# SPECIAL REPORT

## TD Economics

August 29, 2013

# THE TAPER COMETH

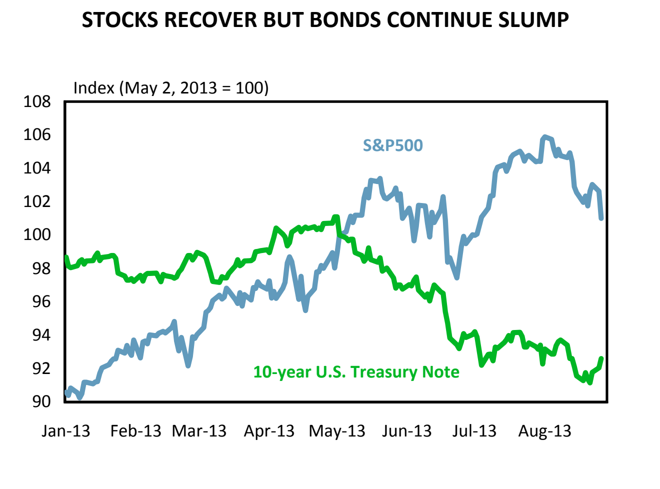
### Highlights

- Talk of the Federal Reserve scaling back (tapering) and eventually ending its bond buying program (QE3) has resulted in a sharp rise in U.S. bond yields since early-May. Most of this can be attributed to an increase in the term premium, and is largely justifiable.
- The remainder of the rise in yields is related to the pulling forward of expectations for the first rate-hike and anticipation of a faster pace of subsequent monetary policy tightening -- neither of which is warranted.
- Given that a September-taper is largely priced in, and assuming economic data cooperates, the FOMC is likely to act on September 18. However, risks remain with recent data slightly less supportive.
- The taper is likely to be modest initially and weighed towards Treasuries, but its course will not be pre-determined. This will leave the FOMC several months of data to adjust policy if required.
- Tapering does not constitute tightening, with the stance of monetary policy becoming more accommodative still -- this should be supportive for equities, especially amid a strengthening economy.
- As it embarks on the taper, the FOMC is likely to concentrate on effectively communicating its forward guidance emphasizing that short-term rates will remain at current levels for a long time -- likely until mid-2015. This could lower bond yields a bit after the September meeting by more closely aligning market expectations to their own.
- Aligning expectations may require the FOMC to alter its thresholds, or more firmly emphasize the notion that thresholds are not triggers.

The economic recovery is beginning to gather momentum and it's time to start thinking about taking off the training-wheels; but, the growing possibility that a reduction in the pace of Federal Reserve (Fed) asset purchases (or tapering[1]) is close at hand has unnerved global financial markets. Since May, the Federal Open Market Committee (FOMC) has signaled that moderation in bond buying could come sooner rather than later, leading market participants to reevaluate their expectations. This sparked a period of asset re-pricing, both domestically and across global markets more broadly. The re-pricing became all the more pronounced in the aftermath of the FOMC press conference on June 19th, during which the Fed Chairman, Ben Bernanke, laid out some preliminary timelines for the future of the open-ended asset purchase program -- a reduction in the pace of buying later this year and cessation by mid-2014 -- but reiterating its data-dependent nature. Anticipating the taper, investors began to dump everything in favor of the U.S. dollar, leading to sharp losses for nearly every asset class. Global markets remained volatile through the remainder of the summer, as investors continued to re-weigh their expectations based on incoming economic data and ongoing FOMC member communications.

The selloff in fixed income markets resulted in sharply higher bond yields. The 10-year Treasury yield soared from roughly 1.65% before taper talk to about 2.80% in late August. The bulk of the rise in yields reflected a sharp increase in the term premium[2] with the remainder attributed to pulling forward

Michael Dolega, Economist 416-983-0500



Note:
Sources: Wall Street Journal, U.S. Treasury, TD Economics

of expectations of the first rate-hike and a faster pace of subsequent monetary policy tightening. We feel that the rise in yields was justified in so far as it relates to the term premium, but not so in the case of future policy. Markets front-load any re-pricing as new information arrives, and have now largely priced in a September-taper, or *Septaper*, to the tune of $10-$15 billion per meeting, with a mid-2014 end to purchases.[3] With that in mind, the Fed could begin moderating purchases come September without a substantial increase in domestic interest rates. Delaying the taper slightly will not bring the term premium (or yields) down much, rendering future purchases only marginally beneficial for the economy -- which looks better able to stand on its two feet now. But, future bond buying will expand the balance sheet just the same, providing less bang for the Fed buck.

