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On the "Hirshleifer effect" of unscheduled monetary policy announcements.

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Abstract

When monetary policy announcements are expected to occur at scheduled dates, the event of an unscheduled announcement often "surprises" financial markets. However, if the information provider knows the future policy beforehand, he might be induced to anticipate the release of information without waiting for the next scheduled date, on the assumption that better informed traders will be able to attain superior equilibria. On January 3, 2001, (and subsequently on April 18, 2001) the chairman of U.S. Fed announced a half point interest rate cut well before the next scheduled meeting. The real surprise for the markets was the timing, not the content, of the announcement. In this paper we look at the volume of trade in interest rate futures before these two dates and compare it to the volume of trade before scheduled meetings. We argue that the wrong timing of policy announcements might involve an "Hirshleifer effect" and prevent a significant volumes of securities to transact for hedging purposes.

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1 Introduction

Independent Central Banks have different procedures of delivering their monetary policy decisions to the public.

The monetary authority might announce interest rate changes at pre-scheduled and publicly available dates, e.g. after scheduled meetings of the monetary committee. Today, many Central Banks follow this procedure: among them, the Federal Reserve of United States (since 1994), the Bank of England (since 1997) and the European Central Bank (ECB). Alternatively, the monetary authority might follow a discretionary procedure and inform the markets about interest rate changes whenever considered appropriate. This was the case for the U.K. Treasury before Bank of England independence in 1998 and for many Central Banks of European countries (e.g. the Bank of Italy) before ECB was established.

Under rational expectations, were no transaction costs involved and markets complete, prices would perfectly reflect information and traders would continuously adjust their portfolios: in this respect, the procedure and the timing of announcement should not really matter. However, financial markets do respond differently to different procedures. When announcements follow a fixed and reliable schedule, agents trade and hold the relevant securities only for the time necessary to hedge against the risk of rate changes. A significant volume of trade clusters around the announcement date: before the scheduled date for hedging purposes and after the date, in order to re-adjust the portfolio to the difference between the realization and the expectation of the rate.

When announcements do not follow a certain practice, agents hold hedging securities according to their beliefs on the probabilities and magnitude of the monetary policy intervention.

Central Banks have often justified the adoption of a scheduled calendar for monetary policy announcements in order to reduce uncertainty, increase transparency and accountability and dialogue with the public[1].

Most importantly, Central Banks usually retains the option of acting between fixed announcement dates. Hence, if the information provider knows the future policy beforehand and believes that better informed traders attain superior equilibria, he will be induced to anticipate

[1]See Bank of Canada press release (2000): *The Bank expects that there will be a number of benefits from fixed announcement dates that will make monetary policy more effective. In particular, fixed dates will reduce uncertainty in financial markets associated with not knowing exactly when the Bank might announce an interest rate change. They should also focus greater attention on the economic and monetary situation in Canada; put greater emphasis on the medium-term perspective that underlies monetary policy; and increase the Bank's transparency, accountability, and ongoing dialogue with the public. Together, these improvements should contribute to better public understanding of the factors influencing monetary policy and increase the public's ability to anticipate the direction of policy.*

the release of information without waiting for the next scheduled date.

By releasing the information before the trade in assets takes place, the information provider might indeed destroy traders' insurance opportunities. Agents trade in financial markets in order to transfer income across time and contingencies. However, once uncertainty resolves, there is no scope for exchanging income across states of nature: all agents would otherwise arbitrage by transferring income into the realized state and out of the others. Timing plays here a relevant role: Hirshleifer (1971) was the first to point out that an unexpected, early release of information might have an adverse effect on the volume of trade.

Several authors have extended and qualified Hirshleifer's result on the adverse effects of public information, identifying conditions for public information to have social value. With different degrees of generality, Marshall (1974), Green (1981) and Hakansson et al. (1982) identify cases where a partial increase of information cannot be Pareto improving. Wilson (1975) shows that better information is Pareto impairing when agents have preferences represented by a log utility function. Sulganik and Zilcha (1996) study the welfare effects for a trading firm from exchange rates information improvements and Berk and Uhlig (1993) show that markets might be (endogenously) dynamically incomplete if some agents can choose to purchase earlier information. Recently, Schlee (2001) has given more general conditions guaranteeing that public information is Pareto impairing and finally, Sulganik and Zilcha (1996) have showed that information referring to tradable assets might be undesirable if agents are enough risk averse.

