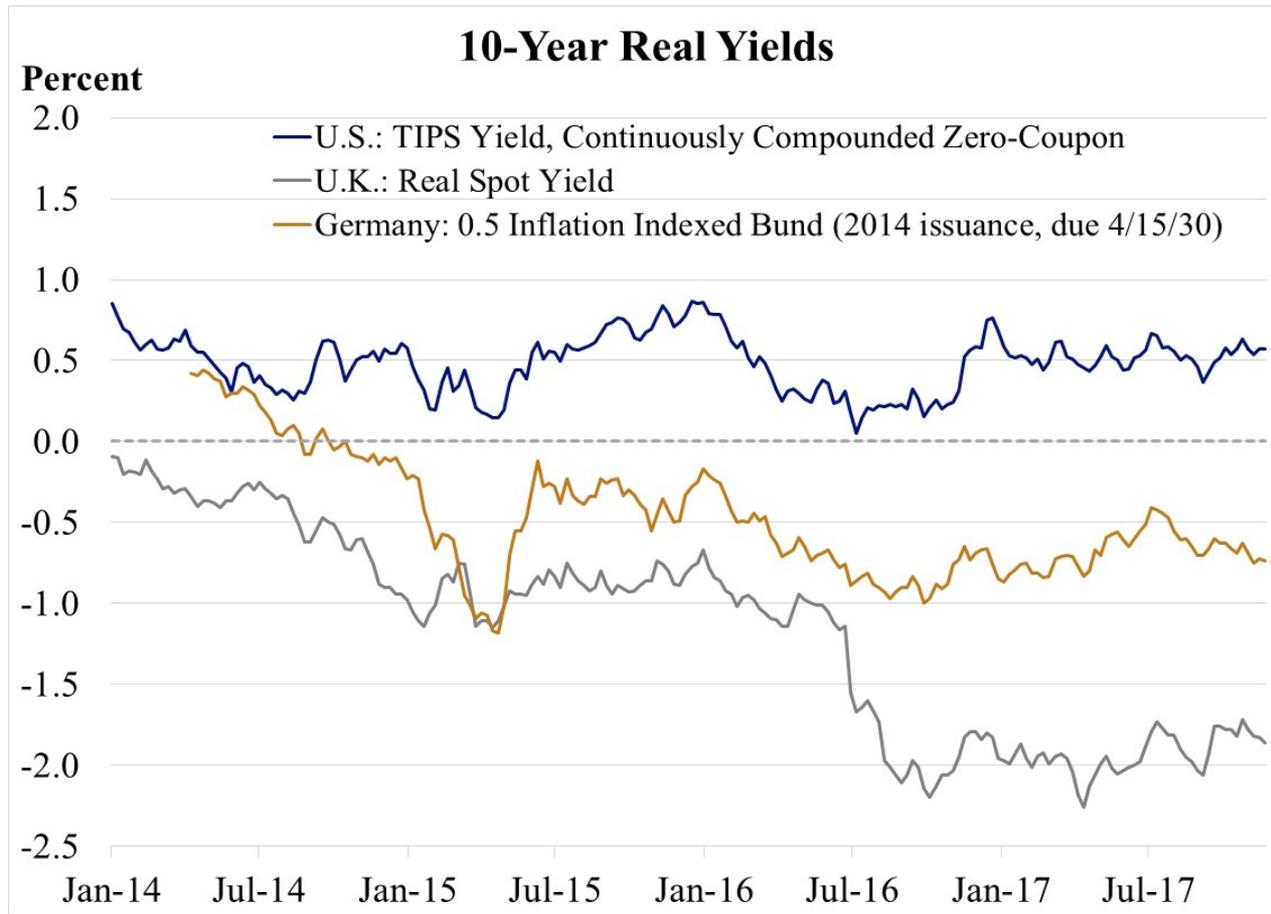
# The 10-year real rate has been roughly constant since 2014



Sources: Federal Reserve Board and author's calculations. Last observation: Nov. 24, 2017.

Note: TIPS stands for Treasury Inflation-Protected Securities.

# Global real interest rates are low



Sources: Federal Reserve Board, Bank of England and Deutsche Bundesbank. Last observation: Week of Nov. 24, 2017.

