

Revealing the power of Central Banks Communications on Interest Rates



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Contents

1.	Abstract	2
2.	Introduction	3
3.	Literature development	4
4.	Empirical Analysis	6
5.	Conclusion	11

1 Abstract

In this paper we aim to investigate the dynamic causal effects of the monetary policy of the european central bank and the federal reserve on the main european rates. Many studies has showed that the forward guidance from central banks can influence the Euro Interbank Offered Rate (EURIBOR) with its different maturities and it could lead to some future jump expectations. The empirical results show that the announcements of the ECB has a great impact on long maturities compared to the shortest one. Indeed, It appeared that the Fed had no significant effect on that period which is convenient with the studies of Paul Hubert and Fabien Labondance on overnight indexed swaps (OIS).

2 Introduction

”As laid out in the ECB’s forward guidance, monetary policy will continue to support the economy and respond to future risks in line with our price stability mandate. And we will continuously monitor the side effects of our policies. But it is clear that monetary policy could achieve its goal faster and with fewer side effects if other policies were supporting growth alongside it.”, Speech by Christine Lagarde¹.

According to the previous discourse, the most important mission of a central bank is keeping up the stabilization of the European financial system, so it is logical that ECB decides a lot for the keeping up a healthy economic system. Indeed, the ECB measures the market by controlling the refinancing rate, the deposit rate, and the marginal lending as directing refinancing tasks where it designates capital dependent on its own examination of economic conditions for the euro area. In fact, European Banking Federation announce report about Euro Overnight Index Average which is controlled by ECB. This report which is published in act/360 include the daily weighted average of overnight rates for unsecured interbank lending in euro area.

From this viewpoint, we can think about the market could be shaken in an indirect way or could not. Forward lead is given by ECB and it gives by providing information about its future monetary policy intentions, based on its assessment of the outlook for price stability. Therefore, the answer is yes. So those information could lead to a heavy shocks in the market. The European council organizes monetary policy meeting in regular period (every two weeks) in Frankfurt, Germany. After European council meeting, the ECB set media conference, president explains the decisions and answers the questions from the media. Also FOMC set meetings eight times in a year. ECB and FOMC topics

¹President of the ECB, at the Frankfurt European Banking Congress, 22 November 2019

are nearly similar but not exactly the same. Generally FOMC discuss about the political monetary issues.

In fact, the Federal Reserve thinks modest inflation has important economic benefits, and it has aimed since 2012 to keep prices rising at an annual pace of 2 percent.

In a nutshell, one can try to investigate if the announcements of the Central Banks, the ECB or The Fed can shake enough the rates. In order to do so we have proceeded in two ways the first part we investigate the effect on the Eonia rates and also on the Euribor since the last one is the most used instrument for lending money between banks, so any effect should be observed in the Euribor and the maturity has to be a significant parameter for our study. Indeed, one can also think of the announcements on the long term rates and this is our second part.

3 Literature development

it exists a wide literature on the effect of the ECB and FED announcements on the interest rates, we start from the paper of doctor Monticini in which he describes perfectly the effect of the news on the interest rates. He described that effect as change in the conditional expectation of the spot rates, which means that $N_t = E(r_m|I_t) - E(r_m|I_{t-1})$.

Indeed this conditional expectation could be seen as price of futur at time t with maturity m so $E(r_m|I_t) = f_{t,m}$, in the end we have that $N_t = f_{t,m} - f_{t-1,m}$. Finally he described the linear model in which he asses the changes of the spot rate as function of the changes in future prices and using dummies that takes 1 if an announcement exists at that date or 0 else, for both the ECB and the Fed. so he had that:

$$\Delta r_t = \alpha_0 + \alpha_1 D_1 + \alpha_2 D_2 + \beta_1 D_1 * N_t + \beta_2 * D_2 * N_{t+1} + \Delta r_{t-1} + \epsilon_t$$

D_1 dummy of the ECB and D_2 dummy of the fed. Indeed the choice of N_{t+1} stems from the fact that the FED announcement is given at 18:15 GMT so Nt would contain just the ECB shocks but not the fed shocks.

