Irving Fisher Committee on
Central Bank Statistics

BANK FOR INTERNATIONAL SETTLEMENTS

Ninth IFC Conference on "Are post-crisis statistical initiatives completed?"

Basel, 30-31 August 2018

Evaluation of the transmission of the monetary policy interest rate to the market interest rates considering agents expectations [1]

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[1] This paper was prepared for the meeting. The views expressed are those of the authors and do not necessarily reflect the views of the BIS, the IFC or the central banks and other institutions represented at the meeting.

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Deicy Cristiano-Botia, Eliana Gonzalez-Molano, Carlos Huertas-Campos[1]

Abstract

Alternative economic models are used to determine whether policy interest rate expectations and unanticipated changes in the reference interest rate affect saving and credit interest rates. We found empirical evidence that policy surprises have predict power to set passive and active interest rates. Similarly, results show that to fix their interest rate financial entities take into account their expectations about policy rate. On the other hand, we found evidence of changes in deposits rates in advance of the announcement of the monetary authority and no significant change on the day of the announcement and the day after the change.

Keywords: Expectations, Monetary Policy, Interest Rates and Transmission Mechanism.

JEL classification: D84, E43, E52, E58

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Contents

1. Introduction

A way to evaluate the degree of transmission of changes in the monetary policy interest rate to market interest rates is to measure it after the decision of the Central Bank. I.e., calculating how much has changed a specific interest rate once the Board of Directos make a policy announcement. This methodology does not consider the effects of the expectations of agents on the transmission. For example, the market can anticipate and partially incorporate the changes in the policy rate to the rates of interest of the economy, and therefore, the transmission would be underestimated. This is important, since in theory, both not anticipated and anticipated changes in the policy rate by financial institutions have effects on the setting of market interest rates.

In this context, this document analyzes the transmission of changes in the monetary policy interest rate on the 90-day deposit rate and the interest rates for credits for both ordinary and preferential loans, considering the expectations of agents on future monetary policy decisions. These expectations are based on the information available each period and the agents forecast ability.

Empirical analysis comprises three exercises. Firstly, we evaluate the effect that has the unanticipated component of changes in the policy rate to market rates (Vargas et al (2012)). This component is defined as the forecasting error that agents make to project changes in the policy rate using all available information. Second, we present a model under the conditional expectations hypothesis, in which, a medium-term interest rate is defined as the average of the expected short term rates for all periods until maturity. Finally, an analysis of the behavior of short-term interest rates is made considering daily data and taking into account the time intervals defined in Roley and Sellon (1995). To this end, we evaluate the prospective or anticipated effect and the immediate effect of the changes in the policy rate decomposing the estimation in three time periods: a day previous to the announcement, the day of the announcement and the day Post-announcement.

This document consists of four sections and the first is this introduction. Section two contains a review of literature and section three explains the econometric models and present estimation results and the final section concludes.

2. Literature review

According to Loayza and Schmidt-Hebbel (2002) monetary policy rules that use central banks evaluate its efficiency and optimality mainly through four channels of transmission of monetary policy: the interest rate channel, the channel of asset prices, the exchange rate channel and credit channel. These channels affect the macroeconomic variables in different speed and intensity.

Alternatively, the literature identifies the expectations channel, which considers the intertemporal effects associated with the projections of the stance of the Monetary Authority and the present and future behavior of the main variables of the economy. In this way, the beliefs of agents on the shocks and the expected behavior of the main macroeconomic variables affect the effectiveness of the transmission. Similarly, effectiveness also depends on the credibility of the Central Bank and the agents reaction to future policy announcements. To the extent that the credibility of the Central Bank and other institutions is high, the expectations channel has a greater role given that the formation of expectations will be in line with the economic policy measures.

In theory, long-term rates can be defined as the average of the expected interest rates of short term until the maturity plus a risk premium. Therefore, it is important to know the expectations of agents on future changes in the policty rate. Faced with this situation, Ellingsen & Söderström (2001) argue that monetary policy actions respond to new and private information, as well as changes in the preferences of the central bank in terms of the stabilization of the output and inflation. Thus, a forecast of the policy rate must include all these variables.

One of the first analysis of the response of interest rates before the FED reference rate changes was made by Cook and Hahn (1989), who analyzed the daily relationship between the policy rate and the treasure bonds rates with maturities from 3 months up to 20 years. The authors analyzed for the 70's the movement of the interest rates of the Treasury bonds in the days close to the FED announcement (two days prior to each ad, the day of the announcement and the two days following the ads). They found that the market requires at least one day after the announcement of the FED to consider that the change is carried out. During this period the response of short-term rates was strong, moderate for the mid-term and weak for the long term (being significant for all maturities). Likewise, to analyze the relevance of the theory of expectations, the authors found a strong influence of the expectations on the movements in the daily market rates at the different maturities.

Roley and Sellon (1995) studied the response of the long-term rates taking into account the tendency of the market to anticipate monetary policy actions. They found that these forecasts influence the transmission of changes in the policy rates to long-term interest rates. As the authors says, financial institutions have incentives to match the profitability of its portfolio to different maturities. Therefore, they include and adjust their expectations on long-term interest rates, considering the expected future changes in the short-term rates. As an approach of future long-term interest rates, the authors build an average rate from rates of short-term futures. They warn that the response in the long term rates can be inverse to that described by the monetary traditional view, since it depends not only on the expectations of policy rate, but also in the expected persistence of this. In this regard, Roley and Sellon make one caveat to mention that the magnitude of the expected response may vary depending on the perception that agents have on the phase of the economic cycle in which the economy is currently. Thus, surprising policy announcements (which do not correspond to the perceived phase of the economic cycle) will generate a greater response in rates since agents should adjust their investments for short or long term depending on the expected persistence.

Kuttner (2001) estimated for United States (between June 1989 and February 2000) a uniform and inferior interest rates response with respect to that found by Cook and Hahn, using the same methodology but with information from the federal funds futures market of the United States (as proposed by Roley and Sellon (1995)). The author suggests that the difference is in comparing changes in rates expected and unexpected in the period posterior to the monetary policy announcement. They found that the response of interest rates to anticiated policy action is low, while that of unanticipated changes is high and significant.

