Lecture 5: Central Bank Mandates, a Streamlined Macro Model and a First Step at Forecasting

In the previous lecture, we learned two essential things about modern day economies. Growth is the goal and the rule. That said economies exhibit persistent cyclical patterns. Armed with a sense of the long-term sustainable trajectory for an economy, and aware of its recent economic trajectory, we can conjecture about the future pace of economic growth. To do so, however, we need to cast one more player in this drama, the central bank.

The Federal Reserve Board

The U.S. FRB has a dual mandate. Fed officials attempt to deliver low inflation and maximum long run sustainable growth rate. They also are responsible for the safety and soundness of the U.S. banking system. Obviously, keeping banks safe is an integral part of keeping growth prospects good. Indeed, the Fed’s original mandate was to protect the banking system — its creation in 1913, was in response to a painful string of banking panics, 1873-1907. As we will learn later in this course, the FRB was created in the image of the Bank of England, itself inspired by the insights of Walter Bagehot. For now, however, we will put lender-of-last-resort issues aside. Aside from bank issues, how does the Fed decide upon monetary policy?

Step 1: The Fed estimates potential real GDP and compare it to the actual level of real GDP. The CBO provides one estimate of potential GDP. As a practical matter, we would argue that most forecasters use the unemployment rate and a NAIRU concept, to calculate where real the economy is relative to potential. De facto, therefore, we need to agree upon an estimate for NAIRU, and then we judge the economy to be at, above, or below potential.

Note: CBO has radically reduced their sense of potential U.S. growth, in the aftermath of the Great Recession:

<table>
<thead>
<tr>
<th>Percent</th>
<th>Average Annual Growth</th>
<th>Projected Average Annual Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Economy</td>
<td>4.0 3.2 3.4 3.3 2.4 1.4 3.2 1.7 1.9 1.8</td>
<td></td>
</tr>
<tr>
<td>Potential GDP</td>
<td>1.6 2.5 1.7 1.2 1.0 0.5 1.4 0.5 0.5</td>
<td></td>
</tr>
<tr>
<td>Potential Labor Force</td>
<td>2.4 0.6 1.7 2.0 1.4 0.9 1.7 1.2 1.4 1.3</td>
<td></td>
</tr>
</tbody>
</table>
NAIRU in theory tells us the floor for the unemployment rate, below which inflation begins to accelerate. We know, however, that the U-3 definition of unemployment ignores important other issues pertaining to slack in the labor market. To address these issues I created an expanded definition of labor market slack, L. It combines those who identify as unemployed, those who are prime age and out of the labor force, and those who hold part-time jobs and wish they had full time jobs. The chart below compares L with U3, from 1994 through January of 2017. Note that from 1986 through 2009 deviations are quite small. The wedge that appears, post the Great Recession, suggests that labor market slack, early 2017, is considerable higher than the level suggested by the sub-5% level for U-3.
The table below looks at 3-month average levels for U-3 vs. L. The table homes in the months in which U-3 equaled 4.7%, the three-month average through January of 2017. What do we discover? In previous circumstances, L was more than a full percentage point lower than it is today.

**Step 2:** The Fed estimates long-term sustainable growth, and compares it to the economy’s emerging growth rate. To do so, they estimate the long-term growth rate for the labor force and for labor productivity gains.

At present we think $\Delta$ labor productivity = 1.5%/yr
At present we think $\Delta$ labor force = 0.5%/yr
At present we think LTSG = 2%/yr

**Step 3:** The Fed sets a target for inflation. If inflation is above this target, and unemployment is low, the FRB tightens, to slow the economy raise unemployment and lower inflation. Conversely, if inflation falls below the zone, the Fed eases in order to stimulate activity. The Fed, at present, identifies 2% as the ideal inflation rate.

