

# The Basics of Interest Rates

by Sophia



## WHAT'S COVERED

In this lesson, you will learn about different yield curves and their meanings. Specifically, this lesson will cover:

## 1. Understanding the Cost of Money

The concept of the cost of money, as does the subject of finance in general, has its basis in the time value of money. The time value of money is the value of money, taking into consideration the interest earned over a given amount of time. If offered a choice between \$100 today or \$100 in a year's time – and there is a positive real interest rate throughout the year – a rational person will choose \$100 today. This is described by economists as time preference. The time preference can be thought of as a US Treasury bill.

➔ **EXAMPLE** Consider a \$100 Treasury bill that currently sells for \$80. The present value of the bill is \$80 whereas the future value of the bill would be \$100 in one year.

This fee paid as compensation for the current use of assets is known as interest. In other words, the concept of interest describes the cost of having funds tied up in investments or savings.

Furthermore, the time value of money is related to the concept of opportunity cost. The cost of any decision includes the cost of the most forgone alternative. The cost of money is the **opportunity cost** of holding money in hand instead of investing it. The trade-off between money now (holding money) and money later (investing) depends on, among other things, the rate of interest that can be earned by investing. An investor with money has two options:

- Spend the money right now
- Save the money

The financial compensation for saving it versus spending it is that the money value will accrue through the compound interest that he will receive from a borrower (the bank account or investment in which he has the money).



### TERM TO KNOW

#### Opportunity Cost

The cost of an opportunity forgone (and the loss of the benefits that could be received from that opportunity); the most valuable forgone alternative.

## 2. Interest Rate Levels

An **interest rate** is the rate at which interest is paid by a borrower for the use of money that they borrow from a lender. Changes in interest rate levels signal the status of the economy. As a vital tool of monetary policy, interest rates are kept at target levels – taking into account variables like investment, inflation, and unemployment – for the purpose of promoting economic growth and stability. In the US, the Federal Reserve, often referred to as "The Fed," implements **monetary policies** largely by targeting the federal funds rate. This is the rate that banks charge each other for overnight loans of federal funds, which are the reserves held by banks at the Fed.

Monetary policy can be classified as being either expansionary or contractionary.

- Expansionary policy is traditionally used to try to combat unemployment in a recession by lowering interest rates in the hope that easy credit will entice businesses into expanding. An expansionary policy increases the total supply of money in the economy more rapidly than usual.
- Contractionary policy is intended to slow inflation in hopes of avoiding the resulting distortions and deterioration of asset values. Contractionary policy increases interest rate levels by expanding the money supply more slowly than usual or even shrinking it.

Most central banks around the world assume and expect that lowering interest rates (expansionary monetary policies) would produce the effect of increasing investments and consumptions. However, lowering interest rates can sometimes lead to the creation of massive economic bubbles, when a large amount of investments are poured into the real estate market and stock market.

Crowding out is a phenomenon occurring when expansionary fiscal policy causes interest rates to rise, thereby reducing investment spending. That means an increase in government spending crowds out investment spending. This change in fiscal policy shifts equilibrium in the goods market. A fiscal expansion increases equilibrium income. If interest rates are unchanged, an increase in the level of aggregate demand will follow. This increase in demand must be met by a rise in output.

With this increase in equilibrium income, the quantity of money demanded is higher. Because there is an excessive demand for real balances, the interest rate rises. Firms' planned spending declines at higher interest rates, thus the aggregate demand falls. The adjustment of interest rates and their impact on aggregate demand dampens the expansionary effect of the increased government spending.



### TERMS TO KNOW

#### Interest Rate

The percentage of an amount of money charged for its use per some period of time. It can also be thought of as the cost of not having money for one period, or the amount paid on an investment per year.

#### Monetary Policy

The process by which the monetary authority of a country controls the supply of money, often targeting a rate of interest for the purpose of promoting economic growth and stability.

---

## 3. Drivers of Market Interest Rates

Market interest rates are mostly driven by deferred consumption, inflationary expectations, alternative investments, risk of investment, and liquidity preference.

Factor	Description
Deferred consumption	When money is loaned, the lender delays spending the money on consumption goods. According to time preference theory, people prefer goods now to goods later. In a free market, there will be a positive interest rate.
Inflationary expectations	Most economies generally exhibit inflation, meaning a given amount of money buys fewer goods in the future than it will now. The borrower needs to compensate the lender for this. If the inflationary expectation goes up, then so does the market interest rate and vice versa.
Alternative investments	The lender has a choice between using his money in different investments. If he chooses one, he forgoes the returns from all the others. Different investments effectively compete for funds, boosting the market interest rate up.
Risks of investment	The chance of an investment defaulting is always prevalent. Because of this, lenders will assess a risk premium, to account for this risk and compensate the lender for taking on additional units of risk. The greater the risk is, the higher the market interest rate will get.
Liquidity preference	This describes the fact that investors prefer to be able to easily convert their investments to cash. If people are willing to hold more money in hand for convenience, the money supply will contract, increasing the market interest rate.