The relationship between monetary policy and long-term interest rates is widely documented, however, responses differ across countries. Skinner and Zettelmeyer (1995) conducted an analysis for Germany, France, United Kingdom and United States on the response of long-term rates to policy actions using the unanticipated component of monetary policy. It was found that for the United States long term rates are adjusted in 41.2% of the unanticipated shock, for the United Kingdom this setting is 27.9%, while there is a lower setting for Germany and France (10.1% and 8.7%, respectively).

On the other hand, authors like Thornton (2009) and Vargas et al (2012) analyzed the disconnection of the mechanism using market-based measures and structural factors such as fiscal policy. Thornton (2009) estimated again the response of interest rates reviewing Kuttner method, as it suggests that the changes in the federal funds rates respond to both monetary policy news, and others news of the market or the environment in general.

To correct the problem of bias some authors suggest the use of high-frequency data, others suggest the structural identification through simultaneous equations using constraints in the matrix of variances and covariances[2] . However, Thornton applied a model that conceptualizes more

[2] See Gürkaynak, Sack, and Swanson (2007); and Craine and Martin (2008).

accurately changes in the market interest rate by including in the Kuttner method two parameters: one that considers the bias to shocks generated by news of the environment and another that estimates the bias to unexpected changes in the policy rate. Separately estimated the effect for all days of the sample, and not only for the days prior or subsequent to the policy announcement, including a dichotomous variable to identify the days when monetary events occur. Their results indicate that traditional specification overestimates the effect of monetary policy, and that there is no transmission at rates exceeding 3 years of maturity, with the exception of 20 years, which is significant but with negative effect.

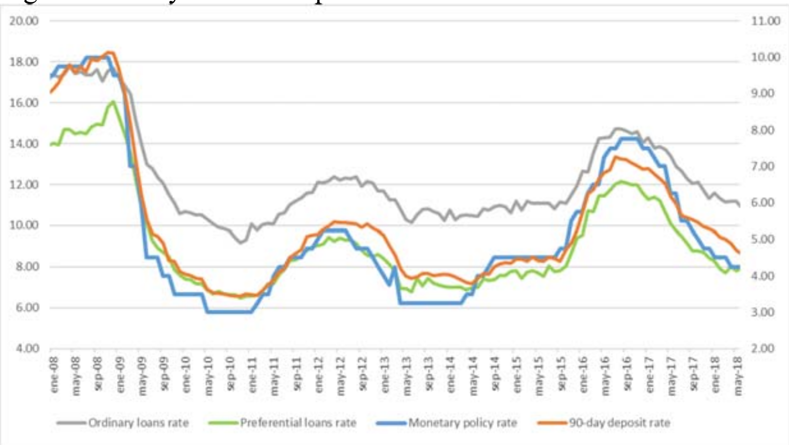
The literature also suggests that structural factors and the prevailing macroeconomic conditions may explain the transmission of the policy interest rate to market interest rates. Vargas et al (2012) analyzed the relationship between the credibility of the Central Bank and the transmission mechanism of monetary policy in Colombia for the period 2002-2011. In particular they analyze whether under a regime of monetary policy credibility, a change in the policy interest rate has less chance of being understood as a transitional move and more likely to be incorporated in government long-term bonds and, in general, in the interest rate of the financial market as being considered as a persistent long term monetary policy signal.

The authors apply the methodology of local projections proposed by Jorda (2005) in order to estimate the Impulse-response function (FIR) of the rate of interest on public bonds (TES) to an unexpected monetary shock. They later estimate a similar model to build the FIR of the market interest rate for loans and deposits given the shock in the monetary component as not anticipated by the agents. The results show, that after the reforms presented at the beginning of the decade of 2000, the response is more persistent for both the bonds and the market rates. They considered that structural improvements of policy that provide reliability to the economy, in particular the fiscal, has a positive effect on monetary policy, allowing to wide the maturity of bonds and as a result generate a deepening in that market. Therefore, they conclude that the strength of the monetary transmission mechanism is the result of structural factors as a sound fiscal policy and greater depth of fixed-rate public debt market.

3. Estimation of the impact of unanticipated shocks in the policy rate on market interest rates

This section discusses three types of models that explain the behavior of interest rates (passive and active) in response to unanticipated shocks in the policy interest rate for the period between October 2008 and May 2018; Figure 1 shows the dynamics of the deposit, the commercial credit interest rates and the policy rate. The market rates move with the policiy rate, but not at the same pace and magnitude. In the first model we estimate the response of a monetary surprise on the market intrest rates. In the second, a passive interest rate to a horizon of p periods forward (where p is a short period for an interest rate) is expressed as the average of the expected short-term (policy rate) for each period until maturity p. In the latest model we analyze daily 90-day deposit rate to determine if the effect of monetary policy decisions is made before, the day of the announcement, or immediately after the announcement.

Figure 1. Policy rate and deposit and credit market interest rates



Source: Financial Superintendency, Banco de la República.

3.1 The effect of unanticipated monetary policy shocks on the market interest rates

The change in the market interest rate (Δi_t) is explained by the unanticipated change in the policy rate (Ψ_t).

$\Delta i_t = \alpha_0 + \alpha_1 \Psi_t + \epsilon_t$ (Eq. 1)

Where i_t could be either the monthly 90-day deposit rate or the commercial loans rate for ordinary and preferential credits for the period from may,2002 to may,2018. (Ψ_t) is defined using two alternatives. In the first one, a regression model for the policy rate is estimated as a function of a set of variables available for all economic agents when the Board of Directors make policy decisions. We follow the work of Vargas et al, (2012), in which, they asume monetary authority does not necessarily follows a standard Taylor rule, but apart from the output gap and inflation deviation from target may include expectations. Thus, we include other variables that may add some information and signals of future behaviour of the policy actions. So, with variables describe in equation 2, we obtained a one-step ahead forecast for the policy rate and we define the unanticipated monetary policy shock as the forecasting error obtained from this equation.

$$i_t^p = f\left(Y,\ \bar{\pi}, \pi^{USA},\ \Delta s, ICI,\ CCI\right)_{t-p} + \Psi_t \qquad \text{(Eq 2.)}$$

$$\Psi_t = i_t^p - i_{t/t-1}^p$$

Where Y : Output gap, $\bar{\pi}$: Inflation deviation from target, π^{USA}: USA Inflation, Δs: Nominal devaluation, ICI: installed capacity index, CCI: consumer confidence index.