**FRB Policy and the Taylor Rule:**

What constitutes ‘easy’, ‘neutral’ or ‘tight’ monetary policy? In normal times, that is to say, the lion’s share of our experiences from 1950 through 2005, the primary focus was on the FRB determined level of the federal funds rate. In simplest terms Fed monetary policy has amounted to the FRB buying and selling t-bills, in order to peg the level of the fed funds rate—the rate that banks charge one another for short term funds. The Fed’s dual mandate, deliver low inflation and strong employment growth, drives Fed decision-making. John Taylor, in 1993, proposed a simple equation aimed at addressing inflation/unemployment issues. It is a handy tool for exploring the issues that drive fed funds rate targeting decisions. In practice, however, the world is much too complex to permit a one equation decision rule for monetary policy. The equation helps us think about key issues. It does not formulate policy. The Taylor equation:

$$f = \pi + \alpha (\pi - \pi^*) + (U^*-U) + r^*$$

- $f$ = fed funds rate
- $r^*$ = neutral real short rate.
- $\pi$ = inflation rate
- $\pi^*$ = target inflation rate
- $U$ = the unemployment rate
- $U^*$ = NAIRU
- $U^*-U$ = deviation of unemployment from full employment
- The parameter $\alpha$ is econometrically determined.

(Note: Inflation appears twice in the equation because the Fed is trying to set real rates. They need to change rates, over and above any changes in the inflation rate.)
The Taylor rule, stated above, attempts to characterize Fed policy a function of two inputs—the unemployment rate and the inflation rate. The logic of the Taylor rule is simple:

- The FRB uses open market operations to set the real fed funds rate.
- If inflation and unemployment are ideal, the Fed puts the real rate in *neutral*.
- If inflation is high and unemployment low the Fed targets a *restrictive* real rate.
- If unemployment is high with low inflation the FRB sets an *easy* real funds rate.
- If both unemployment and inflation are high? Then priorities come into play

Let us posit the following:
- The Fed’s target inflation rate is 2%.
- The Fed’s target unemployment rate is 5%
- The neutral real short rate is 1% \( \alpha=0.5 \)

The Taylor Rule now reads:

\[ f = \pi + 0.5(\pi-2) + 1(5-U) + 1 \]

If we are in equilibrium, inflation is at 2%, unemployment is at 5%. In that case the equation says the fed funds target rate equals the inflation rate plus the neutral real short rate, in this case 2% + 1% = 3%.

If the economy is overheating, with the unemployment rate at 4% and inflation at 3%, the Taylor rule requires the Fed to set a high fed funds rate:

\[ f = 3 + 0.5(3-2) + 1(5-4) + 1 = 5.5\% \]

**The Taylor Rule: One Modification**

How has the Taylor Rule done as a forecaster of the Fed? As the next charts make clear, the Taylor Rule had a tough ten years from 1997 to 2007, even before we experienced the Great Recession. Part of the problem reflected the wild swing for energy prices. Oil prices fell to below $10 per barrel, in mid-1998, and climbed to more than 15 times that price in mid-2008. That put CPI changes into very volatile territory. Taylor Rule calculations, as chart 1 shows (below), called for volatile swings for fed funds despite relative quiescence for underlying price pressures.
Fed policy makers, in response, elevated the importance of core inflation. We therefore need to revise our calculation of the Taylor rule, using a core measure of inflation. But as chart 2 reveals, a Taylor Rule fed funds trajectory using a core measure (the core CPI) also does a poor job of catching actual swings in the overnight rate. In particular a core CPI generated Taylor Rule fails to anticipate late 1990s tightening. It fails to predict aggressive Fed ease in 2001-2002. And quite spectacularly, both the core CPI Taylor Rule and a Taylor Rule using headline CPI failed to anticipate the violent Fed ease of 2008. We will address these shortcomings later in the course.

