The optimal duration of the forward guidance at the zero lower bound

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May, 2016

Abstract

In recent years the nominal interest rate has hit the zero lower bound, thus limitating the ability of the monetary policy to facilitate the real economy recover after a slump.

In order to overtake this problem, many central banks have exploited an instrument based on announcements about the future level of interest rates, the so called "forward guidance". Considering a binding zero lower bound, we investigate to what extent forward guidance can help economic activity to recover, when the monetary policy is in a liquidity trap. Moreover, by relying on a welfare measure, we analyse what is the optimal duration of forward guidance, i.e., for how many further periods the central bank should announce future interest rates close to zero.

Keywords: DSGE models, zero lower bound, forward guidance, interest rate rules.

1 Introduction

In the past few years, following the great crisis, many central banks have loosened their monetary policy allowing the short-term nominal interest rate to hit the zero lower bound. When the monetary policy falls in the liquidity trap it looses part of its efficacy to affect the economic activity. In order to overcome these problems and reestablish the monetary policy efficacy, many central banks have adopted the so called “forward guidance”. Essentially, forward guidance is the practice of communicating the future path of monetary policy instruments. By announcing his intentions about the future monetary stance, the central bank is thus able to manipulate private sector expectations' and leading to a gradual recovery of the economic conditions. As widely recognized, managing expectations is an important part of monetary policy activity as the level of prices set today depend crucially on people's expectations of the future paths of prices. In fact, in New Keynesian models of monetary policy, the Phillips curve, describing the supply side of the economy, relates current inflation with expected future inflation, signaling that, e.g., if agents would expect lower future inflation this will involve lower current inflation, as well. Following Den Haan (2013), “Forward guidance shares the basic economic logic that links today's decisions to future expectations, but it differs in its subject. Forward guidance focuses on the instruments of monetary policy rather than the targets of monetary policy.”

As a consequence, in recent years, a growing number of central banks around the world have adopted forward guidance as a monetary policy tool to accomplish two goals: stimulating the economy and restoring monetary policy efficacy when the zero lower bound is hit.

Since the seminal work by Gurkanyak, Sack and Swanson (2005, GSS henceforth), a growing number of papers have analysed forward guidance from several perspectives. GSS (2005) investigate whether monetary policy actions and statements have effects on asset prices. They disentangle between two kinds of FOMC announcements on financial markets: changes in the fed funds rate target and statements about future monetary policy actions. In particular, they find that FED announcements accounts for more than three-fourths of the explainable variation in the movements of five- and ten-year Treasury yields around FOMC meetings.

Eggertsson and Woodford (2003) show that a shock to the natural rate of interest that causes the economy to hit the zero lower bound on nominal interest rates induces a powerful deflationary spiral and a severe economic downturn. Nonetheless, the recession can be overcome if the monetary authority commits from the outset to holding interest rates at zero for a few additional periods beyond what is justified by current economic conditions.

Campbell *et al.* (2012) examine how the statements of the Federal Open Market Committee (FOMC) can influence the economic activity at the zero lower bound. They distinguish between Odyssean and Delphic forward guidance. By Odyssean, they label statements that commits the FOMC to a future action, whereas by Delphic they mean statements that simply make forecast about economic activity. They show that "open-mouth operations" can improve current macroeconomic outcomes, by altering current expectations of future inflation and output.

Woodford (2012), however, argues that recent forward guidance policies may be more effective than routine forward guidance; whereas routine forward guidance just provided forecasts, recent forward guidance have an element of commitment or at least a promise.

Finally, McKay, Nakamura and Steinsson (2016) build a model introducing incomplete markets in order to obtain smoother response of inflation and output gap when forward guidance is implemented nad solving the so-called forward guidance puzzle (see also Carlstrom *et al.*, 2012; Del Negro *et al.*, 2012).

In this paper we try to extend the stream of research focusing on forward guidance investigating the efficacy of this tool at the zero lower bound compared with a standard Taylor rule. The main novelty of our approach is to measure the optimal duration of forward guidance, in order to understand how long the central bank should keep the policy rates to zero after the crisis have dissipated. For our analysis we rely on a simple New Keynesian DSGE model similar to that described in Galí (2008), characterized by imperfect competition on the goods market, giving rise to the presence of price mark-up, and nominal price rigidities, the latter modeled coherently with Calvo (1983).