The second alternative (Equation 3), considers as a measure of the unanticipated monetary policy shocks the forecasting errors of the expectations of the policy rate made by the agents through the monthly expectations survey[3].

$\Psi'_t = TI_t - E_{t-1}(TI_t)$ (Eq. 3)

The estimation results for the 90-day deposit interest are shown in Table 1.

Table 1. Estimation of effect of unanticipated monetary policy shock

	90-day Deposit rate	
Coeficient	1	2
Shock	0.44	0.49
	(0.11)	(0.17)
constant	-0.005	-0.003
	(0.00)	(0.00)
Adjusted R^2	0.28	0.11

* Significant at 10%, ** significant at 5%, *** significant at 1%
1: monetary shock estimated as the forecasting error from equation 2
2: monetary shock estimated as the forecasting error from expectation survey

The coeficient associated to the monetary shock with both measures of the shock is positive, significant and close each other and may be interpreted as the change in the 90-day deposit rate due to an unanticipated change in the policy rate.

The estimation results for the credit rates are shown in Table 2.

Table 2. Estimation of the effect of unanticipated monetary policy shock on the commercial credit interest rates

	Commercial credit rates				
	Ordinary loans			Preferential loans	
	1	2		1	2
Shock	0.43	0.58	Shock	0.56	0.7
	(0.11)	(0.22)		(0.11)	(0.22)
constant	-0.003	-0.004	constant	-0.005	-0.003
	(0.00)	(0.00)		(0.00)	(0.00)
Adjusted R^2	0.11	0.06	Adjusted R^2	0.17	0.08

* Significant at 10%, ** significant at 5%, *** significant at 1%
1: monetary shock estimated as the forecasting error from equation 2
2: monetary shock estimated as the forecasting error from expectation survey

[3] The monthly expectations survey is applied to financial analysts and some institutions of economic research. It asks expectations about future inflation, Exchange rate, output and the policy rate for different horizons.

The results indicate that the monetary policy shock, obtained with both methodologies is significant in explaining the changes in both commercial credits rates. However, for preferential loans, the transmission is higher than for ordinary loans and there is a non negligible difference in the estimates of the two definitions of the shock.

Using Equation 1 and the local proyections methodology proposed by Jordà (2005), we estimate the impulse-response function of a monetary shock on the market interest rates. The FIR for the 90-day deposit rate is shown in Figure 2 for both definitions of the shocks. The effect is larger and longer for the shock estimated from the model than from the survey of expectations. For expectations definition of the monetary shock, the effect is bigger one month after the shock (84%) and last up to 10 months. For the shock obtained from the model the peak of the effect of the monetary shock is also one month after the shock is observed, but the effect is smaller (55%) and last longer, up to 15 months.

Figure 2. FIR of a monetary policy shock on the 90-deposit interest rate

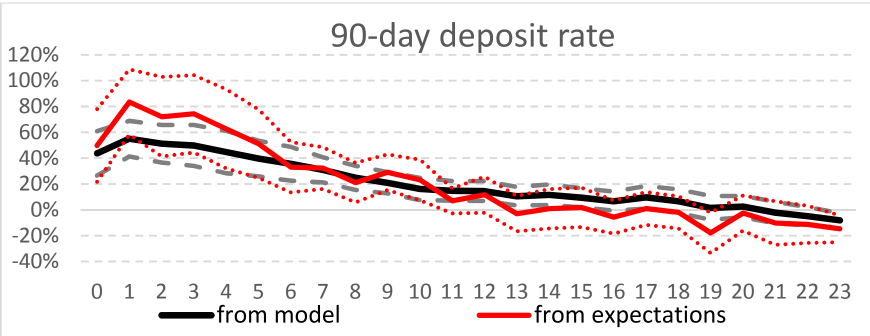
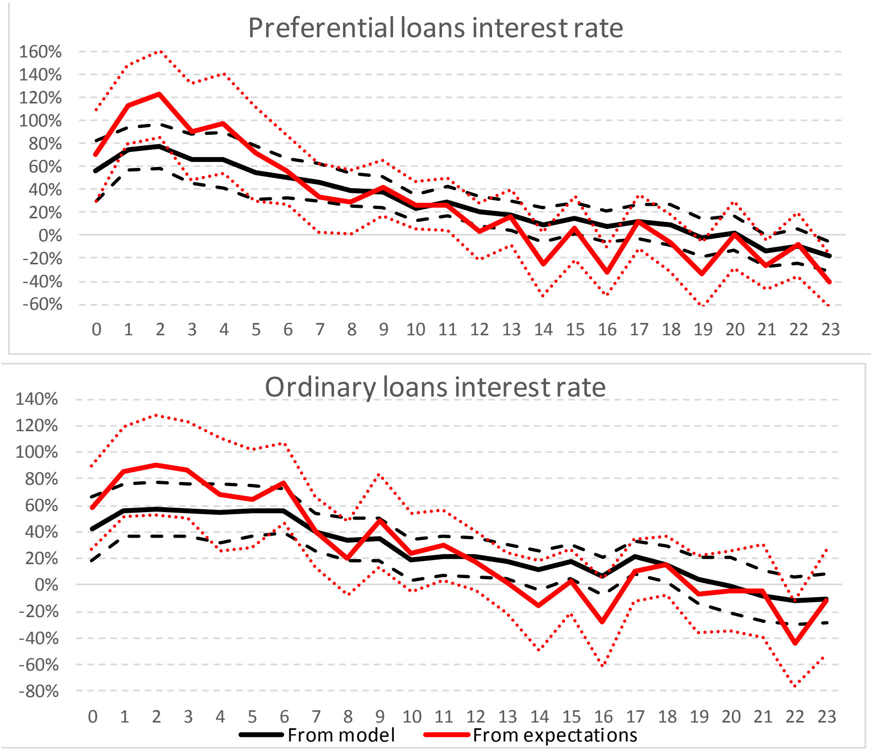


