

Global Perspective

Predicting a US recession: has the yield curve lost its relevance?

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Executive summary

It is becoming apparent the US economy is now in the late phase of the economic cycle. As a result, investors are carefully looking for signs that the cycle is ending and that a recession could be imminent.

Market participants are understandably focused on the yield curve due to the belief that further interest rate hikes will lead to an inversion. This is a situation that has preceded every US recession since 1960 but is there any reason to believe it remains a reliable indicator?

Whether or not the yield curve is still a good indicator of an incoming recession depends partly on whether it has been distorted by the Federal Reserve's unconventional monetary policy. Unconventional monetary policy, or more precisely Quantitative easing (QE) and Operation Twist, has led to the Federal Reserve becoming a huge holder of US Treasuries. Is the yield curve consequently flatter than it would otherwise have been without the impact from QE? Could this affect the reliability of the yield curve as an advanced indicator of an upcoming recession?

If a model that relies solely on the yield curve is indeed flawed, then what other economic indicators should be considered in order to improve accuracy?

Investment implications

- We believe that the Federal Reserve will continue to normalise its monetary policy and investors should expect a continued increase in short-term yields. For long-term yields, a very low probability of a recession means that they are unlikely to decline meaningfully.
- We believe that the risk of a recession in the US over the next 12 months is very low and that a large market correction, barring a negative shock to the economic and financial system, also remains low.
- The low probability of recession in the US means that the US cycle is unlikely to be a destabilising force for the global economy.



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After almost a decade of expansion, it is becoming apparent the US economy is now in the late phase of the economic cycle. As a result, investors are carefully looking for signs that the cycle is ending and that a recession could be imminent.

Market participants are particularly focused on the yield curve – the difference between long-term yields and shorter ones – as they are concerned that further interest rate hikes will lead to an inversion of the yield curve. This is a situation that has preceded every US recession since 1960.

The exact links between the yield curve and an economic slowdown are complex and not well understood. However, there are several possible explanations:

1. An inversion signals that investors are becoming pessimistic about the future and are starting to expect that the central bank will need to loosen monetary policy, i.e. cut rates in the future.
2. An inverted curve suggests that monetary policy is in restrictive territory. In this case, the long-term yield is viewed as the equilibrium interest rate. Hence, once short-term rates are higher than long-term ones, it could mean that monetary policy is restrictive.
3. A flatter yield curve makes it less profitable for banks because they borrow at the short term rate and lend at the long term one. As a result, banks are less willing to extend credit, which reduces the supply of loans, tighten credit conditions and leads to weaker business investment.

In this report, we look at whether the yield curve is a good indicator of an incoming recession. We first explore whether the yield curve could have been distorted by the Federal Reserve's unconventional monetary policy. We then look at whether the yield curve should be taken in isolation or whether other indicators are required to refine its predictive power. Finally, we ask what it means for investors.

Could the yield curve be distorted?

The very low unemployment rate in the US distorted the true amount of slack in the labour market in recent years (see **Inflation Risks Rise as US Economic Slack Erodes**), and the yield curve could have been similarly distorted. Unconventional monetary policy, or more precisely QE and Operation Twist, has led to the Federal Reserve becoming a huge holder of US Treasuries and, consequently, it is having a big influence on US Treasury yields.

As a result of QE, the Federal Reserve holds around USD 4.0 trillion of securities, of which around USD 2.25 trillion are US Treasuries. This represents a little more than 15% of all the US Treasuries currently in circulation, a proportion that is very similar to before the financial crisis. However, what has changed is the maturity composition of this holding. Before the financial crisis, 20% of the Fed's holdings of US Treasuries had a maturity of 5 years or more. That proportion is now about 40% and, for a maturity of

10 years or more, the proportion is currently 25% – up from 10% (see Figure 1). As a result, we estimate that the Fed currently holds about 45% of the outstanding US Treasury with maturity in excess of 10 years and 25% for a maturity of more than 5 years (see Figure 2).