(Note: Given problems with owners’ equivalent rent in the CPI, we prefer to use core PCE deflator)

The FRB and the Zero Bound

What does the Taylor rule tell us about Fed policy in a very weak economy? If the economy is in a deep recession, with the unemployment rate at 10% and inflation at 1.5%, the Taylor rule requires the Fed to set an impossibly low fed funds rate:

\[ f = 1.5 + 0.5(1.5-2) + 1(5-10) + 1 = -2.75\% \]

More to the point, in the world that followed the onset of the Great Recession a Taylor Rule calculation directed the Fed to target fed funds well BELOW ZERO. If the Fed did that, they would be setting an interest rate that translated to, “lend me $100 today, I’ll give you a bit less than $100 tomorrow.” That invites all sorts of problems. (why not keep your money under your mattress?) And therein lay the justification for various QE2 bond buying efforts by the Fed and for their decision to explicitly specify their intentions concerning when short rates will rise. We will formally explore the dynamic real economy/financial market linkages that justify these actions in the second half of the semester when we introduce the full panoply of financial instruments into our model. For now, we simply need to recognize that ‘the zero bound’ for the nominal fed funds rate is, very much, a real world problem, in the aftermath of the Great Recession.
The ECB: A Charter That Dictates a Singular Focus, Inflation

Unlike the FRB, the ECB defines their mandate singularly. They conduct monetary policy solely to ensure price stability, which they target as 1.5% to 2% headline inflation. Low inflation amid high unemployment, for the ECB, warrants no dramatic response. They argue that price stability is the only purview of the central bank.

In addition, and amazingly, in light of the history that surrounds the development of central banks in modern day economies, the ECB, for a time following the Great Recession, professed to have no lender of last resort responsibilities. Jean Claude Trichet, the previous head of the European Central Bank liked to say, “the ECB has only one needle in its compass, and that is inflation”. Again, this striking difference between the ECB and its sister central banks—the FRB, the BoE, the BoJ—created enormous policy challenges, under the direction of Jean Claude Trichet. Mario Draghi, a much more creative central banker, has end run a good many of these seeming impediments. We will address these in the second half of the semester.

If we, again, ignore bank safety issues, it appears to me that the ‘one needle in the compass’ approach to monetary policy, instead of a dual mandate, has proven to be a painfully sub-optimal approach to conducting policy. We can look upon the Great Recession as a natural experiment, set to test the idea that one focus is all a central bank’s need to get policy right. Some academics, champion the ECB mandate asserting that price signals are all a central bank needs to focus upon, in order to deliver optimal monetary policy strategy.

This line of reasoning is labeled the divine coincidence. The argument depends upon the notion that inflation will continue to fall if excess capacity persists, ultimately causing prices to fall (deflation). In this were true, the central bank that exclusively focuses on prices will be easing aggressively amid high joblessness and excess capacity, just as they should be, notwithstanding the fact that they are solely looking at price statistics. How so? Standard theory asserts that excess capacity will force inflation below the target level, justifying ease on price stability grounds. In other words, whether you focus on inflation and unemployment, or just inflation, you will end up doing the same thing, as weak growth will deliver the faltering price pressures that justify ease.

The ECB and the Crisis

Jean Claude Trichet was the ECB President from 2003 to 2011. He steadfastly embraced the singular ECB price stability goal.

This framework was always flawed. As we discuss in the pages that follow, wage and price stickiness, amid BIG Recessions, will lead a one-target central bank to remain too tight. Moreover, in a financial crisis such myopia can, indeed did, lead to disastrous results.
In the table below we provide a look at the ECB’S target rate—their key interest rate. They expect that the target rate will greatly influence eonia, the rate that European banks charge one another for funds. How have the two rates fared, since the onset of the crisis, and how has Europe fared relative to the USA? Consider the two tables below:

<table>
<thead>
<tr>
<th></th>
<th>Jun-07</th>
<th>Dec-07</th>
<th>Jul-08</th>
<th>Jun-09</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECB MAIN REFINANCING RATE</td>
<td>4.00</td>
<td>4.00</td>
<td>4.25</td>
<td>1.00</td>
</tr>
<tr>
<td>FEDERAL FUNDS TARGET RATE</td>
<td>5.25</td>
<td>4.25</td>
<td>2.00</td>
<td>0.25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Dec-10</th>
<th>Jul-11</th>
<th>Dec-11</th>
<th>Dec-12</th>
<th>Dec-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECB MAIN REFINANCING RATE</td>
<td>1.00</td>
<td>1.50</td>
<td>1.00</td>
<td>0.75</td>
<td>0.05</td>
</tr>
<tr>
<td>ECB QE</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>FEDERAL FUNDS TARGET RATE</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>FRB QE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