The relation between information and economic efficiency in economies with asymmetric information has also received some attention. It has been pointed out that incomplete financial markets with trade in nominal assets might have both revealing and non-informative equilibria (Polemarchakis and Siconolfi (1993)) but, due to the Hirshleifer effect, equilibria associated to prices that fail to be informative might or not dominate, ex-ante, the equilibria associated to informational efficient prices (Polemarchakis and Seccia (2000) and Citanna and Villanacci (2000)).

However, there is lack of empirical studies on the Hirshleifer effect. Rejection of costless information has been documented in two studies (Lerman et al. (1996) and Quaid and Morris (1993)[2]) reporting cases of people rejecting free tests on hereditary diseases for fear of loosing the insurance opportunity.
Our analysis looks into a quite different issue of undesirable, early release of public information.

On January 3, 2001, the chairman of the U.S. Fed surprised the financial markets by announcing a half point interest rate cut outside the scheduled Federal Open Market Committee (FOMC) meeting. The real surprise was the timing, more than the content, of the announce-

[2]The two papers are discussed in Schlee (2001).

ment. The same happened on April 18, 2001. There were also a surprise quarter point cut by the Fed on October 15,.1998 during LTCM and Russian Crisis.

In this paper we look at the volume of trade in interest rate futures, the instrument typically traded for hedging against rates' fluctuations. We compare the traded volume before the unscheduled meetings relative to the traded volume before the scheduled meetings. We present an empirical time series model for the daily data of the interest rate futures. Our results indicate that there is significant decrease of trading activities before any unscheduled change of Federal fund rates compared to a scheduled change. We therefore argue that a "surprise" in the timing of monetary policy announcements prevented transactions of a significant volume of securities for hedging purposes.

Section 2 briefly describes the theoretical problem. Section 3 and 4 present the empirical model and analyze the data on U.S. interest rate futures. Section 5 concludes.

2 Description of the problem

The trading activity extends over $T+1$ periods, denoted by $t = 0, 1, \ldots, T$, under uncertainty. At $t = 0$ the monetary authority announces the schedule of meetings of the Monetary Committee. Each meeting, denoted by $i = 1, \ldots, I$, is followed by an announcement on the interest rate levels, one of five possible outcomes: $-0.5, -0.25, 0, 0.25, 0.5$.

The Central Banker announcement on the interest rate is based on private information and on some form of the simple monetary policy rule proposed by Taylor (1993):

$$r_t = k + 1.5\pi_t + 0.5y_t, \tag{1}$$

where r_t is the interest rate at t, π_t is the inflation rate at t and y_t is the change of GDP at t.

The variables entering the Taylor's rule, GDP and inflation rate, are common knowledge. These variables are officially estimated and announced by the relevant agencies between meetings. The traders know the rule and change their interest rate expectations accordingly. Conditional on the realization of the macroeconomic variables, the economy is static. Agents' portfolio composition is stationary.

At each period before the announcement, risk averse agents form expectations on the basis of the Taylor's rule and trade in interest rate futures in order to hedge against interest rate uncertainty. They re-trade in the period after the announcements on the basis of the differences of expected and realized change of interest rate.

Figure 1 shows that on average there is more trade around scheduled meetings followed by an interest rate change than during any other days. This has also been observed by the Federal

Reserve Bank of Cleveland (FRB Cleveland) (Monetary policy report, July 2001). The FRB Cleveland attributed this phonomena to "... speculators trading contracts immediately before and after FOMC actions and from hedgers adjusting positions in other short-term financial instruments." It also thinks that "Increased futures- price volatility (around meeting dates) may have driven up volume as well, as it has in other futures markets."

[INSERT FIGURE 1]

The possibility of an announcement occurring outside schedule meeting, i.e. unscheduled announcement, is unforeseen by the financial market participants. Such an unforseen event is a "surprise" to the traders who will not hold the relevant portfolio from previous periods in order to hedge against such a change in policy.

3 The empirical model

The trading behavior of risk averse agents is modelled as follows. We look at the traded volume of short term interest futures as a function of changes of the Federal Funds rate following scheduled and unscheduled meetings' announcements.

$$\begin{aligned} v_t &= f(\Delta r_t, E_t(\Delta r_i)) + \epsilon_t, \\ \epsilon_t &\simeq ARIMA(p, d, q), \end{aligned} \tag{2}$$

where v_t is the volume of trading at time t, Δr_t is the change of Federal Fund rate at time t, and $E_t(\Delta r_i)$ is the market expectation of change of rate at the i^{th} meeting given public information at time t. We shall show that the two unscheduled meetings on 03 January 2001 and 18 April 2001 prevented agents form insuring against the cuts in the interest rate.

