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# **The yield curve and its role in predicting U.S. recessions**

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**ABSTRACT:**

The yield curve, especially the difference between 10-year and 3-month U.S. Treasury yields, has long been seen as a sign that a recession is coming. This thesis looks at how well it can predict recessions by looking at the U.S. recessions of 1990–1991, 2001, and 2008. The study looks at the timing, depth, and length of yield curve inversions and un-inversions. It finds that inversions always come before recessions, but un-inversions may provide a more immediate signal. The results show that the characteristics of inversions are important and that yield curve signals need to be interpreted in the context of the broader context of the economy and policy.

Korkokäyrä, erityisesti 10 vuoden ja 3 kuukauden Yhdysvaltain valtionobligaatioiden korkoeroa, on pitkään pidetty indikaattorina lähestyvistä taantumista. Tämä kandidaatintutkielma tarkastelee sen ennustekykyä analysoimalla Yhdysvaltojen taantumia vuosilta 1990–1991, 2001 ja 2008. Tutkimuksessa keskitytään korkokäyrän kääntymisten ja normalisoitumisten ajoitukseen, syvyyteen ja kestoon. Tulokset osoittavat, että kääntymiset edeltävät taantumia johdonmukaisesti, mutta normalisoitumiset voivat tarjota välittömämmän varoitussignaalin. Johtopäätöksenä on, että korkokäyrän ominaispiirteillä on merkitystä, ja sen signaaleja tulee tulkita osana laajempaa makrotaloudellista ja rahapoliittista kokonaisuutta.

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**KEYWORDS:** Yield Curve inversion, Leading indicator, un-inversion, Interest Rates, Monetary Policy, Treasury Spreads, Business Cycles, Financial Markets, Economic Forecasting

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Picture 1. 10-Year Treasury Constant Maturity Minus 3-Month Treasury Constant Maturity. (FRED, 2025). 17

# 1 Introduction

Economists, investors, and policymakers have been interested in the yield curve's behavior for a long time, mostly because it is thought to be an economic indicator (Estrella & Mishkin, 1996). The yield curve is a graph that shows interest rates for different maturities. It shows what the market thinks will happen to interest rates and, indirectly, economic growth (Ang, Piazzesi & Wein, 2006). A lot of people are paying attention to an inversion of the yield curve, which happens when short-term interest rates are higher than long-term rates. This could be a sign of an economic downturn. Historical evidence has demonstrated a correlation between yield curve inversions and subsequent recessions in the United States, raising questions about the reliability and underlying mechanisms of this indicator (Wheelock & Wohar, 2009).

There have been a number of yield curve inversions in the last few decades, and each one has led to discussions about whether a recession is coming. An inverted yield curve may mean that people are worried about the economy because investors are buying long-term bonds in the hopes that rates will go down in the future because they think the economy will get weaker (Bernanke & Blinder, 1992). Even so, there have been times when an inverted yield curve did not lead to a recession in the United States, or when other economic indicators played a big role in the economic forecast (Estrella & Turbin, 2006). This thesis looks at how the yield curve can be used to predict U.S. recessions.

## 1.1 Purpose of the thesis

This thesis objective is to clarify the role of the yield curve as a leading economic indicator, to analyze historical cases of yield curve inversion and their consequences, and to assess the usefulness of the yield curve in indicating economic slowdowns. Many economists and policymakers refer to an inverted yield curve, which occurs when short-term interest rates are higher than long-term interest rates. This phenomenon has been observed before several economic downturns in the United States (Estrella & Mishkin, 1996). Although yield curves have preceded recessions in the past, they are subject to

several limitations, and their accuracy varies across economies and time periods (Wheelock & Wohar, 2009).

The purpose of this thesis is therefore to analyze whether yield curve inversion consistently precedes recessions in the United States and to derive the following hypotheses:

H1: Historically, a negative spread between the 10-year and 3-month Treasury yields has consistently served as a reliable predictor of impending recessions in the U.S. economy.

Second, this study examines the predictive power of the 10Y-3M Treasury yield spread in determining the timing of U.S. recessions. Given historical variations in lead times, this research aims to evaluate whether the spread consistently provides reliable early warning signals of economic downturns.

H2: The 10Y-3M Treasury yield spread provides reliable signals for the timing of U.S. recessions, with the lead time varying across economic cycles.

The hypotheses build on the arguments of other researchers who claim that yield curve inversion is a useful but not flawless way to see where the economy is headed (Estrella & Turbin, 2006). In this thesis, we examine past trends and findings that can help us understand the predictive power of the yield curve.

