Are We Heading into a Recession?
Yield Curve Inversion as a Recession Predictor

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Abstract

Yield Curves reflect the borrowing and lending rates over a range of maturities within a particular market and currency. Yield curves capture the term structure of interest rates and provide observers with a means of comparing short- and long-term interest rates.

There are different types of yield curves, reflecting the different markets, institutions and instruments investors can choose to secure financing. Government Bond curves reflect the rate of return or yield required for governments to secure financing and likewise Swap Curves reflect the borrowing and lending rates available in Swap markets via interest rate swaps.

Current market yield curves are on the verge of inverting. The returns from long-term Government Bonds are lower than the equivalent short term bonds and borrowing money long-term is cheaper than short-term borrowing. This is unusual, typically long-term financing should cost more than short-term financing, not less.

In US markets inverted yield curves have been a reliable predictor of recessions. Each time the yield curve has inverted the US economy has entered a downturn within the subsequent 18 months. This has been the case with only one exception in the last 40 years. In this paper we review firstly what a yield curve is. Secondly we discuss the term structure of yields and interest rates and thirdly we outline the yield spread and explain why an inverted yield curve is a good recession predictor and indicator of heightened recessionary risk.

Finally we conclude with an estimate of the likelihood of a US recession in the next 12 months based on current market information.

1 Introduction

The current economic landscape is dominated by trade wars, most notably between the USA and China, political disputes, Brexit and slowing growth in the US, Eurozone and BRIC[1] nations. Such negative macro events heighten awareness and talk of a global economic slowdown. There is no single indicator to predict or determine a recession, however Yield Curves and Yield Spreads are one of the most closely-watched mechanisms for signals of a market downturn.

In what follows we review firstly what a yield curve is. Secondly we discuss the term structure of yields and interest rates and thirdly we outline the yield spread and explain why an inverted yield curve is a good recession predictor and indicator of heightened recessionary risk. Finally we conclude with an estimate of the likelihood of a US recession in the next 12 months based on current market information.

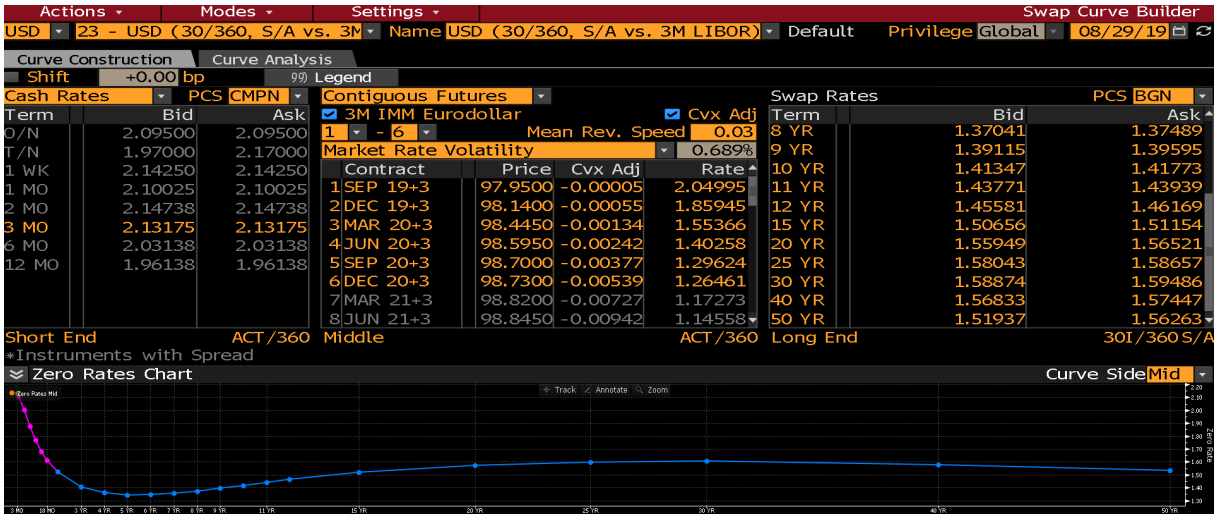

Figure 1: US Swap Curve, Bloomberg ICVS USD

2 Yield Curves

A yield curve represents the collective borrowing and lending rates quoted in a particular market, bond issuer or lender over a variety of maturities and time horizons. The primary benchmark government bond yield curves include US Treasuries and German Bunds, which and reflect government borrowing rates in the US and Germany respectively.