3.1 The model for expected interest rate changes

In his simple interest rate determination proposed as in (1), Taylor (1993, 1999) proposed as a descriptive rule $k = 1$ in order to capture some important factors influencing monetary policy and the general stance of policy from the mid-1980s onward.

Assume that the market believes that the FOMC will be using a form of Taylor's rule to produce their monetary policy targets. The market reacts on the basis of any official announcements of inflation rates and GDP, therefore

$$E_t(\Delta r_i) = \gamma_1 \Delta \pi_t + \gamma_2 \Delta y_t. \tag{3}$$

Also, if the market believes that FOMC is strictly following the Taylor's rule, then $\gamma_1 = 1.5$ and $\gamma_2 = 0.5$.

We compute the expected change of interest rate ($E_t(\Delta r_i)$) as

$$\Delta r_t^e = 1.5 \Delta \pi_t + 0.5 \Delta y_t. \tag{4}$$

we then use Δr_t^e as a proxy for $E(\Delta r_t)$ in equation (2).

We also take a generalized approach and directly include $\Delta \pi_t$ and Δy_t in equation (2) and estimate the reduced form of the structural equation (2) and (3).

We work similarly when estimating the model (4).

3.2 Brief description of the data set

$CBT30DAY_t$ is the indicator of the daily volume traded of CBOT® 30-Day Federal Funds futures at time t in the Chicago Board of Trade. $RATE_t$ is the Federal Funds at t determined by the FOMC after the scheduled and unscheduled meetings. $DRATE_t$ is the change in $RATE_t$ at t defined as

$$DRATE_t = RATE_t - RATE_{t-1}.$$

Define $DINF_t$, the change in inflation rate at t, as

$$DINF_t = INF_t - INF_{t-1},$$

where INF_t is the annual inflation rate at for a 12 months period as released by the Bureau of Labor Statistics (BLS) at time t. We also use the seasonally adjusted inflation figures released by the BLS as well. The Y_t is the advanced, preliminary and final estimates of the quarterly change in GDP as released by the Bureau of Economic Analysis. We define

$$DY_t = Y_t - Y_{t-1},$$

which give us the changes in GDP growth estimates.

The observations included in the dataset are from 03 January 1998 to 31 May 2001. There are 30 scheduled FOMC meetings during this time

In the analysis above, the underlying assumption is that there are no significant changes in the structure of the economy, so we restrict ourselves to this relatively recent developments. For longer time series data this assumption would be difficult to sustain.

4 Estimation of the model and results

We use a linear model to estimate the time-series model as proposed in (2). We differentiate between the announcements which changes the Federal Fund Rate and which do not. We introduce two dummy variables,

$$DumDRATE_t^0 = I\left[|DRATE_t| = 0 \text{ and there is a scheduled meeting at } t\right],$$
$$DumDRATE_t = I\left[|DRATE_t| \neq 0 \text{ and there is a scheduled meeting at } t\right],$$

where I is an indicator function.

To capture the effects of possible excess trading the day before scheduled announcements we use $DumDRATE_{t+1}^0$ and $DumDRATE_{t+1}$. For the day after announcement effects we include the lagged dummies $DumDRATE_{t-1}^0$ and $DumDRATE_{t-1}$. We also introduce a separate but similar set of variables to capture the effects of the surprise or unscheduled rate changes by introducing following dummy variable,

$$DumUDRATE_t = I\left[|DRATE_t| \neq 0 \text{ and there is a unscheduled meeting at } t\right].$$

To capture the effects of possible excess trading the day before the unscheduled announcement we use $DumUDRATE_{t+1}$. For the day after announcement effects we include the lagged dummy $DumUDRATE_{t-1}$.

We include the variables $DINF$ and DY to incorporate expected changes in Federal funds rate ($RATE$) as described in equation (4). We therefore estimate the following model (referred as Model 1).

$$CBT30DAY_t = c + \sum_{i=-1}^{1} \alpha_i^0 DumDRATE_{t+i}^0 + \sum_{i=-1}^{1} \alpha_i^s DumDRATE_{t+i} \qquad (5)$$
$$+ \sum_{i=-1}^{1} \alpha_i^u DumUDRATE_{t+i} + \gamma_1 DINF_t + \gamma_2 DY_t + \epsilon_t$$

where $\epsilon_t \simeq ARIMA(p,d,q)$.