For this reason, assuming the data co-operates, the FOMC is likely to take advantage of this opportunity and act in September -- something we believe is the most likely outcome. However, whether the FOMC decides to act in September or December,[4] the move will not imply a tightening of monetary policy.[5] Indeed, it is only reducing the rate at which it is injecting additional stimulus -- something that should prove supportive for domestic equities, especially amid accelerating economic growth. As it begins to taper, the Fed will likely concentrate on more effectively communicating its forward guidance, accentuating its separation from asset purchases. Effective use of forward guidance could lead to lower yields by more closely aligning market expectations with the path of monetary policy envisioned by the FOMC and keeping the term premium range-bound. However, aligning expectations may require the FOMC to alter its thresholds, or emphasize that thresholds are not triggers, with future monetary policy decided on a broad range of indicators. This notion is especially important should the declines in the unemployment rate overstate the health of the labor market -- a view shared by some Committee members.

### All good things must come to an end

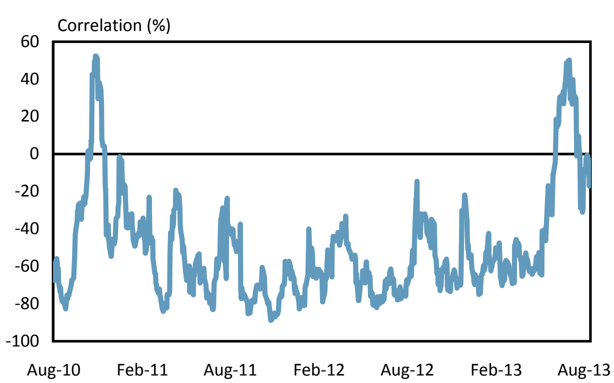
The Federal Reserve has pursued large-scale asset purchases (LSAP) -- frequently referred to as quantitative easing (QE) -- in an effort to provide additional stimulus to the economy. In the wake of the financial crisis, the Fed cut its benchmark fed funds target rate effectively to zero. It then ran into a problem, as the deteriorating economy resulted in Fed models suggesting the appropriate conduct of policy called for substantially more accommodation. Faced with the constraint of a zero lower bound (ZLB) on nominal interest rates, the Fed opted to provide additional support through asset purchases (and forward guidance). During the current, third round of asset purchases, it has committed to buy $85 billion of U.S. Treasuries and mortgage-backed securities (MBS) per month. The effect has been to materially lower bond yields.

It was inevitable that the QE program would need to eventually be wound down as economic conditions improved and deflationary fears abated. In recent months, the FOMC has signaled that the time to taper the bond buying is quickly approaching. Taper-talk has grown ever louder since May 3rd, when U.S. April non-farm payrolls surprised to the upside, with sizeable upward revisions to boot. This helped to debunk the myth that the labor market recovery tends to fizzle out in the spring, just as it did in the previous two years. Relatively upbeat data in the weeks that followed have seen Treasury yields steadily march higher. Then, on May 22nd, a double-whammy came. The release of the April 30th/May 1st FOMC meeting minutes revealed that "a number of participants expressed willingness to adjust the flow of purchases downward as early as the June meeting." The same day, Chairman Bernanke confirmed that view during his testimony to the Joint Economic Committee in Congress. When asked if asset purchases could end before Labor Day, Bernanke remarked that the Fed "could take a step down in the next two meetings," should economic data prove supportive. That day the S&P500 index fell from its all-time high and the 10-year Treasury yield moved above 2%. The relatively tame asset sell-off turned into a stampede for the exits, in the aftermath of the Chairman's June 19th press conference, where he indicated that if data evolve as expected it will be "appropriate to moderate the monthly pace of purchases later this year… ending purchases around midyear [in 2014]."

Bonds suffered large losses as sharply negative term-premia rebalanced. Declines in fixed-income markets were made more severe as taper-talk led investors to expect an earlier start to the tightening cycle -- despite an unchanged outlook from the FOMC. Moreover, the idea that any tapering was conditional on a strengthening economy fell on deaf ears, with domestic equities registering sharp losses. This resulted in bond prices and equities moving together for the first time since the introduction of QE2 -- but, this time both declining.