There is a market for investments that ultimately includes the money market, bond market, stock market, and currency market as well as retail financial institutions like banks. Exactly how these markets function is sometimes complicated. However, economists generally agree that the interest rates yielded by any investment take into account:

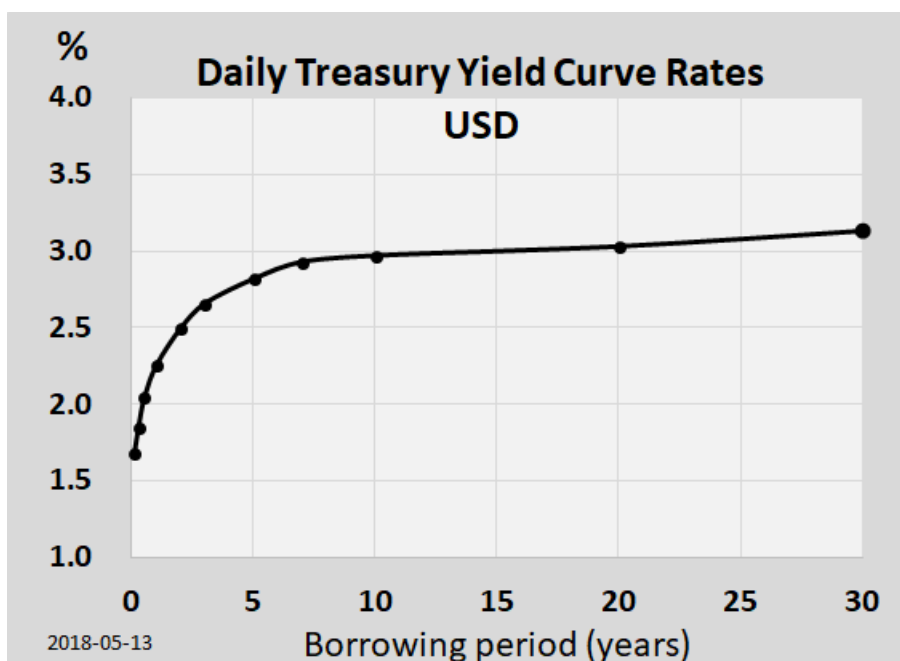
- Risk-free cost of capital
- Inflationary expectations
- Level of risk in the investment
- Costs of the transaction

This rate incorporates the deferred consumption and alternative investment elements of interest.

---

## 4. The Term Structure

Term structure is a phrase used to describe how a given quantity or variable changes with time. In the case of bonds, time to maturity, or terms, vary from short-term (usually less than a year) to long-term (10, 20, 30, 50 years, etc.). **Term structure of interest rates** is often referred to as the yield curve. A **yield curve** indicates various interest rates across various contract lengths. The curve illustrates the relationship between the time of maturity and the interest rate.



The curve allows an interest rate pattern to be determined, which can then be used to discount cash flows appropriately. Unfortunately, most bonds carry coupons, so the term structure must be determined using the prices of these securities.



#### TERMS TO KNOW

##### Term Structure of Interest Rates

The relationship between the interest on a debt contract and the maturity of the contract.

##### Yield Curve

The graph of the relationship between the interest on a debt contract and the maturity of the contract.

## 4a. Shapes of Curve

Based on the shape of the yield curve, we have normal yield curves, steep yield curves, flat or humped yield curves, and inverted yield curves.

Shape	Description
Normal	The yield curve is normal, meaning that yields rise as maturity lengthens (i.e., the slope of the yield curve is positive). This positive slope reflects investor expectations for the economy to grow in the future and, importantly, for this growth to be associated with a greater expectation that inflation will rise in the future rather than fall. This expectation of higher inflation leads to expectations that the central bank will tighten monetary policy by raising short-term interest rates in the future to slow economic growth and dampen inflationary pressure.
Steep	Sometimes, Treasury bond yield averages higher than that of Treasury bills (e.g., 20-year Treasury yield rises higher than the three-month Treasury yield). In situations when this gap increases, the economy is expected to improve quickly in the future. This type of steep yield curve can be seen at the beginning of an economic expansion (or after the end of a recession). Here, economic stagnation will have depressed short-term interest rates. However, rates begin to rise once the demand for capital is re-established by growing economic activity.
	A flat yield curve is observed when all maturities have similar yields, whereas a humped curve

Flat	results when short-term and long-term yields are equal and medium-term yields are higher than those of the short-term and long-term. A flat curve sends signals of uncertainty in the economy.
Inverted	An inverted yield curve occurs when long-term yields fall below short-term yields. This would occur when lenders are seeking long-term debt contracts more aggressively than short-term debt contracts. The yield curve “inverts,” with interest rates (yields) being lower and lower for each longer periods of repayment so that lenders can attract long-term borrowing.

## 4b. Theories

There are three main economic theories attempting to explain different term structures of interest rates. Two of the theories are extreme positions, while the third attempts to find a middle ground between two extremes.

