

## Yield Curves and the Recession Expectations

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**Abstract:** The curve representing the returns of bonds bearing the same risk, liquidity and tax conditions but with different maturities is called yield curve. The yield curve typically slopes upward, i.e. longer-maturity assets have a higher return than shorter-maturity assets, due to the fact that investors demand a premium to hold a bond or a note for a longer period. The premium is demanded for risks such as inflation and other uncertainties that can develop over time. A flatter yield curve signals concerns about the future economic outlook while an inverted yield curve is considered as a warning sign about the future economic outlook. When the short-term asset rates rise above the rates on long-term assets, i.e. the spread is negative, yield curve inversions occur. Interest rates increase in periods of economic expansion, while interest rates decrease in periods of economic recession. The horizontal and negative slope of the yield curve indicates that short-term interest rates are expected to fall. Therefore, the economy is expected to enter a recession. The recent flattening and inversion of the yield curve in the USA have triggered the discussions about the recession expectations in the USA.

**Key Words:** Yield Curve, Recession, Globalization

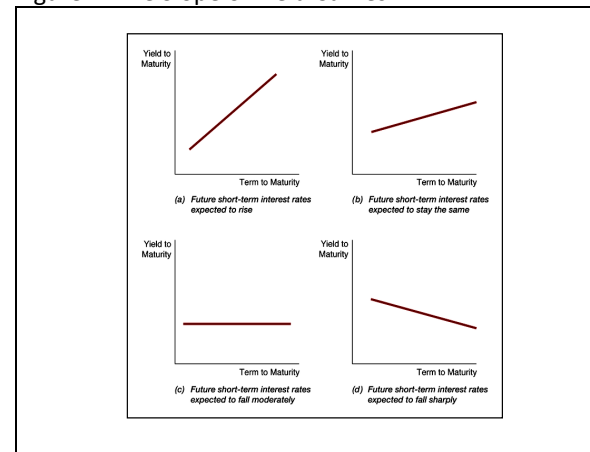
### 1. INTRODUCTION

Risk, liquidity and tax conditions (risk structure) affect the interest rates of the bonds. Another factor affecting the interest rate of bonds is the number of days remaining in the maturity of the bonds. Bonds with the same risk, liquidity and tax characteristics may have different interest rates. The reason for this situation is that the number of days remaining in the maturity of these bonds is different from each other (Mishkin, 2007).

The curve representing the returns of bonds bearing the same risk, liquidity and tax conditions but with different maturities is called yield curve. Yield curves represent the term structure of interest rates of certain types of bonds, such as government debt securities. For example, yield curve for the US securities can be obtained by plotting rates on similar the US securities with different maturities, such as the 10-year U.S. Treasury note and the three-month U.S. Treasury bill (Mishkin, 2007).

Yield curves can be positively inclined, horizontal and negatively inclined (inverse). If the slope of the yield curve is positive, it means that long-term interest rates are higher than short-term interest rates. If the yield curve is horizontal, it indicates that the long-term interest rates and the short-term interest rates are the same. If the slope of the yield curve is negative, it signals that the long-term interest rates are below the short-term interest rates (see Figure 1). Yield curves can also take a more complex form. For example, it may have a positive slope first, then a negative slope (Mishkin, 2007).

Figure 1: The Slope of Yield Curves



Source: Mishkin, 2007: 143

Empirical facts about the maturity structure of interest rates indicate the following (Mishkin, 2007):

- 1) Interest rates of bonds with different maturities act in a similar manner over time.
- 2) When the short-term interest rates are low, the yield curves are likely to have a positive slope; When short-term interest rates are high, the yield curves tend to be negatively sloping and inverse.
- 3) Yield curves usually have a positive slope.

The yield curve typically slopes upward, i.e. longer-maturity assets have a higher return than shorter-maturity assets, due to the fact that investors demand a premium to hold a bond or a note for a longer period. The premium is

demanded for risks such as inflation and other uncertainties that can develop over time.

## 2. THE RELATIONSHIP BETWEEN THE SLOPE OF YIELD CURVES AND FUTURE SHORT-TERM INTEREST RATES

The slope of yield curves can help us predict future short-term interest rates (Mishkin, 2007).

- The yield curve with a positive and steep slope implies that short-term interest rates are expected to rise.
- The yield curve with a positive and non-steep slope implies that short-term interest rates are expected to remain the same.
- A horizontal yield curve implies that short-term interest rates are expected to drop moderately.
- The inversed yield curve with a negative slope implies that short-term interest rates are expected to fall sharply.