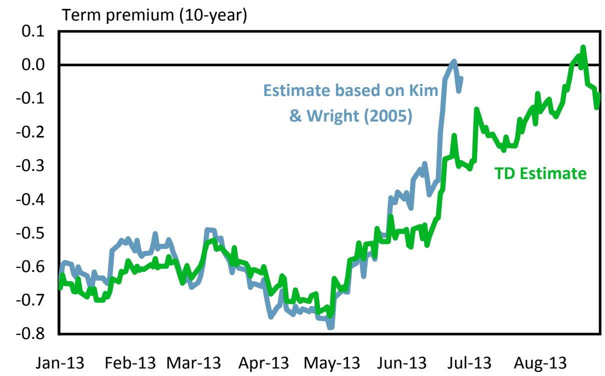
The message of a strengthening economy appears to have since resonated with market participants, with equities clawing back their losses over July. Stock indices in the U.S. have outperformed most international benchmarks, highlighting the more robust growth prospects at home. However, equity market jitters remain evident as the odds of a September-taper announcement, have increased with almost each successive data release. Fixed-income market participants also re-evaluated their expectations of the first fed hike, putting it somewhat more in line with the Committee's forward guidance.[6] But, any would-be benefit for bond prices has largely been offset by the rising term premia. This has left domestic bond prices largely depressed, whipsawed only by major economic data releases, geopolitical evens, and FOMC member speeches during a less-liquid summer period.

BONDS AND EQUITIES BRIEFLY MOVE TOGETHER




Note: Based on 20-day moving average correlation between the Standar & Poor's 500 index and the 10-year Treasury Total Return Index
Source: Bloomberg, TD Economics

TERM PREMIUM REBALANCES WITH TAPER-TALK




Note: TD estimate is based on fed fund futures where available, thereafter imputed by assuming pace of tightening follows a logarithmic function f'(FFR)=b*ln(FFR)+c, where FFR is fed fund rate target and coefficients estimated with daily frequency.
Sources: Federal Reserve Board, Bloomberg, TD Economics

## Back to basics

As it stands now, the yield on a 10-year Treasury note remains nearly 115 basis points above its early-May level. About one quarter of that, or approximately 30 basis points, reflects the pulling forward of expectations regarding the timing of the first rate hike and the speed of subsequent tightening -- which we discuss in a latter section. Another fifteen basis points of the rise is related merely to the passage of time.[7] But, the remainder, or approximately 70 basis points can be attributed to the sharp uptick in the term premium. This premium, or compensation for risk related to holding longer dated securities, fell into negative territory in mid-2011, driven down by successive rounds of quantitative easing and global developments that increased the appetite for U.S. Treasuries. Having bottomed out at close to minus 80 basis points in the first two days of May, the premium on the 10-year Treasury note has been on an upward trajectory since.[8] It rose by 10 basis points after both the April and May payroll reports, and another 10 basis points following the Chairman's testimony to Congress. Then, in the days following the June 19th FOMC conference, the term premium gained more than 25 basis points. It continued to rise with positive data (June payrolls, July ISM manufacturing), retreating slightly when the FOMC attempted to jawbone bond markets, or geopolitical tensions arose. Still, the pace of the ramp-up has surely surprised economists (including ourselves) and Fed officials alike, with the premium hovering within a few basis points of zero through much of August.[9]

So what caused the term premium, and consequently, much of the benefit of QE to fizzle out in just several weeks? Admittedly, the term premium in early-May was simply far too low. Compensation for risk far into the future -- well after monetary policy is expected to be normalized -- was negative.[10] This seems counter-intuitive, with some re-pricing inevitable.

Some of the ramp-up then was a recalibration of the economic outlook and, consequently, a reduction in market expectations about the ultimate size of QE3. The near 70 basis point ramp up in term premia suggests a downward shift in expected asset purchases to the tune of $1.1 trillion.[11] Given that the Fed balance sheet is still expected to swell by nearly $500 billion, under a gradual *Septaper* assumption of $10 to $15 billion per meeting, implies that market participants in early-May had embedded expectations that QE3 would last nearly two years. While this reasoning is sensitive to the estimate of the impact of asset purchases, it is unlikely that the term premium ramp-up can be fully explained by this argument.