## **1.2 Thesis structure**

To investigate these questions, this thesis first reviews the existing literature on the meaning of the yield curve, the economic theory behind the yield curve movement, and previous studies on the predictive power of the yield curve. This thesis will explore the historical yield curve inversions and followed recessions to provide empirical insights from the data (Rudebusch & Williams, 2009). At the end of the thesis, I will discuss about

the reliability of the yield curve as a leading indicator and give my thoughts for future avenues of research.

I used AI-based tools, specifically ChatGPT-4o, to help me write this thesis. This tool helped me come up with ideas and make the research topic and thesis structure better. I also used AI to proofread, which helped me find and fix grammar mistakes and make sentences clearer and more fluid. ChatGPT-4o helped a lot with the language and flow of my work, but I am still the only one responsible for the content and quality of the thesis.

## **2 Foundational theories**

This thesis uses existing economic theories to explain why an inverted yield curve is a sign of a recession. This thesis investigates the efficient market hypothesis, expectations theory, and liquidity preference theory that all view interest rate movements from different perspectives. This thesis combines these theories to provide a comprehensive understanding of how the yield curve changes as the economy develops.

### **2.1 Efficient market hypothesis**

The efficient markets hypothesis assumes that financial markets efficiently process and reflect all available information (Fama, 1970). According to this theory, shifts in the yield curve reflect how informed investors adjust their behavior in response to changing expectations about the economy. An inverted yield curve shows how the market as a whole feels about a possible downturn, since investors use available data to figure out how much risk they are willing to take on in the future (Bernanke, 1990). But evidence from the real world shows that markets don't always fully or accurately price in future economic risks, especially when things are uncertain or changing structurally (Malkiel, 2003). For example, when recessions happen later than expected after an early inversion, it shows that investors may not know when or how bad a downturn will be, which goes against the strongest versions of the efficient market hypothesis.

The efficient market hypothesis says that yield curve inversions happen because investors, as a group, read macroeconomic signals like slowing growth or tighter credit conditions and change bond yields to reflect these changes. But market inefficiencies, like behavioral biases or missing information, can make prices not always follow the rules of rationality. This can lead to wrong interpretations of yield curve signals (Malkiel, 2003).

## **2.2 Expectations theory**

The expectations theory gives a more detailed account of how investors' expectations affect the shape of the yield curve. This theory says that long-term interest rates are basically the average of short-term interest rates that are currently happening and those that are expected to happen in the future. So, if investors think that short-term rates will go down in the future, long-term rates will go down as well, which could cause an inverted yield curve (Mishkin, 1988). This connection means that when the yield curve inverts, it means that the market thinks short-term rates will go down, which happens a lot when people think the economy will slow down.

In the real world, investors change how much they want bonds based on their expectations for interest rates. For example, when they think a recession is coming, they buy more long-term bonds, which lowers their yields compared to short-term rates (Estrella & Hardouvelis, 1991). This mechanism connects expectations theory to the yield curve's ability to predict the future by saying that inversions happen when people in the market expect monetary policy to get easier and the economy to shrink.

## **2.3 Liquidity preference theory**

Liquidity preference theory is different from the other two theories because it adds the idea of a risk premium. This means that investors want higher returns on long-term bonds because they are riskier and less liquid than other types of investments. Investors want a higher return on their money when they put it into long-term investments because they don't know what will happen over time (Mankiw & Miron, 1986). This extra cost is because interest rates, inflation, and other economic factors are more likely to change over longer investment periods (Fama, 1970).

This risk premium makes the yield curve go up when the economy is doing well, because long-term yields are usually higher than short-term yields (Campbell & Shiller, 1991). But when the economy is uncertain, investors may want the safety of long-term bonds, even

if they have lower yields. This can lower long-term rates and possibly flip the yield curve (Mankiw & Miron, 1986). This change shows that when investors think the economy will be unstable, their preference for safe, liquid assets affects the shape of the yield curve. This so-called flight to quality is what investors do when they think the market is going to go down. They switch to assets that are perceived as safer, even if they offer lower returns (Estrella & Mishkin, 1996).

The liquidity preference theory therefore provides a more complex picture of the impact of risk aversion and liquidity on yield curve spread. When investors fear a recession, they buy more long-term bonds, which lower their interest rates relative to short-term bonds. This dynamic reinforces the relationship between yield curve inversions and recession expectations and shows how investor risk aversion in times of uncertainty affects the predictability of the yield curve (Rudebusch & Williams, 2009).