We discover several things. When the Great Recession took hold, in 2008, the U.S. Fed was easing aggressively. They correctly, looked through the high CPI, caused by the final jump for oil prices, and focused instead on the leap for joblessness and the tame core inflation. The ECB, slavishly focused upon headline inflation, actually raised their target rate in July of 2008. We also see that the U.S. FRB much more aggressively eased, hitting the ZERO BOUND in mid-2009. In 2010, and again in 2012-2013, the U.S. Fed resorted to QE, to supplement their easy money policy.

The Trichet led ECB, in stark contrast, stopped easing in mid-2009, when their overnight rate touched 1%. They tightened in 2011, reacting to a temporary rise for inflation, and ignoring very high joblessness. Obviously, there are major differences between the U.S. and Europe. Nonetheless, some of the major gains in the U.S., relative to Europe, in the aftermath of the Great Recession, can be laid at the doorstep of the more aggressive ease delivered by the Fed.

Read the following: [http://www.levyinstitute.org/pubs/wp_742.pdf](http://www.levyinstitute.org/pubs/wp_742.pdf)
More Generally: The Central Banker Reaction Function

Central Bankers and the 3-Equation Model

We now have the pieces in place to think about a barebones macroeconomic model. In this section we will be using the model depicted in the Carlin-Soskice paper (C-S). We assert the following.

The IS Curve

The elemental notion that drives central bankers, business planners and speculators is that output responds to changes in the level of real interest rates. A big jump for real interest rates, other things equal, will reduce investment and in turn the overall level of output and income. C-S puts it this way:

\[ y_t = A - ar_t \]

*(real income is a positive function of autonomous expenditure A and a negative function of the real interest rate r)*

The Phillips Curve

We learned about the relationship between price pressures and the level of resource utilization in the last lecture. The most familiar, the Phillips Curve, relates changes in the rate of inflation to deviations from equilibrium levels of output. Changes in inflation come in response to the level of the output gap. Carlin Soskice state:

\[ \pi_1 = \pi_e + \alpha (y_1 - y^*) \]

\[ \pi_e \equiv \text{inflation expectations} \quad y^* \equiv \text{equilibrium output.} \]
We can also think of deviations of unemployment, $U$, from NAIRU, as a Phillips Curve measure, as we did in the last lecture:

$$\pi_1 \pi_e + \alpha (U^* - U)$$

Notice that in both cases we start with a contemporaneous inflation rate, $\pi_0$ and the output gap deviation shifts the inflation rate up or down. This is an all-important modification of the original notion of an unemployment/inflation tradeoff. We don’t get to have unemployment permanently below NAIRU for a one-time increase for inflation. Instead each year that we operate above output potential, we add to our inflation problem. This accelerationist Phillips Curve model makes it clear that we cannot benefit, in the long run, from keeping the economy ‘too hot’.

**The Monetary Policy Rule**

The final equation in our three equation model is the monetary policy rule. A Taylor Rule is a good starting point.

$$f = \pi + \alpha (\pi - \pi^T) + (U^* - U) + r$$

Carlin and Soskice point out that a monetary policy rule is a means by which to minimize losses, characterized as below potential output and/or above ideal inflation. The Carlin/Soskice loss function:

$$L = (y_1 - y_e)^2 + \beta (\pi - \pi^T)^2$$

For our purposes, we will ignore the derivation of the Carlin/Soskice rule, and simply focus on the graphical representation. We also will shift the parameter, $\beta$, and have it determine the weight we put on deviation from potential output:

$$L = \beta (y_1 - y_e)^2 + (\pi - \pi^T)^2$$

**Manipulating the Barebones Macro Model**

We are now ready to think about forecasting. We have a simple three equation model that relates investment and therefore output to interest rates, inflation as a function of output relative to potential, and interest rates, a function of inflation and output relative to central bank target.