We find that, when the central bank face a recession, and is unable to further lower the interest rate since the zero bound has been it, the forward guidance is a good tool to bring back to monetary policy its ability to influence real activity. This mechanism works through movements of the real interest rate, which is influenced, in turn, by changes of the expetcations about future inflation. This is particularly true when policy rates are kept to zero for some fewer period than requested. Therefore, in some cases forward guidance can also provide welfare improvements with respect to a Taylor rule. On the contrary, when forward guidance implements zero rates for too long periods this can destabilize the economy leading to highly significative welfare losses.

This paper is organized as follows: Section 2 presents our model specification, Section 3 shows the dynamic response of inflation and output gap, under zero lower bound, when the central bank adopt a forward guidance regime. We show how credible announcements about the future path of the policy rate can somehow mitigate a recession. Section 4 provides a welfare analysis in which we study what is the optimal duration of forward guidance. Finally, Section 5 concludes.

2 The DSGE model

For our analysis we use a Dynamic Stochastic General Equilibrium (DSGE) model that strictly follows the one described in Galí (2008).[1] It is a model of New Keynesian kind as it embeds monopolistic competition on the goods markets and nominal price rigidities *a la* Calvo (1983).

2.1 Households

We assume the economy is populated by a continuum of infinitely lived household, seeking to maximise the following utility function:

$$E_0 \sum_{t=0}^{\infty} \beta^t U\left(C_t, N_t; Z_t\right)$$

The utility function has two arguments: C_t denoting the consumption, bringing positive utility to the family and labor, indicated by N_t that gives disutility to the family members'. Z_t represents a stochastic shock to the preferences. The consumption index is given by:

$$C_t = \left(\int_0^1 C_t\left(i\right)^{\frac{\varepsilon-1}{\varepsilon}} di\right)^{\frac{\varepsilon}{\varepsilon-1}}$$

[1] All the equations characterizing our model are in expressed as log-deviations from their steady state. For a detailed description of our model see Galí (2008).

where $C_t\left(i\right)$ denotes the quantity of good i consumed by the household in period t. Due to the presence of imperfect competition on the goods market, consumption is aggregated by a Dixit-Stiglitz aggregator and we denote by ε the elasticity of substitution between differentiated goods. Assuming complete financial markets, the representative household faces a standard budget constraint specified in real terms as follows:

$$C_t + R_t B_t \leq B_{t-1} + W_t N_t + D_t \tag{1}$$

where B_t denotes the holdings of one-period nominally riskless state-contingent bonds purchased in period t and maturing in period $t+1$ and paying the gross real return R_t, D_t are dividends paid to the households from the ownership of firms, W_t is the real wage. The aggregate price index is:

$$P_t = \left(\int_0^1 P_t(i)^{1-\varepsilon}\right)^{\frac{1}{1-\varepsilon}}$$

with $P_t(i)$ denoting the price of good i at time t

We assume an utility function having the following form:

$$U\left(C_t, N_t\right) = \left(\frac{C_t^{1-\sigma}}{1-\sigma} - \frac{N_t^{1+\varphi}}{1+\varphi}\right) Z_t \tag{2}$$

where σ is the relative risk aversion coefficient and φ denotes the inverse of the Firsch elasticity. The exogenous preference shock is assumed to follow a stationary AR(1) process:

$$Z_t = \rho_z Z_{t-1} + \varepsilon_t^z \tag{3}$$

with $0 \leq \rho_z < 1$ and ε_t^z is a white-noise process.

