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Market anticipation of monetary policy actions and interest rate transmission to US Treasury market rates

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ABSTRACT

This paper decomposes monetary policy changes into anticipated and unanticipated ones. Then US Treasury rate pass-through and the corresponding central bank reaction function are analyzed within an asymmetric error–correction framework. Our empirical analysis indicates that changes in policy rate have a significant effect on Treasury rates in all maturity spectra during periods of anticipated policies only, implying asymmetric transmission. Moreover, some evidence is provided in favor of a nonlinear adjustment toward a long-run equilibrium, as the long-term rates adjust faster in such periods. Impulse response analysis indicates that in periods of low monetary policy anticipation, a shock in long term rates may engage central bank to significant reactions reflected in the policy rate with possible destabilizing effects for the economy. Given that smooth interest rate movements are linked to successful management of the economy more transparent policies are suggested. Our findings can be useful for the US monetary authorities in their attempt to monitor the long-term rate pass-through and reinforce monetary policy effectiveness.

1. Introduction

Interest rate pass-through transmission mechanism is very important for the achievement of monetary policy goals by central banks. The monetary policy affects income and inflation to a large extent through its effects on the public's expectations about the future policy. Many investment decisions depend on longer-term interest rates that are connected to monetary policy through expectations of short-term interest rates over the lifetime of the investment. In our days managing successfully inflation expectations by central banks is crucial for economic stability (Cecchetti and Krause, 2002; Geraats, 2002; Issing, 2004; Spyromitros and Tuysuz, 2012; Van der Cruijsen and Demertzis, 2007).

In economic literature, there are many studies indicating theoretically and empirically the benefits of adopting more transparent monetary policies by central banks (for an extensive review see Eijffinger and Van der Cruijsen, 2007). On the one hand a recently emerged strand of theoretical literature analyzes the effect of central bank's transparency on learning. In reaction to the critique toward rational expectations, models that include learning agents are constructed. According to Svensson (2003) transparency may have a large impact on learning by the private sector to form the right expectations about the economy and inflation. In this line Eusepi (2005) argued that transparency can reduce uncertainty and stabilize expectations. Other beneficial effects of central bank transparency on economy are: (i) the reduction of sacrifice ratio (e.g. Chortareas et al., 2003; Dai and Sidiropoulos, 2008); (ii) the achievement of lower level of inflation (Hughes Hallett and Libich, 2006) and of lower variability of inflation (Demertzis and Hughes Hallett, 2007); and (iii) the dynamic stability of the economy (Dai and Spyromitros, 2012).

On the other hand, there is a significant number of empirical studies providing evidence that central bank's transparency implies market anticipation of monetary policy (see among other Biefang-Frisancho Mariscal and Howells, 2006; Chortareas et al., 2002; Haldane and Read, 2000; Kohn and Sack, 2003; Lange et al., 2003; Poole et al., 2002; Swanson, 2004)[1]. In this context, Kia (2011) develops a market-based transparency index for the US based on monetary policy anticipation. Kuttner (2001) and Poole et al. (2002) indicate how monetary policy anticipations can be measured. They argue that the futures market of the federal fund rate could anticipate monetary policy actions. A federal fund future contract is a bet on the average effective federal fund rate for the month in which the contract matures. Consequently, the federal fund futures rate reflects the market's expectation for the average level of the federal fund rate for that month (Poole and Rasche, 2003). Given that in theory the main way in which a cut in short-term rates will affect longer-term rates is through changing the expectations of future short rates, information of federal fund futures may be crucial when studying interest rate transmission. Moreover, some times the financial markets exhibit a high level of information asymmetry and the central bank faces severe problems with market credibility (Barros et al., 2012).

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[1] For an extensive literature review on the effect of central bank's transparency on several macroeconomic variables see Eijffinger and Van der Cruijsen (2007) and Dincer and Eichengreen (2007).