Figure 3. FIR of a monetary policy shock on commercial credit interest rates



For credit rates, we observed that the effect is higher for the preferential than for the ordinary loans rate. The duration of the effect is shorter than the observed for the deposit rate, about 8 to 10 months. The reaction of credit rates is bigger for the shock defined from expectations than from the model. The preferential rate overreact to the unanticipated change in the policy rate with the former definition of the shock and the peak of the effect is two months after the shock occurs. For the ordinary rate the reaction is less than proportional to the shock but also the peak is two months after the shock occurs. With the later defintion of the shock, the effect last longer, like 12 to 13 months, and the magnitud of the responses are inferior to those of the shock measured with expectations. Again, the effect is bigger for the preferential rate than for the ordinary rate.

3.2 unanticipated monetary shocks estimated as the average of short-run expectations

In theory, market interest rates can be defined as the average of the short run interest rates up to maturity. In this exercise, we use the policy rate as a proxy of the short-run interest rate and the 90-day deposit rate as the market rate. It is not possible to do this exercise for the commercial credit rates since the maturiry is at least a year and there is not expectations for the policy rate available for further horizons than eleven months ahead. Thus, the 90-day deposit rate in monrth t, is defined as the average of the policty rate in month t, and the expectations for the next two months (i_t^{mp}), $E_t[i_{t+1}^{mp}]$ y $E_t[i_{t+2}^{mp}]$.

$$i_t^{90-day} = \frac{1}{3}\left(i_t^{mp} + E_t[i_{t+1}^{mp}] + E_t[i_{t+2}^{mp}]\right) \qquad (Eq.\ 4)$$

Thus, the change in the 90-day deposit rate is represented by:

$$\Delta i_t^{90-day} = \frac{1}{3}\left(i_t^{mp} - E_{t-1}[i_t^{mp}]\right) + \frac{1}{3}\left(E_t[i_{t+1}^{mp}] - E_{t-1}[i_t^{mp}]\right) + \frac{1}{3}\left(E_t[i_{t+2}^{mp}] - i_{t-1}^{mp}\right) \qquad \text{(Eq. 5)}$$

then, by adding an error term, the model may be rewritten as:

$$\Delta i_t^{90-day} = \alpha_1\left(i_t^{mp} - E_{t-1}[i_t^{mp}]\right) + \alpha_2\left(E_t[i_{t+1}^{mp}] - E_{t-1}[i_{t+1}^{mp}]\right) + \alpha_3 E_t[i_{t+2}^{mp} - i_{t-1}^{mp}] + \epsilon_t \text{ (Eq. 6)}$$

Where we define the following terms:

$$unanticipated\ monetary\ policy\ surprise = i_t^{mp} - E_{t-1}[i_t^{mp}]$$
$$expectations\ revision = E_t[i_{t+1}^{mp}] - E_{t-1}[i_{t+1}^{mp}]$$
$$expectations\ of\ the\ monetary\ policy\ rat\ in\ the\ whole\ period = E_t[i_{t+2}^{mp} - i_{t-1}^{mp}]$$

The last term is the total change of the monetary policy rate in the whole period up to maturity of the 90-day deposit rate, which is the average of the changes in the policy rate of each month.

$$E_t[\Delta i_{t+2}^{mp} + \Delta i_{t+1}^{mp} + \Delta i_t^{mp}] \qquad \text{(Eq. 7)}$$

then,

$$\Delta i_t^{90-day} = \alpha_1\ unanticipated\ monetary\ shock + \alpha_2 expectations\ revision + \alpha_3 expectation\ of\ total\ change\ in\ the\ policy\ rate + \epsilon_t$$

In order to estimate the Equation 6 we use the expectations for the policy rate from the monthly expectation survey. Results are shown in Table 3.

Table 3. Estimation of Equation 6

	Coeficient	Estimate	std error
Monetary policy surprise	α_1	0.188	0.089
expectation revision	α_2	0.124	0.121
expectation of total change in the polity rate	α_3	0.465	0.095

* Significant at 10%, ** significaant at 5%, *** significant at 1%

Both (α_1) and (α_3) coeficients are significant and thus, the monetary policy shocks and the expectations on the total change of the policy rate up to maturity are important to set martket 90-day deposit rate. On the other hand, it seems that the revisions of agents expectations (α_2) has not effect on setting the market rate.

In general the estimated model validates the theorical model, since the hyphotesis of equal weights of the three components, equal to (1/3) is not rejected, although the parameter of the expectations revision is not significant.

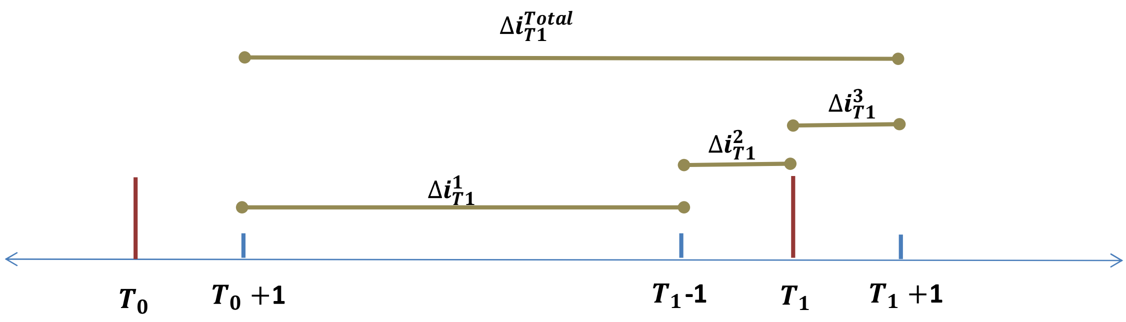
In summary, the changes in the 90-day deposit rate are mainly explained by the expectations of the agents about the changes in the policy rate as well as the monetary policy surprises, while the revisions of the expectations agents make about the policy rate on the different horizons up to maturity (90 days) seems not to be relevant to set this passive interest rate.