# Expected inflation

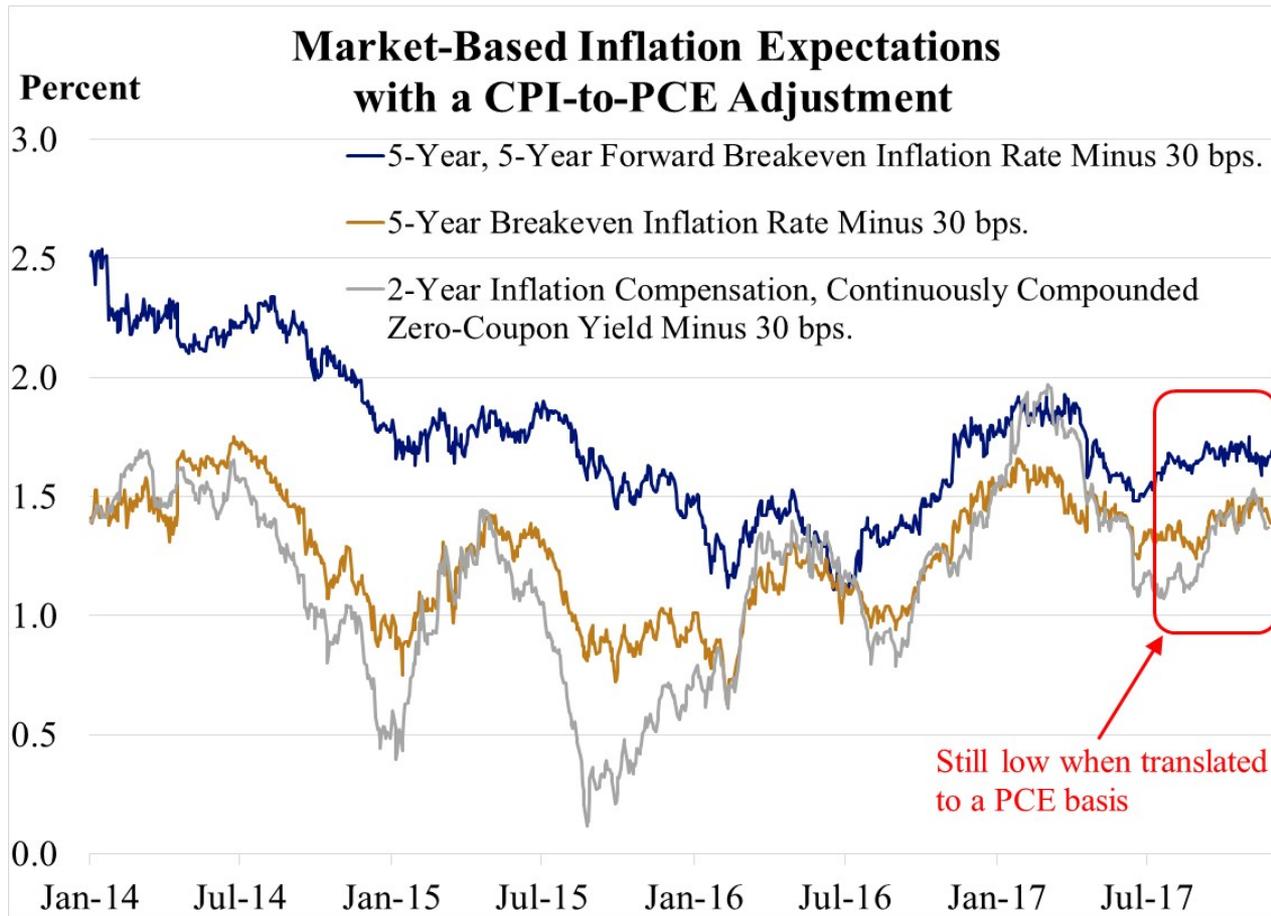
- Let's turn to the possibility that longer-term nominal interest rates will begin to rise because longer-term expected inflation will begin to rise.
- This may be the case if investors perceive greater risk of higher inflation in the U.S. economy going forward.
- However, it does not currently appear that there is any trend toward increased inflation expectations over the longer run.

# Market-based inflation expectations

- The inflation compensation derived from Treasury Inflation-Protected Securities (TIPS) is based on headline consumer price index (CPI) inflation.
- The FOMC's inflation target is in terms of the annual change in the price index for personal consumption expenditures (PCE).
- Historically, CPI inflation has run somewhat higher than PCE inflation, with an adjustment of about 30 basis points at an annual rate.\*
- Other factors can influence TIPS-based expected inflation.

*\* This adjustment is conservative. The difference between CPI and PCE inflation since January 1960 was, on average, 46 basis points.*

# Market-based inflation expectations remain low



Source: Federal Reserve Board. Last observations: Nov. 29 (breakeven inflation rates) and Nov. 24, 2017.

# Will longer-term nominal yields rise?

- In summary, longer-term nominal yields in the U.S. have been relatively low.
- So far, these yields have not increased in tandem with the FOMC's policy rate increases.
- U.S. longer-term nominal yields could move higher, but current trends seem to indicate that both the real and the expected inflation component will be subdued going forward.
- This suggests that the risks of yield curve inversion are best avoided by FOMC caution in raising the policy rate during 2018.