The representative household solves an intertemporal optimization problem by maximizing the utility function (2) under the constraint given by (1). The associated first order conditions are:

$$\varrho_t = Z_t C_t^{-\sigma} \tag{4}$$

with ϱ_t representing the marginal utility of consumption. The labor supply schedule is:

$$\varrho_t W_t = Z_t N_t^{\varphi} \tag{5}$$

The Euler equation is specified as:

$$\beta E_t R_{t+1} \Lambda_{t,t+1} = 1 \tag{6}$$

with $\Lambda_{t,t+1}$ denoting the stochastic discount factor and evolving as:

$$\Lambda_{t,t+1} = \frac{\varrho_{t+1}}{\varrho_t} \tag{7}$$

2.2 Firms

The supply side of the economy is fairly standard and characterized by the presence of monopolistic competition on the goods market. In particular, we assume a continuum of firms indexed by $i \in [0,1]$. Each firm produces a differentiated good and all the firms share the same technology, given by the following production function:

$$Y_t(i) = A_t N_t(i)^{1-\alpha} \tag{8}$$

where $Y_t(i)$ is the output produced by firm i, $(1-\alpha)$ measures the elasticity of output with respect to labor and A_t is an exogenous technology shock following an AR(1) stationary process:

$$A_t = \rho_a A_{t-1} + \varepsilon_t^a \tag{9}$$

with $0 \leq \rho_a < 1$ and ε_t^a is a white-noise process.

Firms choose the quantity of labor to demand by minimizing their costs under the constraint given by (8). The labor demand is thus:

$$W_t = (1-\alpha) MC_t \frac{Y_t}{N_t} \tag{10}$$

with MC_t denoting the real marginal cost.

In this context firms are price maker and they face nominal price rigidities *a la* Calvo (1983). Thus, each firm can reset its price only with probability $(1-\theta)$ in any given period. Accordingly, in each period a fraction $(1-\theta)$ of the producers is allowed to reset their price, while the remaining fraction do not. As a result the optimal price reset evolves as:

$$\frac{P_t^*}{P_{t-1}} = \mu \frac{\psi_t}{\phi_t} \Pi_t \tag{11}$$

where P_t^* denotes the optimal reset price chose by a firm at time t, $\mu = \frac{\varepsilon}{\varepsilon - 1}$ is the price mark-up, ψ_t and ϕ_t are two auxiliary variables having the following form:

$$\psi_t = C_t^{1-\sigma} MC_t + \beta\theta E_t \Pi_{t+1}^{\varepsilon} \psi_{t+1} \tag{12}$$

$$\phi_t = C_t^{1-\sigma} + \beta\theta E_t \Pi_{t+1}^{\varepsilon-1} \phi_{t+1} \tag{13}$$

Finally, the evolution of the inflation is:

$$\Pi_t^{1-\varepsilon} = \theta + (1-\theta) \left(\frac{P_t^*}{P_{t-1}} \right)^{1-\varepsilon} \tag{14}$$

2.3 Equilibrium and the linearized economy

Market clearing in the goods market implies that:

$$Y_t(i) = C_t(i)$$

Aggregate output is defined as

$$Y_t = \left(\int_0^1 Y_t(i)^{\frac{\varepsilon-1}{\varepsilon}} di \right)^{\frac{\varepsilon}{\varepsilon-1}}$$

and, consequently:

$$Y_t = C_t \tag{15}$$

As aforementioned, for our analysis we rely on a model log-linearized around a determinstic steady state.[2] Exploiting the market clearing condition, the Euler equation can be written as:

$$y_t = E_t y_{t+1} - \frac{1}{\sigma} (i_t - E_t \pi_{t+1} + E_t z_{t+1} - z_t) \tag{16}$$

As usual it expresses the output gap as depending on expectations about future output and negatively from expected real rate. The supply side of the economy is

[2] Lower-case letters denotes variables expressed as log-deviations from the steady state.

described by a price Phillips curve having the following form:[3]

$$\pi_t = \beta E_t \pi^p_{t+1} + k y_t \tag{17}$$

with $k = \frac{(1-\theta)(1-\beta\theta)}{\theta}\frac{1-\alpha}{1-\alpha+\alpha\varepsilon}\left(\sigma + \frac{\varphi+\alpha}{1-\alpha}\right)$. The supply side of the economy is completed by the production function that can be written in a log-linearized form as:

$$y_t = a_t + (1-\alpha)\, n_t$$

2.4 Monetary authority

The model is closed specifying the behavior of the monetary authority. As common practice, it is assumed that the central bank adjust the nominal interest rate i_t according to a Taylor rule:

$$i_t = \rho_i i_{t-1} + (1-\rho_i)\,(\delta_\pi \pi_t + \delta_y y_t) \tag{18}$$

where δ_π and δ_y measure the response of the nominal interest rate to inflation and output gap, respectively. The term ρ_i capture the degree of interest rate smoothing.