We can add to this model a painful truth about economic forecasting. The starting point, when thinking about the pace of economic growth, is unfortunately, backward looking. It
turns out that the best guess, in most cases, about what the next six months real growth, IS WHAT THE LAST SIX MONTHS GROWTH RATE HAS BEEN.

So our forecasting framework now takes shape.

We posit a long-term sustainable growth rate, in the USA today, 2%.
We posit a NAIRU, in today’s circumstances in the USA, 5%.
We identify the Fed’s target for inflation, 2%.
We calculate the economy’s real growth trajectory over the recent past.
Our preliminary assumption is that, absent policy efforts, exogenous shocks, or cyclical turning point dynamics, the next six months growth rate approximates the last six months pace.

We then ask ourselves 3 questions:

1. If our starting assumption, more of the same, actually transpires, where will that put the unemployment rate, a year or so down the road?

2. What does that level for unemployment imply for the economy’s output gap over the period (the projected jobless rate versus our estimate for NAIRU)?

3. In turn, using a Phillip’s curve calculation, what should we expect from inflation?

We then attempt to modify our preliminary extrapolation, by anticipating the Central bank’s policy response to the extrapolative outlook. In the USA we can use the Taylor Rule to calculate where the Fed will set the fed funds rate, as they attempt to respond to a backdrop that is either too strong or too weak, relative to target. Finally, we then modify our extrapolative forecast, to the extent that we believe Fed policy actions will change the trajectory for economic activity, unemployment, and, in turn, inflation. In the current circumstances, we might make the following statement:

*The economy has been growing at a modest pace for the past six months, with above trend employment gains but poor productivity and output gains. Inflation has slowly crawled back to close to its target level. A new White House with control of both Houses of Congress, however, suggests major policy changes may soon be in the offing. If we ignore possible policy changes and extrapolate the recent trend for labor, it suggests a fall for L to 5.8% from 6.3%. In addition, both headline and core inflation are rising slowly and are near the Fed’s target.*

*We know the FOMC wants interest rates to approach ‘normal’ as the economy approaches full employment and inflation touches its 2% target. In two years’ time, if current trends were to continue, they would likely want the federal funds rate to be near neutral. So we would expect them to be signaling that they will be slowly raising rates over the next two years.*

*What about major Trump motivated policy changes? The FOMC had signaled they will respond, if and when such polices are enacted, and after the implications of such policies begin to become clear.*
The Great Recession and Monetary Policy: A Graphical Depiction

How might we use this model to understand the events of the past few years? We present the relationships between output, inflation and interest rates graphically. To make matters easier than in the Carlin Soskice graphs we will ignore, for the moment leads and lags between monetary policy, changes in output relative to potential and changes in inflation in the next period.

We draw a standard downward sloping linear IS curve, that relates output levels to the Fed controlled real interest rate ($r_r$). Below this graph we draw an upward sloping linear Phillips curve that relates the level inflation to the deviation of output from potential.

<table>
<thead>
<tr>
<th>$r_r$</th>
<th>IS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2%</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>$\pi$</th>
<th>PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>2%</td>
<td></td>
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</table>

In equilibrium, inflation is 2%
Given a neutral rate short rate of 2% and the Fed's desire to be neutral, they set the real rate at 2% and therefore the Fed Funds Rate at 4%.

We now allow for a banking crisis and a violent fall in invested demand, at a given interest rate. In other words we draw a sharp inward shift of the IS curve. We discover that if we leave the Fed Funds rate at 4% we are no longer in neutral. Why? The violence of the fall in output pushes unemployment sharply higher (6% to 10%). The climb for joblessness squeezes out any and all inflation and we face deflation ($\pi$ falls from 2%...
to -2%). With deflation of 2% the real rate would leap to 6% from 2%, if the Fed left the nominal rate at 4% lowering the rate to zero, the Fed would keep the real rate at 2%. But as the graph demonstrates, this leaves the economy with high unemployment.

