# Better Late Than Never: The ECB and Eurozone Monetary Policy

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## EXECUTIVE SUMMARY

The ECB is the only major central bank in the developed world that has, so far, not undertaken a program of unsterilized government bond purchases; or what is usually known as a QE program. Many have speculated that, amongst the potential monetary policy measures that could be used, government bond-buying would be a poor fit for the ideology of the ECB, potentially also contravening its mandate (which prevents it from monetizing government debt). However, the market as a whole still seems to believe that the ECB may choose to press ahead with QE. With this possibility hanging over European financial markets, our objective in this paper is to better understand the ECB's situation, and then assess to what extent the prospect of QE has been affecting Eurozone bond yields. Though we acknowledge the uncertainties of such an exercise, we produce a quantitative estimate of the extent to which Eurozone bond yields have been suppressed by this possibility. We believe that this information should allow more informed decisions for investors in European bonds markets.

### THE ECB HAS BEEN OPPOSED TO AGGRESSIVE MONETARY POLICY

The European Central Bank has been the subject of much controversy over the past two years. The Euro area has consistently shown the weakest economic performance of anywhere in the developed world, but the ECB has been far less aggressive in its monetary policy than any of its major peers: the Federal Reserve, the People's Bank of China, the Bank of Japan, or the Bank of England. Under Jean-Claude Trichet, the ECB considered its mandate to be purely inflation-fighting, and ran its monetary policy accordingly. Mario Draghi appears to want to be a more activist central banker, but he has previously faced opposition from the Bundesbank. The Bundesbank was itself created as an independent entity partly as a result of hyperinflationary episodes in Germany in the 1920s and 1940s, and has in the past argued that aggressive monetary policy is at best ineffective, and at worst dangerous.

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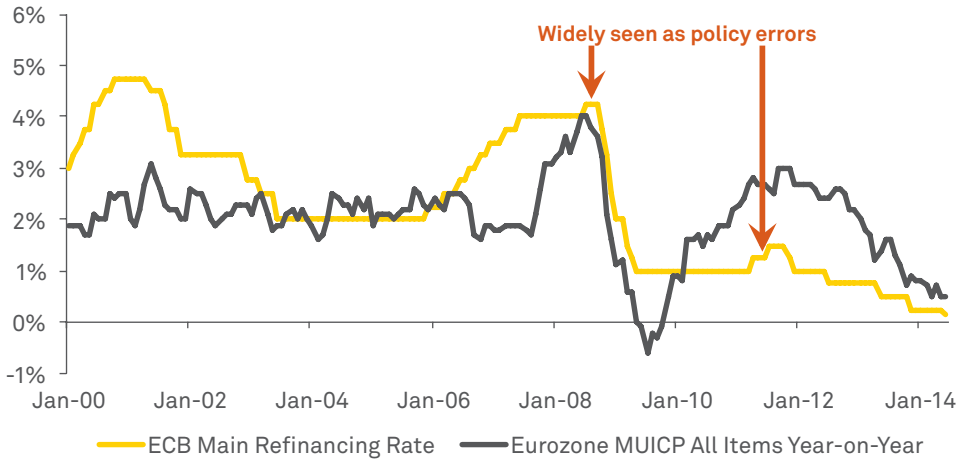
This belief on the part of the ECB that inflation was the greatest threat, even as the economic situation deteriorated, led to what many consider to be two major policy mistakes:

**Figure 1: European Central Bank Refinancing Rate and Eurozone Inflation**




Source: Bloomberg; data runs from January 2000 to June 2014

The conventional tool for boosting inflation would be monetary policy.

However, the European economy has been very weak since the Eurozone crisis started to take hold in late 2010, and the problem is arguably a monetary one. High debt burdens, private sector de-leveraging, and extremely low inflation lead some to conclude that the Eurozone is facing a potential debt-deflation spiral. The conventional response for this would be to try to boost inflation, reducing real interest rates and real debt burdens. The conventional tool for boosting inflation would be monetary policy. Principal has therefore gradually given ground to practical necessity, and over the past year or so, the ECB's attitude towards monetary policy does seem to have changed. Though the ECB does not announce how its governing panel's members have voted, it has been implied by Draghi that the panel has been won over to the activist approach, and is no longer split on whether or not more aggressive monetary policy should be employed. This was evident from the unusually aggressive monetary actions take in the June ECB meeting.

