What Yield Curves Tell Us About Financial Crises

Sharing his research into interest rates is PROFESSOR DOGAN TIRTIROGLU, the Chair for Banking with the University Of Adelaide Business School.

Interest rates, while important, rarely capture the interest of the average investor. The same can be said of yield curves, which are closely linked to interest rates. Historically, the shape of yield curves has been a useful (but not foolproof) leading indicator of economic growth.

Professor Dogan Tirtiroglu is the Chair for Banking with the University of Adelaide Business School. At the 2010 Ngee Ann-Adelaide Business Centre Business Forum, he presented his preliminary findings of his research into interest rates. To make sense of his findings, one must venture into the sometimes arcane world of bond terminology. Be advised: jargon ahead.

A yield curve describes the interest rates of bonds of equal quality, but with differing maturities. So the yield curve for US Treasuries would describe the relationship between interest rates (or yields) and various maturities.

The shape of the yield curve holds insights for those who know how to read them. Investors should recognise three common yield curves.
The normal yield curve reflects the expectation that there will be no surprises. Under these conditions, the yield increases with maturity, and the resulting yield curve slopes smoothly upwards. The steepness of the slope illustrates how wide the gap between short-term and long-term yields is. A steep upward-sloping curve indicates expectations of improving economic conditions.

A flat yield curve illustrates that the yields for short-term and long-term bonds are roughly the same, while a humped yield curve illustrates yields for mid-term bonds are higher than short or long-term bonds. This indicates market uncertainty.

An inverse yield curve reflects yields for short-term bonds are much higher than long-term bonds resulting in a downward-sloping curve. This indicates the market expects worsening economic conditions in the future.

Armed with this knowledge we can now venture into the findings of Professor Dogan’s research.

Preliminary Research into Yield Curves During Financial Crises
Interest rates are one of the key monetary policy variables and also important for investors. A yield curve captures the relation between the yields on a particular entity’s bonds and their maturities at a point in time. The yield curve that plays a key role as a benchmark in any country pertains to the default-free government securities. The shape of this curve at any time reveals the expectations about the future (direction) of the interest rates and the macroeconomic conditions. The shape, the level, and volatility of the yield curve do and should respond promptly to the uncertainty arising from financial crises. Thus, the inter-temporal movements of the yield curve for government securities serve as a closely watched financial barometer.

In an era of interconnected financial markets, isolated, contained or domestically inclined financial crises of the past induce currently increasing contagion across countries. Thus, we examine comparatively the behavior of yields on government securities in the US and Singapore between January 1, 1999 and December 31, 2009. Several financial events had the capacity to affect financial markets and yield curves during this period. We focus only on two financial crises that have put their economic and political signatures on this period: The attacks on New York City’s twin towers on September 11, 2001 is an exogenous shock for Singapore while the global financial crisis (GFC), which has been effective since at least mid-2007, has implications for being an endogenous shock for all economies in the world. We identify yield patterns and attempt to elicit their financial implications.

The September 11, 2001 Crisis
An examination of the daily yield curves of US government securities between September 11 and September 19, 2001 indicates declines between about 100 and 50 basis points in the yields of 3-month to 2-year maturities and quite small declines in the yields of 10- through 30-year maturities. The mid-month yield curves between September 2001 and December 2001 exhibit consistent declines (increases) in the short-term (long-term) yields, respectively, which is, the yield curves exhibit non-linear patterns and get steeper over this period of time. This steepening pattern is followed by relatively parallel shifts in the mid-monthly yield curves some months into 2002. Interestingly, the US starts 2001 with yields of slightly above 5% that form an inverted but close-to-flat curve, witnesses some steepening, arising from yield declines in the short-end between June and August, and ends 2001 with a substantially steep yield curve, ranging from yields of less than 2% for the 3-month security to more than 5% for the 30-year bond.

An examination of the daily yield curves of Singapore government securities between September 11 and September 18, 2001 shows declines between about 15 and 5 basis points in the yields of 3-month to 2-year maturities and small changes in the yields of other maturities. The mid-month yield curves between September 2001 and December 2001 exhibit visible changes, though. The yields decline between about 100 and 50 basis points for securities with a maturity of 3-months up to 3-years until November; other maturities remain relatively stable during this period. The December 15, 2001 yield curve exhibits an increase of about 50 basis points for all maturities from 3-years to 15-years and no change for the 3-month maturity. This causes a steepening shift in the short-term end and a parallel shift in mid- to long-term segments of the yield curve. The pattern of yield increases in the long-term (5-year maturity and above) maturities continues at least until May 2002. Singapore starts 2001 with a steep curve with about 2.2% and 3.9% yields on the 3-month and 10-year maturities, respectively and ends 2001 with a substantially steeper yield curve, ranging from yields of about 0.9% and 3.9% for the same maturities. There is a 50-basis point increase in the 10-year maturity’s yield from November to December 2001.
As expected, we observe an immediate, drastic and persisting reaction in the US to the events. Meanwhile, the reaction to the same event in Singapore occurs with some time delay. That is, the uncertainty in the US spills over to Singapore with a delay of about one month, but shows persistency for a relatively long period in the following months. Overall, the common element of yield curve movements in both countries is that they get steeper, especially with a marked reduction in the yields of the short- to mid-maturity securities and persist into 2002.

