What Drives a Yield Curve?

Short vs long end

Short term rates tend to determine curve shape more than the long end which is more stable, as can clearly be seen in the chart below. An exception to this would be when very short term administered interest rates are particularly rigid, as in the current business cycle, which can be seen since 2009 and which we deal with in "ZIRP and the Yield Curve" below.
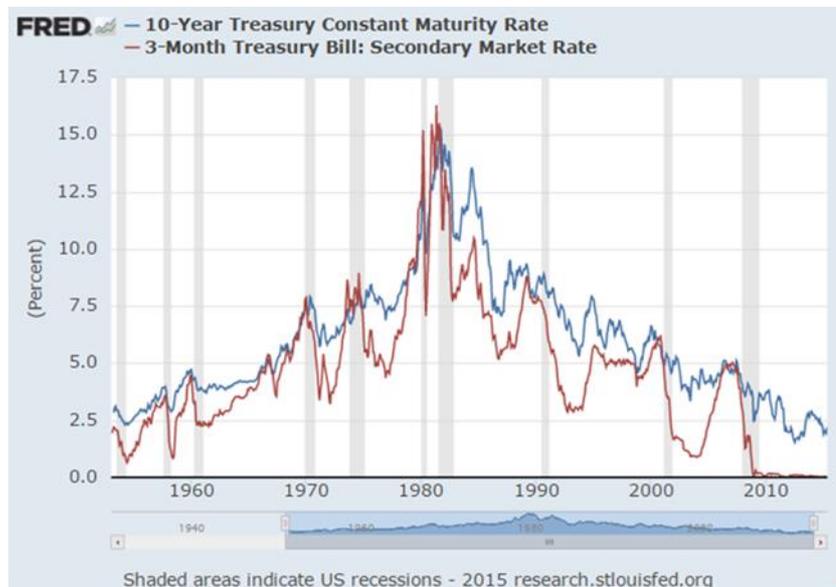
Short term rates tend to drive curve shape more than long term rates, except when policy rates are kept anchored as they have since 2009

FRED — 10-Year Treasury Constant Maturity Rate
— 3-Month Treasury Bill: Secondary Market Rate

Shaded areas indicate US recessions - 2015 research.stlouisfed.org

Maturity mismatching

Maturity mismatching (funding short and lending long) is a strong driver of curve shape. When banks raise short term capital and supply it into long term capital markets to arbitrage the positive yield spread, short term rates will be bid up relative to long term rates. This is the main reason why yield curves tend to flatten throughout a business cycle expansion phase as bank credit creation arbitrages short and long dated spreads. Maturity mismatching is unsustainable and unstable when done against the backdrop of central bank moral hazard and the often excessive mismatching permitted by state-protected fractional reserve banking and implicit state-sanctioned bailout guarantees. But when consumption and inflation rise in response to credit expansion, the supply of short term savings/funding diminishes, driving up short term rates.

Financial intermediaries arbitrage the spread between short and long term interest rates through maturity mismatching

Excessive maturity mismatching is risky and can lead to a credit crunch when short term funding dries up

The curve can invert and maturity mismatching activity falls sharply, quickly reducing project funding. Philipp Bagus and David Howden[1] outline two ways in which this can lead to a recession, the first originating in corporate bond markets, and the second in the banking system:

> "In the first case, companies finance additional long-term investments with short-term loans…Once savers fail to roll over the short-term loans and commence consuming, the company is illiquid. It cannot continue its operations to complete the project. Projects are liquidated and the term structure of investments readapts itself to the term structure of savings.