Moreover, the real interest rate, in line with the Fisher equation, is defined as

$$r_t = i_t - \pi_t \tag{19}$$

As in our framework the zero lower bound is binding, we add the following constraint to the nominal interest rate:

$$i_t = \max(0, i_t^*) \tag{20}$$

with i_t^* denoting the shadow rate, that is the rate that would prevail in absence of the zero lower bound. From (20) it is clear as there is a floor, represented by zero, under which the nominal interest rate cannot fall.

In order to capture forward guidance in DSGE model, we follow Laséen and Svensson (2011) using anticipated policy shocks. Such shocks reflect deviations of the short-term interest rate from the historical policy rule that are anticipated by the public. They can be affected by central bankers announcements about its intentions regarding the future

[3] See Galí's (2008) textbook for a complete derivation.

path of the policy rate.

3 Model dynamics

In this section we study how the model variables respond to a negative demand shock in a context characterized by a binding zero lower bound. In particular, we consider a structural shock to the preferences evolving as (3), with $\rho_z = 0.5$. Under such a kind of shock, both inflation and output gap falls. Assuming that the shock is so strong of causing a hard worsening of economic condition, if the zero lower bound is not binding, the nominal interest rate could also drop under zero, causing a decrease in the real rate. This mechanism leads to a recover of the output gap and inflation as well, mitigating the economic recession. When the zero lower bound becomes binding, the central bank can decrease the nominal interest rate but not as much required by the negative economic conditions. In this way, the monetary policy looses part of its efficacy in helping the economy to recover from the recession, causing a longer and deeper fall of the output gap and inflation. This is mainly due to the fact that the real rate increases, entailing a drop of the private consumption. As explained in the introduction, the monetary authority can overtake this problem recurring to an Odyssean forward guidance, i.e., by committing to keep the nominal interest rate to zero for a longer period. Through its announcements and statements, the central bank may try to influence the private sector expectations' about the future level of the policy rates. If the policymaker announces that will keep the interest rate close to zero for longer, rational agents will incorporate this information and adjust their forecast about future inflation. Moreover, as current inflation mainly depends on expectations on future inflation, lower future interest rate will involve higher inflation in the future, involving, in turn, higher inflation today. This helps the real rate to decrease and stimulate consumption, helping the economic recovery.

Our aim is to reproduce this environment. To do this, we simulate our model under three different scenario:

- Taylor rule (18);
- Taylor rule (18) plus the zero bound constraint (20);
- Forward guidance for two more periods with respect to the duration of the zero

bound.

As explained above forward guidance is introcued according to Laséen and Svensson (2011). The model is simulated assuming that an unexpected negative shock to the preferences hits the economy at time t.In Table 1 we report the calibration of the parameters characterizing our model.

Table 1 - Parameters calibration

$\beta = 0.99$	$\sigma = 1$	$\varphi = 2$	$\alpha = 0.33$	$\theta = 0.66$	$\varepsilon = 11$	$\kappa_\pi = 1.5$	$\kappa_Y = 0.125$	$\rho_i = 0.7$

As common practice, the discount factor β is equal to 0.99, implying an annual real rate close to 4%. The relative risk aversion parameter and the inverse of Frisch elasticity are calibrated equal to 1 and 2, respectively. This value are coherent with the empirical findings of Justiniano *et al.* (2013) and Chetty (2012). In line with some macro estimates (see, e.g., Rabanal and Rubio-Ramirez, 2005) we assume that prices are re-adjusted every 3 quarters. The elasticity of substitution between good is calibrated equal to 11, inducing a gross price mark-up of 10%. Finally, the central bank respond both to inflation and output gap, according to parameters κ_π and κ_y, calibrated to 1.5 and 0.125, respectively. Moreover, it is assumed a certain degree of interest rate smoothing, equal to 0.7. In Figure 1 we depict the dynamic responses of output gap, inflation, short-term nominal interest rate and real rate conditional to a negative preference shock.