FIG. 1 COMPOSITION OF FED'S US TREASURY HOLDING

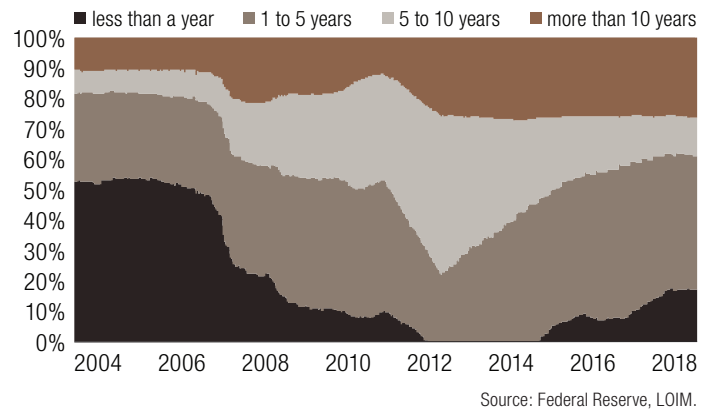
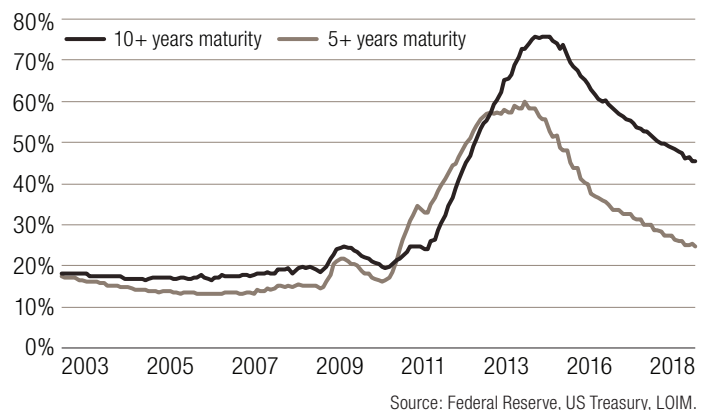


FIG. 2 SHARE OF OUTSTANDING US TREASURY HELD BY THE FED



Large-scale purchases of US Treasuries likely had an impact on the market, and to understand how QE is likely to have influenced the UST yields and the shape of the curve, it is important to understand what has been the impact of QE on the US Treasury market. The main impact of QE was to increase demand for Treasuries and, as a result, push prices higher and yields lower. To be more precise, QE had the effect of reducing the term premium embedded in US Treasuries. It can also be argued that if QE is deemed successful or expected to increase inflationary pressures, it would also push inflation expectations higher, offsetting some of the downward pressures on yields from a lower term premium.

The Federal Reserve estimates that QE and Operation Twist reduced the term premium embedded in 10-year US Treasuries by about 100bp by the end of 2017¹. As a result, many estimates

¹ See Bonis, Brian, Jane Ihrig, and Min Wei (2017). "The Effect of the Federal Reserve's Securities Holdings on Longer-term Interest Rates," FEDS Notes. Washington: Board of Governors of the Federal Reserve System, April 20, 2017, <https://doi.org/10.17016/2380-7172.1977>.

of the term premium on the 10-year Treasury are in negative territory – a somewhat remarkable development as it suggests that investors do not want to be compensated more for lending long-term rather than lending short-term (see Figure 3 and 4).

