



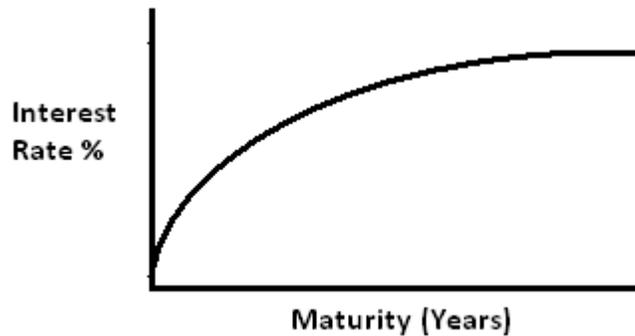
Understanding the Yield Curve

The *yield curve* is one of the sexiest relationships in economics. At its core, the yield curve is about two resources of outsized importance to human beings—time and money. Despite our best and most sociable efforts to downplay their value, they clearly shape many chapters of our individual and collective histories. They are hopelessly intertwined, swapping leading roles in our motivations.

When we are busy with work and money, we lament the time we missed with family, friends and nature. When we are awash with time, society whispers to us that we are not achieving what we should be, that we are not “innovating,” or changing the world. It’s a timeless balancing act for everyone.

While the *yield curve* doesn’t outright solve these problems for us, it describes them very well. What’s more, it does so gracefully with provocative visuals. Hopefully that draws you into a conversation about something more blandly and academically known as the *term structure of interest rates*.

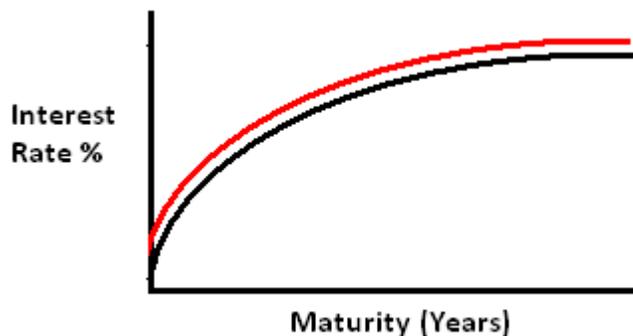
The *yield curve*, which is the sexier colloquial name for this *term structure*, is shown below:



On the vertical axis you have interest rates and on the horizontal axis you have the length of time for lending or borrowing. Typically the terms stretch from overnight to 30 years. In a normal economy the curve follows a simple logic; if you borrow for a short time you pay less, and if you borrow for a long time you pay more, because time equals uncertainty. We feel confident about our counterparties tomorrow morning, but less so 30 years from now. This upward sloping curve is called a *normal yield curve*.

The Federal Reserve conducts the majority of its mysterious business on this curve. While the free market generally controls the long-term end of the curve, the Federal Reserve controls the short-term end trying to lead the market towards its employment and inflation goals. The left hand terminus of the curve, called the Federal Funds Rate, is the overnight rate. On December 16th the Fed increased this rate to 0.25% from zero—where it had been pegged for 7 years.

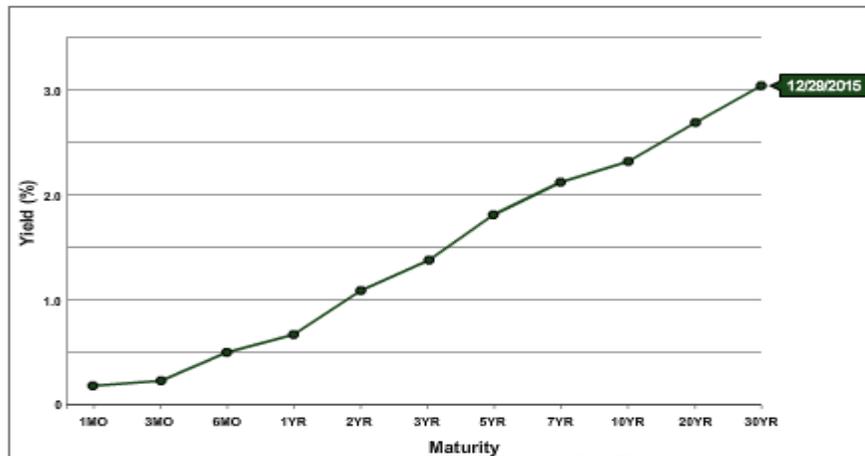
Sometimes the private market agrees with the Fed and follows along, and other times it doesn't. In theory, you'd expect an increase at the front end of the curve would lift the whole curve a bit higher like this:



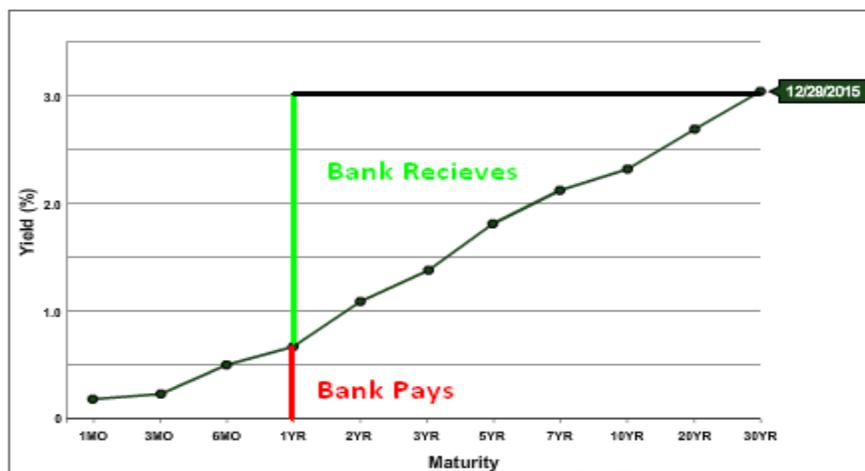
That makes sense. If you're going to require more to make a loan tomorrow then you should also require more to make a loan in 2045. In practice, things often develop differently. For example, two weeks after the December 16th rate hike, 3 month rates actually fell from .27% to .23%, while the 10 year and 30 year rates, which fell for the first week, closed up by a mere 0.02% each to 2.32% and 3.04%

respectively. Decimals aside, the point is that the curve is wiggling and dodging as it tries to gauge the wisdom of the Fed's first new rate cycle in 12 years. The market is not yet wholly convinced.

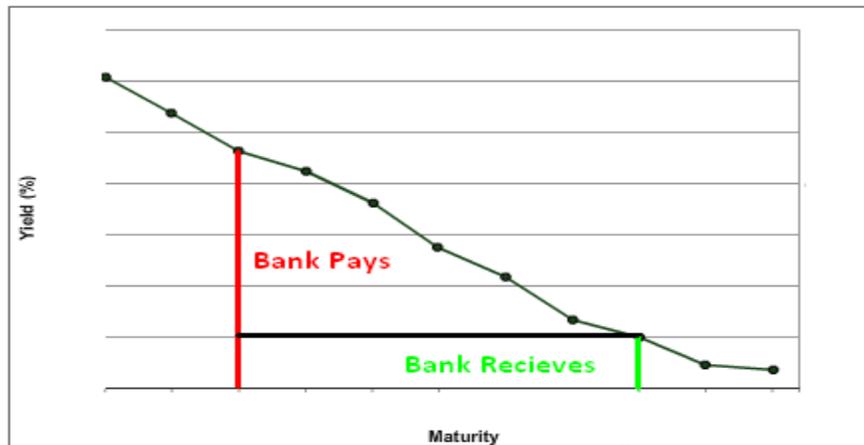
The state of the curve is best obtained directly from the source at the U.S. Treasury's website: (<https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/Historic-Yield-Data-Visualization.aspx>) The 12/29/15 curve is below. You can see it is a typical upwardly sloping yield curve. It looks a bit straighter than the smooth curve of the drawing above simply because the horizontal axis has been compacted a bit. Make no mistake, it is just as fecund as the curve shown above.