## **2.4 Connecting theories to evidence**

Each of these theoretical perspectives explains different aspects of what determines yield curve movements over time. The efficient market hypothesis looks at how markets use and show information that is already out there. It says that changes in the yield curve happen because everyone agrees on what will happen in the future (Fama, 1970). According to expectations theory, investors' expectations about future short-term interest rates, particularly expected changes in monetary policy, have a significant impact on long-term interest rates (Campbell & Shiller, 1991). Liquidity preference theory emphasizes that investors are generally risk averse and therefore will demand higher yields as the compensation for holding long-term bonds. However, this is not the case during times of heightened economic uncertainty, when demand for safer, longer-term assets increases (Mankiw & Miron, 1986). Bringing these theories together provides a comprehensive picture of why yield curve inversions often precede recessions. It also shows that no single concept can perfectly explain how markets work. Combining theoretical methods allows for a more precise analysis to understand changes in the yield curve, especially in today's complicated and changing financial environment, where

both rational analysis and psychological factors affect how investors make decisions and how the market works (Malkiel, 2003).

## **2.5 Limitations in existing research**

Historically, there has been a strong correlation between yield curve inversions and recessions, but the strength of this correlation is not yet fully understood. One thing that has not yet been fully comprehended is how global financial conditions will affect the US yield curve. As global financial markets become more interconnected, foreign policy, capital flows, and geopolitical risks can influence U.S. Treasury bond yields. Therefore, yield curve inversions can lead to less accurate estimates of future economic downturns (Diebold, Li, & Yue, 2008).

Another important gap is the impact of unconventional monetary policies, such as quantitative easing, which have fundamentally changed the functioning of bond markets. Central banks buy long-term securities to lower long-term interest rates, which can change the signal that the yield curve normally provides (Bauer & Rudebusch, 2017). There is still no consensus on whether this deterioration in conditions will have the same impact on the yield curve as in more normal financial conditions (Krishnamurthy & Vissing-Jorgensen, 2011).

Changes in Federal Reserve policy, such as forward guidance and balance sheet management, further complicate the situation. These tools can shift investor expectations without changing underlying economic conditions, making it difficult to understand yield curve movements (Engstrom & Sharpe, 2019). Future research should examine whether the yield curve retains the same predictive power it had when central banks had fewer tools to affect monetary policy.

Although the yield curve remains as a widely used tool, some researchers have referred to cases where an inversion did not cause a recession or cases where a recession occurs without an inversion (Estrella & Trubin, 2006). Given the rapidly changing environment

of financial markets, further research is needed to determine whether the relationship between yield curves and recessions remains constant over time.

### **3 Research strategy and technique**

In this chapter, we analyze historical data on U.S. Treasury bond yields and use descriptive and statistical methods to examine the relationship between yield curve inversion and the onset of a recession, providing a robust framework for testing our hypotheses. This chapter describes the data sources, analytical methods, and issues that can affect the results. All of these factors are important to ensure the accuracy and reliability of the results and provide a solid basis for evaluating the effectiveness of the yield curve as a recession forecasting tool.

#### **3.1 Data sources**

The study uses historical data on U.S. Treasury yields, using the 3-month treasury bill for short-term yields and the 10-year treasury bill for the long-term yields. Yield curve data is taken from the Federal Reserve Economic Database, which contains comprehensive historical information on U.S. Treasury yields and is often used in yield curve studies. This information provides insight into how yield curve inversions have changed over time and how they relate to U.S. recessions. Recession data is taken from official reports of the National Bureau of Economic Research. Using historical data is necessary because it allows us to see past yield curve inversions and how accurately they predicted economic downturns. This method is also supported by many economic forecasting studies. (Chauvet & Potter, 2005).

#### **3.2 Framework for analysis**

This study uses descriptive and statistical analysis to test the hypotheses. Descriptive analysis shows the movement of the yield curve in the past and when recessions materialize. Statistical methods, including correlation analysis and regression models, are used to identify the relationship between yield curve inversion and the onset of recessions. Regression model helps to determine the ability of the yield curve to predict

events and determine when signs of recession occur. This method has been proven effective in the past (Ang, Piazzesi, & Wei, 2006).

### **3.3 Limitations**

There are several limitations with this study. First, although there is ample historical data on government bond yields, this data does not always perfectly reflect how recent economic events or policy changes, such as quantitative easing, have affected these yields and their spread. This can alter the signals we typically receive from the yield curve and may influence our conclusions. (Wheelock & Wohar, 2009). Second, the study's use of historical data may make it less useful for predicting future economic conditions because new factors, like globalization or unusual monetary policies, could change the yield curve's ability to predict future events. This means that we should be careful when applying the results to future economic cycles (Rudebusch & Williams, 2009).

Lastly, this study doesn't take into account other big-picture factors that could affect recessions, like how people feel about the economy, the state of the global economy, or changes in commodity prices. These are all important factors that are talked about in the literature but are not the focus of this study. These extra variables could help us understand economic downturns better, but they were left out because the study's main focus was on the yield curve as a separate predictor of recessions. Also, the study's empirical scope is limited because it only looks at three historical recessions. These are representative, but they may not fully show the range of economic situations in which yield curve inversions happen. Future research may look into a wider range of indicators to make recession prediction models more reliable.