After an empirical analysis that he performed over a period that is divided into two from 1999:01:01 to 2004:06:30 and from this date until 2006:08:30. He found that shocks are mainly driven by the ECB announcements since the spot rates undergo the futur shocks. however it's not the case for the fed since there is no statistical evidence on those shocks during all those maturities ,which is convenient with results of Thornton (2009). Moreover in his analysis he used OLS but with wild bootstrap since his data suffered from the problem of non normality and (HC) heteroscedasticity consistent covariance matrix

Another study that sounds interesting for us and it stimulated us is the study that I mentioned in the abstract which the study of Paul Huberta and Fabien Labondancea (2018) on (OIS) rates overnight indexed swaps. those two tried to investigate not only the shocks that doctor Monticini had mentioned before but also another shocks that is called Krippner shocks which a difference between shadow rates because it incorporates private reactions to central bank all the decisions, and central bank communication of the health of the economy. Indeed he added to the work of Monticini Control variables and he used a set of variables such as ESI economic sentiment index and oil prices in order to solve the problem of the Bias of the ommitted variable. He solved the problem problem using OLS but using HAC-corrected robust standard errors since he suffered from autocorrelation and heteroskedasticity. Indeed, he implemented also an ARCH model to solve the clustering of volatility. He concluded his work by the results that affirmed Monticini results that the shocks of the announcements of the ECB negatively impacts the change of the OIS rates in long term. We can also states that the idea (K.Bernoth) of considering the Euribor as dependent variable is very used in order to understand the jumps of the market.

4 Empirical Analysis

Since the data of the futures was not disponible because of the problem of maturity and liquidity we have decided to use a proxy that captures the shocks of the announcements and we have found that the article of Paul huberta describes a new type of shocks which is called Krippner shock which the daily change of the shadow rate . We recall that a shadow rate was invented by Black (1995) and Rogers (1995), since they had the problem of short interest rate that is negative so they have created SSR_t such that $r_t = \max(SSR_t, 0)$ in order to continue on using all the properties with the positive short rate indeed, it is used by chicago board monetary when the policy entered the zone termed the “zero lower bound.”

Indeed we have used the daily change of the Interest Rate Swap Volatility Index $SRVIX_t$ that’s quoted on Chicago board, which measures the fair market value of future volatility implied by the swaptions , so we have thought about it as tool to capture the shocks on the fed rates and as consequence the market of swaption so one can think about its volatility.

Finally, in order to remove the Omitted-variable bias we have used a control variable which is STOXX 50 that is traded on Eurex and it includes 50 blue chip stocks across 12 eurozone countries The index captures about 60% of the free-float market capitalization of the EURO STOXX. Our dependant variables are Euribor rates written on different maturities from 1 week, 3 months, 6 months, one year and also the Eonia rates.

Our Data contains 2007 observations taking from 2012-06-18 till 2017-12-14 indeed as usual, the dummies a D_{ECB} take value 1 if there is an announcement and 0 else and the same for the D_{Fed} . The model then can be described as follow:

$$\Delta \mathcal{E}_{t,m} = \alpha_0 + \alpha_1 D_{ECB} + \alpha_2 D_{FED} + \beta_1 D_{ECB} K_t + \beta_2 D_{FED} V_t + \beta_3 C_t + \epsilon_t$$

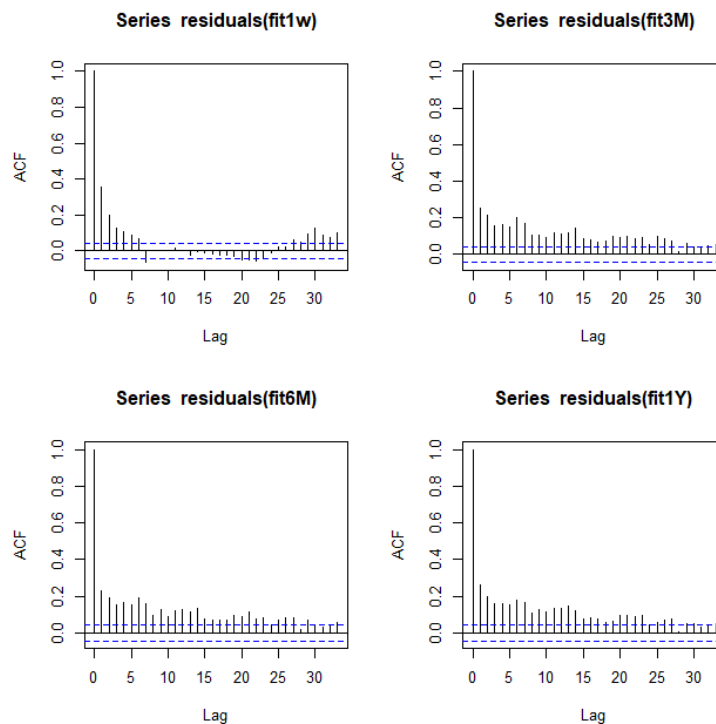
$$i.i.d \epsilon_t \sim (0, \sigma_t^2)$$

Where $\mathcal{E}_{t,m}$ is the Euribor rate and $m \in \{1W, 3M, 6M, 1Y\}$

K_t is Krippner shock which is $K_t = SSR_t - SSR_{t-1}$. Moreover, V_t is the daily change of logarithm of the SRVIX which is $V_t = \ln \frac{SRVIX_t}{SRVIX_{t-1}}$, and C_t is the control variable which is $C_t = STOXX_t$

Before, running the OLS we had to make some interpolations since the shadow rate is given on a monthly basis but we need the daily changes. Indeed, we had other variables that are written on business days so we had to make some interpolations, Indeed we refer to the work of Paul huberta.