FIG. 3 ESTIMATED TERM PREMIUM ON 10-YEAR US TREASURIES

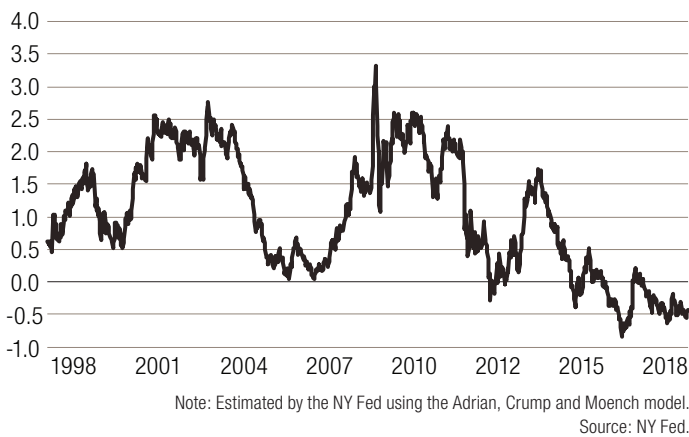
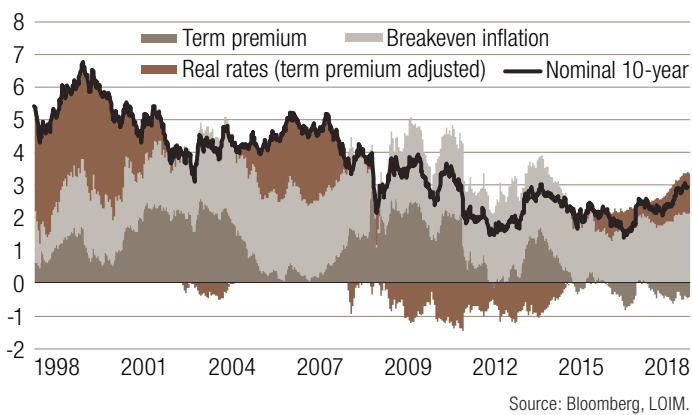


FIG. 4 DECOMPOSITION OF THE 10-YEAR US TREASURY NOMINAL YIELD



As the Federal Reserve gradually reduces its holding of US Treasuries, the term premium is likely to increase. However, it is important to note that since the Federal Reserve is unlikely to bring the size of its US Treasury holdings back to pre-financial crisis levels, the term premium will not normalise fully. Moreover, the normalization of the term premium may be slow to occur since the Federal Reserve reinvests the proceeds of maturing bonds in a way that keeps the average maturity of its portfolio unchanged.

Based on this, it is likely that the level of the 10yr US Treasury yields used in the calculation of the yield curve may have been distorted lower, which would have rendered the yield curve flatter than it would otherwise have been without the impact from QE. This could affect the reliability of the yield curve as an advanced indicator of an upcoming recession.

² A probit model is a model estimating the likelihood a dependent variable will take the value 1. In this case, the dependant variable takes a value of 1 in periods of recessions, as defined by the NBER, and otherwise.

If we defined the yield curve as the difference between the yield on the 10-year US Treasury and the 3-month T-bill, the yield curve is currently around 95bp. Given the Federal Reserve is expected to hike rates by around 125bp between now and the end of 2019, according to the latest Fed projection, the yield curve is likely to invert at some point in 2019. This would signal a recession in 2020, according to the usual predictive power of the yield curve. However, if the yield on the 10-year US Treasury is biased and is 50bp lower (if we assume only half of the impact of QE since the Federal Reserve is unlikely to reverse the change in its holdings of long term US Treasuries), it means that it is possible the yield curve would need to be at -50bp to signal a recession.

Moreover, since its previous operations likely led to a flatter curve, if the Federal Reserve is concerned by the flattening of the yield curve, it could reverse some of these operations or do a reversed Operation Twist by selling longer term bonds to buy shorter term ones, reducing the average maturity of its US Treasury holdings. This would likely help the term premium to normalise and push long-term yields higher. However, since some rates like mortgage rates and some corporate rates are linked to long-term yields, an increase in those yields would tighten financial conditions. In fact, the artificial flattening of the curve due to the Federal Reserve's holding of long-term US Treasuries is likely providing some stimulus, at the margin, to the economy, and maybe even reducing the risk of a recession.

What is the likelihood of a recession?

Regardless of whether QE is distorting the yield curve, the next step is to estimate the probability of a recession in the near future based on the actual level of the yield curve. To do this, we estimate a probit model² based on the yield curve as defined by the difference between the 10-year Treasury yield and the yield on 3-month T-bills.³ We find that the yield curve is generally a good predictor of recessions with an optimal horizon of between 12 to 18 months.