## **4 Historical analysis of yield curve inversions and U.S. recessions**

This chapter looks at the past connection between yield curve inversions and recessions by looking at three major economic downturns: the 1990–1991 recession, the dot-com bubble of 2001, and the global financial crisis of 2008. Across these historical cases, we examine whether the yield curve provided early warning signals in each case and what external factors may have influenced the timing and extent of each recession.

### **4.1 Exploring the historical data**

The yield curve has been used to predict economic downturns, sometimes months or even years before a recession occurs (Bordo & Haubrich, 2004). Historically, recessions typically precede inversions, but the intensity and timing of these signals vary depending on overall economic developments, monetary policy measures, and external shocks to the economy (Rudebusch & Williams, 2009).

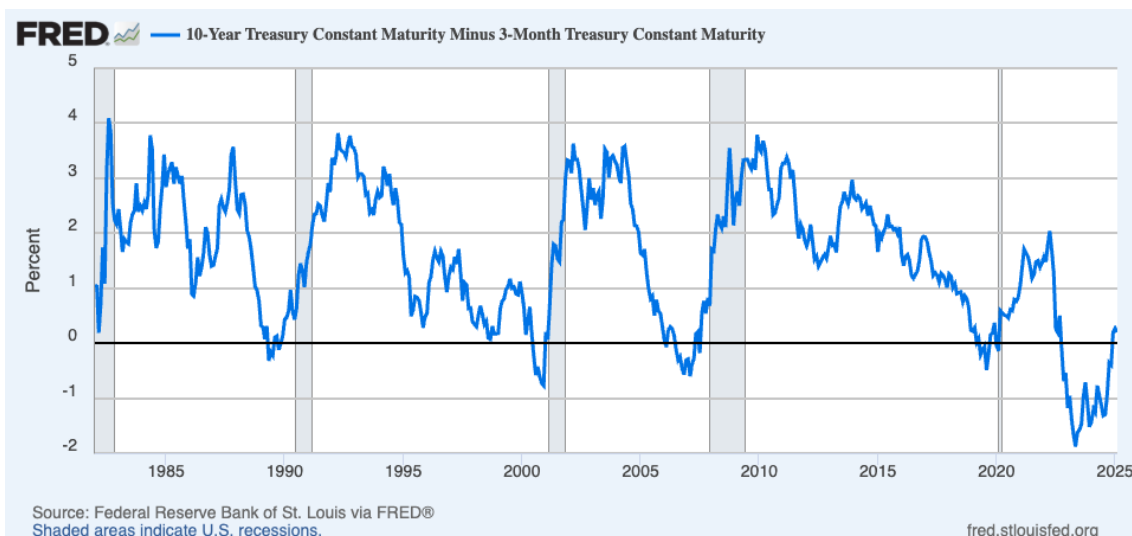
In this section, we will analyze three major recessions in the United States to see how well the yield curve inversion can predict recessions. The fact that these recessions occurred in different macroeconomic environments allows us to analyze whether the yield curve's ability to predict the future is the same across different economic environments.

### **4.2 Methodology for selecting historical cases**

The study looks at times when the yield curve inverted before a recession, as the National Bureau of Economic Research (NBER) defines it. The NBER defines recessions in a more general way than just saying that GDP growth has been negative for two quarters in a row. They look at a wider range of economic indicators, such as GDP, employment, industrial production, and real income (NBER, 2025).

The chosen recessions the 1990–1991 recession, the 2001 dot-com bubble, and the 2008 global financial crisis, were chosen because they were important in history and had different catalysts and economical environments. The recession of 1990–1991 was caused by a combination of the Federal Reserve's aggressive monetary tightening to keep inflation in check and a sudden rise in oil prices due to political tensions. All of these things together put a lot of downward pressure on economic growth (Hall, 1993). Ten years later, the 2001 recession happened after the dot-com bubble burst, which caused stock markets to drop sharply. A string of high-profile corporate accounting scandals shook investors' faith even more, which led to less hiring and business investment (Kliesen, 2003). The U.S. housing market crash led to the 2008 global financial crisis, which is widely thought to be the worst economic downturn since the Great Depression. This crisis showed that the financial system has some serious problems, such as too much debt, derivatives that aren't well-regulated, and a lot of people not paying their mortgages. The chaos that followed froze the world's credit markets and caused a long period of economic decline (Reinhart & Rogoff, 2009).

This study uses historical yield curve data from the Federal Reserve to show how yield curve inversions and recessions are related. Figure 1 shows how the 10-year minus 3-month Treasury spread has changed over time. The black line shows the inversion threshold. If the value is negative, it means that short-term interest rates were higher than long-term rates. The gray areas show when the NBER said the U.S. was officially in a recession. This graph makes it easy to see if yield curve inversions always came before economic downturns.