Likewise in the interest rate swap markets we have swap curves which reflect the cost of swapping variable or floating rates of interest for an equivalent fixed rate of interest for a variety of maturities, see figure (1). Swap curves typically trade as a spread to government bond curves and reflect borrowing costs in the corresponding interest rate markets for the respective currency.

[1] An acronym for Brazil, Russia, India and China, which are major emerging national economies

In this paper we focus on US Government Bonds. We show in figure (2) the market yields quoted for the current US Treasury benchmark bonds.

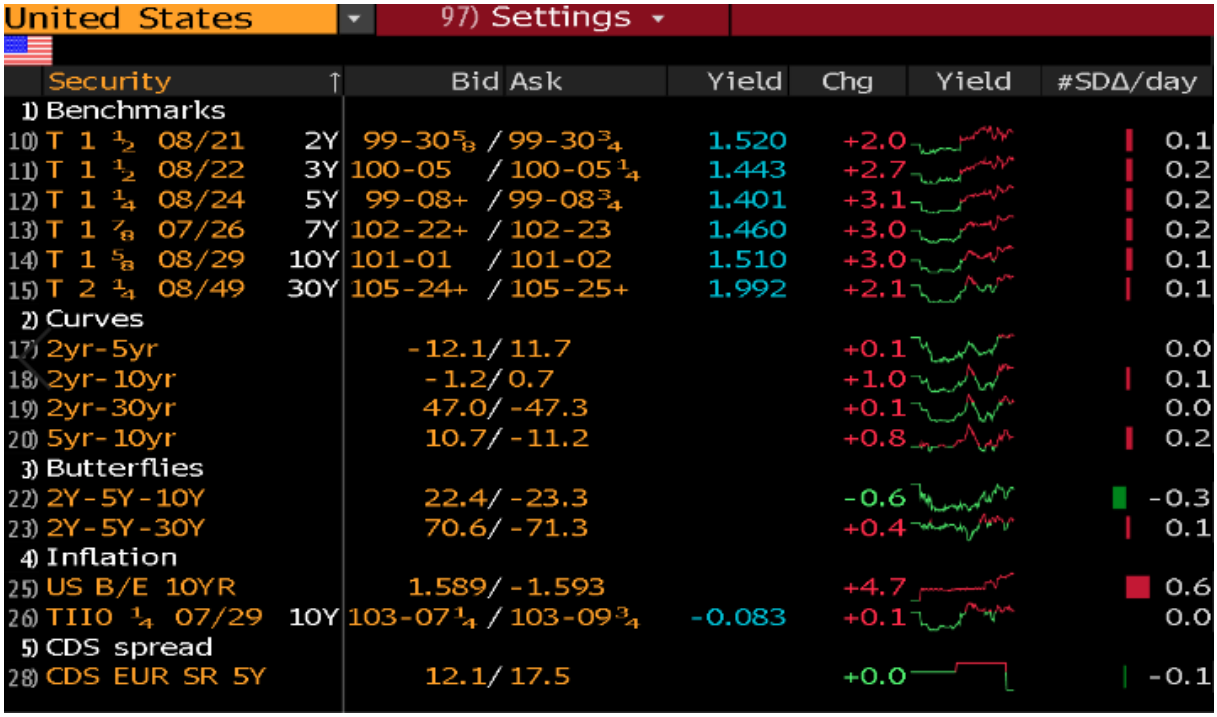

Figure 2: US Sovereign Debt Monitor, Bloomberg WB

3 Yield Spreads

Yield curves provide a convenient mechanism to compare short- and long-term interest rates. A key feature of the yield curve is the yield-spread, which is actively quoted and traded in the financial markets, see section 2) Curves within figure (2). The spread is the differential between short- and long-term rates for a chosen maturity pair. The spread measures the steepness of the yield curve provides much valuable information and are considered an excellent predictor of future recessions, see [1].

