This week President Obama nominated Janet Yellen to become the fifteenth Chair of the Federal Reserve Board. If she is confirmed as we expect, investors can look forward to hearing a lot more about a monetary policy strategy known as “optimal control”. In a series of speeches in 2012, Yellen framed the central bank’s policy outlook using an optimal control framework. While the FOMC has not fully embraced this approach, we believe it has informed much of the committee’s public communication over the last year. Although optimal control can be a highly technical subject, the underlying concepts are central to the Fed’s current approach to monetary policy. Understanding optimal control can therefore shed light on policymakers’ goals as well as some of the risks they are taking today.

The basic idea behind optimal control is that the central bank considers all possible paths for short-term interest rates over the next several years, chooses the best one, and then commits to sticking with that plan over time. This differs from a strategy of deciding policy on a meeting-by-meeting basis, in which the choice is based on current conditions alone. An analogy could be made to the game of chess. A beginner will decide the best move based on the current configuration of the board, even if her choices might lead to dead ends later on. In contrast, an expert player will consider all the future paths that the game could take and then make the sequence of moves that gives the best probability of winning. Sometimes this forward-looking strategy will lead to decisions that appear suboptimal over the short-run—e.g. sacrificing a valuable piece to gain an advantage later on.

Optimal control monetary policy works much like this: the central bank commits to a game plan that at times might look misguided, but in theory the strategy should lead to better outcomes for unemployment and inflation over time. Mechanically, optimal control works by setting a specific “loss function” for the central bank. A loss function is simply a way to express policymakers’ objectives (“price stability and full employment”) in equation form. Economists then use a model to simulate the performance of the economy under different paths for short-term interest rates. The path that generates the best outcome for the loss function—where inflation and the unemployment rate are closest to their targets over time—is called the optimal control policy.

Today, the optimal control approach argues for a much lower path for the funds rate than standard Taylor Rules. Figure 1 shows this comparison, using data from Janet Yellen’s...
first optimal control speech in April 2012. The two Taylor Rules are drawn from John Taylor’s academic research and are standard rules for monetary policy analysis (though Yellen made a minor adjustment from the original papers). At the time she gave this presentation, the “Taylor 1993” rule prescribed a start to rate hikes in Q4 2013, and the “Taylor 1999” rule called for a first hike in Q1 2015. In contrast, the optimal control rule argued for a first hike in Q1 2016. Optimal control simulations using current economic conditions show a similar lift off date for the funds rate.

Why is the optimal path for the funds rate so low? There are two (related) ways to get the intuition. First, the extended period of a low funds rate makes up for lost time. Because of the zero lower bound on nominal interest rates, the Fed could not cut the funds rate as much as it wanted to during the recession and early in the recovery. Policy was too tight during this time, and keeping the funds rate at zero for an extended period helps the economy play catch up. Second, because long-term interest rates and other asset prices depend on expectations of future policy, committing to a lower-than-normal policy rate in the future can help stimulate the economy today. Economists sometimes refer to this latter idea as “committing to be irresponsible”.

Because of the longer period of zero rates, the optimal control policy achieves different outcomes for the economy. The unemployment rate falls faster than under a Taylor Rule approach, which is of course the whole point. But inflation also rebounds more quickly, and in fact over-
The major criticism against an optimal control approach to monetary policy is that the outcomes depend heavily on certain assumptions. We would highlight these three:

1) Policymakers and the general public both know the structure of the economy
2) The policy path is transparent and perceived as credible by the public
3) Inflation expectations are firmly anchored

In our view these assumptions are very strong. Indeed, it’s ironic that this approach has gained prominence in light of the backlash against mainstream macroeconomic models after the financial crisis. We would have thought policymakers’ confidence in existing models—such as the FRB/U.S. model Yellen uses in her simulations—would be very low today.

Focusing on the assumptions behind optimal control can help us understand the risks inherent in the strategy. Take the second assumption for example: that the future path for monetary policy is transparent and considered credible. Despite the Evans Rule framework in place at the Fed, markets began to doubt the credibility of the forward guidance when officials considered pulling back on quantitative easing (QE) this summer. The communication approach used by the Bank of England faced similar challenges. Part of the reason for this limited credibility is that investors know policymakers will have an incentive to renege on their promises in the future. Fed officials cannot guarantee they will always stick with the optimal control game plan, and thus their forward guidance could remain under pressure during the exit process.

The assumption about inflation expectations is also problematic. Overshooting the inflation target is not very costly if expectations remain stable, but could be very costly if they are not.² This point was made in a 2008 paper by San Francisco Fed president John Williams who argued (with coauthor Athanasios Orphanides) that optimal control “works extremely well when private expectations are perfectly aligned with those implied by rational expectations; however, if agents are learning, expectations can deviate from those implied by rational expectations, and the finely-tuned optimal control policy can go awry. In particular, by implicitly assuming that inflation expectations are always well anchored, the optimal control policy responds insufficiently strongly to movements in inflation, which results in highly persistent and large deviations of the inflation rate from its target.” (Williams and Orphanides, 2008. “Learning, Expectations Formation, and the Pitfalls of Optimal Control Monetary Policy”, Federal Reserve Bank of San Francisco Working Paper).