**Picture 1.** 10-Year Treasury Constant Maturity Minus 3-Month Treasury Constant Maturity. (FRED, 2025).

### 4.3 Historical analysis of yield curve inversions and recessions

Before each of the chosen recessions, the yield curve inverted, but the time between the inversion and the recession and the state of the economy outside the country were different. The following historical analysis looks at how the yield spread acted before each recession to see if the yield curve was a good early warning sign.

#### 4.3.1 The 1990-1991 recession

The recession that happened in the US from July 1990 to March 1991 was a moderate but long-lasting downturn. The Federal Reserve's tight monetary policy, an oil price shock after Iraq invaded Kuwait, and a drop in business investment because of increased financial uncertainty were the main reasons (Hall, 1993). The recession didn't last long, but the recovery was slow, which had a big effect on job levels in the early 1990s (Cecchetti, 1995).

The yield curve inversion happened a long time before this recession. On May 26, 1989, the 10-year Treasury yield fell below the 3-month Treasury yield (FRED, 2025). The inversion lasted for about 219 days, ending on January 2, 1990. However, it briefly got

un-inverted between August 30, 1989, and October 26, 1989 (FRED, 2025). The official recession started in July 1990, about 18 months after the inversion started and 6 months after the curve returned to normal (FRED, 2025).

Tight Federal Reserve policies that were put in place to stop inflation in the late 1980s had an effect on the economy leading up to the recession. The Federal Reserve raised interest rates quickly, going from about 6.5% in early 1988 to almost 9.75% by mid-1989 (Cecchetti, 1995). This tightening slowed credit growth by a lot, which made businesses and consumers spend less. The savings and loan crisis also caused a widespread credit contraction, which made investment even less likely (Hall, 1993).

When Iraq invaded Kuwait in August 1990, oil prices shot up sharply, which made the economy even weaker. From mid-1990 to October, the price of oil went up from \$17 per barrel to almost \$40 per barrel. This made it hard for people and businesses to pay their bills (Hall, 1993). The rise in energy costs made people have less money to spend and businesses had to pay more to run, which made the economic downturn that was already happening worse.

The recession officially started in July 1990, six months after the yield curve went back to normal (FRED, 2025). The drop in GDP wasn't as bad as later recessions, but the recovery took a long time. By early 1991, the Federal Reserve reversed course and lowered interest rates significantly, cutting the federal funds rate from 9.75% to approximately 3% by mid-1992 (Cecchetti, 1995).

#### **4.3.2 The 2001 Dot-com bubble**

The Dot-Com bubble of 2001 was mostly caused by the burst of the speculative technology stock bubble that had formed in the late 1990s. Investors really liked internet-based companies, which caused the technology sector to be way too expensive (Ofek & Richardson, 2003). By the beginning of 2000, stock prices had gotten too high, and when earnings didn't match them, the market crashed. The Nasdaq Composite Index

went up almost 400% from 1995 to 2000, but it dropped almost 78% from its peak in March 2000 to its low in October 2002 (Hendershott, 2003). This big drop in wealth, along with a drop in capital spending by tech companies, caused the economy to weaken and business investment to drop (Jorgenson, 2001).

The yield curve inverted before this drop, with the 10-year Treasury yield falling below the 3-month Treasury yield on July 13, 2000 (FRED, 2025). The inversion lasted for 194 days, until January 23, 2001 (FRED, 2025). The recession officially started in March 2001. This means that the downturn started about 20 months after the inversion and 2 months after the un-inversion (FRED, 2025). This lag was consistent with prior research suggesting that yield curve inversions often precede recessions by several months to two years (Estrella & Mishkin, 1996).

Before the recession, macroeconomic conditions were marked by tighter monetary policy and too much capital going into the technology sector. The Federal Reserve raised the federal funds rate from 4.75% in mid-1999 to 6.5% by mid-2000 because they were worried that financial markets were getting too hot (Jorgenson, 2001). These rate hikes made it harder for people to get money in the financial markets and slowed down corporate investment, especially in the technology and telecommunications sectors (Ofek & Richardson, 2003). At the same time, consumer confidence and corporate profits fell, which caused private-sector spending to drop even more.

The recession lasted from March 2001 to November 2001, which is one of the shortest post-war recessions. But the economy took a long time to recover, especially the job market, where unemployment kept going up even after GDP growth started again. The Federal Reserve reacted by lowering interest rates quickly, bringing the federal funds rate down from 6.5% to 1.75% by the end of 2001 (Hendershott, 2003). Even with these efforts, business investment stayed low, and stock market prices didn't fully recover until the middle of the 2000s.