Under company maturity mismatching, the bust hits investment projects directly

> In the second case, companies finance their long-term projects with long-term loans via a financial intermediary. This financial intermediary borrows short and grants long-term loans. The upper-turning point of the cycle comes as a credit crunch when it is revealed that the amount of savings at that point in time is insufficient to cover all of the in-progress investments. There will be no immediate financial problems for the production companies when the rollover stops, as they are financed by long-term loans. The financial intermediaries will absorb the brunt of the pain as they will no longer be able to repay their short-term debts, as their savings are locked-up in long-term loans. The bust in this case will reverberate backward from the financial sector to the productive sector. As financial intermediaries go bankrupt, interest rates will increase, especially at the long end of the yield curve, lacking the previous high-degree of maturity mismatching driving them lower. Short-term rates will also increase due to a scramble for funds by entrepreneurs who try to complete their projects. This will place a strain on those production companies that did not secure longer-term funding, or rule out new investment projects that were previously viable under the lower interest rates. Committed investments will not be renewed at the higher rates."

Under excessive financial intermediary maturity mismatching the bust reverberates backward from the financial to the productive sector

An inverted yield curve is a classic sign of impending macro gloom that's usually not picked up in the conventional GDP stats until a few quarters later. After a boom-induced inflation washout, deflationary forces set in and growth and bank lending slow sharply. Reduced maturity mismatching restores a natural positive spread between short and long term rates. Heightened recession-period risk aversion can then exacerbate the positive spread due to acute liquidity preference that demands higher premia for duration risk, compounded yet further by state intervention as central bank monetary easing reduces short term rates artificially low and Keynesian countercyclical government borrowing adds longer term bond supply, pressuring longer end yields to rise even more.

The curve flattens ahead of a recession, and then steepens sharply and often excessively during a recession

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[1] Bagus, Philipp and David Howden. "The Term Structure of Savings, the Yield Curve, and Maturity Mismatching", *Quarterly Journal of Austrian Economics* 13, no. 3: 60–68. (link)

This is why the yield curve tends to steepen so quickly and exten-
sively during recessions.
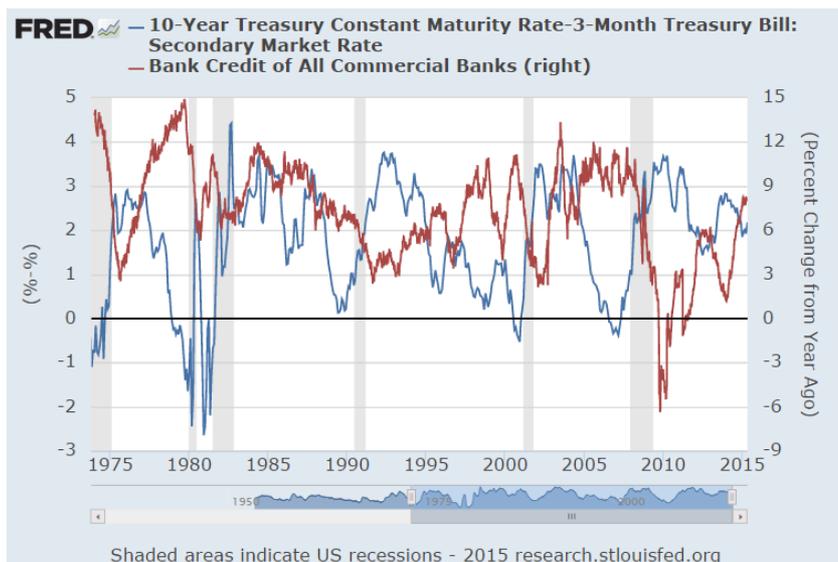
Note the inverse relationship between bank credit and the yield curve

*Strong bank lending is associated
with curve flattening due to maturity
mismatching*

So due to various state-induced distortions the yield curve be-
comes excessively flat or inverted and then, on the flipside, ex-
cessively steep. The inversion is a sign of excessive maturity
mismatching and the dramatic steepening is a reaction in the
markets and by policy makers to the recessionary slump after
those excesses. By steepening the curve excessively, policy mak-
ers try to restore the attractiveness of maturity mismatching and
availability of short term money funding for projects, especially
the projects that ran into funding trouble and were forced to liq-
uidate. Very often, since many investments were irreparably
damaged and since post-boom deflation is setting in, an even
looser monetary stance is adopted to not only restore the sal-
vageable malinvestments back to life but also stimulate new pro-
jects. The long term effect of this has been to steepen the yield
curve on average since the 90s to double the levels of the 1970s.