## EUROPEAN MONETARY POLICY SINCE THE START OF THE FINANCIAL CRISIS

The ECB has attempted a number of forms of monetary policy since the start of the financial crisis. Initially, the ECB's reaction to the events of 2008 was notably muted. Interest rates were rapidly cut, consistent with other developed markets, but beyond this monetary operations were limited. The Eurozone crisis, which was a dominant event for markets in both 2011 and 2012, prompted a greater degree of monetary intervention, with the Long-Term Refinancing Operations auctions being the most obvious example. What was notable about all forms of monetary policy attempted prior to September's announcement, is that the ECB took pains to ensure that they can be presented as either being sterilized interventions, or, if unsterilized, as market stabilization manoeuvres. In this sense, they have not been 'quantitative easing', at least not in the sense that most investors would understand it.

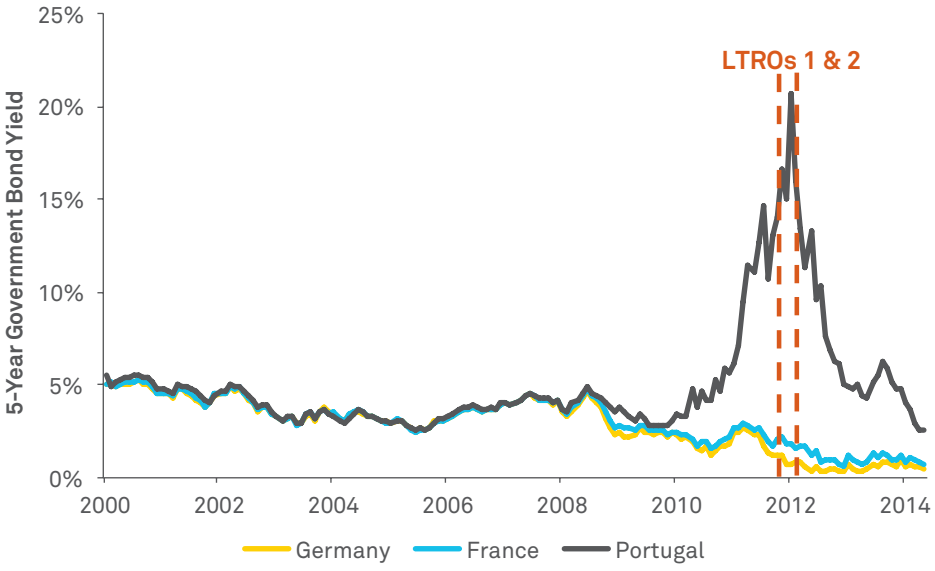
The forms of exceptional monetary policy that the ECB has attempted so far are, in chronological order:

1. From May 2010, sterilized bond purchases via the Securities Markets Program (SMP), still on-going
2. On 21 December 2011, Long-term Refinancing Operations (LTRO), amounting to €489bn
3. On 29 February 2012, a second LTRO auction, amounting to €530bn
4. From September 2012, sterilized bond purchases via the Outright Monetary Transactions (OMT) program, still on-going
5. On 5th June 2014, a range of measures, which include
   - Negative deposit rates: a reduction in the rate paid for excess reserves held at the ECB, to -0.1%
   - The Targeted Long-term Refinancing Operation (TLTRO), a €400bn scheme to provide banks with low-cost funding in exchange for their agreement to lend to SMEs
   - A decision to suspend the sterilization of bond purchases done under the SMP
   - An announcement that the ECB may buy ABS in future in an attempt to stimulate lending to the real economy (sometimes referred to as 'credit easing')
6. On 4th September 2014, additional measures
   - The refinancing rate was cut from 0.15% to 0.05%
   - The announcement of the purchase of an unspecified volume of private sector-issued ABS and covered bonds

The two LTRO operations were instrumental in reducing credit spreads on peripheral European bonds.

From the perspective of a global investor, the effects of these interventions have been somewhat limited. The two LTRO operations were instrumental in reducing credit spreads on peripheral European bonds, but the credit ratings for these peripheral economies have been hovering between investment grade and high yield for some time, and many investors had already reduced their exposure to these assets. The effect on 'core' economy government bonds has been harder to observe:

**Figure 2: Effect of LTRO on Core vs Peripheral Bonds**




Source: Bloomberg, January 2000 to June 2014

For government bond investors, amongst the range of possible monetary policy measures that could be deployed, QE is likely to have the largest effect on markets and is therefore the most relevant. The ECB so far seems to have been considering QE as a last resort, which is unsurprising. It is unclear whether quantitative easing is legal under the ECB's existing mandate, and there has been historical opposition to it from some ECB members. From a technical standpoint, the decision not to sterilize the SMP bond purchases leads to a situation which is highly similar to quantitative easing, but does not have the same degree of commitment or scale as a QE program might and so does not convey such a clear message to the market. This difference in scale can be clearly seen from a comparison between European Central Bank and Federal Reserve balance sheets, shown below. Though the volume of central bank assets is not the only determinant of monetary policy intervention, the ECB's asset holdings have actually been shrinking over the course of the past year.