### 4.3.3 The 2008 global financial crisis

The Global Financial Crisis of 2008 was one of the worst economic downturns in recent history. It caused banks to fail, credit markets to shrink significantly, and a long global recession (Brunnermeier, 2009). The U.S. subprime mortgage market was the source of the crisis. Financial institutions took on too much risk, and the rise of mortgage-backed securities and collateralized debt obligations made the financial system highly leveraged and open to shocks (Mishkin, 2011). When housing prices hit their highest point in mid-2006 and started to fall, mortgage defaults skyrocketed. This caused a liquidity crisis that spread throughout the financial sector (Gorton, 2008). This economic chaos led to the failure of big banks like Lehman Brothers and required the government to step in in ways that had never been done before (Taylor, 2009).

The yield curve turned negative on July 17, 2006, and stayed that way until May 31, 2007, which was a sign that a crisis was coming (FRED, 2025). This inversion lasted for 318 days, with a short period of steepening from March 16, 2007, to April 6, 2007. The official recession started in December 2007, about 17 months after the inversion started and 7 months after the curve went back to normal (FRED, 2025).

The macroeconomic conditions that led up to the crisis included a housing market that was too hot, too much risk-taking in financial markets, and a banking system that was too heavily leveraged. Low interest rates between 2001 and 2006 led to a housing boom, which led banks and other financial institutions to give out subprime mortgages to borrowers who were likely to default (Mishkin, 2011). Banks, hedge funds, and institutional investors bought a lot of these loans and put them together into mortgage-backed securities and collateralized debt obligations. This made the housing market more risky for everyone (Gorton, 2008). Defaults on subprime mortgages started to rise sharply when housing prices peaked in mid-2006. This hurt confidence in the financial sector (Brunnermeier, 2009).

As credit markets got tighter, banks had less money to lend and liquidity dried up. Bear Stearns went out of business in March 2008, which was an early sign of market trouble. But when Lehman Brothers filed for bankruptcy on September 15, 2008, the crisis got a lot worse (Taylor, 2009). The resulting financial panic caused a huge drop in economic activity, with GDP falling 4.3% from its highest point to its lowest point and unemployment reaching 10% in October 2009 (Demirgüç-Kunt & Servén, 2009). The crisis had effects all over the world, including on trade, financial markets, and the amount of debt that governments had (Acharya & Richardson, 2009).

## 5 Discussion

The study of past yield curve inversions before U.S. recessions shows that the 10Y-3M spread has been a good early warning sign of economic downturns. The yield curve inverted well before each of the three economic downturns. This is in line with earlier research on its ability to predict future events (Estrella & Mishkin, 1996). The timing and size of the inversions, on the other hand, varied depending on macroeconomic conditions, monetary policy, and shocks from outside the economy. The results provide valuable insights into how the yield curve works as a forecasting tool and how changes in the yield curve are explained by conventional economic theories.

### 5.1 Core conclusions drawn from the data

The results closely align what expectations theory says, which is that long-term interest rates reflect what the market collectively thinks the future path of short-term rates will be. (Campbell & Shiller, 1991). In each of these historical cases, investors expected the economy to be weak, which led to more demand for long-term bonds and a drop in long-term yields compared to short-term yields. The long inversions before the 2001 and 2008 recessions show that the financial markets were right about a downturn, even though the timing was different. Expectations theory does explain why inversions happen, but it doesn't fully explain why the time it takes for recessions to happen is different in different economic cycles.

The efficient market hypothesis says that all available information should be fully included in financial markets (Fama, 1970). If markets worked perfectly, yield curve inversions would always mean that a recession was coming at a certain time. But the past cases showed that the time between an inversion and the start of a recession could be anywhere from 17 to 20 months (FRED, 2025). The fact that lead times vary makes the idea of perfect market efficiency less believable. This suggests that external shocks, policy changes, and market distortions all play a role in when a recession starts.

The results also back up liquidity preference theory, which says that investors want higher yields on long-term bonds because they are more risky (Mankiw & Miron, 1986). During times of economic uncertainty, though, investors move toward long-term bonds for safety, even if they have lower yields. This causes an inversion. The 2008 financial crisis made this dynamic very clear. Investors looked for safe-haven assets during times of financial instability, which drove down long-term yields and made the yield curve's predictive role stronger. (Demirgüç-Kunt & Servén, 2009)

The results also show that the depth and length of inversions were related to how bad the recessions were. The longest inversion lasted 318 days and happened before the 2008 financial crisis. It was followed by the worst economic contraction. The 1990–1991 and 2001 recessions, on the other hand, came after shorter inversions and had less of an effect on the economy. This result is in line with studies that say that long and deep inversions are a sign of stronger economic downturns (Bordo & Haubrich, 2004).