Since the yield curve contains information on expected future interest rates, it may help to estimate real product fluctuations. Interest rates increases in periods of economic expansion, while they decrease in periods of economic recession. The horizontal and negative slope of the yield curve indicates that short-term interest rates are expected to fall. Therefore, the economy is expected to enter a recession.

Figure 2 provides examples for the relationship between yield curve and short-term interest rates from the US economy. On January 15, 1981, the inverted yield curve occurred in the USA. This situation pointed out that short-term interest rates was expected to reduce sharply. Short-term interest rates should be expected to fall sharply in order for long-term interest rates having a positive liquidity premium to fall below short-term interest rates. Thus, the average of the expected short-term interest rates will fall below the short-term interest rates in the current period. As a matter of fact, interest rates of three-month treasury bills dropped from 16% to 13% until March.

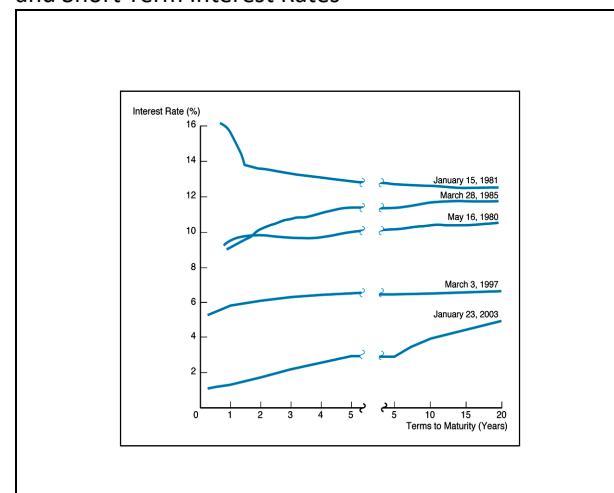
The yield curves with positive slope on March 28, 1985 and January 23, 2003 indicate that short-term interest rates will soon increase. If the short-term interest rates are expected to rise, the long-term interest rates will be higher than the short-term interest rates, because the average of the short-term interest rates plus the liquidity premium will

be higher than the current short-term interest rates.

Moderately positive sloping yield curves on 16 May 1980 and 3 March 1997 indicate that short-term interest rates are not expected to rise or fall in the future. In this case, the average of short-term interest rates is the same as the current period short-term interest rates. The positive liquidity premium for long-term bonds explains the moderately positive slope of the yield curve.

The yield curve on February 6, 2006 indicates that short-term interest rates are expected to decline slightly (Mishkin, 2007).

Figure 2: The Relationship between the Yield Curve and Short Term Interest Rates



Source: Mishkin, 2007: 143

## 3. THE RELATIONSHIP BETWEEN YIELD CURVES AND RECESSION

Under normal conditions, the yield curve should have a positive slope and the term spread (the difference between the rates) should be positive whereby longer-maturity assets have a higher return than shorter-maturity assets. A liquidity premium due to risks involving for a longer period is the main reason of the positive spread.

When the short-term asset rates rise above the rates on long-term assets, i.e. the spread is negative, yield curve inversions occur. Assuming the liquidity premium has not changed, there are two primary reasons for the spread to become negative:

- a) Increased risk
- b) Lower expectations about future outcomes, such as a recession

The risk premium of an asset is the premium associated with the difference in the likelihood of default of that asset over a risk-free asset. U.S.

Treasuries are generally considered risk free. Thus, inversions in the yield curve of the USA is linked to recessions in the US economy (Owyang, 2016).

Hence, a flatter yield curve signals concerns about the future economic outlook while an inverted yield curve is considered as a warning sign about the future economic outlook.

It is argued that the yield curve—specifically, the spread between the interest rates on the ten-year Treasury note and the three-month Treasury bill—is a valuable forecasting tool for the US economy and significantly outperforms other financial and macroeconomic indicators in predicting recessions two to six quarters ahead (Estrella and Mishkin, 1996). Studies on recessions in the US economy suggest that recessions came around a year after an inversion in the yield curve occurred. In the last 50 years in the USA, seven times a recession followed the inverted the 3-month/10-year curve for 10 straight days. It is taken on average 311 days for a recession to follow the inverted yield curve (see Table 1) (Watts, 2019).