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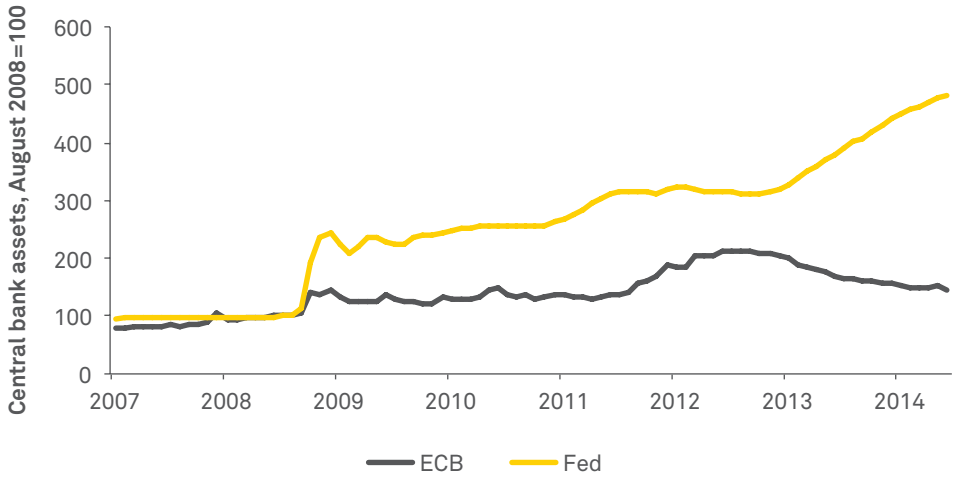
**Figure 3: ECB balance sheet usage has been very conservative**




Source: Bloomberg, February 2007 to June 2014

The first official suggestions that quantitative easing was a possibility appeared to come in March of 2014, with ECB officials suggesting both that asset-buying would be possible, and also that, given the limited size of Euro ABS markets (particularly ABS centred on SME loans[1]), sovereign bond-buying was also a possibility. These ABS purchases were confirmed in the September announcement. However, market observers had already started to speculate regarding the possibility of QE, since at least as early as the start of 2014. In the first quarter of the year, both BNP Paribas and Credit Suisse (amongst others) published research articles discussing this possibility. We therefore consider an increasing awareness amongst investors that QE in the Eurozone was a possibility, to have been a driver of government bond yields since at least the start of 2014.

1 Deutsche Bank estimate the total size of the Euro ABS market rated at least AA- is €513bn, of which only €50bn are SME loan-related. QE on the ECB's roadmap, April 2014

## INTRODUCTION TO QUANTITATIVE ANALYSIS OF ECB QE AND EUROPEAN BOND YIELDS

The objective of this research is to estimate how much of a premium is priced into European bonds as a result of market expectations of quantitative easing. Since quantitative easing by its nature involves the purchase of longer-dated securities after the short-term interest rate has already been reduced near to zero, the effect to be measured is in the reduction of longer term European interest rates and the flattening of the yield curve. Various other factors can affect interest rates, which move about on a regular basis in response to economic and market conditions. In order to estimate how much of these changes are actually due to expectations of QE, it will be necessary to account for as many other factors as possible. It will also be necessary to compare the magnitude of the move ascribed to QE to the size of normal fluctuations, in order to check for statistical significance — in other words, in order to feel confident that we are not simply misinterpreting normal bond yield volatility to fit with our theory.

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## HOW WE WILL CONDUCT THE ANALYSIS

The statistical tool that we have used to investigate this question is a regression analysis. A regression analysis attempts to understand and quantify what independent variables are relevant to the behaviour of a dependent variable. In this case, we are seeking to find which macro-economic or financial data series might be the drivers for European Government bond yields. Our process for estimating the effects of possible European QE on Eurozone bond yields is as follows:

1. We will attempt to find the factors that drive changes in Eurozone bond yields, under normal circumstances. To find these factors, we will need to use a mixture of common sense, market knowledge and statistical analysis. We will first decide what factors should be relevant to Eurozone bond yields. We will then look at the co-movements of these variables and Eurozone bond yields in the period prior to QE being considered a possibility

2. Once we believe we have these factors, we will form an equation which shows how we believe Eurozone bond yields should behave, based on those factors. The effects of the factors will be weighted to express their relative importance on Eurozone bond yields.