One important thing to take away from the results is that while yield curve un-inversions have always come before recessions, the timing of these events is still not set in stone. The results show that inversions happened a long time before each downturn, but recessions happened between 2 and 8 months after the yield curve returned to normal (FRED, 2025). This suggests that un-inversions may serve as a late stage warning signal, reflecting growing financial and economic stress in the economy.

This observed relationship between yield curve un-inversion and the timing of recessions highlights a promising direction for further research. The findings have shown that recessions generally occur with much less lead time following un-inversions than inversions themselves. If these patterns also hold true in a broader historical context, yield curve inversion points could provide policymakers and investors with a better signal that a recession is impending.

## 5.2 Understanding the limitations of the yield curve

The Yield curve has been a reliable early warning sign of U.S. recessions historically, but there are several important problems that can reduce its effectiveness. The main problems with these are that lead times can change, false positives can happen, monetary policy can be distorted, and financial markets can change their structure.

One of the biggest challenges of using the the yield curve to predict a recession is the variance in lead times between inversions and the onset of economic downturns. This difference makes the idea of a set timeline for a recession after an inversion seem less likely, since changes in the economy, government policies, and the behavior of the financial markets all affect how quickly the economy goes from inversion to contraction.

While yield curve inversions have accurately predicted many past recessions, there have been instances where the curve inverted without a subsequent recession, creating false positives. In the middle of the 1960s, for example, the 10Y-3M spread briefly inverted, but there was no recession after that (Estrella & Trubin, 2006). In 1998, there was also an inversion because of the Russian debt crisis and the failure of Long-Term Capital Management, which caused financial instability. However, aggressive monetary easing by the Federal Reserve stabilized markets, preventing a recession (Wheelock & Wohar, 2009).

These examples show that an inverted yield curve is often a necessary condition for predicting a recession, but it is not always a sufficient one. External factors like changes in monetary policy, fiscal stimulus, or global financial conditions can stop or slow down the expected downturn and prevent a recession, even if the inversion signal is present.

The yield curve is greatly affected by what the Federal Reserve does, and sometimes it changes its ability to predict the future. After the 2008 financial crisis, the Federal Reserve used unusual monetary policies, such as quantitative easing, which lowered long-term yields and flattened the yield curve even when the economy was growing

(Bauer & Mertens, 2018). Forward guidance strategies, in which the Federal Reserve tells investors what it expects interest rates to do in the future, have also affected how investors feel and how interest rates move in ways that may make traditional yield curve signals less clear (Engstrom & Sharpe, 2019).

These changes make it seem like the yield curve might not be as good at predicting things when monetary policy has a big effect. If central banks buy assets to artificially lower long-term yields, the yield curve could flip for reasons other than a weak economy.

The globalization of financial markets has made it harder to understand U.S. yield curve signals. International capital flows into U.S. Treasuries have grown over the past 20 years because of safe-haven demand, foreign central bank reserves, and institutional investment strategies (Diebold, Li, & Yue, 2008). These flows of money can lower long-term interest rates regardless of what is happening in the domestic economy. This could cause false inversions or distortions in how the yield curve behaves.

For instance, when the world economy is uncertain, foreign investors often look for U.S. Treasuries as a safe investment, which lowers long-term yields even when the U.S. economy is growing strongly. This could lead to a yield curve that looks flat or inverted, which doesn't always mean that the U.S. economy is about to go into a recession (Bernanke, 2005).

These limitations show how important it is to put yield curve signals in the context of the bigger picture of the economy. Policymakers, investors, and analysts shouldn't just look at inversion events. They should also keep an eye on the length, depth, and un-inversion trends to get a better idea of how likely a recession is.

### **5.3 Practical implications and current economic conditions**

This study's results confirm that the yield curve, especially when it becomes inverted, can be an important early warning sign of economic downturns. But it's important to

know that the yield curve doesn't predict recessions by itself. Instead, it means that investors and policymakers should start to pay more attention to other signs of a weak economy, like rising unemployment, slowing consumer spending, or credit markets getting tighter (Bordo & Haubrich, 2004). So, to understand the yield curve, you need to know more than just how it works, you also need to understand how the economy as a whole is doing and how policymakers are responding.

The lesson for policymakers is that yield curve inversions are often a good sign that it's time to rethink monetary policy settings. In the past, central banks have usually lowered interest rates when the yield curve inverted to keep the economy from slowing down. The Federal Reserve, on the other hand, decided to keep interest rates high during the 2022–2024 inversion because they were worried about inflation and a strong job market (Federal Reserve Board, 2024). This choice shows that yield curve signals should be considered along with other important economic factors, like price stability and jobs.