*The current monetary and banking
system tends to increase yield curve
cycle volatility from peak to trough*
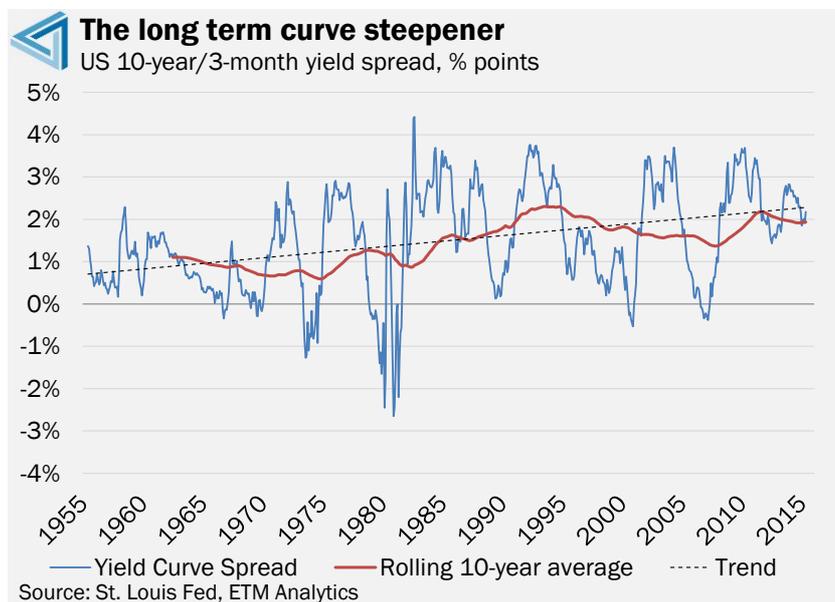
*Structurally loose US monetary policy
has caused the US curve to steepen
on a secular basis over 40 years*

We have essentially seen these repeated cycles of boom-bust-easing-boom-bust-easing etc. to the point of ZIRP and QE, all in the name of keeping the distortions and malinvestments on life-support but with the consequence that trend real per capita growth has declined markedly over the past 25 years because – in our view – too much capital has remained chronically misallocated.

Falling structural growth
US real GDP/capita, y/y %chg

Source: St. Louis Fed, ETM Analytics
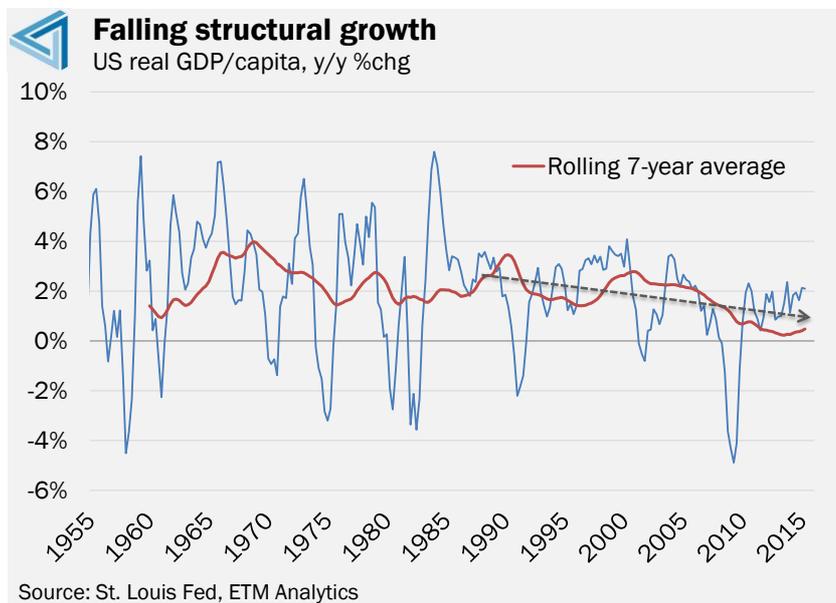
The result of trying to prop up malinvestments with secular curve steepening is falling trend growth