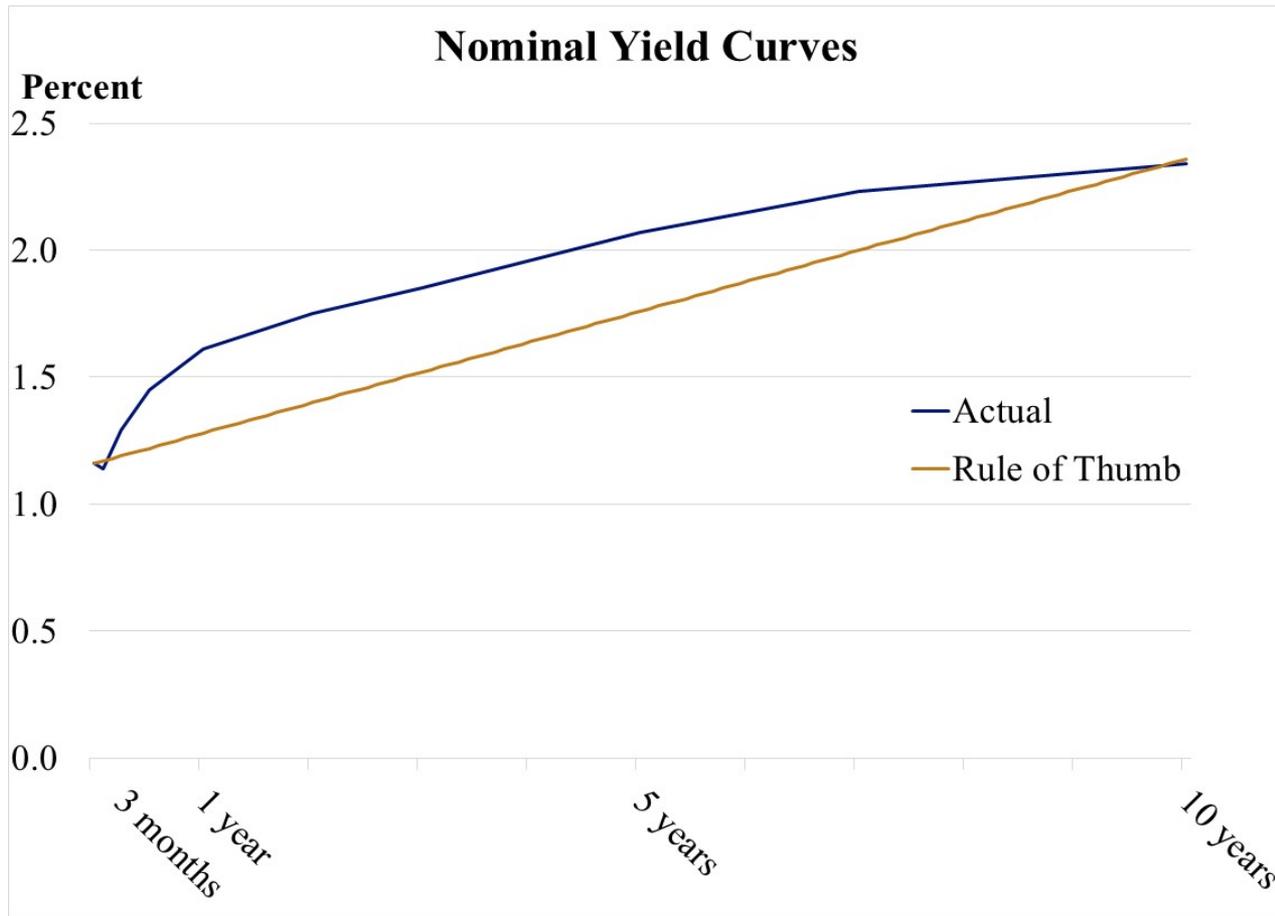
# An adjustment for QE?

- It is possible that longer-term yields in the U.S. are being held lower in part because of the size of the Fed's balance sheet.
- One could adjust the longer-term yields for the magnitude of this effect and judge the possibility of yield curve inversion based on this adjusted metric instead.
- There are two issues with such an adjustment:
  - The magnitude of these effects is very uncertain.
  - It is far from clear if “adjusted” yield curve inversion would be a better or worse predictor of future real activity than yield curve inversion conventionally defined.

# A normal yield curve?

- The nominal U.S. yield curve currently has a positive slope.
- Is it too steep or too flat?
- Standard theories do not really answer this question satisfactorily.
- However, a rule of thumb sometimes used at the Fed is that the term premium is one basis point per month.
- By this rule of thumb, the current slope of the yield curve is about right.
- This suggests that the current policy rate is also about right.

# Yield curve slope about right



Sources: U.S. Department of the Treasury, Federal Reserve Board and author's calculations. Last observation: Nov. 24, 2017.  
Note: The rule of thumb yield curve was calculated as the federal funds rate plus one basis point per month.

# Conclusion

# Conclusion

- There is a material risk of yield curve inversion over the forecast horizon if the FOMC continues on its present course of increases in the policy rate.
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