The yield curve helps banks and other financial institutions predict changes in the market and the risks of lending. When the yield curve flips, banks may not want to lend as much because the cost of borrowing for a short time is higher than the cost of lending for a long time. Because of this, credit availability can get tighter, making it harder for people and businesses to get loans (Adrian & Shin, 2010). Investors and financial managers can change their portfolios based on the yield curve. When the curve is inverted, they can become more cautious by lowering their exposure to high-risk assets and raising their holdings in safer investments like government bonds.

The yield curve can help people, including families and small businesses, plan their finances. When the yield curve inverts, it often means that economic conditions may worsen in the near future (Bordo & Haubrich, 2004). People might want to be more careful with their money, put off big purchases, or save up as a safety measure. In the same way, small business owners could get ready for lower demand or stricter lending rules. The yield curve doesn't tell you exact dates or guarantee outcomes, but knowing

that it could mean bad things for the economy can help people make better financial decisions (Bordo & Haubrich, 2004).

The recent inversion from 2022 to 2024, which was the longest and deepest in modern U.S. history. The inversion lasted 779 days and reached a depth of -170 basis points, suggesting strong market concern about the future economic outlook (FRED, 2025). The Federal Reserve didn't cut rates right away like it did in previous cycles, but history shows that recessions usually happen 2 to 8 months after an inversion (Bordo & Haubrich, 2004). This time after an inversion is over is especially important for both decisionmakers and regular people to stay alert and ready for possible changes in the economy.

## 6 Conclusion

The 10-year minus 3-month Treasury yield spread was the main focus of this thesis, which looked at how well yield curve inversions can predict U.S. recessions. The study looked at three big recessions the 1990–1991 recession, the 2001 dot-com bubble, and the 2008 global financial crisis, to see how well and when yield curve movements can be used to predict recessions. The results show that yield curve inversions tend to precede most economic downturns, but the timing of these signals varies considerably. This suggests that yield curve movements should be interpreted with caution and inversions should not be considered the only cause for concern.

The theoretical basis for this study was expectancy theory, liquidity preference theory, and efficient market theory. The results were in line to what expectations theory says, which states that yield curve inversions occur when people fear a weaker economy and lower short-term interest rates. The empirical analysis of the study showed that investors do not always accurately estimate the economic downturn because the time between an inversion and a recession has varied across economic cycles. This observation challenges the assumptions of the efficient market hypothesis, which posits that financial markets fully incorporate all available information into asset prices. Instead, the evidence suggests that market inefficiencies, policy responses, and external shocks influence the effectiveness of the yield curve as a predictor of recessions.

The empirical findings also show that the depth and duration of the inversion correlate with the severity of the economic downturn. This suggests that not all inversions have the same predictive power. The study also found that recessions occur two to eight months after the yield curve normalizes, which may be a better timing signal than the initial inversion itself. This finding, which requires further investigation, suggests that market corrections and policy measures that return the yield curve to positive territory may be associated with increased economic stress and thus accelerate the transition to a recession.

This study confirms that the yield curve has long been a good indicator of recessions. But it also shows how macroeconomic conditions, financial market distortions, and central bank interventions can change the dynamics of the yield curve. Unconventional monetary policies, such as quantitative easing or monetary policy guidelines, may have altered the behavior of the yield curve in recent decades. The 2022–2024 inversion was the longest and steepest inversion in modern history and will test the yield curve’s ability to forecast the outlook after quantitative easing. It is unclear whether this inversion follows historical trends, but its extreme magnitude and duration suggest significant economic risks.

The results of this study have important implications for policymakers, investors, and anyone who wants to forecast economic developments. The yield curve inversion remains an important tool for assessing risk, but the analysis must take into account distortions due to policy actions, financial conditions, and global economic factors. Policymakers should be aware that aggressive monetary policy interventions can undermine the reliability of yield curve signals as a predictor of economic growth. Investors should also consider trends in the yield curve and other macroeconomic indicators when making portfolio composition decisions. Additionally, the results suggest that more attention should be paid to the un-inversion period, as it seems to be more acute timing signal for the recession than inversion.

While this study provides valuable information on the relationship between yield curve inversion and recessions, further research is needed to assess the reliability of yield curve inversion as a predictor across a range of economic cycles. Furthermore, the role of modern monetary policy in yield curve movement is unknown and requires further study. Future research could also examine international yield curves to see whether similar predictive patterns can be observed in economies with different financial structures and policy environments.

This study reinforces the view that the yield curve remains among the most dependable indicators of impending economic downturns, although its predictive power is not infallible. While historical evidence suggests that sustained yield curve inversions are typically associated with elevated recession risk, the exact onset of a downturn is influenced by a range of factors, including broader financial conditions, policy responses, and shifts in the global economy. As these dynamics continue to evolve, it is crucial that researchers interpret yield curve signals within the context of a changing economic landscape. Ongoing research and careful, nuanced analysis of yield curve movements will be essential for navigating future business cycles.

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