3.3 estimation of the effect of the changes in the policy rate through time.

Another alternative to check the transmission of the changes in the monetary policy rate to the market rates that involve expectations of the agents about the policy rate is the methodology proposed by Roley y Sellon (1995). They propose to analyse the effect in different moments during a month. Thus, estimate the anticipated effect, the effect that ocurs the day of the policy announcement and the day after the announcement. So, if for example the Board of Directors made two announcements about changes in the policy rate at the end of month T_0 and at the end of month T_1, then the three mentioned effects could be measure in the following way:

1. The anticipated effect $\left(\Delta i_{T_1}^{1} = i_{T_1-1} - i_{T_0+1}\right)$ is the change in the market rate between the day after the later announcement $(T_0 + 1)$ and the day before the actual announcement $(T_1 - 1)$. Thus, this effect catches the revisions of the expectations of future actions of the monetary authority due to either a monetary policy surprise at time T_0 or for a change in the fundamentals, incorporating new information about the state of the economy, and then market interest rates are adjusted days before the actual announcement of the monetary authority.
2. The effect that ocurs the day of the announcement $\left(\Delta i_{T_1}^{2} = i_{T_1} - i_{T_1-1}\right)$ is the change in the market rate between the day before the announcement $(T_1 - 1)$ and the day of the announcement (T_1).
3. The inmmediate effect $\left(\Delta i_{T_1}^{3} = i_{T_1+1} - i_{T_1}\right)$ is the change in the market rate between the day of the announcement (T_1) and the day after that $(T_1 + 1)$.
4. Thus, the total effect $\left(\Delta i_{T_1}^{Total} = i_{T_1+1} - i_{T_0+1}\right)$ is the total change of the market rate between $(T_0 + 1)$ y $(T_1 + 1)$, which is the sum of the three former effects.

Figure 4. Decomposition of the effect of a policy rate change in the market rate



With this definitions we can estimate the effect of a change in the policy rate on the market rate on the three periods of time and the aggregate response using the following model:

$$\Delta i_T^j = \phi_0 + \phi_1 \Delta i_T^{mp} + \nu_T \quad con \ j = 1,2,3,4$$

The results of this exercise for the 90-day deposit rate are shown in Table 4.

Table 4. The effect of a change in the policy rate on the 90-day deposit rate

	Before MP decision	**Day of the MP decision**	**Day after MP decision**	**Total change**
ϕ_1	0.440***	-0,081	0.265*	0.624***
	(0,1476)	(0,1472)	(0,1363)	(0,1090)
ϕ_0	0.0015***	-0.0015***	-0,0001	-0,0001
	(0,0004)	(0,0004)	(0,0004)	(0,0003)

* Significant at 10%, ** significant at 5%, *** significant at 1%

The estimation results suggest that the martket adjust interest rates with anticipation to the Board of Directors announcement and in second place, the day after the announcement. Changes that ocurr the day of the announcement are not significant in the setting of the market rates. As a result, summing up all the three effects, the complete response is around 62% of the change in the policy rate. In summary, the anticipated effect is the most important in setting the 90-day deposit rate by the financial institutions.

4. Conclusions

In this document we evaluate three methodologies to estimate the effect of expectations about the monetary policy rate and the unanticipated changes in the policy rate on the market deposit and credit interest rates. The results show that in first place, the monetary policy surprises have an important effect on setting the market rates for both deposits and credits finding a bigger effect on credit than in deposit rates.

In the particular case of the 90-day deposit rate, the factor that seems to mainly explain the dynamic of the market rate are the expectations of the policy rate and in second place the presence of unanticipated changes in the policy rate.

Finally, the third exercise, suggest that the 90-day deposit rate changes with anticipation to the changes in the policy rate as the agents expectations take into account that a change in the policy rate would take place in the future. On the other hand, changes after the announcement of monetary policy are not significant. These results validate the importance of expectations on the policy rate when setting market interest rates.

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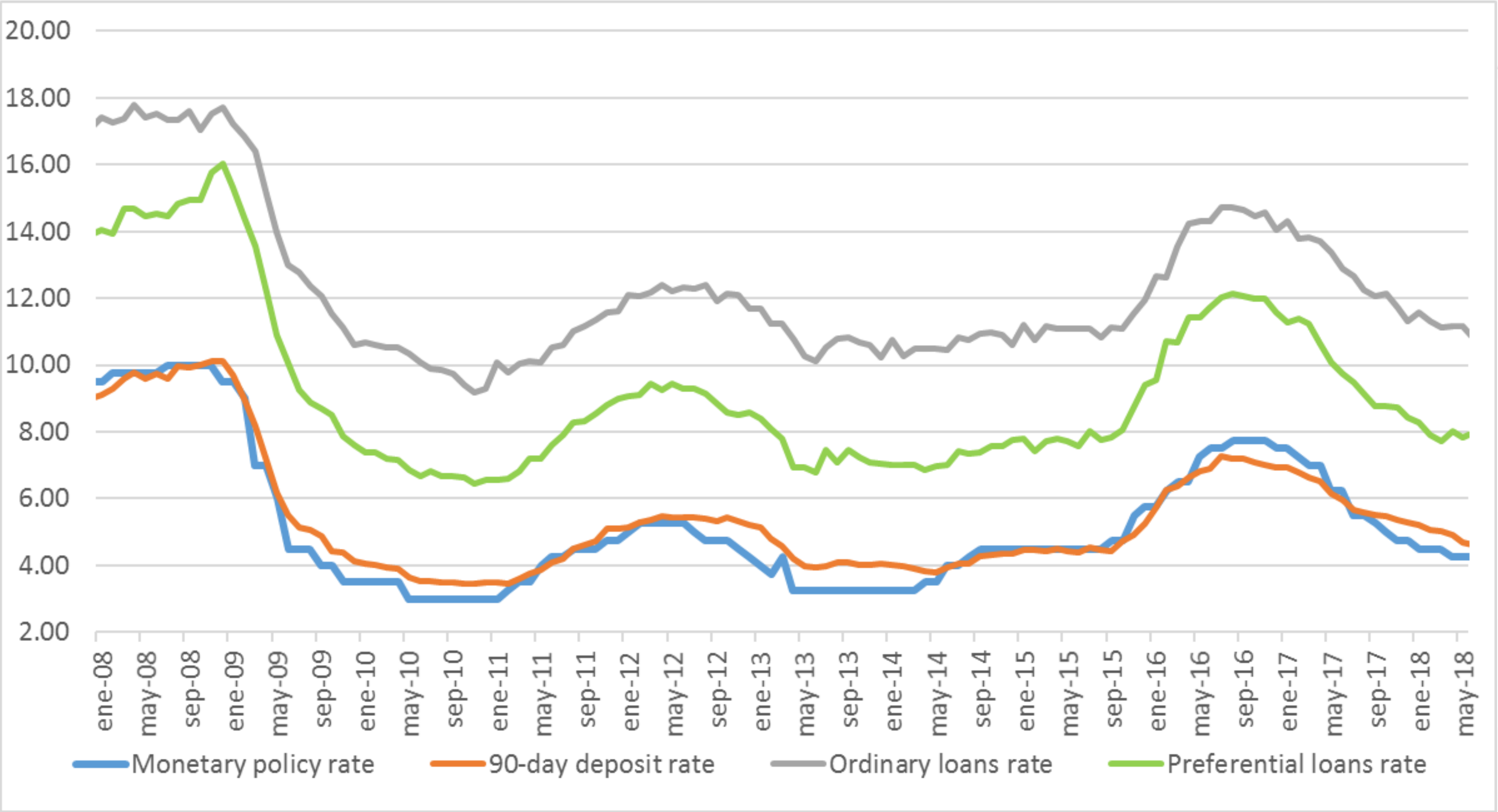
Transmission of the policy rate to market interest rates considering agentes expectations