- *Expectation hypothesis:* This theory of the term structure of interest rates is the proposition that the long-term rate is determined by the market’s expectation for the short-term rate plus a constant risk premium. A shortcoming of the expectation theory is that it neglects the risks inherent in investing in bonds, namely interest rate risk and reinvestment rate risk.
- *Liquidity premium theory:* This theory asserts that long-term interest rates not only reflect investors’ assumptions about future interest rates, but also include a premium for holding long-term bonds (investors prefer short-term bonds to long-term bonds), called the term premium or the liquidity premium. This premium compensates investors for the added risk of having their money tied up for a longer period, including the greater price uncertainty. Because of the term premium, long-term bond yields tend to be higher than short-term yields, and the yield curve slopes upward. Long-term yields are also higher, not just because of the liquidity premium, but also because of the risk premium added by the risk of default from holding a security over the long term.
- *Segmented market hypothesis:* With this theory, financial instruments of different terms are not substitutable. As a result, the supply and demand in the markets for short-term and long-term instruments is determined largely independently. Prospective investors decide in advance whether they need short-term or long-term instruments. If investors prefer their portfolio to be liquid, they will prefer short-term instruments to long-term instruments. Therefore, the market for short-term instruments will receive a higher demand. Higher demand for the instrument implies higher prices and lower yield. This explains the stylized fact that short-term yields are usually lower than long-term yields. This theory explains the predominance of the normal yield curve shape. However, because the supply and demand of the two markets are independent, this theory fails to explain the observed fact that yields tend to move together (i.e., upward and downward shifts in the curve).

## 5. Using the Yield Curve to Estimate Interest Rates in the Future

For debt contracts, the overall duration of time of the debt security coupled with the interest rate compounded over that time frame will illustrate the overall yield of the security during its lifetime, also referred to as a yield curve. When this is applied to US Treasury securities in respect to interest rates, useful information regarding projected interest rates in the future over time can be estimated. This is carefully monitored by many traders, and utilized as a point of comparison or benchmark for other investments (particularly valuation of bonds).

Projections	Description

Relationship to the Business Cycle	Through assessing the slope of a yield curve on debt instruments such as governmental Treasury bonds, investors can estimate the overall health of the economy in the future (i.e., inflation, interest rates, recessions, growth). Inverted yield curves are typically predictors of recession, while positively sloped yield curves indicate inflationary growth.
The Financial Stress Index	Defined as the rate of difference between a 10-year Treasury bond rate and a 3-month Treasury bond rate, the Financial Stress Index is a useful tool in projecting future economic well-being. In fact, each of the recessionary periods since 1970 have demonstrated an inverted yield curve when subjected to a Financial Stress Test just prior to that recessionary period.
Market Expectations (i.e., Pure Expectations)	When it comes to interest rates specifically, yield curves are useful constructs in projecting future behavior. The market expectations theory assumes that various maturities are perfect substitutes, and as a result the shape of the yield curve represents market expectations over time in relation to interest rates. In short, through investor expectations of what the 1-year interest rates will be next year, the current 2-year interest rate can be calculated as the compounding of this year's 1-year interest rate by next year's expected 1-year interest rate.
Heath-Jarrow-Morton Framework	When it comes to predicting future interest rates, the Heath-Jarrow-Morton framework is considered a standard approach. It focuses on modeling the evolution of the interest rate curve (instantaneous forward rate curve in particular). The equation itself is a rather evolved derivation, incorporating bond prices, forward rates, risk free rates, the Wiener process, Leibniz's rule, and Fubini's Theorem.



## SUMMARY

In this lesson, you developed your **understanding of the cost of money**, which is quantified by the interest rate. **Interest rate levels** rise and fall according to economic conditions. They are a key tool of monetary policy, but they also respond to other **drivers of market interest rates** that impact supply and demand. Yield curves reflect **the term structure** of interest rates for various contract lengths. These curves can be used by traders and other parties to evaluate the state of the economy and to **estimate interest rates in the future**.

Best of luck in your learning!

Source: THIS TUTORIAL HAS BEEN ADAPTED FROM "BOUNDLESS FINANCE" PROVIDED BY LUMEN LEARNING BOUNDLESS COURSES. ACCESS FOR FREE AT [LUMEN LEARNING BOUNDLESS COURSES](#). LICENSED UNDER [CREATIVE COMMONS ATTRIBUTION-SHAREALIKE 4.0 INTERNATIONAL](#).



## ATTRIBUTIONS

- [Yield Curve](#) | Author: Wikipedia | License: Creative Commons



## TERMS TO KNOW

**Interest Rate**

The percentage of an amount of money charged for its use per some period of time. It can also be thought of as the cost of not having money for one period, or the amount paid on an investment per year.

**Monetary Policy**

The process by which the monetary authority of a country controls the supply of money, often targeting a rate of interest for the purpose of promoting economic growth and stability.

**Opportunity Cost**

The cost of an opportunity forgone (and the loss of the benefits that could be received from that opportunity); the most valuable forgone alternative.

**Term Structure of Interest Rates**

The relationship between the interest on a debt contract and the maturity of the contract.

**Yield Curve**

The graph of the relationship between the interest on a debt contract and the maturity of the contract.