3. We will use this equation, and the historical data we have of these factors, to find the regression-implied bond yields for more recent history (the period when the market became aware that QE was a possibility). This is not the actual historical bond yield, but the bond yield that would have been implied by our regression equation.

4. We then observe the difference between this regression-implied bond yield and the actual historical bond yield, for the period where QE started to look like a possibility. Large differences between these two could be ascribed to investors factoring in the possibility of QE into market prices, since expectations regarding QE are not one of the inputs into our regression analysis. We will therefore have a quantitative estimate of the effects that expectations of QE have had on asset prices.

Among the factors affecting bond yields are the credit status of their issuer and the demand for a safe haven asset in times of economic uncertainty.

**FURTHER DETAILS OF THE ANALYSIS**

Among the factors affecting bond yields are the credit status of their issuer and the demand for a safe haven asset in times of economic uncertainty. In order to get a clean reading of the QE discount unaffected by either credit concerns or safe-haven status, it was decided to use Finnish bonds to measure interest rates. Finland is one of the few Eurozone economies to have retained its AAA credit rating, so it can be considered that there is very little credit spread incorporated into Finnish bond yields. The same is true for Germany, but German bonds have been widely used by European investors (who can move money out their own economies without incurring currency risk) as a safe store of value, when they believe that their own government bonds may not be. We believe that Finnish bonds have not had their prices distorted in this fashion, or at least not to the same extent.

The Finnish five year bond yield was regressed on various explanatory factors in order to account for as much of the normal movement of bond yields as possible. We started by thinking of economic or market variables which might reasonably be expected to influence government bond yields. Our list, and the results of testing these variables for statistical significance, is shown below:

1. **Economic data**, since capital market returns are ultimately derived from the real economy

   *Result:* We tried Eurozone GDP and Eurozone industrial production, but found that these were statistically insignificant.

2. **Monetary policy**, since this has a direct effect on fixed income markets

   *Result:* Both EURIBOR and the US 5-year government bond yield were found to be statistically significant, and thus we included both of them. Although US bond yields may seem to explain the 5-year rate in terms of itself, to the extent that the US bond yield is unaffected by anticipation of QE in Europe, it should still provide a reliable predictor of European yields in the absence of QE.

3. **Market risk aversion**, which affects demand for safe assets such as bonds

   *Result:* We tested the VIX index but found it to be statistically insignificant.

4. **Returns from other financial assets**, which increase or decrease the opportunity cost of holding bonds

   *Result:* The return of the Eurostoxx 50 index was found to be a statistically significant variable.

The list of variables ultimately used in the regression (along with t-statistics) is therefore shown below:

**Figure 4: Variables used in regression analysis**

| Independent Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| **EURIBOR change** | 0.176 | 0.068 | 2.60 | 1.02% |
| **EURO STOXX 50 change** | 0.433 | 0.172 | 2.52 | 1.28% |
| **US 5-year rate change** | 0.487 | 0.048 | 10.26 | 0.00% |

Source: Sovereign Institutions Group

The total R-squared of the regression is 0.455.

The first column lists the independent variable, the second lists the coefficient of that variable determined in the regression, the third lists the standard error in that coefficient, the fourth the t-statistic (the coefficient divided by the standard error), and the last the probability that this coefficient could have occurred by chance had its true value been zero. As can be seen, the probabilities are all small and the statistical significance of the coefficients is therefore good. The period of data for which the regression was performed was from March 1999 to December 2012. The start of the regression is the point at which the Euro was initially adopted (we did not want data from before this point) and the regression was closed off in December 2012 to minimize the possibility that the market had started to price in the possibility of QE during the regression period.

Further details of this regression process are shown in the appendix.

We therefore find that expectations of QE have lowered bond yields by 41 basis points since the start of 2014.

**RESULTS OF REGRESSION ANALYSIS**

Using these results, we have made projections of what the Finnish 5-year rate would be in the absence of expectations of QE. This can be attempted in either of two ways.