Eliana González, Deicy Cristiano and Carlos Huertas

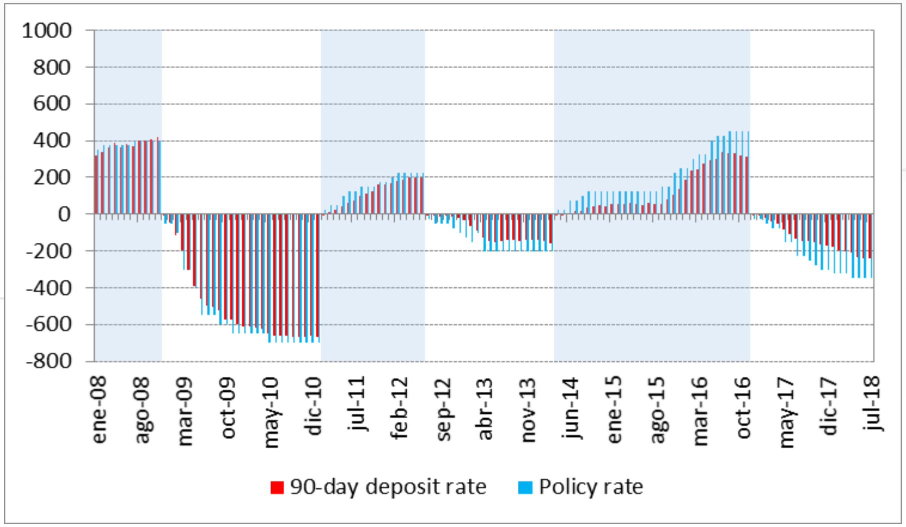
Banco de la República de Colombia

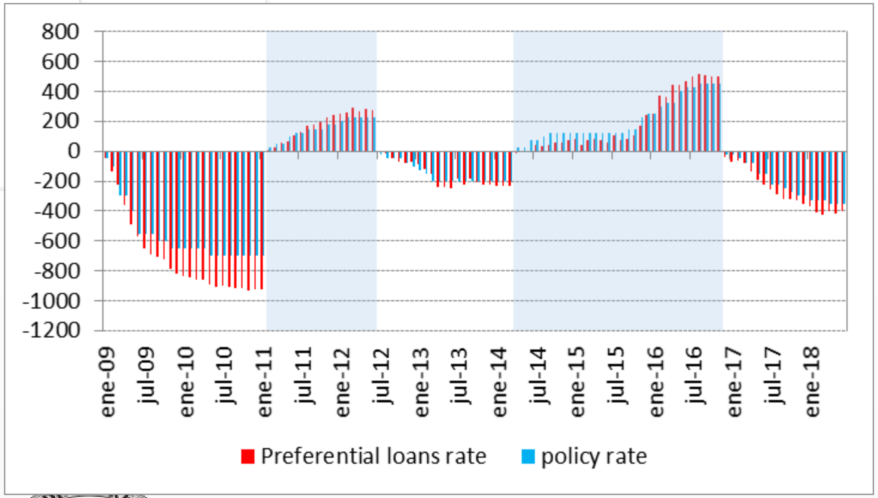
August, 2018

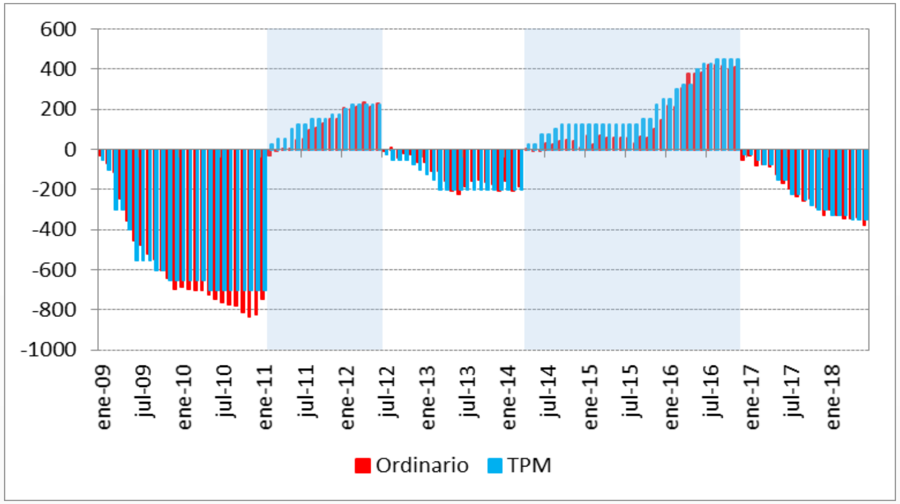
MARKET INTEREST RATES AND MONETARY POLICY RATE



CUMMULATIVE CHANGE SINCE THE CHANGE IN MONETARY POLICY STANCE(BP)