How will the central banks respond? In this simplified world the U.S. Fed confronted deflation and very high unemployment. Note that moving the nominal Fed Funds rate to zero, in the top graph, with the Fed funds rate at zero additional ease by traditional means was not possible. So the Fed embarked on two installments of large bond purchases, commonly called QE1 and QE2/

What about the ECB? They too would have confronted a leap for joblessness and a plunge into deflationary territory. They ignore unemployment, but deflation demands big ease anyway. The divine coincidence triumphs in this simplified framework and we get a big ease from the ECB as well.

**Persistent Large Output Gaps and the Destruction of the Divine Coincidence**

The charts in the previous section lead us to conclude that FRB and ECB monetary policy would be the same during the Great Recession. In fact, the FRB has been much more aggressively easing than has its European counterpart. How do we explain the difference? As it turns out, life is not as simple as the simple model used on the previous page. A key insight into the flaw in our model can be found in the IMF working paper, *Minding the...*
The study looks at a host of developed economy experiences with persistent large output gaps (PLOGS). PLOGS are long periods of excess capacity and higher than ideal unemployment. The study investigates what happens to inflation in such circumstances. The empirical results from the study confirm a prototypical Keynesian concept: **Wages And Prices Are Sticky**. More specifically, it’s easier to get a big fall for inflation, when inflation is high and it’s very hard to convince people to cut wages and prices—generating outright deflation—even amid very high joblessness and ample excess capacity. We draw some stylized Phillips Curves below:
The key point embedded in the graphs above is that a large output gap, starting from a low inflation rate, will generate only moderate disinflation. So far in both the USA and Europe that has been the case. And that is a key result when we think of monetary policy and central banks that are mandated to target only inflation.

Now let’s put these observations into the output inflation space of our 3-equation New Keynesian Model – acknowledging that we now have a non-linear Philips Curve.

A sharp IS decline, the Great Recession, occurring in a low inflation world, elicits Big Ease from dual mandates Central Banks. They respond to the surge in joblessness. Inflation mandated Central banks ease only moderately given the absence of a move to large price declines. As unemployment endures, cyclical joblessness becomes structural joblessness. In macroeconomics terms, hysteresis occurs. In this circumstance, inflation mandated Central banks conduct sub-optimal monetary policy and are unwitting agents of hysteresis. In effect, by failing to come to their economy’s rescue, they lock many jobless people into long term unemployment. They lose skills and become structurally unemployed.
Appendix: ECB Monetary Policy Operations

(This review excerpts from: The Eonia Spread Before and during the Crisis of 2007-2009: The Role of Liquidity and Credit Risk; John, Beirne, 25, August, 2010)

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</tr>
</thead>
<tbody>
<tr>
<td>May</td>
<td>July</td>
<td>Dec</td>
<td>April</td>
<td>Feb</td>
<td>May</td>
<td>July</td>
<td>Dec</td>
<td>June</td>
</tr>
<tr>
<td>5.25</td>
<td>3</td>
<td>1.75</td>
<td>1.75</td>
<td>2</td>
<td>2.25</td>
<td>1.75</td>
<td>1.5</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**Target Rate**

| 4    | 4.25 | 2.5  | 1    | 1    | 1.25 | 1.5  | 1    | 0.75 | 0.75 |
|------|------|------|------|------|------|------|------|------|
| May  | July | Dec  | Eonia| Deposit Rate | May  | July | Dec  | June |
| 4.25 | 2.25 | 0.45 | 0.69 | 1    | 1.25 | 0.45 | 0.12 | 0.06 |
| 3    | 3.25 | 2    | 0.25 | 0.25 | 0.5  | 0.75 | 0.25 | 0  |
| 2    | 2    | 1    | 1.5  | 1.5  | 1.5  | 1.5  | 1.5  | 1.5  |
| 0    | 0    | 0.25 | 0.55 | 0.31 | 0.25 | 0.25 | 0.55 | 0.63 | 0.69 |

The ECB focuses on the interbank money market to effect monetary policy in Europe. Just like the FRB, the ECB tries to steer overnight interest rates in order to provide an anchor for the term structure of interest rates. The ECB manipulates its rates in order to guide the Euro Overnight Index Average (EONIA).