The first is simply to perform the regression on the period ending December 2012 (before the possibility of QE was seriously entertained by the markets) and to use that model to estimate what the movement of the 5-year rate should have been between February 2014 and April 2014, in the absence of any possibility of QE. This can then be compared to the actual movement in the market yield during the latter period, and the difference is attributed to the decrease in yield due to market expectations of QE. The results of this are shown below:

**Figure 5: Approach using regression period up until December 2013**

| Period | Model predicted move in 5-year rates | Actual move in 5-year rates | Difference (ascribed to the effects of QE) |
|---|---|---|---|
| **February 2014** | –16bps | –34bps | –18bps |
| **March 2014** | +4bps | –3bps | –7bps |
| **April 2014** | +15bps | –1bps | –16bps |
| **Total over Period** | +3bps | –38bps | **–41bps** |

Source: Sovereign Institutions Group

We therefore find that expectations of QE have lowered bond yields by 41 basis points since the start of the year. This result is significant at the 10% level, meaning we have a reasonable degree of confidence that it cannot be explained by normal volatility alone.

The second method for calculating the QE yield differential follows a similar strategy, but rather than explicitly using separate regression and forecast periods, it uses the entire period through April 2014 for regression, but includes a 'dummy variable' in the regression for the period from February to April 2014. The coefficient of this dummy variable represents the additional movement that occurred as a result of events during this three month period. In other words, we assume this represents the effect of QE on the monthly yield movements. The coefficient was found to be -13bp, meaning an additional 13bp per month reduction in yields occurred during these three months, so that the total effect on yields from QE expectations during this period is again -40bp. The t-statistic of this coefficient was -1.3, again corresponding to a one-sided significance level of 10%.

The t-statistic of this coefficient was -1.3, again corresponding to a one-sided significance level of 10%.

**Figure 6: Approach using regression period up until April 2014, with dummy variable**

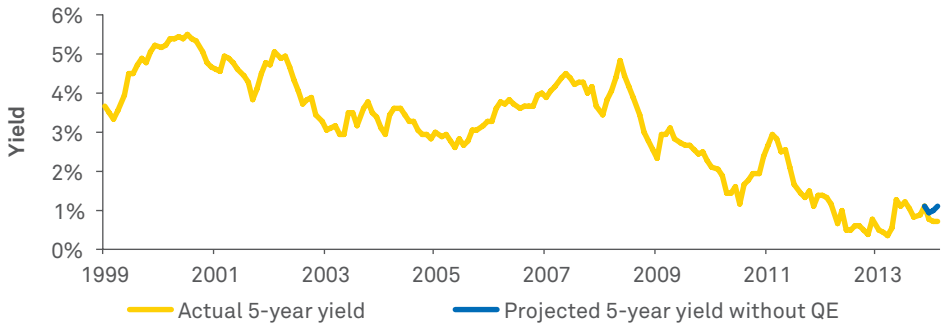
| Period | Actual move in 5-year rates | Co-efficient of dummy variable (ascribed to the effects of QE) |
|---|---|---|
| **Feb – April 2014** | –38bps | **–40bps** |

Source: Sovereign Institutions Group

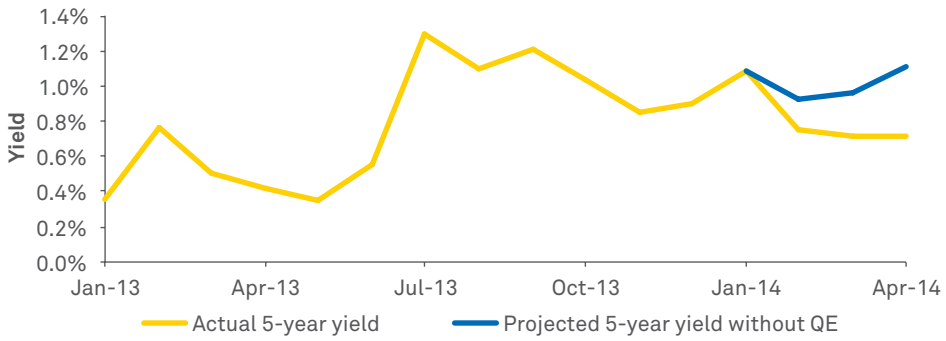
We therefore map the actual path of yields against the regression-implied path of yields, with the results shown below:

**Figure 7: Actual yields versus regression-implied yields**

**In long time series:**




**In shorter time series:**




Source: longer time series is Datastream, shorter time series is Sovereign Institutions Research Group's own calculation. Data in top chart from March 1999 to April 2014, data in bottom chart from January 2013 to April 2014

Looking at the scale of the yield reduction resulting from the possibility of QE, we find that intuitively, 40bps of yield reduction as a result of QE expectations feels about right. Though a wide range of estimates for the effect of, for example, US QE on bond yields have been published over the past few years, 50 — 100bps seems to roughly represent academic consensus.[2] Given the uncertainty regarding whether QE will actually go ahead, we assume that the market has only partially priced in its effects. However, we should caution that this is an unreliable estimate at best, with numerous confounding factors.