It is important to acknowledge that Yellen uses a variety of tools and methods, including traditional Taylor Rules. However, she seems to prefer the optimal control approach at the moment, pointing out that Taylor Rules do not “adjust for the constraints that the zero lower bound has placed in conventional monetary policy” and do not “fully take account of the protracted nature of the forces that have been retraining aggregate demand” (June 6, 2012). Thus, although she offers some caveats, optimal control appears to figure prominently in Yellen’s policy analysis. Optimal control is a bold approach to monetary policy. If the assumptions hold, it could lead to meaningfully better out-

(Continued from page 2)
comes for employment and inflation than traditional Taylor Rule-like approaches. However, it is also more accident prone—over the short run because the rate path is not fully credible, and over the long run because stable inflation expectations are not guaranteed. In the coming months, look for the Yellen Fed to consider more communication changes in an effort to limit these risks and improve credibility around the strategy. For bond market investors, Yellen’s embrace for optimal control is probably helpful for the near-term. But this will not necessarily always be the case, and optimal control could be a source of volatility down the road.

¹This feature is not unique to optimal control. Other types of policy rules, such as nominal GDP targeting, currently call for similar short rate paths.

²One could make a related argument about financial stability but we will not consider that issue here.
The recent government shutdown and ensuing debt ceiling breach present many unknowns for financial markets and for money market funds in particular. According to Treasury Secretary Lew, the Treasury will only have $30 billion remaining to satisfy the nation’s debts after October 17. Most analysts estimate that the Treasury will be unable to continue to meet its obligations after October 31 (which includes the November 1 Social Security payment) should our leaders fail to renew U.S. borrowing authority before it runs out.

While analysts, political pundits and respected financial professionals all publicly seem to agree that any failure of the U.S. Treasury to pay its debts will be a short lived event, the ramifications of a technical default by the Treasury are widespread and could cause a run on liquidity. To wit, the market has re-priced the very short end of the curve to account for a possible default. Yields have more than doubled on these obligations after President Obama rejected a call to invoke the 14th Amendment to bypass Congressional approval for issuing new debt on October 8.

Against this backdrop, we believe it is prudent for money market funds to take steps to mitigate an adverse outcome should either of the two scenarios discussed below occur.

**Treasury defaults on debt:** If this were to occur, most people believe that once the debt ceiling is raised, the Treasury will make good on all obligations. While this may be true, money market funds would still have to endure this shortfall for some period, and assuming the default is cured, at present there is no obligation or mechanism in place for the Treasury to pay interest past maturity date. With this risk in mind, many funds, including Columbia Money Market Fund, are being careful to

*Money Funds and the Debt Ceiling Drama*

By John McColley
Co-Portfolio Manager, Money Markets

![U.S Treasury Bill Curve](source: Bloomberg, October 2013)

(Continued on page 6)
avoid issues most at risk of technical default; that is issues with maturities between October 17 and November 30.

**Shareholder withdrawals:** An additional risk in the event of a default by the U.S. Treasury is that financial markets seize up and in the panic shareholders demand significant withdrawals. Again, money market managers can prepare for this potential outcome by increasing liquidity. Since the implementation of SEC Rule 2a-7 in 2009, money market funds have been required to maintain a much higher percentage in daily and weekly liquidity (daily liquidity + 2 to 7 day liquidity) to stay within the Weighted Average Maturity (WAM) and Weighted Average Life (WAL) guidelines outlined in the ruling.

SEC Rule 2a-7 allows all Treasury bills, regardless of maturity, to count toward the fund’s statutory daily liquidity requirement. Likewise, all agency discount notes with final maturities of less than 60 days are counted toward the fund’s weekly liquidity. The logic behind this rule is these types of government rated securities are traded in highly liquid markets and should have no difficulty being traded on demand.

Money market funds could also increase the percentage of non-government rated securities which mature next day to satisfy potential extraordinary withdrawals, as long as the federal budget and debt ceiling are of immediate concern.

**Columbia Management** will continue to closely monitor activity in our nation’s capital and maintain appropriate levels of liquidity in our money market fund until the crisis passes. As always, capital preservation remains our number one goal.
According to Eurostat, the 17 eurozone member states showed seasonally-adjusted growth of 0.3% quarter on quarter in Q2 2013, confirming that the bloc has exited recession. Significantly, Europe’s largest economy Germany saw growth of 0.7%, but France also performed well, registering a surprisingly strong figure of 0.5%. In Portugal, the economy grew for the first time in two and a half years – by as much as 1.1%. Meanwhile, Spain and Portugal reported a drop in unemployment for the first time in two years.

Business confidence is also recovering. In Germany, the IFO business climate index climbed to 107.7 in September, the highest reading so far this year. Purchasing managers’ indices (PMIs) have also shown a recovery; for example, France’s composite flash PMI moved above the crucial 50 level in September, a 19-month high. The German composite PMI hit an eight-month high.