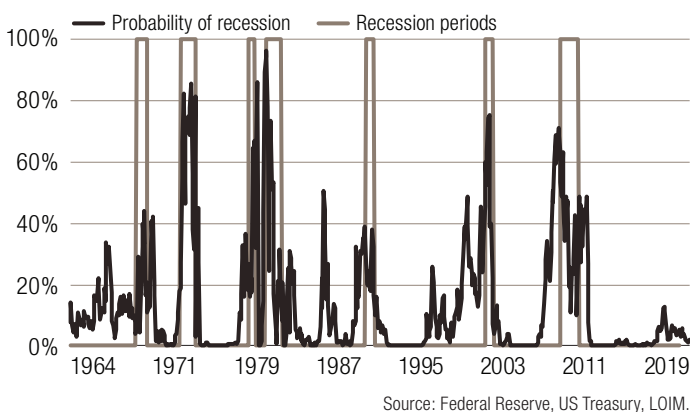
The current level of the yield curve, at 95bp, indicates that the risk of a recession over the next 12 to 18 months is about 15% - which is relatively low. However, if we assume that the yield curve flattens by 100bp, which would be consistent with the Federal Reserve hiking interest rates four more times while long-term yields remain unchanged, the likelihood of a recession in 12 months jumps to 32% – a level that has often signalled an imminent recession in the past.

The issue with a model that relies solely on the yield curve is that it does not take into account other important economic indicators that could improve the accuracy of the estimation of the probability of a recession. To expand the model, we also add the following indicators:

³ The model was also estimated using a yield curve defined as the difference between the yields on 2-year and 10-year US Treasuries, albeit on a shorter sample because of shorter availability of data on 2-year yields, and the results and simulations are very similar.

- 1. Policy stance:** this is the deviation between real 10-year bond yields and real potential growth. A positive number suggest that monetary policy is restrictive while a negative number suggests it is stimulative. The idea is that a recession is less likely when real yields are low and monetary policy is loose.
- 2. Leading economic indicator:** we use the 6-month change in the Conference Board's Leading Economic Indicator that we modified to exclude the yield curve from the official measure to prevent multicollinearity.
- 3. Credit growth:** measured as the year-on-year change in total corporate credit as a % of GDP. There is growing academic evidence of links between the credit cycle and increased corporate leverage to an increase in the risk of recession.⁴
- 4. Earning growth:** we use the 6-month change in the EPS of the S&P500. The idea is that profitability usually declines at the end of the cycle and leads to a reduction in corporate spending, especially in investment, affecting growth. Moreover, lower corporate profits can also be a sign that demand has peaked.

FIG. 5 MODEL PREDICTION



Using this expanded model, we find that the probability of a recession over the next 12 months is currently about 2% or almost null. The reasons behind this sharp decline in the probability of a recession are: 1) the leading indicator growth remains strong despite moderating in recent month, 2) the policy stance remains in accommodative territory given how low real rates are, 3) corporate leveraging has slowed in recent months, 4) EPS growth has improved.

Simulations

What really matters for most investors is what happens to this probability as the Federal Reserve continues to normalise monetary policy. With this in mind, we conducted a series of simulations to see what would happen to the likelihood of a recession in those cases.

- 1. Curve flattens by 100bp to -5bp.** Probability of recession at 15%
- 2. Curve flattens by 100bp and real long-term rate increases by 25bp.** This involves that the curve is also higher i.e. that short-term and long-term yields increases. Probability of recession at 16%
- 3. Curve flattens by 100bp and change in Leading indicators falls to 0.** Probability of recession at 23%
- 4. Curve flattens by 100bp and change in EPS declines to 0.** Probability of recession at 25%
- 5. Curve flattens by 100bp, change in Leading indicators falls to 0, real long-term rate increases by 25bp and EPS growth at 0.** Probability of recession at 38%
- 6. Curve flattens by 100bp, leading indicators decline by 1%, EPS declines by 1% and real rate increases by 25bp.** Probability of recession at 48%

What these simulations show is that it is not enough for the curve to flatten in order to significantly increase the probability of a recession. This means that a continuation of Fed tightening over the next year is unlikely to be enough to significantly raise the likelihood of a recession. This would need to happen alongside a deterioration in the indicators of the real economy and/or corporate profitability. Moreover, it is important to note that these reflect the probability of a recession over the next 12 months, meaning that, barring a negative shock to the economy, the US is unlikely to experience a recession in the next 12 months and, with the curve unlikely to invert until mid-2019, a recession before 2020 seems to remain unlikely.