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Previous literature that analyzes term structure effects from monetary policy actions includes, among others, studies by Buttiglone et al. (1997), Cook and Hahn (1989), Evans and Marshall (1998), Favero et al. (1996), Haldane and Read (2000), Kuttner (2001), and Lindberg et al. (1997). All of them indicate a positive effect of short-term rates on long-term rates[2]. However, none of these studies focus on the interest rate pass-through under transparent versus less transparent policies, a gap in literature that this paper tries to fill. Moreover, the vast majority of these papers focus on the way in which short-term policy changes affect long-term rate changes by ignoring, most of the time, the long-run relationship. On the other hand, a number of these papers assume only contemporaneous effects without considering any time lag effects.

Recently empirical findings indicate a general decline in the effectiveness of monetary policy at the longer horizons of the yield curve (see for instance, Demiralp and Jorda, 2004; Gurkaynak et al., 2005). Additionally, Demiralp and Yılmaz (2012) illustrate that the decline in the responsiveness to monetary policy along the yield curve is much more muted during tightening periods, implying asymmetric interest rate pass-through[3].

Therefore, in order to take into account the long run relationship between long and short term rates and to investigate further the effectiveness of monetary policy transmission, this paper postulates that another source of asymmetric response is whether a policy is anticipated or not.

In this context, the contribution of this paper to existing monetary policy literature is twofold. First, quantitatively identifies the interest rate pass through from the Fed discount rate to long-term Treasury rates over periods of high versus low monetary policy understanding by the markets. Second, provides empirical evidence on the response of policy rate to long-term rate shocks under such periods. The empirical approach adopted here allows us to distinguish the importance of expectations implied by long-term rates on discount and federal fund rate.

The results can be summarized as follows. The changes in policy rate have a significant effect on Treasury rates in all maturity spectra during periods of anticipated policies only, implying asymmetric transmission. Moreover, some evidence is provided in favor of a nonlinear adjustment toward a long-run equilibrium, as the long-term rates adjust faster in such periods. In periods of low monetary policy anticipation, a shock in the long-term rates may engage central bank to significant reactions reflected in the policy rate with possible destabilizing effects for the economy. Therefore, given that smooth interest rate movements are linked to successful management of the economy more transparent policies are suggested.

The rest of the paper is organized as follows. Section 2 presents data and methodology used. Section 3 discusses the empirical findings, while Section 4 concludes.

2. Data and methodology

The sample period consists of monthly data on the Fed discount rate and Treasury rates on 2-, 3-, 5-, 7-, and 10-year maturity bonds from November 1988 to December 2011.[4] Data on the federal fund one-month-ahead future are taken from Reuters Ecowin. The period selection is based mainly on the beginning of trading of the federal fund futures in October 1988 at the Chicago Board of Trade.

In the first step of our methodology the Treasury bond rate (TB) and discount rate (DR) are tested for unit roots and then for cointegration where appropriate, following Johansen's procedure. In cases in which cointegration is present, the following vector error–correction (VEC) model is specified for every pair of rates TB_j (j = 2, 3, 5, 7, 10 years) and discount rate (DR):

$$\Delta TB_{j,t} = c_1 + \sum_{i=1}^{p} \phi_i \Delta TB_{j,t-i} + \sum_{i=1}^{p} \theta_i \Delta DR_{t-i} + a_1 ECT_{t-1} + u_t \tag{1}$$

$$\Delta DR_t = c_2 + \sum_{i=1}^{p} \delta_i \Delta TB_{j,t-i} + \sum_{i=1}^{p} \zeta_i \Delta DR_{t-i} + a_2 ECT_{t-1} + v_t \tag{2}$$

where Δ is the first-difference operator and u and v are the disturbance terms. The series ECT is the error–correction term corresponding to the largest eigenvalue of the cointegrating matrix for a given rank of one.