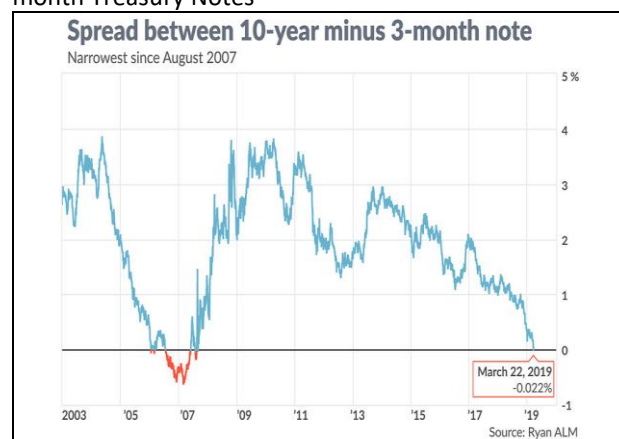
Table 1: The Relationship between Date of Inversion of the Yield Curve and Recession in the USA

| How Long Until The Recession?                       |                        |                        |
|---|------------------------|------------------------|
| When the 3M/10Yr Curve Inverts For 10 Straight Days |                        |                        |
| Date of Inversion                                   | Date of Next Recession | Days to Next Recession |
| 1/10/1969   | Dec-69                 | 325                    |
| 6/14/1973   | Nov-73                 | 140                    |
| 12/8/1978   | Jan-80                 | 389                    |
| 11/7/1980   | Jul-81                 | 236                    |
| 6/6/1989  | Jul-90                 | 390                    |
| 7/31/2000   | Mar-01                 | 213                    |
| 8/1/2006  | Dec-07                 | 487                    |
| <b>Average</b>                                      |                        | <b>311</b>             |

Source: <https://www.marketwatch.com/story/the-yield-curve-inverted-here-are-5-things-investors-need-to-know-2019-03-22>

The most recently the yield on the 10-year Treasury note fell below the yield on the 3-month T-bill, i.e. the yield curve inverted, on 22 March 2019 in the USA. Weak eurozone economic data lead to a global bond rally which pulled down yields as such the 10-year Treasury note yield TMUBMUSD10Y at 2.42% fell below the three-month T-bill yield at 2.45% (see Figure 3) (Watts, 2019). This situation has caused investors and stock market participants to expect a potential recession.

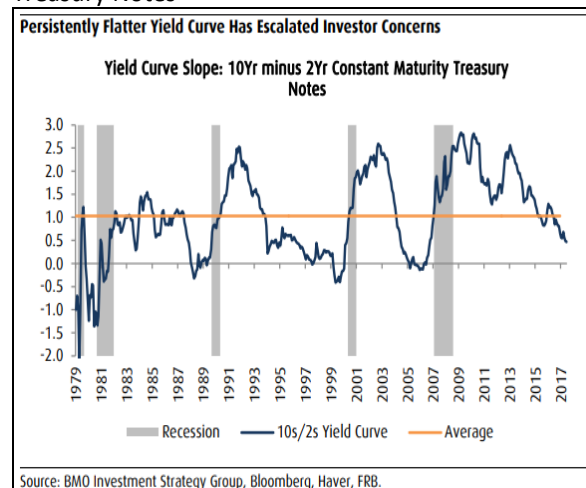
Figure 3: The Spread Between 10-year and 3-month Treasury Notes



Source: <https://www.marketwatch.com/story/the-yield-curve-inverted-here-are-5-things-investors-need-to-know-2019-03-22>

The yield curve has been flattening for some time. The concern about the yield curve have started since mid-2018 when the yield curve has flattened. The spread between 2-year Treasuries and 10-year notes has kept narrowing since 2007 (see Figure 4). When the yield curve flattened, some market analysts argued that investors shouldn't worry about the yield curve implications as long as the yield curve doesn't invert (Watts, 2018).

Figure 4: The Spread Between 10-year and 2-year Treasury Notes



Source: <https://www.marketwatch.com/story/why-stock-market-investors-should-stop-freaking-out-about-the-yield-curve-2018-06-28>

However, the predictability of a recession by the mean of the inverted curve is not certain. Although inversion in the yield curve could signal economic slowdowns, a recession doesn't always follow the inverted yield curve. Not all inversions in the yield curve are associated with recessions in the USA. An inversion in late 1966 and a "very flat" curve in late

1998 were not followed by a recession in the USA (Watts, 2019).

Moreover, the predictability of a recession by the mean of an inverted curve is shaken by globalization. Besides market participants, central banks in the world also hold important amount of Treasuries. Thus, the yield is no longer seen as market-driven.

Besides, expectation of recession is one of the reasons of the inverted yield curve. The reasons of the inverted yield curve include the following:

1) The yield curve suggests the current situation of the monetary policy. Current monetary policy has a significant influence on the yield curve spread and hence on real activity over the next several quarters. The horizontal and negatively sloped yield curve indicates a tight monetary policy. A rise in the short rate tends to flatten the yield curve as well as to slow real growth in the near term. In other words, short-term interest rates could be higher than long-term interest rates because market participants see monetary policy as overly tight and slowing the economy.