Real rates and recessions

Another point that some seem to be missing when it comes to these concerns about an inversion of the curve signalling a recession is that the level of real rates in the US are still very low and even in negative territory. This means that the level of interest rates should still be stimulative to the economy.

Looking at the past recessions in the US (see Table 1), we find that the level of real rates was always positive ahead of a recession, with the exception of the one in 1980. The reason for this difference is that the recession in 1980 was partly the result of a more than 260% increase in the price oil between late 1978 and early 1980, resulting a massive negative supply shock on the economy and a sharp increase in inflation, which pushed real yields lower.

Real rates are currently at about -90bp for the 3-month T-bill and about 0bp for 10-year Treasuries. Assuming that inflation remains constant, this means that the policy rate needs to increase by about 100bp for the real short-term interest rate to be in positive territory.

⁴ There is a growing literature that links increased level of debt and the risk of recession. See "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles and Financial Crisis," American Economic Review, Vol 102, no 2, April 2012.

These examples are for illustrative purposes only and are not actual results. If any assumptions used do not prove to be true, results may vary substantially.

Another point worth considering is that a recession occurring when real rates are negative would have dramatic implications for monetary policy. This would require some serious thinking and imaginative solutions to find ways to stimulate the economy in an environment where negative rates have failed to do so.

Table 1: Level of real rates at start of recessions

	6-MONTH AVERAGE		6-MONTH AVERAGE 6-MONTHS BEFORE THE RECESSION	
	10 YEAR	3 MONTH	10 YEAR	3 MONTH
1969-1970	1.1	1.3	0.7	1.1
1973-1975	3.5	1.0	3.6	1.6
1980-1980	-0.4	-1.4	-0.1	-0.9
1981-1982	3.3	3.7	-0.2	-0.8
1990-1991	3.9	3.1	3.6	3.4
2001-2001	2.8	2.3	3.6	2.5
2007-2009	2.4	1.2	2.3	2.4
Current	0.2	-0.8	0.3	-0.9

Note: the 6-month average is the level of real rates in the immediate period before the recession. The "6-month average 6-months before the recession" is 6-month average of the real rates but calculated 6 months ahead of the start of the recession. This takes into account the lag in the transmission of the impact of monetary policy.

Source: Bloomberg, LOIM.

What does it mean for investment?

The exercise above has important implications for investors. What it says is that the risk of a recession in the US over the next 12 months is very low and that a large market correction, barring a negative shock to the economic and financial system, remains low. Investors should remain exposed to risky assets, especially equity.

Beyond the 12-month horizon, it will depend on whether the leading economic indicators start to decline in conjunction to a flattening/inverting yield curve.

On the fixed income side, it means that the Fed will continue to normalise its monetary policy and investors should expect a continued increase in short-term yields. For long-term yields, a very low probability of a recession means that they are unlikely to decline meaningfully. Moreover, a continued reduction in the size of the Fed's balance sheet is likely to lead to an increase in the term premium on long-term bonds and their yields. With this in mind, we continue to prefer short duration in the US to longer ones.

As for the rest of the world, a low probability of recession in the US means that the US cycle is unlikely to be a destabilising force for the global economy. However, the risk of the US pushing the world into a global trade war remains elevated and would have a damaging impact on the global economy, especially countries that benefit from free trade.

In Europe, the main risks remain political, with the Brexit negotiations and political tensions with Italy likely to flare up again this autumn, while the risk of a trade war with the US has diminished somewhat following Juncker's visit to Washington. In EM, the main headwinds remain country specific risks (eg Turkey), the risk from a trade war, and a continued increase in US yields and the USD. However, it is important to note that the underlying fundamentals of many developing economies remain much stronger than they were in 2015 and that a stabilisation in external risks could result in a rebound, based on both valuation and fundamental support.

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