installed capacity

The effect of unanticipated monetary policy shocks

$$\Delta i_t = \alpha_0 + \alpha_1 \Psi_t + \epsilon_t$$

1. Estimación of monetary policy shocks as one-period forecasting errors from the model:

$$i_t^p = f(Y, \bar{\pi}, \pi^{USA}, \Delta s, ICI, CCI)_{t-p} + \Psi_t$$

$$\Psi_t = i_t^p - \ i_{t/t-1}^p$$

Where Y : Output gap, $\bar{\pi}$: Inflation gap from target, π^{USA}: USA Inflation, Δs : Nominal devaluation, installed capacity index, consumer confidence index.

The effect of unanticipated monetary policy shocks

2. Estimation of monetary policy shocks as forecasting errors from the monetary policy rate expectations (survey of experts)

$$\Psi'_t = i_t^p - E_{t-1}(i_t^p)$$

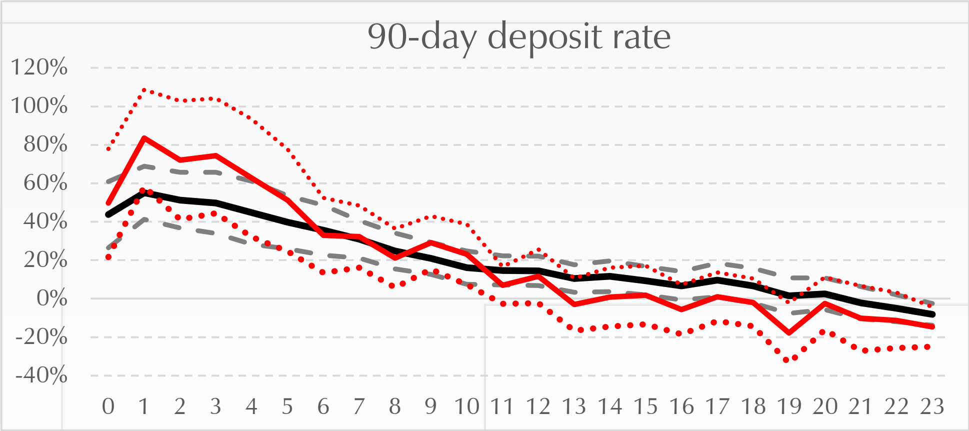
90-day Deposit rate

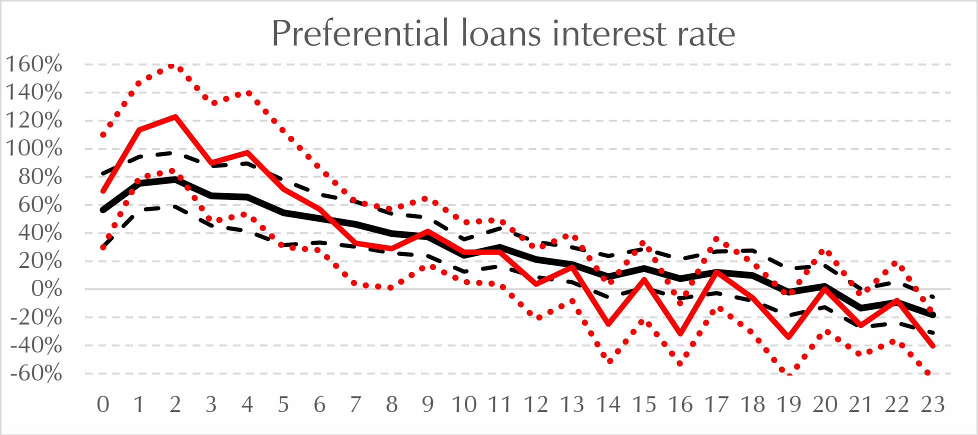
Coeficient	1	2
Shock	0.44	0.49
	(0.11)	(0.17)
constant	-0.005	-0.003
	(0.00)	(0.00)
Adjusted R^2	0.28	0.11

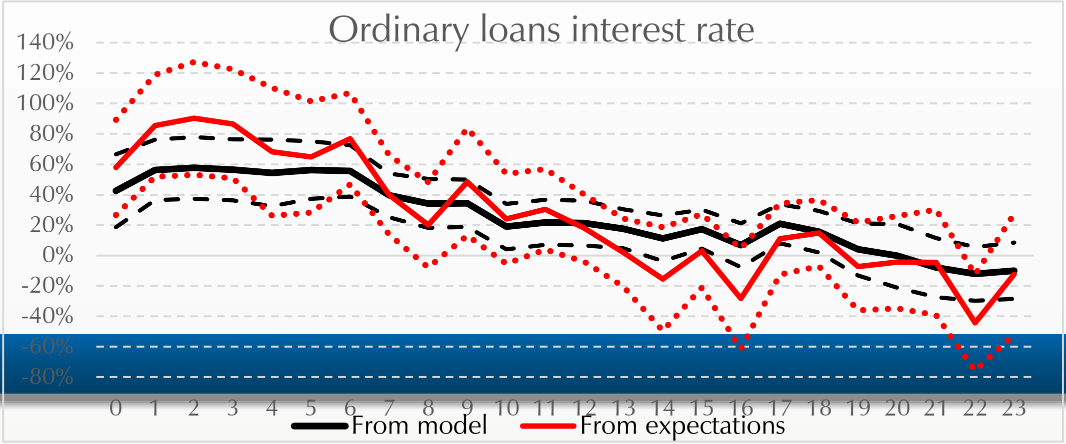
Commercial credit rates

	Ordinary loans		Preferential loans	
	1	2	1	2
Shock	0.43	0.58	0.56	0.7
	(0.11)	(0.22)	(0.11)	(0.22)
constant	-0.003	-0.004	-0.005	-0.003
	(0.00)	(0.00)	(0.00)	(0.00)
Adjusted R^2	0.11	0.06	0.17	0.08