From results in Table 1 we see that $DINF_t$ has a significant effect on the volume of trade whereas DY_t is not significant. This is probably due to the fact that the FED gives more weight on inflation than growth (by Taylor's rule) and the market anticipates that. So in the next model we directly compute the Taylor's rule for incorporating the expected change of FED rate by the market.

We can compute the expected change of interest as in equation (4), by

$$DRATE_t^e = 1.5 * DINF_t + 0.5 * DY_t,$$

and plug it in to the following model (referred as Model 2) as

$$CBT30DAY_t = c + \sum_{i=-1}^{1} \alpha_i^0 DumDRATE_{t+i}^0 + \sum_{i=-1}^{1} \alpha_i^s DumDRATE_{t+i} + \sum_{i=-1}^{1} \alpha_i^u DumUDRATE_{t+i} + \gamma ADRATE_t^e + \epsilon_t, \quad (6)$$

where $\epsilon_t \simeq ARIMA(p,d,q)$ and

$$ADRATE_t^e = |DRATE_t^e|\,.$$

We use the absolute value since the volume changes only with the magnitude of change of the Taylor's Rule.

From the results in Table 1 we find that the effect of absolute change in Taylor's rule is significant. So the market indeed believes that the FED is following the Taylor's rule.

For the sake of completeness we also regress equation 6 with $DRATE_t^e$ (referred as Model 3).

[INSERT TABLE 1]

4.1 Comparing trading of unscheduled announcements with trading of scheduled announcements

Our hypothesis is that the day before a FOMC meeting the market will be more active due to insurance taking activities. This activity will be more so if the market anticipates a change in Federal Funds rates. We see from Table 1, that the market does not react the day before scheduled announcements if there is 0 point change but there is a significant amount of trading activity the day before if there is a change.

If we look at the trading activity the day before the unscheduled announcement, then we see that there is no significant excess trade. In fact there is a negative (though not significantly so) trading activity before 15th October 1998, 3rd January 2001 and 18 April 2001 rate changes, this even though two of these were a half a point change. The results are robust irrespective of how the market formulates his expectations about rate changes.

5 Conclusion

When monetary policy announcements are expected to occur at scheduled dates, unscheduled announcements, by preventing agents to hedge against policy changing, might have an adverse effect on the volume of trade[3].

We show that there is more trade on the day before a scheduled announcement even after taking into account actual changes in the federal funds rates and expected changes in rates, and after explaining the trading volumes. When there is an unscheduled announcement this trade is lost and our models show that this loss of trade is statistically significant. An unscheduled monetary policy announcement does entail an Hirshliefer effect.

We do not perform a welfare analysis nor suggest whether the Central Bank should prescheduled the possible policy announcements or should follow a discretionary rule. We just show that by not following the schedule the Central Bank may prevent important hedging opportunities by traders in the financial markets. So if the Central Bank opts for a scheduled calender of policy announcements then it is better not to surprise the markets, or else it may release information to the markets in a discretionary way[4].

How markets and economies might perform under different regimes remains an open question.

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[3]Unscheduled announcements will have such an effect only until the schedule is credible.

[4]This has been in the case of Reserve Bank of India (RBI). Contrary to the trend of major Central Banks in the last decade, the RBI has switched from a scheduled bi-annual procedure of announcements to a discretionary procedure in 1999. The RBI decided to make structural and medium term policy announcement on schedule but decided that "[$\cdots$] *short-term measures, such as changes in the Bank Rate, CRR, Repo rates, access to refinance, etc. may also be included if proposed changes in these variables happen to coincide with the timing of the April statement. It will be understood that these short-term credit and regulatory measures are subject to change at short notice in the light of actual developments and emerging external market conditions.*" See: Reserve bank of India, Press Release, April 1998. It is believed that the reason has been that scheduled meeting has been weakening the independence of the Central Bank from market expectations on short term changes.