This should point to an uptick in earnings which have suffered a long period of negative revisions. Moreover, the pace of change is particularly interesting versus the U.S. market. European earnings are down by around 4% year on year (compared to the 2% decline seen in the U.S.) but it is clear from the chart below that we have reached a turning point.

There has also been some better news on the consumer side. Consumer spending in the eurozone stabilised in the first quarter of 2013 and there are signs that this has continued more recently:
- In September 2013, the flash consumer confidence indicator improved in both the euro area (to -14.9 after -15.6 in August 2013) and in the EU (to -11.7 after -12.8 in August 2013).
August 2013). The EU indicator exceeded its long-term average of -12.3 for the first time since June 2011 (source: European Commission).

Crucially, labour markets have shown signs of stability and improvement, even in peripheral countries such as Portugal. In August, the 3-month moving average for euro-area unemployment reached a 28-month low.

**How are corporates faring?**

Businesses have been notably reluctant to spend through the uncertain times of the European crisis and capital expenditure (as a share of GDP) is at its lowest level for more than 20 years. On top of this, merger & acquisition (M&A) activity (see Exhibit 2) is at a low level. However, there are now signs that transactional activity is increasing as businesses become more financially secure. The benefits of industry consolidation and cheap funding (for good risks) means that many deals undertaken now will have lasting benefits for shareholders in terms of operating efficiency, pricing power, and sales and profits growth. With borrowing costs attractive, any increase in animal spirits should drive up capex and M&A activity, further supporting economic activity.

**Valuations remain attractive**

Whilst we are some way off the rock bottom valuations of 2009, European equities have lagged the U.S. and UK and also look cheap compared to history.

Only a few months ago the eurozone was in meltdown. Bond spreads were widening, the political environment appeared fragile and earnings estimates were falling. Certainly, if you wanted to create an economic zone representing 17% of global GDP, you would not start from here. Nevertheless, we believe there are signs that the outlook is finally brightening. While Europe remains beset by challenges, the economic background is improving, valuations are looking more attractive and investors who have not been paying attention to European stocks may want to take a closer look.

Exhibit 2: Western European M&A activity

Source: Datastream
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CM.Thought.Leadership@columbiamanagement.com
## Weekly Market Summary as of 10/14/2013

<table>
<thead>
<tr>
<th></th>
<th>Last</th>
<th>Week Ago</th>
<th>Month Ago</th>
<th>YTD</th>
<th>Year Ago</th>
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<td><strong>Bonds</strong></td>
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<td>U.S. 2-year</td>
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<td>0.02</td>
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<td>U.S. 10-year</td>
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<td>BoA Merrill Lynch High Yield Master II Index</td>
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<td>AAA Muni 10-year</td>
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<td><strong>Equity Indices</strong></td>
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<td>S&amp;P 500 Index</td>
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<td>1,690.5</td>
<td>0.8%</td>
<td>1,689.1</td>
<td>1.0%</td>
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<td>Russell 1000 Grow th Index</td>
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<td>781.2</td>
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<td>Russell 1000 Value Index</td>
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<td>Russell 2000 Value Index</td>
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<td>MSCI EAFE Index</td>
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<td>MSCI EM Index</td>
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<td>991.9</td>
<td>3.3%</td>
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<td><strong>Commodities</strong></td>
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<td>Gold</td>
<td>1,722.2</td>
<td>1,710.8</td>
<td>-2.9%</td>
<td>1,365.5</td>
<td>-6.8%</td>
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<td>Crude Oil</td>
<td>102.0</td>
<td>103.8</td>
<td>1.8%</td>
<td>107.6</td>
<td>-5.2%</td>
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<td><strong>U.S. Dollar</strong></td>
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<tr>
<td>U.S. Dollar Index</td>
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<td>80.1</td>
<td>0.3%</td>
<td>81.5</td>
<td>-1.4%</td>
</tr>
</tbody>
</table>

### Source
Source: Columbia Management Investment Advisers, LLC

**Past performance does not guarantee future results.** It is not possible to invest directly in an index.

### DESCRIPTION OF INDICES

The Barclays U.S. Aggregate Bond Index is a market value-weighted index that tracks the daily price, coupon, pay-downs, and total return performance of fixed-rate, publicly placed, dollar-denominated, and non-convertible investment grade debt issues with at least $250 million par amount outstanding and with at least one year to final maturity.

The Barclays U.S. Corporate Investment Grade Index is an unmanaged index consisting of publicly issued U.S. Corporate and foreign denominated corporate bonds publicly issued in the U.S. domestic market.

The Russell 1000 Growth Index measures the performance of those Russell 1000 Index companies with higher price-to-book ratios and lower forecasted growth values.


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The MSCI EAFE Index is a capitalization-weighted index that tracks the total return of common stocks in 21 developed-country markets within Europe, Australia and the Far East.

The MSCI EM is a free float-adjusted market capitalization index that is designed to measure equity market performance in the global emerging markets.

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