The remainder of the declining appetites for U.S. Treasuries was driven by fear of potential losses that tapering may bring. After years of solid Treasury demand, driven by global 'risk-off' events and QE purchases, the markets had to adjust to the idea that the biggest buyer in the market would bow out sooner than later. Moreover, the implication that the tightening cycle is closer than previously thought spooked investors. Afraid of potential losses on longer-duration Treasuries as yields rise, domestic and international investors began to reposition their portfolios. Initial losses spurred more repositioning, and consequently additional selling. Both China and Japan -- two largest international holders of Treasuries -- began selling U.S. bonds in June, with net sales totaling over $40 billion. Other emerging market countries likely sold longer duration Treasuries, in an effort to stem the declines in their currencies, while also reducing duration of their bond holdings. Selling likely continued through the remainder of the summer, although detailed data is not yet available.

The global re-pricing of financial assets will likely continue, but should do so at a more gradual pace going forward. Most of the adjustment has already occurred. As market expectations adjust to new information, the re-pricing of assets tends to be front-loaded. In the context of the "portfolio balance" effect, described by Tobin (1958, 1969), prices of securities are bid up now, in anticipation of future purchases by the Fed. That was the case when LSAPs were introduced. The same principle applies to the taper, albeit in the opposite direction when it comes to prices. We believe that the spike in the term premium went a little too far too fast, and a modest reversal of 10 to 20 basis points may be warranted -- some of this has already take place in recent days. In fact, Treasuries are beginning to look cheap by some measures, particularly in light of the high-probability that asset purchases are likely to be tapered only gradually. MBS prices also look attractive, should the taper be skewed toward Treasuries -- which is certainly a possibility. Moreover, at current levels, the 10-year term premium is a mere 40 basis points from its 2004-07 average. This should limit the scope for further increases, which are likely to be more gradual going forward.

### When opportunity knocks

However, it is unlikely the term premia will reverse course unless the economic outlook deteriorates substantially or fiscal/geopolitical issues flare up -- both still distinct possibilities. A mere delay in the timing of the taper is unlikely to alter it. In this game of musical chairs that is QE, keeping partygoers walking will prove a real challenge when the MC (or Mr. Chairman in this case) is reaching for the volume dial. Nobody wants to be left standing when the music stops. Moreover, disappointing market expectations could cause some unwanted volatility as markets once again try to sort out the exact timing of future Fed actions.

With this in mind, the Septaper appears arguably a desirable outcome. Fed asset purchases are only effective in lowering rates in so far as market participants cooperate. Now that the cat is out of the bag, it will be very difficult for the FOMC to push the term premia back down in a meaningful way, leaving future QE with little expected benefit and all the more cost of future unwinding. On the other hand, now that market participants frontloaded the term premium adjustment in anticipation of the taper, yields are unlikely to increase much when the taper is announced. Therefore, the markets effectively provided the Fed with an opportunity to embark on the taper with limited financial market impact. Assuming the data cooperates, the FOMC is likely to act, setting forth the process of moderating asset purchases at its next meeting in September. In our view, reducing them only gradually ($10 to $15 billion per meeting at the start), in a data-dependent fashion (not pre-determined) and back-loading (leaving largest cuts until the end) would be advisable and is the most likely outcome. This scenario is least likely to spook markets, which have priced in between $10 and $20 billion of tapering per month. Moreover, it would provide several additional months of data to confirm the strengthening economy. This would allow for adjustment along the way should the outlook change -- with a possibility of reversing course should growth prospects materially deteriorate. This path would provide some comfort for the more dovish FOMC members, helping ensure consensus within the Committee. Moreover, skewing the taper towards Treasuries (less reduction in MBS) could lower mortgage rates -- helping nurture the ongoing housing recovery.[12] Once tapering is set in motion, the FOMC is likely to concentrate its efforts on influencing longer-term rates through forward guidance, and in particular, more clearly defining the separation of the two unconventional policies: asset purchases and forward guidance. The latter has always been a more robust way of influencing rates and does not come with the usual QE-baggage consisting of an enlarged balance sheet. Having said that, as we head into September, we would like to clarify a few things that seem especially pertinent in the current environment.