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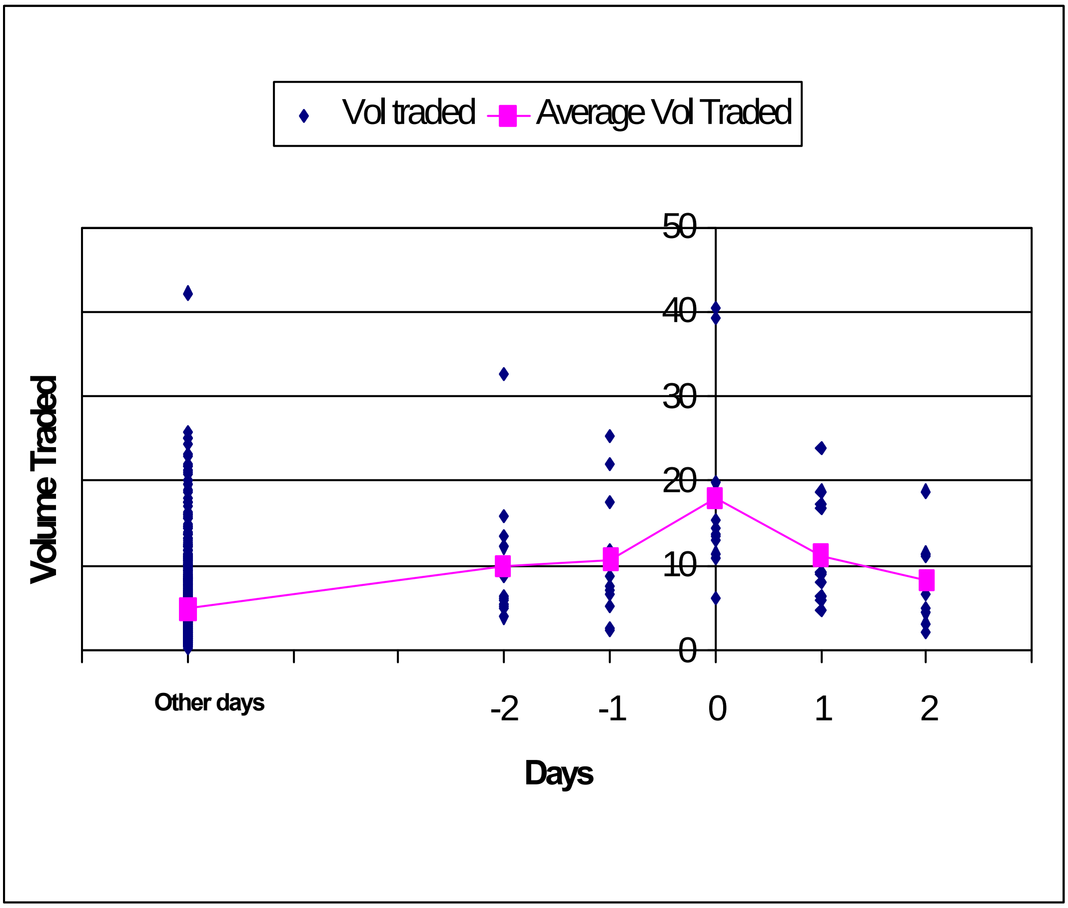

Volume traded in CBT30day Futures, before and after changes in rates (Scheduled Meetings)

Table 1: **Estimation Results**

	Model 1		Model 2		Model 1	
Number of obs	855.00		855.00		855.00	
Wald chi2	3222.25	0.00	2862.86	0.00	2853.63	0.00
Log likelihood	-8131.75		-8129.61		-8129.25	
	Coeff	p-values	Coeff	p-values	Coeff	p-values
DY_t	-267.26	0.56				
$DINF_t$	2603.73	0.00				
$DRATE_t^e$			1056.37	0.00		
$ADRATE_t^e$					1104.54	0.00
$DumDRATE_t^0$	4018.24	0.00	3914.17	0.00	3908.92	0.00
$DumDRATE_t$	11169.75	0.00	11112.00	0.00	11122.09	0.00
$DumDRATE_{t+1}^0$	316.93	0.71	201.41	0.82	199.48	0.82
$DumDRATE_{t+1}$	2537.12	0.00	2472.16	0.00	2482.89	0.00
$DumDRATE_{t-1}^0$	870.05	0.49	776.00	0.55	775.15	0.55
$DumDRATE_{t-1}$	3783.30	0.00	3795.35	0.00	3801.37	0.00
$DumUDRATE_t$	14471.28	0.00	14775.30	0.00	14793.58	0.00
$DumUDRATE_{t+1}$	-136.41	0.96	-337.12	0.91	-322.60	0.91
$DumUDRATE_{t-1}$	9113.06	0.00	9285.31	0.00	9297.85	0.00
$Constant$	5041.82	0.00	1257.93	0.36	1079.42	0.44
$AR(1)$	0.42	0.00	0.41	0.00	0.41	0.00
$AR(2)$	0.13	0.00	0.12	0.00	0.12	0.00
$AR(3)$	0.14	0.00	0.12	0.00	0.12	0.00
$AR(4)$	0.10	0.00	0.09	0.00	0.09	0.00
σ	3266.30	0.00	3258.61	0.00	3257.27	0.00