**EONIA** is a weighted average of all overnight lending transactions between most active credit institutions in the euro area’s money market.

To drive this steering effort the ECB establishes three interest rates that pertain to two standing facilities.

Note: a standing facility is a central bank facility available to counterparties (mostly commercial banks) on their own initiative. The Eurozone has two overnight standing facilities:

Marginal lending facility (banks get liquidity from ECB, for ‘acceptable collateral’)

The ECB manipulates its rates in order to guide the Euro Overnight Index Average (EONIA).
Deposit facility (banks make overnight deposits at the ECB). Banks lend their excess liquidity to the ECB, via the Deposit facility.

The ECB creates a rate ‘corridor’ that it expects overnight rates to oscillate within. The corridor’s upper bound is the ECB marginal lending rate—the punitive rate it imposes on borrowers. The lower bound is the deposit rate—the rate it pays banks that park excess reserves at the ECB. The ECB target rate—the main financing rate—is the most widely discussed rate that the ECB sets. It approximates the U.S. fed funds rate.

More formally:

**ECB Target Rate** (ECB Main Refinancing Rate):

The Main Refinancing rate is the equivalent of the American federal funds rate. This number is an indication of the least cost short term money from the ECB. To maintain this rate at a given level, the ECB conducts main refinancing operations where it allots capital in an auction where banks offering higher rates receive funds until the total amount offered for auction is exhausted. The ECB determines the amount needed based on its own analysis of conditions in the market, but at times of crisis it may also offer unlimited liquidity in order to defuse tensions in the money markets. As such, since October 2008, the bank is conducting its MROs on a fixed basis where amounts are fully allotted at a fixed interest rate, in response to the economic crisis.

Bloomberg Symbol: [EURR002W INDEX GP GO]

**ECB Marginal Lending Rate**

The equivalent of the Federal Reserve’s Discount Window, this facility acts as the last resort for firms which are unable to obtain funding at the wholesale market by their own actions alone, for whatever reason. By asking additional funds from the ECB financial firms agree to pay a higher interest rate over what is available in the interbank market, but they also overcome their liquidity problems without facing much higher costs, or insolvency in the worst case.

The marginal rate is usually maintained at 100 points above the main refinancing rate of the ECB, although the ECB can modify the value in response to market fluctuations at will. During the crisis the additional cost of borrowing from the ECB instead of the interbank market was first reduced to 100 from 200, and as of March 2012, it stood at 75 points.

Bloomberg Symbol: [EECBMARG INDEX GP GO]

**ECB Deposit Rate**: The rate the ECB pays to banks for reserves at the ECB, in excess of required reserves.

Bloomberg Symbol: [EUORDEPO INDEX GP GO]
**ECB Rate Corridor:** The spread between the ECB marginal lending rate and the ECB deposit rate.

See graph below:

Effective steering of the overnight rate by the ECB would therefore imply a low spread between the ECB policy rate and the EONIA rate, whereby the overnight rate anchors the term structure of interest rates.”

There have been two bouts of very large negative spreads between eonia and the target rate, since the onset of the 2008 crisis. In both instances these reflected large surpluses of liquidity that came into being as banking strains derailed interbank market activity and non-standard monetary policy measures were implemented by the ECB. In non-crisis times, excess volatility is not prevalent in the EONIA as it tracks closely the main ECB policy rate, so that the EONIA spread is relatively low (i.e. less than five basis points). In crisis times, however, this is not necessarily the case, and in the recent crisis, there has been a clear rise in both the level and volatility of the EONIA spread. Clearly, under such circumstances where volatility is higher, so too is uncertainty associated with the spread.

*The Eonia Spread Before and during the Crisis of 2007-2009: The Role of Liquidity and Credit Risk;* John, Beirne, 25, August, 2010