Impulse-response function of an unanticipated monetary policy shock







UNANTICIPATED MONETARY SHOCKS ESTIMATED AS THE AVERAGE OF SHORT-RUN EXPECTATIONS

$$i_t^{90-day} = \frac{1}{3}\left(i_t^{mp} + E_t\left[i_{t+1}^{mp}\right] + E_t\left[i_{t+2}^{mp}\right]\right)$$

$$\Delta i_t^{90-day} = \frac{1}{3}\left(i_t^{mp} - E_{t-1}\left[i_t^{mp}\right]\right) + \frac{1}{3}\left(E_t\left[i_{t+1}^{mp}\right] - E_{t-1}\left[i_t^{mp}\right]\right) + \frac{1}{3}\left(E_t\left[i_{t+2}^{mp}\right] - i_{t-1}^{mp}\right)$$

$$\Delta i_t^{90-day} = \alpha_1\left(i_t^{mp} - E_{t-1}\left[i_t^{mp}\right]\right) + \alpha_2\left(E_t\left[i_{t+1}^{mp}\right] - E_{t-1}\left[i_{t+1}^{mp}\right]\right) + \alpha_3 E_t\left[i_{t+2}^{mp} - i_{t-1}^{mp}\right] + \epsilon_t$$

$$unanticipated\ monetary\ policy\ surprise = i_t^{mp} - E_{t-1}\left[i_t^{mp}\right]$$

$$expectations\ revision = E_t\left[i_{t+1}^{mp}\right] - E_{t-1}\left[i_{t+1}^{mp}\right]$$

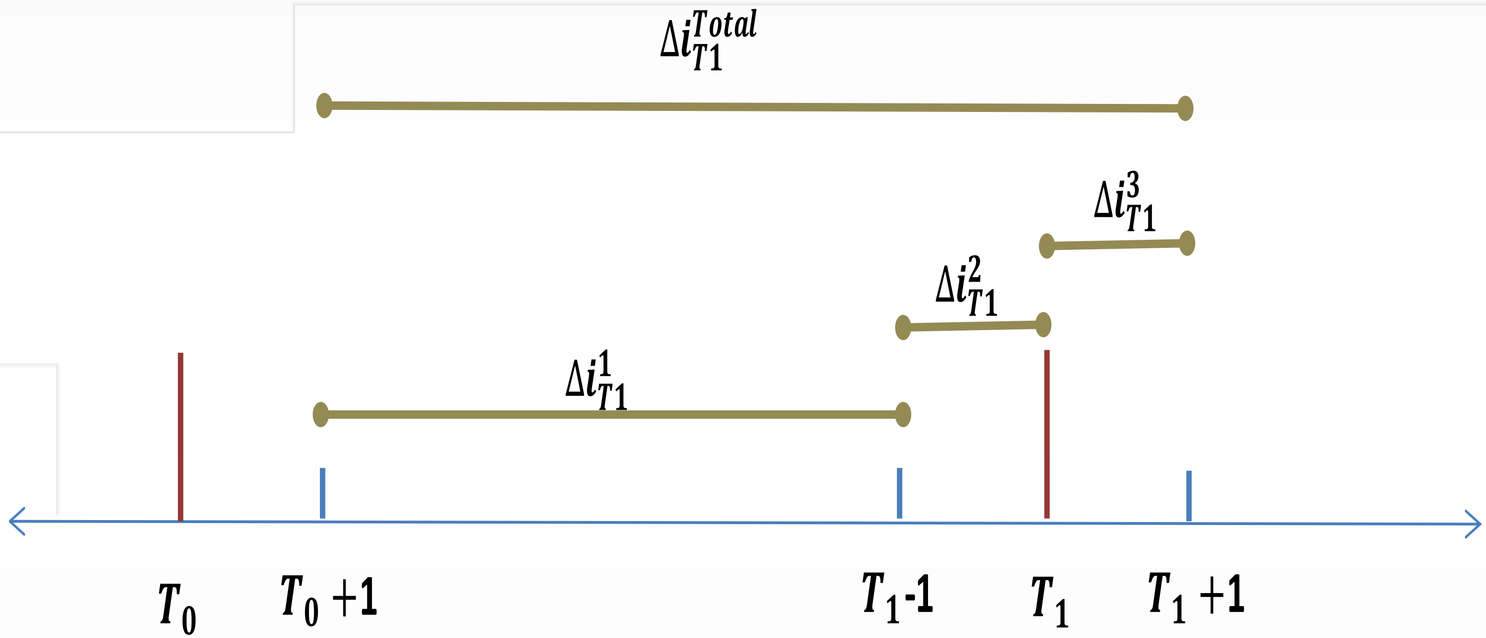
$$expectations\ of\ the\ \text{change in}\ MP\ rate\ in\ the\ whole\ period = E_t\left[i_{t+2}^{mp} - i_{t-1}^{mp}\right]$$

$$= E_t\left[\Delta i_{t+2}^{mp} + \Delta i_{t+1}^{mp} + \Delta i_t^{mp}\right]$$

Estimation results

	Coeficient	Estimate	std error
Monetary policy surprise	α_1	0.188	0.089
expectation revision	α_2	0.124	0.121
expectation of total change in the polity rate	α_3	0.465	0.095

How does the daily deposit interest rate change with The monetary policy decisions



$$\Delta i_T^j = \phi_0 + \phi_1 \Delta TI_T + \nu_T \quad with\; j = 1,2,3,4$$

How does the daily deposit interest rate change with The monetary policy decisions

	Before MP decision	Day of the MP decision	Day after MP decision	Total change
ϕ_1	0.440***	-0,081	0.265*	0.624***
	(0,1476)	(0,1472)	(0,1363)	(0,1090)
ϕ_0	0.0015***	-0.0015***	-0,0001	-0,0001
	(0,0004)	(0,0004)	(0,0004)	(0,0003)