After running the OLS, we have noticed the coefficients are statistically significant on all the maturities with a p value that is very low. However, we have suffered from many problems of heteroskedasticity and autocorrelation that is shown in the graph since the residuals follow an autoregressive process, as the sample autocorrelation function decays quickly for the first few lags, we have then to test if the errors are serially correlated. Indeed, using the OLS on the EONIA rates has shown us that the effects of the of all the coefficients are not significant with p value that is high.



	1W	3M	6M	1Y
Breusch-Pagan	$p < 2.2 * 10^{-16}$	$p < 2.2 * 10^{-16}$	$p < 2.2 * 10^{-16}$	$p < 2.2 * 10^{-16}$
Breusch-Godfrey	$p < 2.2 * 10^{-16}$	$p < 2.2 * 10^{-16}$	$p < 2.2 * 10^{-16}$	$p < 2.2 * 10^{-16}$

Indeed we have Implemented Breusch-Pagan test in order to check the presence of heteroscedasticity, the result show that we should reject the hypothesis of homoskedasticity and then we have to correct this problem. Also, we showed using Breusch-Godfrey with order equal to 6 the existence of autocorrelation. In presence of these problems, we used the (HAC) Heteroskedasticity and autocorrelation consistent estimation of the covariance matrix in order to solve those problems the estimation are given in the tables.

After the correction we have noticed that the longer the maturity the stronger the effect of the shock, indeed, one can see that effect on Euribor of 1 week has completely fade away, The effect of shocks of the ECB is the one that remains and just for maturities bigger than 3 months, which is convenient with results of Both doctor Monticini and Paul huberta. Indeed we have observed that effect is negative on the dummies and it's positive for the shocks which means that restrictive monetary policies increase the Euribor rates.

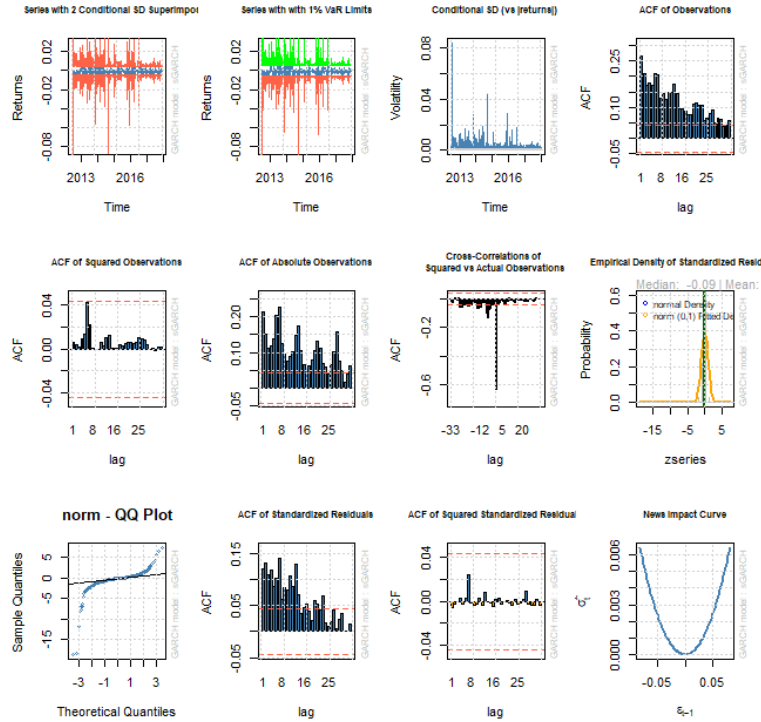
Moreover, we have noticed big changes followed by big changes and vice versa so in order to manage this problem of clustering of Volatility we have implemented an ARCH(1) model in which we have :

$$\Delta \mathcal{E}_{t,m} = \alpha_0 + \alpha_1 D_{ECB} + \alpha_2 D_{FED} + \beta_1 D_{ECB} K_t + \beta_2 D_{FED} V_t + \beta_3 C_t + \epsilon_t$$

$$i.i.d \epsilon_t \sim (0, \sigma_t^2)$$

$$\sigma_t^2 = \omega + \alpha_1 \sigma_{t-1}^2.$$

After performing the test we have found that the coefficients are statistically significant and the intercept is near 0.