### Tapering is not tightening

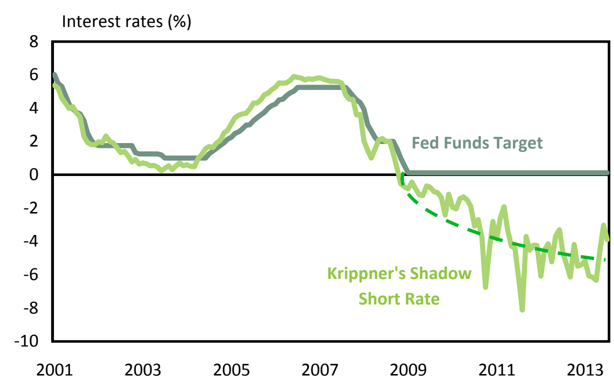
Firstly, moderating the pace of asset purchases does not translate into tighter monetary policy. The slowdown in purchases does not even imply that monetary easing is done. All that it does signify, is that the speed of additional monetary easing is decelerating -- or "letting up a bit on the gas pedal" as per the Chairman's automotive analogy. Assuming a relatively tame *Septaper*, the Fed will still purchase several hundred billion dollars worth of Treasuries and MBS -- even more should the FOMC opt for a less front-loaded taper or delay it until December. Either way, this should, on the margin, continue to put downward pressure on term premia and long-term interest rates. The monetary policy stance will become easier still and the Fed balance sheet will still expand.

If not for the effective lower bound constraint, the tapering that the Chairman is proposing is tantamount to shifting monetary policy from, the equivalent of 100 basis points declines in interest rates per year to an annual average decline of 75 basis points, or so. The reduced pace of asset purchases is still providing stimulus to the economy. Of course, the effective lower bound prohibits the fed funds rate from falling below zero.[13] We would have to imagine a world where the effective lower bound does not apply, in order to better quantify the current monetary policy stance.

One way to go about it is by using a shadow rate, described by Krippner (2013). The method utilizes an option-pricing technique for bonds, in the vein of Black (1995), to value a European call option for cash. In order to eliminate the zero lower bound constraint and allow for negative short-rates, Krippner subtracts this value from the short-term yield, generating a 'shadow' short-rate (SSR). The SSR fell into negative territory just as the fed funds rate reached the zero in November 2008. The measure has at times been volatile, given its sensitivity to asset prices, but has declined by an average of 10 basis points per month since then. Strictly speaking, ongoing asset purchases should continue to pressure the rate lower, with the taper merely slowing the downward move to, say 8 basis points per month, then 6 basis points, and so on. Once purchases cease, or taper-out completely, proceeds of past purchases will still continue to be reinvested, and monetary policy will be at its most accommodative -- the shadow rate will finally reach its trough. At this point, the 'gas pedal' will officially cease to be depressed.

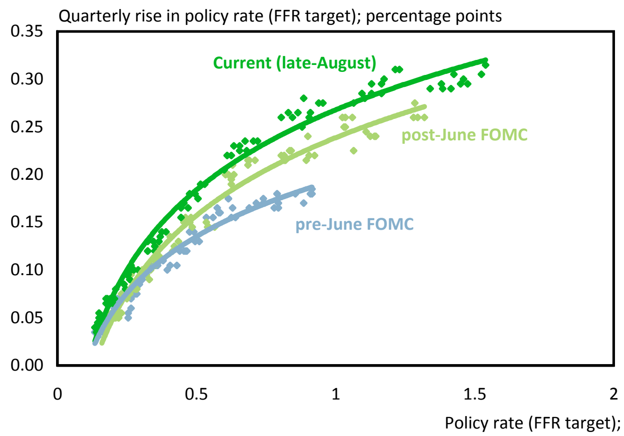
However, the brake will still be far from being applied. Moreover, to continue to the car analogy for the U.S. economy, the vehicle will still be picking-up speed due to more traditional economic forces that are unrelated to existing monetary policy. This is exactly what the recent FOMC communication alluded to, when emphasizing that any tapering will come amid stronger domestic growth. A recovering economy in an environment of ultra-accommodative monetary policy should be a boon for equities, especially domestic-oriented ones. However, it could also prove beneficial for economies of countries which export to

MONETARY POLICY IS ULTRA-ACCOMODATIVE




Note: Trend line (dashed) is added by TD Economics for illustration purposes only, and does not necessarily reflect the views of Leo Krippner.
Sources: Federal Reserve Board, Leo Krippner, TD Economics

PACE OF EXPECTED TIGHTENING INCREASES




Note: Estimates of pace of tightening are based fed funds futures, with the sample consisting of ten business days of observations.
Sources: Bloomberg, TD Economics

the U.S. -- owing to stronger demand for their products amid a strengthening U.S. dollar. In this context at least, it stands to reason that the earlier knee-jerk sell-off in equities was overdone, and future valuations should be at least somewhat supported by acceleration in the pace of economic growth.