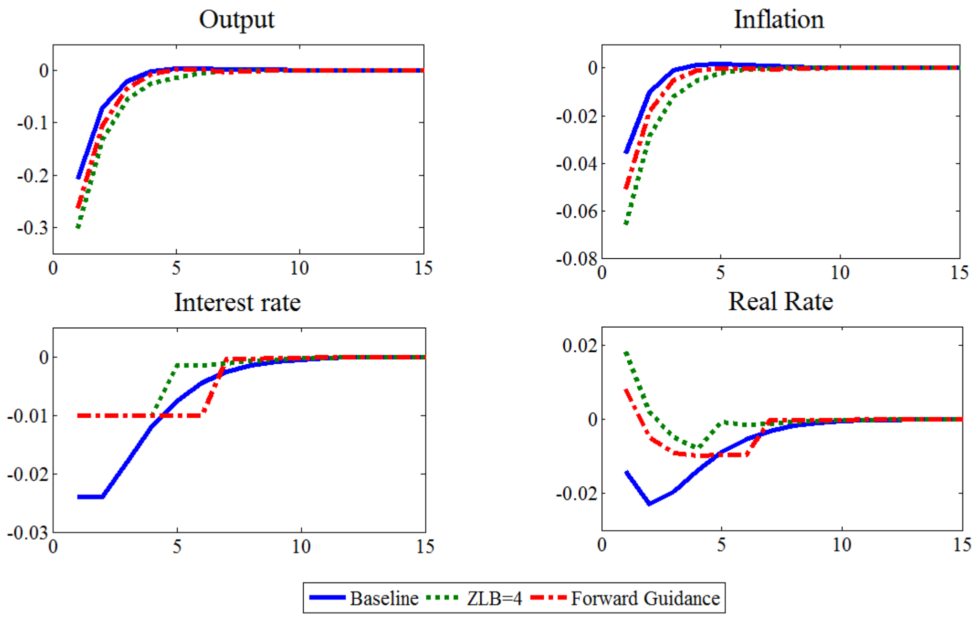

Figure 1 - IRFs conditional to a negative preference shock.

The blue line plots the IRF of the variables when we consider a standard New Keynesian model without zero lower bound. Our IRFs are qualitatively similar to that reported by Galí (2008). In particular, a negative preference shock involves a falls in both output and inflation. The central bank tries to countervail the recession by lowering the policy rate causing a fall also of the real rate, that is the main determinant of the consumption. In this environment monetary policy is effective in stabilizing the economy and smoothing the recession. If we assume the presence of occasionally binding constraint, here represented by a zero lower bound, we notice as the dynamics of the model variables are affected by this constraint. The green dooted line depict this dynamics: in the first four periods following the shock the zero bound is hit, but the central bank cannot lower the policy rate under zero. As a consequence, we observe a deeper recession (with respect to the baseline case) caused by positive real rates due to a strong fall of inflation and the inability of the monetary authority to further lower the nominal rate. Nonetheless, the central bank can try to alleviate the effect of a binding zero lower bound by using the tool of the forward guidance: making credible statements about how monetary policy will be conducted in the future, the policymaker can influence private sector expectations, exploiting the channel described by GSS (2005). In our case we consider a monetary authority announcing that it commits to keep the policy rate to zero for two further periods than requested (red dotted line): we still observe a recession, but now it is smaller. The machanism behind this dynamics is explained as follows: By announcing that the policy rate will remain to zero for longer than expected, the central bank is able to push up private sectors' expectations about inflation. As a consequence, the real rate increase is restrained, entailing a smaller consumption fall. Anyway there is no guarantee that announcing policy rate close to zero for many periods can move private sectors' expectations in the right sense: in fact, the agents can interpretate the central bank choice to keep low policy rate as a signal of a depeer recession and, accordingly push down their expectations about future output gap and inflation.