ZIRP and the Yield Curve

Since 2009 the Fed has anchored rates at nearly zero percent by flooding the fed funds market with reserves (QE). This has meant the long end of the curve has been the predominant driver of curve shape since 2009, which is very different from previous cycles. When a central bank eases monetary policy using OMOs or QE, or commercial banks ease monetary policy by credit expansion, there are initially two effects:

1. *The Wicksell effect*
2. *The Fisher Effect*

The Wicksell effect is the depressive effect on yields across the curve that an injection of new money has by mimicking increased savings available to be lent. The Fisher effect is the inflationary premium priced into long dated debt securities as the monetary easing raises long term inflation expectations. The charts below show the effects of monetary easing by injecting liquidity into the economy or financial system.

These effects work simultaneously during an initial credit expansion or money injection, such that the Wicksell effect dominates on the short end whereas each effect tends to roughly cancel out the other on the longer end[2].

Long term rates are the main driver of curve shape since 2009

The Wicksell effect (loan supply) and Fisher effect (inflation expectations) drive curve shape response to monetary policy

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[2] Paul Cwik. "An Investigation of Inverted Yield Curves and Economic Downturns", Doctoral Dissertation, Auburn, Alabama (2004) (link)
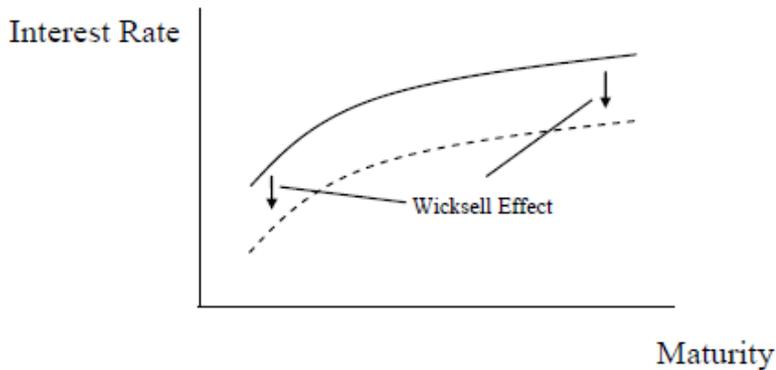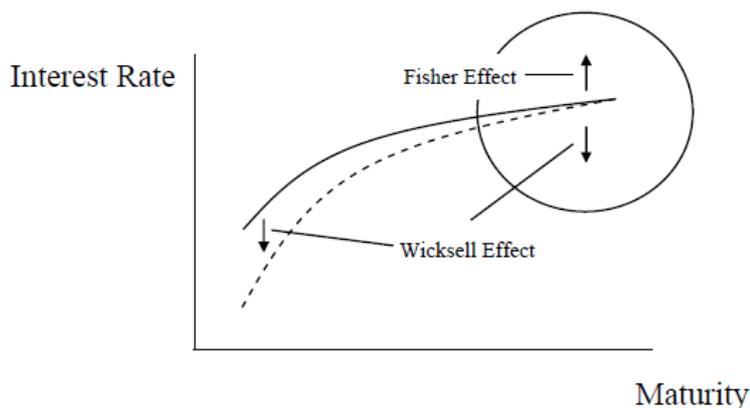
The Wicksell effect tends to operate across all maturities