### Thresholds aren't triggers

Secondly, it is critical to appreciate the relationship, or lack thereof, between asset purchases and forward guidance. While both are unconventional tools of monetary policy utilized by the Committee in a complementary fashion, their implementation remains completely separate. This is a principle which the FOMC attempted to entrench by clarifying the conditions surrounding any tapering of QE in the Chairman's June 19th press conference. This move backfired initially, with market expectations for tightening pulled into December 2014 in the days that followed. However, subsequent speeches by the Chairman and other FOMC members managed to drive a wedge between the taper and forward guidance. As the time of writing this report, the first rate hike is fully priced in for March 2015, which puts it about four months sooner than expected prior to the June FOMC meeting, and a full eight months ahead of the January 2016 tightening anticipated by markets as of May 2nd.

More importantly, the current expectation appears to lie slightly ahead of the median of the latest Summary of Economic Projections (SEP) of FOMC members, but not in a meaningful way. We feel that these may prove somewhat optimistic still and believe that rate hikes will come at least a year after the asset purchases end sometime in the second quarter of 2014. According to the median and mode of SEP estimates, and corroborated by numerous FOMC speeches, the period of monetary accommodation will be substantial. During the June FOMC conference, the Chairman himself reiterated that message stating that the Committee expects a "considerable interval of time" between when the Committee ceases adding accommodation (through asset purchases), and when a reduction of accommodation (first rate-hike) will begin.

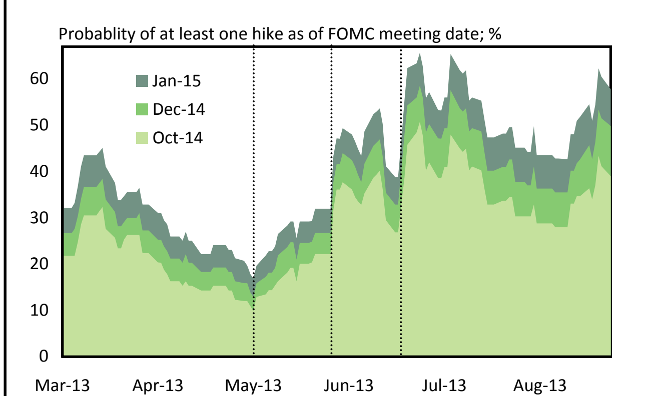
This messaging is substantiated by the historical experience. Following the two recent monetary easing cycles, after the 1990/91 and 2001 recessions, monetary policy was held at its most accommodative for at least 12 months. During the nineties, the fed funds rate fell to 3.00% in September 1992, where it remained until February 1994, whereas in the early-2000's, policy was held at 1.00% between June 25th, 2003 and June 29th of the following year. Moreover, the current cycle differs from the previous two in that it follows a severe financial crisis after which, according to New York Fed President Dudley, the transmission mechanism of monetary policy "can be impaired" requiring policy that is "more accommodative than otherwise." Echoing the sentiment that the current cycle is not "normal times" some FOMC members, including Vice-Chair Yellen, have voiced their support for the "lower for longer" argument stemming from "optimal control" path for monetary policy advocated by Woodford (2013) and others.

The mid-2015 timing for the first rate hike fits rather well with the threshold-based forward guidance first outlined in the January 2013 FOMC communiqué. The Committee set thresholds of 6.5% for the unemployment rate and 2.5% for the inflation rate, assuming long-term inflation expectations remain anchored. Inflation, at this point, is unlikely to pose a binding constraint. In fact, both the June SEP and recently released Survey of Professional Forecasters see the current inflation profile as more muted than in the previous round. Given the substantial slack in the domestic economy, together with subdued commodity prices, and disappointing global growth, inflationary pressures are not likely to materialize over the short-term. As for unemployment rate, the current 6.5% threshold is projected, according to the June SEP, to be breached around April 2015. However, the thresholds outlined by in the policy statement are not triggers. This is a point often overlooked, but should be emphasized in the context of the current debate. The federal funds target is expected to remain at its exceptionally low range "at least as long as" not "until" the threshold is reached. In fact, as suggested by the Chairman, reaching the unemployment threshold of 6.5%, while inflation remained below its objective, would not automatically lead to an increase in the policy rate. It would lead the Committee to consider whether a tightening of policy was justified in a broader economic context -- with the further inflation is away from its target, the more patient the Committee will be with regards to potential tightening. A depressed participation rate, or elevated numbers of under-employed and the long-term employed, could also nudge the FOMC to be more cautious about setting forth on a tightening cycle.