**The Global Financial Crisis**

An examination of the mid-monthly yield curves for US government securities in 2006 shows that the yield curves are overall flat between 4% to slightly above 5% range. The shape of the yield curves in Nov 2006 and Dec 2006 is inverted with a small hump around the 1- and 2-year maturities. Yield curves between Jan 2007 and Oct 2007 overall maintain the same flatness pattern, with either slight steepness or humps or invertedness, in the same yield range but with relatively small parallel yield declines over this period. The yield curves for Nov 2007 and Dec 2007, on the other hand, exhibit increasing steepness, with yields ranging from 3% in the shortest maturity to slightly less than 5% in the longest maturity. Thus, the waves of the global financial crisis begin to hit the shores of the financial markets in the US at the end of 2007. This is not surprising since there were highly credible hints (i.e., failures) of an upcoming and surging strong turbulence as early as in 2007. The effects of this turbulence are quite evident in 2008. The mid-monthly yield curves in 2008 exhibit substantial and relatively strong changes, expressing the US economy's wish to attain further steepness every month. The yield of the 3-month security moves from slightly higher than 3% in Jan 2008 down to practically around 0% in Oct 2008 while the yield of the 30-year security moves from close to 4.5% in Jan 2008 down to 3% in Dec 2008. A parallel decline of about 90 to 100 basis points occurs from Sep 2008 (when the failure of Lehman Brothers occurred) to Dec 2008.

An examination of the mid-monthly yield curves for Singapore government securities in 2006 shows that the yield curves are overall close to flat between the 2.7% to about 3.7% range. Interestingly, the shape of the mid-month yield curves between Oct 2006 and Dec 2006 is inverted; others exhibit some humps mainly around the 2-year maturity. The mid-month yields in Oct, Nov and Dec 2006 move progressively downward to a range around 3%. The mid-month yield curves between Jan 2007 and Feb 2007 overall maintain the same flatness pattern in the same range. The mid-month yield curve for March 2007 unquestionably breaks the flatness pattern of the previous yield curves in 2006 and 2007 and exhibits downward steepness with a range from around 2.35% for the 3-month security to 3.0% for the 15-year security. The yields of 3-month, 1-year and 2-year securities decline about 70 to 50 basis points. Until August 2007, the mid-month yield curves move mainly in a parallel manner (down or up). August starts a new yield curve pattern of a downward hump between 3-month and 2-year securities, followed by steepness across other maturities. The mid-Dec 2007 yield curve exhibits a downward parallel move by about 40 basis points in the short-maturity segment. Thus, a year that starts with a slightly inverted flat yield curve around yields of 3.1% ends with a humped steep curve with yields ranging from about 1.9% (1.7%) for 3-month (2-year) security to 3.15% for the 15-year security. Singapore also introduces its 20-year government security in March 2007.

The pattern of a slightly humped steep yield curve in Singapore continues until June 2008. During this period, the mid-month yields of the short-maturity (long-maturity) securities make parallel declines (increases), overall leading to further steepness in yield curves. The yield on the 3-month (20-year) security in May 2008 is less than 1% (3.5%), respectively. The June 2008 mid-month yield curve clearly is far steeper, moving the 3-month yield to 0.5% and 20-year yield to about 4.1%. The following mid-month yields until Dec 2008 exhibit some flattening where maturities less than 2 years and maturities greater than 2 years exhibit parallel movements while the yield of the 2-year maturity remains pretty much the same during this period. The Dec 2008 mid-month yield curve exhibits a decline of about 50 basis points (relative to Nov 2008's yield curve) beyond the 2-year maturity. The 3-month yield reaches a maximum (minimum) of 1.5% (0.4%) in Jan 2008 (July 2008) and the 20-year yield ranges from 4.1% in June 2008 to 2.5% in Dec 2008.

Year 2009 seems to have brought some order to the disorder of 2008 in Singapore. While the yields of securities with less than or equal to 2-year maturity exhibit some declines and fluctuate around 0.4% to 0.5%, those with a maturity greater than 2-years, especially 10-year, 15-year and 20-year maturities, exhibit rather large parallel movements in 2009. The yields for securities, with a maturity of 10-years or more, range from 1.9% to 3.4%.
It appears from these results Singapore’s reactions to the GFC have been more gradual and measured with a wait-and-see approach than the US’s reactions. While the failure of the Lehman Brothers on Sep 15, 2008 does not seem to have a direct and immediate influence on Singapore securities; the Singapore market exhibits an overall and closer awareness of the totality of the events during GFC. It is clear that a main response against the devastating effects of GFC has been a push-down in yields across all maturities, but mainly across short-term securities.

As a concluding note, it is worth noting that the Singapore government’s 2-year maturity security seems to be the focal point of orchestrating the yield curves over time and that the Singaporean authorities have been patiently and prudently tackling the ongoing financial crisis. FSM