However, in Eq. (1), the short-run effect of the Fed rate on TB rates and the speed of adjustment coefficient a_1 cannot be analyzed separately when monetary policy actions are anticipated or unanticipated by market participants. This can be overcome by constructing a dummy variable taking the value of one under a high level of monetary policy anticipation and zero otherwise. More specifically, suppose that on day t there is a change in the intended fund rate that is expected to persist for h months or longer. If the market participants correctly anticipate both the timing and the magnitude of the Fed's action, the h-month-ahead federal fund futures rate would not respond to the action (i.e., the change in the h-month federal fund futures rate is zero $\Delta fff_t^h = 0$). Poole et al. (2002) show that on day t, the change in the h-month federal fund futures rate (Δfff_t^h) would be the following:

$$\Delta fff_t^h \equiv (1/m) \sum_{i=1}^{m} \left(E_t ff_i^{*,h} - E_{t-1} ff_i^{*,h} \right) \tag{3}$$

where $E_t ff_i^{*,h}$ denotes the expectation on day t for the federal fund target rate on day i of the hth month and m denotes the number of days in the month.

In our case, we calculate the change in the 1-month federal fund futures rate (Δfff_t^1) on the day the target was changed by the Fed,[5] then a dummy is constructed as follows:

$$D_t = \begin{cases} 1, & \text{in days where we have a target change} \,\&\, \Delta fff_t^1 = 0 \\ 0, & \text{in days where we have a target change} \,\&\, \Delta fff_t^1 \neq 0. \end{cases}$$

By using this dummy we can formulate the relevant disaggregated VEC model as follows[6]:

$$\begin{aligned}
\Delta TB_{j,t} = {} & c_1 + \sum_{i=1}^{p} \phi_i \Delta TB_{j,t-i} + \sum_{i=1}^{p} \theta_{1,i} (1-D_{t-i}) \Delta DR_{t-i} \\
& + \sum_{i=1}^{p} \theta_{2,i} (D_{t-i}) \Delta DR_{t-i} + a_{1,1}(1-D_{t-1}) ECT_{t-1} \\
& + a_{1,2}(D_{t-1}) ECT_{t-1} + u_t \\
D_t \Delta DR_t = {} & c_2 + \sum_{i=1}^{p} \delta_{1,i} \Delta TB_{j,t-i} + \sum_{i=1}^{p} \zeta_{1,i} (1-D_{t-i}) \Delta DR_{t-i} \\
& + \sum_{i=1}^{p} \zeta_{2,i} (D_{t-i}) \Delta DR_{t-i} + a_{2,1}(1-D_{t-1}) ECT_{t-1} \\
& + a_{2,2}(D_{t-1}) ECT_{t-1} + v_{1,t} \\
(1-D_t) \Delta DR_t = {} & c_3 + \sum_{i=1}^{p} \delta_{2,i} \Delta TB_{j,t-i} + \sum_{i=1}^{p} \xi_{1,i} (1-D_{t-i}) \Delta DR_{t-i} \\
& + \sum_{i=1}^{p} \xi_{2,i} (D_{t-i}) \Delta DR_{t-i} + a_{3,1}(1-D_{t-1}) ECT_{t-1} \\
& + a_{3,2}(D_{t-1}) ECT_{t-1} + v_{2,t}.
\end{aligned}$$

[2] We have to mention at that point that the literature studying the retail interest rate pass-through instead of long term rates pass-through is much bigger (see among others Wang and Lee, 2009; Marotta, 2009; Nishyama, 2011; Becker et al., 2012).

[3] Empirical evidence of asymmetric interest rate pass-through is provided also for retail deposit and lending rates (see among others Karagiannis et al., 2010; Wang and Lee, 2009; Haughton and Inglessias, 2012).

[4] All the spot rate data are taken from http://www.federalreserve.gov/fomc/fundsrate.htm.

[5] On the first day of the month it is replaced by the futures rate on the 2-month contract for the last day of the previous month.

[6] Bachmeier and Griffin (2003) present a dynamic approach that can be used to test the existence of symmetric or asymmetric transmission behavior (disaggregated VEC) between the examined variables.