### Everything is subject to change

This brings us to our last point: everything is data-dependent and risks to the economy remain. In particular, fiscal policy as well as geopolitical tensions still pose real risks to the economy. The drag stemming from higher payroll taxes as well as spending cuts, has so far been concealed by a significant housing recovery boosting consumer sentiment and household balance sheets. However, with most furloughs beginning only in mid-July, it may yet be too soon to write off its impact on the economy. This view was highlighted by the July FOMC minutes, where a number of participants indicated a risk that "fiscal restraint might not lessen," leading to more muted growth over the remainder of the year. Additionally, with the U.S. Treasury expected to soon run out of room to borrow, political disagreement in Washington risks undermining business confidence. Finally, while there has been some positive international economic news, the readings are far from convincing in so

MARKETS EXPECT RATE HIKE SOONER




Source: Bloomberg, TD Economics

far as future growth is concerned. Europe recently emerged from its longest recession to date, but deep structural reforms are needed, and excessive government debt must be addressed. In China, the manufacturing sector has shown signs of stabilizing, but the unwinding of excessive credit growth policies and declining competitiveness may lead to subdued growth over the medium term. Slower global growth has weakened demand for non-energy U.S. exports -- significantly impacting U.S. manufacturers, with payroll growth in the sector flat-lining in recent months. The sector is not as large an employer as it was a decade ago, but it remains highly integrated with the rest of the economy. A sharp slowdown in manufacturing could significantly impact the broader labor market performance.

To achieve the currently set-out unemployment threshold by the Q2 2015 timeframe, the jobless rate will have to decline at a pace resembling its 2013 average -- around 0.6 percentage points per year. However, there is a real risk that the pace of decline in the jobless rate may yet fall short. Participation rates appear to be cyclical, and often respond with a significant lag, as evidenced by economic research, including the recent work by Daly et al. (2012) and others. If Americans begin to re-enter the labor force in earnest, participation rates will rise from their very depressed levels. Without an offsetting acceleration in job creation, the improvement in the jobless rate may yet slow, pushing out the timing at which point the threshold is breached.

Moreover, current FOMC thresholds have been set in an ad-hoc fashion and could be subject to change.[14] As such, the thresholds are in place as mere guideposts, while the economic recovery unfolds. The unemployment or inflation rates alone do not fully convey the health of the labor market or price pressures. Other indicators, such as participation rates, payroll growth, wage growth, etc. are also considered by the FOMC, with the Committee judging the broader economic outlook when deciding on policy. At this point, many FOMC members remain skeptical that an unemployment rate of 6.5%, without an improvement in other labor market indicators, is sufficient improvement to ensure that the economy achieves full-employment as the tightening cycle begins. In fact, the Chairman himself believed that adjusting the thresholds was something that "might happen," adding that if it did "it would be to lower it, I'm sure, not to raise it." Minneapolis Fed President Kocherlakota, went as far as suggesting that keeping policy ultra-accommodative even after the unemployment rate falls below 5.5 percent would be advisable instead. The subject of modifying thresholds was discussed during the latest July FOMC meeting, but the Committee was concerned it could throw into question the credibility of thresholds -- especially in an environment already volatile due to the taper volatility. Still, lowering the unemployment rate threshold may very well be considered, especially after a successful navigation around the forthcoming taper.

## Bottom line

The bottom line is that, while the spike in bond yields since early-May has been very sharp, most of it came through a rebalancing of the term premium and was largely appropriate in the context of the forthcoming end of asset purchases. Assuming the outlook does not materially change, the FOMC will begin tapering later this year. Since the ramp-up in the term premium has diminished the benefits of QE, we feel that a September-taper is appropriate -- albeit one that is only gradual. Any delay in the timing of the taper is unlikely to force the term premium down very much. Future declines in yields are possible, but more likely due to geopolitical events, a deteriorating economic outlook, or more closely aligning expectations with the Committee's forward guidance.