Figure 4-2: The Wicksell Effect
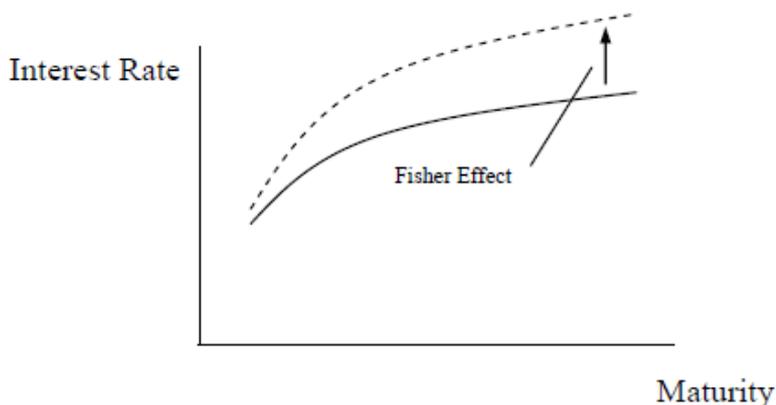
The Fisher effect tends to impact mainly long term maturities

Figure 4-3: The Fisher Effect

The net effect is that monetary easing/ tightening tends to steepen/ flatten the yield curve

Figure 4-6: The Wicksell Effect Offsets the Fisher Effect

Paul Cwik. "An Investigation of Inverted Yield Curves and Economic Downturns", Doctoral Dissertation, Auburn, Alabama (2004)

But at the zero bound, before the central bank takes the plunge into negative yields (which cannot be ruled out at some stage as we've seen in Europe), there is no additional way for the Wicksell effect to be felt on the short end. This in turn dissipates the arbitraged Wicksell effect across the curve, leaving the Fisher effect to dominate on the long end. Note how the Fisher effect (i.e. bear steepening) dominated during QE1, QE2, and the pre-taper portion of QE3.

But at the zero bound the Fisher effect dominates long term rates

Shaded areas indicate US recessions - 2015 research.stlouisfed.org
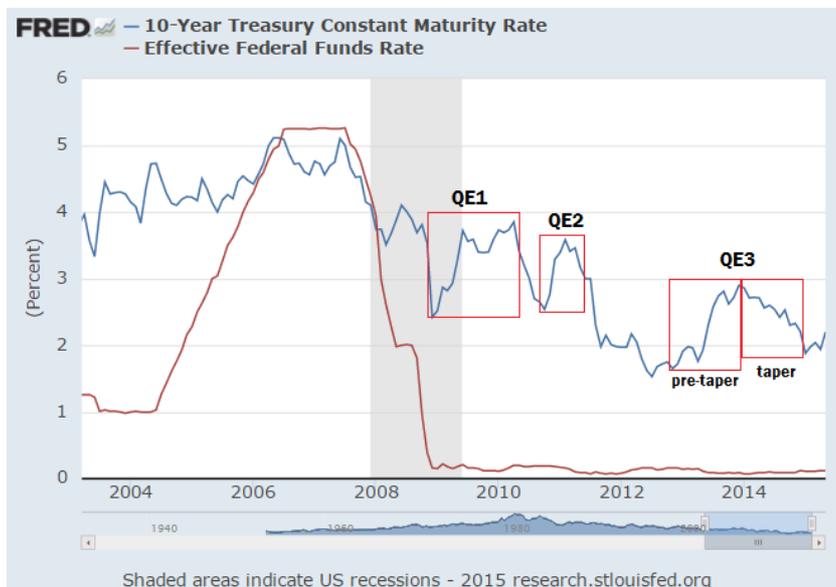
Dominant Fisher effect caused bear steepening during Fed QE episodes

So easing in these instances steepened the curve through bear steepening not bull steepening because of ZIRP. Since the end of QE, commercial bank lending has been strong, causing money supply growth to remain relatively resilient. With ZIRP still in play, this may well be the reason for the recent curve steepening as reflation expectations have emerged.

Recent bank lending surge may have cause a Fisher effect steepening in the curve in H1 2015

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