4 Welfare analysis

In the previous section we have observed that a credible announcement about lower policy rates has the power to mitigate a recession when the zero lower bound is hit. Nonetheless, keeping the interest rate to zero for a period too longer than required by the underlying economic conditions can destabilize the economy. In fact, too low interest rates can put upward pressure to inflation; accordingly agents adjust their forecast expecting also for the current period high inflation, leading to high variance of macroeconomic conditions.

In what follows we analyse what is the optimal duration of forward guidance; In other words, we try to investigate for how many additional periods the central bank should keep the policy rate to zero in order to smooth a recession and correctly stabilize the economy. To perform this analysis we need a proper welfare measure: we follow tha approach designed by Benigno and Woodford (2012) and Woodford (2002) that relies on a second-order approximation of the utility function in order to derive a loss function coherent with our model specification. Under this approach we use a quadratic loss function expressed in terms of output gap and inflation; the relative weights attached to these two terms represent the degree of central concerning is stabilizing these variables.

Our loss function takes the following form:[4]:

$$\mathcal{L}_t = \frac{1}{2} E_0 \sum_{t=0}^{\infty} \beta^t \left[\left(\frac{\varepsilon}{\lambda} \right) \pi_t^2 + \left(\sigma + \frac{\varphi + \alpha}{1 - \alpha} \right) y_t^2 \right] \tag{21}$$

where $\lambda = \frac{(1-\theta)(1-\beta\theta)}{\theta} \frac{1-\alpha}{1-\alpha+\alpha\varepsilon}$.

As in the previous section our welfare study is conducted under the assumption that a negative preference shock hits the economy and pushes down both inflation and output gap. In absence of the zero lower bound the nominal rate should fall under zero for four periods. In the table below we report the welfare loss associated with several cases. In the baseline case it is assumed that there is no zero lower bound, so the nominal rate can fall under zero. By ZLB we label the case in which the zero lower bound is binding and the policymaker does not resort to unconventional instrument such as forward guidance; here, in the four quarters following the shock, would be optimal to lower the interest rate under zero, but this is not possible due to the presence of a zero lower bound. The other cases consider a central bank making credible announcements in which it commits to keeping its policy rate to zero for more periods than requested. For instance, in the case labeled "FG=2 periods" we consider a policy rate that remain fixed to zero for 2 additional periods, so in total the short-term rate stays at zero for six periods.

The policy that should be implemented by the monetary authority is the one that minimize the welfare loss.

Table 2 - Forward guidance and welfare losses

Model	Welfare loss
Baseline	0.384
ZLB	1.307
FG=1 periods	1.121
FG=2 periods	0.768
FG=3 periods	0.367
FG=4 periods	0.218
FG=5 periods	1.019
FG=6 periods	4.299

[4] For the sake of brevity we omit the welfare loss derivation. For a wider discussion see Galí (2008).

From Table 2 we can observe that the social loss deriving in a world where the zero lower bound is not binding is strongly smaller than that arising when an occasionally binding constraint on the interest rate is considered. This is not surprising as, according to Figure 1, the presence of a zero lower bound has a deflationary effect and provocate a crippling recession (see Eggertson and Woodford, 2003). When the central bank implements the forward guidance it is able to obtain significant welfare improvements. In fact, apart the case of a rate equal to zero for ten periods, in all the cases considered herein the welfare loss is significantly smaller than that deriving under the zero lower bound case. Moreover, in some particular cases the central bank is also able to obtain performances better than that observed in the baseline case (when the policy rate is keep to zero for 3 or 4 additional periods). This result, that at first sight might seem weird, derives from the fact that, in general, the Taylor rule could be suboptimal, in particular with repect to optimal policy rules as, e.g., commitment or discretionary policies. When the forward guidance is too longer, i.e., 10 periods, it can be harmful implement it as keeping the rate too far from their fare value could generate a too high variability of inflation and output gap.

4.1 Sensitivity analysis

In what follows we implement a sort of sensitivity analysis by changing the calibration of our model and investigating how variations in some “deep” parameters affect our results. In particular, we have considered different degrees of price rigidity, lack of interest rate smoothing, absence of contral bank response to the output gap, a highr price mark-up, several levels of risk aversion. In the table below we report our results.