Conversely, since it has been largely priced in, a September taper is unlikely to cause a large spike in yields. More importantly, regardless whether it takes place in September or December, the stance of monetary policy will still be getting more accommodative until QE is ended in mid-2014 -- and do so amid a strengthening economy. As it embarks on the taper, the FOMC is likely to fervently emphasize its forward guidance stressing that short-term rates will remain at current levels well into 2015. Finally, by the time monetary policy breaks even begin to be tapped, the economy should show material improvement, and well on its way to the land of monetary policy utopia -- the twin-cities of price-stability and full-employment.

***Michael Dolega***
***Economist***
***416-983-0500***

**END NOTES**

1. Strictly speaking, neither the official FOMC statement – with terminology like 'increasing' or 'reducing' – nor the Chairman – who appears to prefer 'moderate' or 'slow' – used the word 'taper,' perhaps to avoid the alliterative implication to tightening. Still, the term stuck.
2. The term premium can be thought of as the excess yield investors require to compensate them for the risk associated with holding a longer-term maturity bond instead of rolling over a series of short-term risk-free instruments, such as Treasury-bills.
3. According to the median response from the Federal Reserve of New York Primary Dealer Survey (July 2013).
4. While the FOMC does meet in October, it is unlikely that a a major decisions, such as the beginning of the tapering, would be announced given that the meeting is not scheduled to be followed by the Chairman's press conference. In the interest of better aligning monetary policy decisions with incoming data, we agree with Federal Reserve Bank of St. Louis President Bullard, who has been advocating for all FOMC meetings to be, ex-ante, identical. This would allow for major decisions at every one of the FOMC eight meetings and as such, may result in better policy.
5. Some pundits have argued that rising long-term yields are a mark of tightening monetary policy. While they may result in tighter monetary conditions, they do not equate to a tighter monetary policy stance.
6. Forward guidance refers to the part of the FOMC policy statement outlining the expected future path of its policy rate, or the federal funds target. The FOMC had provided some form of forward guidance in each statement since late-2008. The Committee utilized a date-based guidance (including an explicit reference to a calendar date) between August 2011 and December 2012. Since then, the FOMC has resorted to thresholds for the unemployment rate and inflation. The most recent forward guidance states that "the Committee … currently anticipates that th[e] exceptionally low range for the federal funds rate [0 to 1/4 percent] will be appropriate at least as long as the unemployment rate remains above 6-1/2 percent, inflation between one and two years ahead is projected to be no more than a half percentage point above the Committee's 2 percent longer-run goal, and longer-term inflation expectations continue to be well anchored."
7. The passage of time brings the timing of the first rate-hike closer, even if the date of that rate-hike is unchanged. This naturally raises the longer-term yields, with the passage of nearly four months since early-May implying a 10-year Treasury yield about 15 basis points higher.
8. The term premium estimates are from Kim & Wright (2005) (available only up to June 28th, 2013) as well as an in-house estimate. The TD estimate is based on fed funds futures where available (through mid-2016). The author interpolates further expectations assuming the pace of tighteningfollows a logarithmic function, or $f'(x) = b*\ln(x) + c$. The coefficients b and c are fitted for each day so as to minimize the root mean squared error of the function $f(x)$, which denotes the fed funds target rate.
9. The term premium was briefly in positive territory in mid-August, but has retreated recently due in part to geopolitical tensions.
10. As estimated by the instantenous forward term premium from Kim & Wright (2005) ten years into the future.
11. Based on a median estimate from nine studies consisting of: Hamilton and Wu (2010), Doh (2010), D'Amico and King (2010), Bomfim and Meyer (2010), Gagnon et al. (2011), Neely (2011), Krishnamurthy and Vissing-Jorgensen (2011), D'Amico et al. (2011), and Cahill et al. (2013). Mean estimate of impact -6.5bp/$100bn. Median estimate of impact of -5.5bp/$100bn. Range of estimates between -3bp/$100bn and -15bp/$100bn.
12. This is due to the existence of cash as a substitute, which effectively prevents nominal interest rates from falling materially below zero.
13. This view has been emphasized by some pundits including Krishnamurthy & Vissing-Jorgensen (2013) at the recent Jackson Hole Monetary Policy Symposium.
14. The implementation of existing thresholds appears to be significantly influenced by Woodford (2012).

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