Table 1: Parameter Estimates of the ARCH(1, 0) for Euribor 1Y

	Estimate	Std. Error	t value	$\Pr(> t)$
mu	-0.0001	0.00000	-29.775	0
omega	0.00000	0	9,613.764	0
alpha1	0.999	0.059	16.992	0

Indeed we went deeper into some common topics that macroeconomists have developed throughout the years, with some special attention payed for the variables that have a low susceptibility to time. All the datas are provided and downloaded from the ECB statistical warehouse. Some of the datas are updated monthly, whereas other variables are updated every 3 months. We have decided to keep the three months distance among updates for every variable, since we believe that considering monthly fluctuations might not be satisfying due to our goal to describe the economic environment in the long period. The variables that we are going to take into account are those who follow:

1) Monetary aggregate (M3); there are more ways to compute the Monetary Aggregate:

- M1, the restricted monetary aggregate which is composed by the currency and very liquid financial assets (those who can be used as payment), and the

monetary base (the M0).

- M2, also dubbed as the ‘intermediate aggregate’, including M1 and other financial assets that are still highly liquid but cannot be converted to the M1’s types due to various kinds of restrictions (mainly because of the legal system).

-M3 includes M2 and other liquid financial instruments emitted by monetary financial institutions with a highly-guaranteed price. We will consider the M3, which is actually the one published by the ECB, even though some foreign institutions (such as the Fed) prefer to rely only on M2, not considering it more informative than M2 itself. The Monetary aggregate is therefore a good proxy to quantify the money in the economic system, in more technical terms it represents the ECB’s money supply.

2) GDP growth rate in the Euro area (considering current market prices).

3) The inflation growth rate in the Euro area.

4) The productivity of labour’s fluctuations in the Euro area.

5) The unemployment rate in the Euro area.

6) Long term interest rates: we use Italian interest rates as a proxy.

Considering how monetary policy has been working in the past years, It is highly unlikely that, announcements made by the ECB are not believed. In addition, the trend seems to remain stable even with the COVID crisis and the change of president (C.Lagarde recently took Mario Draghi’s place). Taking also into account how often ECB’s meetings take place, it is very difficult to catch up them with an additional variable affecting the Interest rate’s trend even more. It seems that there is no significant evidence that some more ECB’s meetings in a specific year will lower the Interest Rates even more. A challenge for the future will arise when ECB will finally decide to raise IR. Markets will simply find it unbelievable.

5 Conclusion

In this work, we have tried to investigate the effect central banks announcements on interest rates, we have started by understanding the framework of the monetary policies, hence the question of the predictability of the market rises when we have tried to understand in an implied way the market efficiency, and how agents can influence in indirect way the rational decisions of investors. We have shown that, Euribor rate can be a tool to capture the negative affects of the policies of the european central bank however we couldn't come up with any statistical evidence to assume that the fed could also shake the european market even if it has notoriety abroad.

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Table 2: Dynamic Effects of the news on the interest rates

	<i>Dependent variable:</i>				
	EONIA	EURIBOR1W	EURIBOR3M	EURIBOR6M	EURIBOR1Y
	(1)	(2)	(3)	(4)	(5)
dummy_fed	-0.002 (0.002)	-0.001 (0.0004)	-0.0004* (0.0002)	-0.0003 (0.0002)	-0.0005* (0.0003)
dummy_ecb	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)
dummy_change_fed	-0.0002 (0.002)	0.0005 (0.0004)	0.0002 (0.0002)	0.0002 (0.0002)	0.0002 (0.0002)
dummy_change_Ecb	-0.123 (0.137)	0.364 (0.246)	0.391* (0.218)	0.410* (0.213)	0.432** (0.206)
Stoxx	0.0001 (0.0002)	0.00004 (0.0001)	0.0001** (0.00004)	0.0001*** (0.00004)	0.0001*** (0.00004)
Constant	-0.002 (0.006)	-0.002 (0.002)	-0.004*** (0.002)	-0.005*** (0.002)	-0.005*** (0.002)

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 3: Confidence intervals from 1 week till 1 year

	2.5 %	97.5 %	2.5 %	97.5 %	2.5 %	97.5 %	2.5 %	97.5 %	2.5 %	97.5 %
(Intercept)	-0.004	0.00002	-0.006	-0.003	-0.006	-0.004	-0.006	-0.004	-0.006	-0.004
dummy_fed	-0.001	0.0001	-0.001	-0.00002	-0.001	0.0001	-0.001	0.0001	-0.001	-0.00002
dummy_ecb	-0.003	-0.001	-0.002	-0.001	-0.003	-0.001	-0.003	-0.001	-0.003	-0.001
dummy_change_fed	-0.0002	0.001	-0.0003	0.001	-0.0003	0.001	-0.0003	0.001	-0.0003	0.001
dummy_change_Ecb	0.267	0.461	0.327	0.454	0.343	0.477	0.359	0.477	0.359	0.505
Stoxx	-0.00001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0002	0.0001	0.0002