This curve is fertile because it allows banks to make smart loans for all sorts of things along the curve, like auto loans for 36 months, commercial property loans for 7 years, and residential mortgages for 30 years. The bank simply borrows money at low rates short-term, then lends it back out at higher rates long-term. The bank keeps the spread for itself, while people drive new cars from new offices to new homes. It looks something like this on the chart:



We can make an important observation here. The steeper the yield curve, the more profitable banking is. The more profitable banking is, the more banks to want to lend, which then results in more houses, cars, and property getting bought. That boosts the economy. Conversely, a flat yield curve or an inverted yield curve like the one below creates the opposite conditions:



Needless to say, banks don't like this scenario. Nor do people trying to buy or sell big things. In fact, it can be extremely frustrating to consumers because rates look good but nobody will lend at them. That leaves us with a key insight: **The Fed Funds rate means very little. Far more important is the steepness of the curve, which is a proxy for the desirability of doing big transactions.**

Now let's circle back to time and money. A steep curve basically places great value on **time**, while a flat or inverted curve places great value on **money**. By observing the curve's evolution we get clues about whether we should prefer cash in our hands today, or if we should send money out to get paid for its return later. As it turns out, one of the best and most reliable indicators of a looming recession is inversion of the yield curve. The table below from the New York Branch of the Federal Reserve's paper *The Yield Curve as a Predictor of U.S. Recessions* shows the data from 1960 forward: (https://www.newyorkfed.org/medialibrary/media/research/current_issues/ci2-7.pdf)

Estimated Recession Probabilities for Probit Model Using the Yield Curve Spread
Four Quarters Ahead

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

Note: The yield curve spread is defined as the spread between the interest rates on the ten-year Treasury note and the three-month Treasury bill.

This data is best understood in movie format: (<http://stockcharts.com/freecharts/yieldcurve.php>) Watch the evolution of the yield curve through the Great Recession. Simply click the "animate" button to start it, and then click on the chart to the right side in order to fast forward or rewind. Magically, you can see the curve move as key events unfold.

Retirees see higher rates as a blessing because they can generate more income from their savings. They would like to see the entire curve float much higher. Unfortunately, those higher rates are mostly paid

by younger borrowers who then would have less to spend out in the real economy. In turn, that reduces economic growth. These desires for different rate outcomes push on each other dynamically.

As this cycle unfolds in 2016 we need to monitor the steepness of the curve. If the curve flattens out at a low level it will tighten credit conditions significantly. Growth will likely stall and the Fed may be forced to abandon the cycle early. If the cycle looks like it won't survive, we should jump back into the bond market aggressively with the expectation that new all-time lows in interest rates will be seen. European sounding discussions of negative interest rates will be likely under those circumstances.

On the other hand, if the curve floats higher and stays steep, we should continue to avoid bonds until we see 20Y AAA interest rates @ ~4%, which will fund retirements pretty reliably if they are held to maturity. The problem with this plan is that it reminds me of Colonel William Prescott, the Boston revolutionary who told his men not to fire until they saw the whites of the British's eyes. If every retiree in America is waiting to see 4% before they attack, things might turn out a lot like the Battle of Bunker Hill (the revolutionaries lost the battle, while the British acknowledged that it was going to be a much longer gorilla war.) We might want to start shooting when we see 3.75% -- before we see the whites of their eyes.

If we make a habit of watching the yield curve, both in the United States and elsewhere, we will start to see some important messages about when money is overvalued relative to time or vice versa. The old economic law suggests that "time = money," which is true on some quantum level, but is decidedly untrue when they are viewed simultaneously by a 25 and 70 year old. It doesn't matter if money is undervalued when time is what you need.

To be clear, we have no intellectual basis to say older people should always own more bonds. But we do have a strong intellectual basis for knowing when one factor (time or money) is overvalued relative to the other. If I can create a situation in an investor's life were they have an ample supply of the undervalued resource, then I've done something very material and meaningful for them.

That is what our work together is about in the end. We want money ready when it will bring you and your family outsized utility and enjoyment, and when it isn't needed or doing that, then we should be out shopping for more time. Like everything else in the world time can be bought for both good and bad prices. The yield curve is the single best tool we have to be savvy shoppers for that time--no matter our age or perspective.



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