Typically yield curve spreads such as the 10Y-2Y US treasury spread should be positive, it should cost less to borrow money for two years than for ten years. This is because the economy is expected to grow over time and experience inflation. A healthy yield curve should therefore slope upwards.

Expectations of future realized interest rates and inflation are contained within the yield curve term-structure and play an important role in the prediction of economic activity. As highlighted by Mishkin [2] and [3], the expected realized rates may be associated with expectations of future monetary policy and hence of future real growth. Furthermore inflation tends to be positively related to activity, and hence strengthens this argument. Monetary policy decision making influences on the real activity in the market place and yield curve term-structure. The resulting

yield and bond price impact is captured in the yield spread. For example a rise in short-term rates would slow growth in the near term, consequently it costs more to borrow money in the short-term than it does in the long-term and yield curves flatten, in more pronounced cases the curve inverts and slopes downward.

Mishkin [1] explains and demonstrates the predictive power of the yield curve spread[2] by means of a probability unit (probit) model, the results of which we quote below in figure (3). As mentioned in [1] a probit model is a binary regression model, whereby the dependent variable can take only two values e.g. recession or no recession say. Such models are used in statistics to estimate the probability of a characteristic falling into one of the two categories, in our case of entering a recession. We refer the reader to [4] for an illustrative review of probit estimation models.

Recession Probability (Percent)	Value of Spread (Percentage Points)
5	1.21
10	0.76
15	0.46
20	0.22
25	0.02
30	-0.17
40	-0.50
50	-0.82
60	-1.13
70	-1.46
80	-1.85
90	-2.40

Figure 3: Federal Reserve Bank of New York: Estimated Recession Probabilities using 10Y-3M Treasury Spread

The current 10Y vs 3M US-Treasury spread is quoted on Bloomberg as -0.6%, which using the data from in figure (3) for indicative purposes would correspond to a greater than 40% likelihood of a recession. Another common reference maturity pair for yield spread analysis also used as a recessionary predictor is the 10Y vs 2Y US-Treasury spread, which is also negative and quoting at -1.2%.

Based on data from August 2019 and the methodology above the Federal Reserve Bank of New York gave an estimate for the probability of a US recession in the next 12 months as 24%, with periods of recession indicated in red highlighting the high success rate of the analysis.

[2]Defined as the spread between the interest rates of the 10Y Treasury Note the the 3M Treasury Bill.

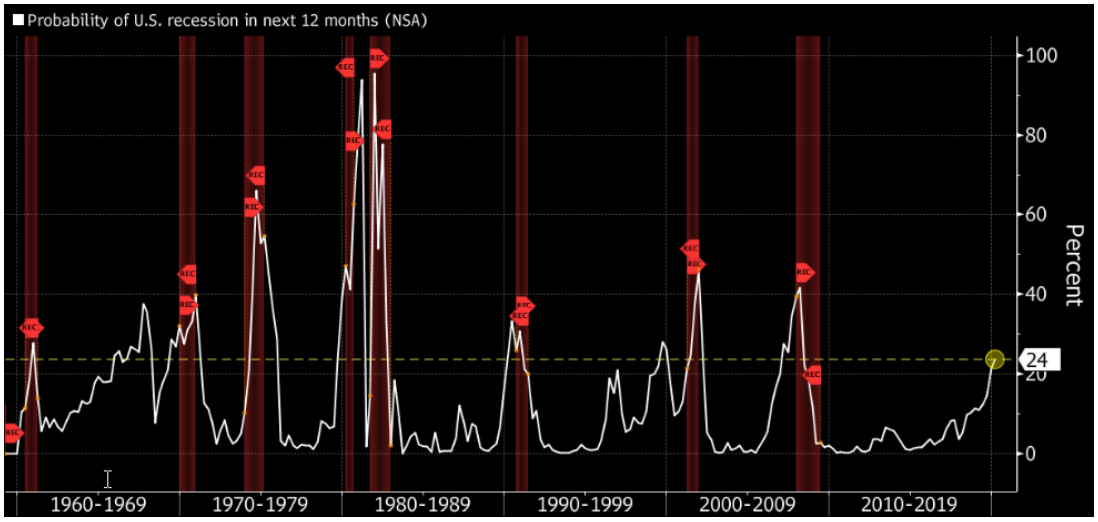

Figure 4: Bloomberg: Federal Reserve New York US Recession Probability Indicator

Similarly the Federal Reserve Bank of Cleveland[3] give a more current estimate for the likelihood of a US recession in the next 12 months at 44.13% as shown below in figure (5).