Looking at the larger picture, European monetary policy remains a large and complex topic.

## CONCLUSION

The ECB is currently an outlier amongst major central banks, in both the form and the scale of monetary interventions it has undertaken. A combination of ideological, legal and practical constraints, arising from the ECB's unique position as a single central bank for multiple economies, means that there has been no Eurozone QE and monetary policy has generally not been aggressive. However, we believe that both logic and the results of our analysis support the conclusion that investors are increasingly aware that QE may be possible, and are starting to factor this into bond prices. The scale and direction of this premium — as revealed by our regression — seems consistent with what we know about ECB intentions. Whilst the purpose of this document is not to make a directional call on markets, the 40bps yield disadvantage that bond markets appear to have suffered as a result of hopes regarding QE seems perhaps excessive, given the obstacles to executing a large-scale bond-buying program, plus the possibility that the European economy simply recovers anyway, rendering QE unnecessary.

Looking at the larger picture, European monetary policy remains a large and complex topic, and arguably ECB policy has, for the first time, become more relevant to Eurozone markets than other central banks to their own respective markets. This is because, unlike most other central banks, the ECB's monetary policies appear to still be being increased in scale, rather than being stabilized (as in Japan) or withdrawn (as in the US). Almost every aspect of the ECB's situation is unique — the severe economic situation it faces, the unusually large decision-making panel, the non-transparent nature of their process, and their unconventional monetary policy methods. Though we think we have shed some light on Eurozone government bond pricing by this analysis, we acknowledge that this is still only a small piece of the overall puzzle.

2 For example, amongst many others:

| AUTHOR | PAPER | YIELD EFFECT AT 5-YEAR TENOR |
|---|---|---|
| Jarrow & Li | The Impact of Quantitative Easing on the U.S. Term Structure of Interest Rates | 50bps |
| Fawley & Juvenal | Quantitative Easing: Lessons We've Learned | Around 80bps |
| Thornton | The Effect of the Fed's Purchase of Long-Term Treasuries on the Yield Curve | 50bps |

Interest rates, inflation rates, and economic growth rates are expected to be highly autocorrelated and possibly non-stationary, and this was found to be the case in the data used.

## FURTHER DETAILS OF REGRESSION ANALYSIS

Interest rates, inflation rates, and economic growth rates are expected to be highly autocorrelated and possibly non-stationary, and this was found to be the case in the data used. Autocorrelation of the 5-yr, overnight, and inflation rates were found to be nearly 1, and unit root tests were consistent with the series being non-stationary. Autocorrelated and non-stationary series can cause inflated estimates of statistical significance and explanatory power of a model. In order to take account of this, regression was performed on the monthly changes in the variables instead of the levels. The monthly changes were found to be stationary and possess no significant autocorrelation. Although the EURIBOR rate and the 5-year rate might be expected to be cointegrated, a Johansen test was conducted for this and found to be inconsistent with the presence of cointegration.

When differences were used, GDP, industrial production, the VIX index, and inflation were all found to be statistically insignificant, as measured by their t-statistic, either alone or in combination with other variables. On the other hand, the short rate, the Euro Stoxx 50 index, and the US 5-year rate were all found to be statistically significant and to contribute to the explanatory power of the model. A model using just the US 5-year rate explained about 41% of the variance of monthly movements in the 5-year rate, while a model using just the other two factors explained about 9% of the variance, and a combined model explained about 45% of the variance. It is therefore clear that it is the US rate which adds the most explanatory power to this model.

The combined model regressing the Finnish 5-year rate onto the EURIBOR short rate, the Euro Stoxx 50, and the U.S. 5-year rate, is

$$\Delta(\text{Finnish 5-yr rate}) = \beta_1\Delta(\text{EURIBOR}) + \beta_2\Delta(\text{EURO STOXX 50 }) + \beta_1\Delta(\text{US 5-yr rate}) + \epsilon$$

where $\Delta$ means “monthly change in” and $\epsilon$ represents the residuals.

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