2) The yield curve suggests the expectation about future inflation. The nominal interest rate is equal to the sum of the real interest rate and the expected inflation rate. Thus, the yield curve includes information on both future nominal interest rates and the way future inflation follows. The horizontal and negative sloping yield curve indicates that future inflation will decline.

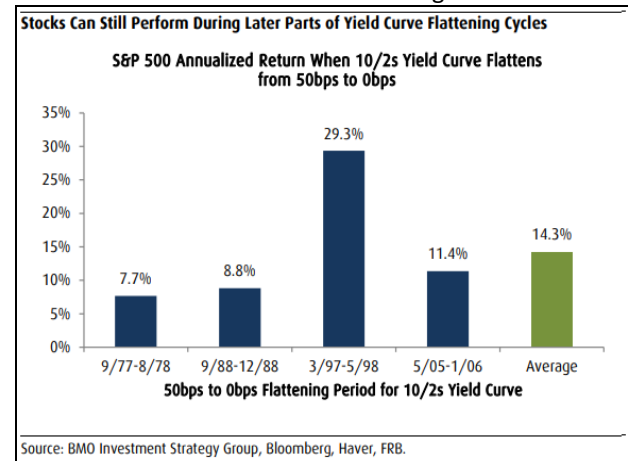
3) The yield curve suggests the expectation of investors about the future of economic growth. Interest rates increases in periods of economic expansion, while interest rates decrease in periods of economic recession. The horizontal and negative slope of the yield curve indicates that short-term interest rates are expected to fall. Therefore, the economy is expected to enter a recession. Thus the horizontal and negatively sloped yield curve indicates that investors worries about future economic growth, they expect that economy could enter a recession, and thus they prefer short-term Treasuries to long-term Treasuries which pushes down long-term interest rates.

#### 4. THE RELATIONSHIP BETWEEN YIELD CURVE AND STOCK MARKET PERFORMANCE

In the USA, it is observed that the S&P 500 has gained 12.3% on average when the yield curve was flattening compared with a 7.9% gain when the yield curve was steepening for all periods since 1980. It is also observed that the S&P 500 can still

deliver double-digit gains during the latter parts of flattening cycles (from 50 bps to 0 bps) (see Figure 5) (Watts, 2018).

Figure 5: The Relationship Between Stock Market Performance and Yield Curve Flattening



Source: <https://www.marketwatch.com/story/why-stock-market-investors-should-stop-freaking-out-about-the-yield-curve-2018-06-28>

#### 5. CONCLUSION

The curve representing the returns of bonds bearing the same risk, liquidity and tax conditions but with different maturities is called yield curve. The yield curve typically slopes upward, i.e. longer-maturity assets have a higher return than shorter-maturity assets, due to the fact that investors demand a premium to hold a bond or a note for a longer period. The premium is demanded for risks such as inflation and other uncertainties that can develop over time. A flatter yield curve signals concerns about the future economic outlook while an inverted yield curve is considered as a warning sign about the future economic outlook. When the short-term asset rates rise above the rates on long-term assets, i.e. the spread is negative, yield curve inversions occur. Interest rates increases in periods of economic expansion, while interest rates decrease in periods of economic recession. The horizontal and negative slope of the yield curve indicates that short-term interest rates are expected to fall. Therefore, the economy is expected to enter a recession.

The recent flattening and inversion of the yield curve in the USA have triggered the discussions about the recession expectations in the USA. However, the predictability of a recession by the mean of the inverted curve is not certain. Although inversion in the yield curve could signal economic slowdowns, a recession doesn't always follow the

inverted yield curve. Moreover, the predictability of a recession by the mean of an inverted curve is shaken by globalization. Besides market participants, central banks in the world also hold important amount of Treasurys. Thus, the yield is no longer market-driven and contain information about the future of the economy, leading to break the link between the slope of the yield curve and recession expectations.

## REFERENCES

- 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, 2(7): 1-6.
- Owyang, M. (2016). "Is the Yield Curve Signaling a Recession?". <https://www.stlouisfed.org/on-the-economy/2016/march/is-yield-curve-signaling-recession>
- Mishkin, F. S. (2007). "The Economics of Money, Banking and Financial Markets". Eighth Edition. New York: Pearson Addison Wesley.
- Watts, W. (2018). "Here's When The Yield Curve Actually Becomes A Stock-Market Danger Signal". <https://www.marketwatch.com/story/why-stock-market-investors-should-stop-freaking-out-about-the-yield-curve-2018-06-28>
- Watts, W. (2019). "The Yield Curve Inverted — Here Are 5 Things Investors Need to Know". <https://www.marketwatch.com/story/the-yield-curve-inverted-here-are-5-things-investors-need-to-know-2019-03-22>