Table 3 - Sensitivity analysis

	Welfare loss						
Model	$\theta = 0.5$	$\theta = 0.75$	$\rho_i = 0$	$\delta_y = 0$	$\varepsilon = 6$	$\sigma = 2$	$\sigma = 0.5$
Baseline	0.446	0.316	0.559	0.530	0.272	0.203	0.746
ZLB	4.814	0.670	1.287	1.388	1.367	0.446	4.841
FG=1 periods	4.383	0.572	1.106	1.174	1.198	0.373	4.290
FG=2 periods	2.373	0.427	0.759	0.797	0.770	0.263	2.714
FG=3 periods	0.236	0.273	0.363	0.378	0.259	0.146	0.819
FG=4 periods	7.322	0.177	0.219	0.216	0.338	0.084	1.578
FG=5 periods	61.962	0.250	1.023	1.007	3.006	0.189	14.289
FG=6 periods	301.863	0.686	4.305	4.279	13.676	0.670	65.226

We begin our analysis changing the level of price rigidity. We consider two values for θ equals to 0.5 and 0.75. In the first case price are more flexible as the adjust each two quarters (in line with the micro study of Bils and Klenow, 2004), whereas in the second case the degree of rigidity is higher inducing one price reset per year. When prices are more flexible, the costs of the zero lower bound dramatically go up. This result comes from the fact that now prices are more responsive to an economic slump and, hence, inflation falls more provocating a harder increase of the real rate. This effect could be countervailed announcing that the policy rate will be kept to zero for some few periods. Also in this case the forward guidance can involve welfare improvements compared with the baseline case when the nominal rate is kept to zero for three further quarters. On the other hand, when higher price rigidity is considered, welfare losses are restrained. Here, due to stickier prices, inflation falls less and, accordingly, the real rate increase limitated. Again, a forward guidance policy could lead to best outcomes with respect to the standard case.

In the second experiment we do not consider a central bank that makes smoothing of the interest rate. The effect associated to this change are quite negligible and the welfare losses are similar to that showed in Table 2. Similar result are obtained assuming that the monetary authority moves the policy rate only responding to inflation.

Therefore, we changed the level of price mark-up from 10% to 20%. As in the other scenario considered, the best choice is implementing a forward guidance for 3 or 4 periods more than that requested. A policy rate fixed for too long to zero (five or six periods more) entails welfare worsening compared with the ZLB case.

Finally, we consider variations in the parameter encoding the relative risk aversion: changes in σ have important effects because it directly affect the elasticity of the output gap to the real rate (see equation (16)). Under $\sigma = 2$, the output gap is less sensible to real rate change and depends more on expectations over its future value. The contrary happens for $\sigma = 0.5$. In the first case, the policymaker's ability to manage private sector expectations play a crucial role as, by exploiting the forward guidance channel, he is able to realize smaller welfare losses (also by keeping the policy rate to zero for just one period more). In the second case, the output gap responds more to the real rate, thus the forward guidance should provide at least zero rates for three additional periods.

In general, in all the cases considered, we observe that the best choice for the central bank is to act following a forward guidance that fixes the nominal rate to zero for three further quarters as this lenght is proved to be the one that minimize the welfare loss and in many cases represents also an improvement with respect to the baseline case.

5 Conclusions

In this paper we have examined the effects of forward guidance on output gap and inflation stabilization. Using a simple New Keynesian DSGE model we showed as central bank promises about its future policy rate could be a good tool to mitigate a recession and restoring the economic stability. Using a welfare-based criterion, we showed that, when the zero lower bound is binding, the forward guidance is effective to reduce the welfare losses associated to a negative demand shock. Anyhow, forward guidance is an instrument that should be used with attention: in fact, keeping nominal rates at zero for too long periods can create more damages than benefit as it puts upward pressure on inflation, thus generating a strong inflationary spiral and destabilizing the economy.

A further step will be the investigation of eventual welfare gains associated to policy announcements in a more complicated model, characterized by endogenous capital accumulation, investment adjustment cost and a labor market featuring imperfect competition. However, we let it to future research.

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