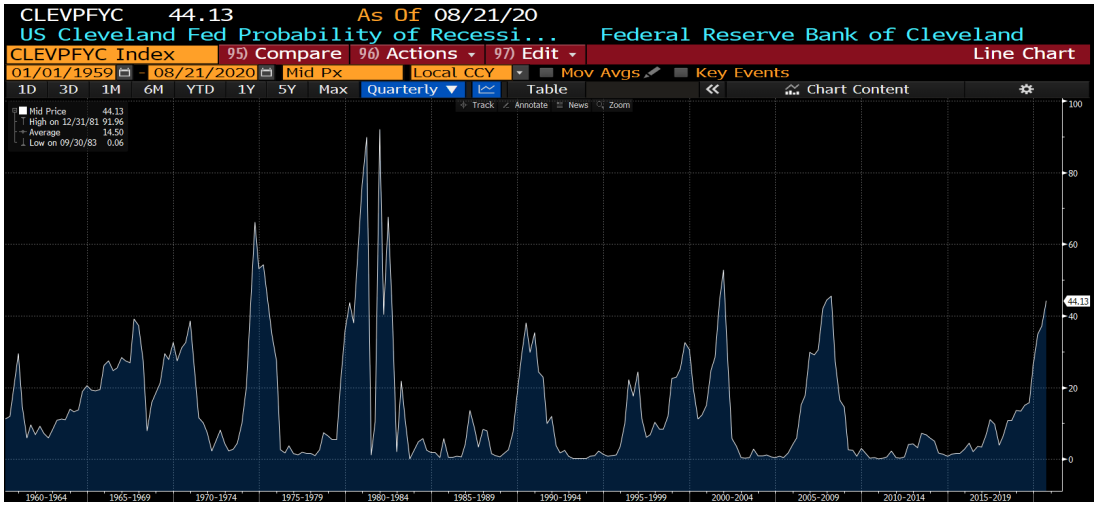

Figure 5: Bloomberg: Federal Reserve Bank of Cleveland US Recession Probability Indicator

4 Conclusion

In conclusion yield curves reflect the borrowing and lending rates over a range of maturities within a particular market and currency. Healthy yield curves slope upwards reflecting future growth, increased activity and inflation. Conversely downward sloping yield curves potentially indicate future economic slowdowns and downside pressure. Yield spreads conveniently capture the yield curve slope and term-structure. A popular choice of yield spread references the

[3] See Bloomberg CLEVPFYC Index

10Y-3M and 10Y-2Y US Treasury Yields. We outlined studies by the Federal Reserve that use yield spread data using probability unit (probit) regression models to estimate the probability of a US recession. Bloomberg indicators such as the Federal Reserve Bank of Cleveland use such an approach and currently estimate the likelihood of a US recession within the next 12 months is currently 44.13%. As shown and suggested by figure (4) such an approach has a high success rate. Should the US enter a recession we believe it is likely other markets may follow, given the importance of the US Dollar as a benchmark currency and the US as a driver of the world economy.

References

[1] **Estrella**, A and **Mishkin**, F. S. (1996) The Yield Curve as a Predictor of U.S. Recessions. Federal Reserve Bank of New York, Current Issues in Economics and Finance. Volume 2, Number 7. 3, 4

[2] **Mishkin**, F. S. (1990) What Does the Term Structure Tell Us About Future Inflation?. Journal of Monetary Economics (January) 3

[3] **Mishkin**, F. S. (1990) The Information in the Longer-Maturity Term Structure About Future Inflation. Quarterly Journal of Economics (August) 3

[4] **O'Halloran**, S. Econometrics II Sustainable Development U9611, Lecture 9: Logit/Probit. Columbia University, www.columbia.edu 4