MONETARY POLICY RULES AND FISCAL EQUILIBRIUM IN BRAZIL

Helder Ferreira de Mendonça
Fluminense Federal University – Department of Economics (Brazil)
and National Council for Scientific and Technological Development (CNPq)

Manoel Carlos de Castro Pires
Institute of Applied Economic Research and Brasília University
Department of Economics

Resumo

O principal objetivo deste artigo é analisar a relação entre o gradualismo na condução da política monetária com o impacto da taxa de juros sobre a dívida pública. Neste sentido, verifica-se que existe uma relação entre a taxa de inflação de equilíbrio e a sensibilidade da política monetária aos desvios da taxa de juros de equilíbrio. Quando a taxa de juros é consistente com o equilíbrio fiscal, uma relação direta entre a taxa ótima de inflação e a dívida pública é alcançada. Com o objetivo de ilustrar esta situação, efetua-se uma análise do caso brasileiro. Os resultados denotam que o Banco Central do Brasil suaviza a taxa de juros de forma a penalizar desvios da taxa de juros da que seria consistente com o equilíbrio fiscal.

Palavras-chave: taxa de juros, inflação, política monetária, dívida pública.

Abstract

The main objective of this paper is to analyze the relation between the gradualism in the conduction of monetary policy with the impact of interest rate on public debt. In this sense, it is verified that there is a relation between the equilibrium inflation rate and the sensitiveness of monetary policy to the deviations of the equilibrium interest rate. When the equilibrium interest rate is consistent with the fiscal equilibrium, a direct relation between optimal inflation rate and public debt is achieved. With the objective of illustrating this situation, an analysis of the Brazilian case is made. The result denotes that the Central Bank of Brazil smooths the interest rate by penalizing the departures of the interest rate from that which is consistent with the fiscal equilibrium.

Key words: interest rate, inflation, monetary policy, public debt.

JEL N. E43, E52, E63.

1. Introduction

Nowadays there is a convergence in the practice of monetary policy. In a general way, central banks use interest rate as the main intermediate target for achieving the objectives defined by policymakers. In the majority of cases, the objectives are focused on inflation target and potential output. Under this view, a great number of researches for evaluating if the behavior of monetary policy is close to that proposed by Taylor (1993) have been made.[1]

One point that must be considered is that although the above-mentioned objectives became standard, central banks have adopted a gradualist strategy to achieve them. This procedure is not a guarantee for the success of the implemented policies.[2] In fact, gradualist behavior can imply a long time to targets being achieved which in turn results in a social welfare loss. As pointed out by Goodhart (1996), if the targets of the central bank are related to social welfare, as soon as those targets are achieved the social welfare is improved.

The behavior observed in several countries that interest rate is gradually changed by central banks can be understood as a search for credibility. This argument is a consequence of the monetary authority being concerned with the perverse effects from a tight monetary policy on the public debt. It is important to note that a conservativeness of monetary policy can generate a fiscal imbalance due to the increase in public debt service. On the other hand, a loose monetary policy is not adequate. The idea is that a central bank that excessively reduces the interest rate is not committed to the inflation target.

The result of a loose monetary policy is the loss of credibility in macroeconomic foundations. Thus, the attempt to stabilize the inflation implies a higher social cost due to the fact that it is necessary to promote an increase in the interest rate above that which would be necessary if the monetary authority were concerned with price stability. Furthermore, the risk to lose the fiscal equilibrium is high due to the impact of a high interest rate on debt/GDP ratio.

In short, in the case where the central bank uses an excessively conservative monetary policy the result is: (i) an increase in output gap; and (ii) an increase in

[1] Taylor (1993) defines a simple rule for the determination of interest rate taking into consideration four basic factors: (i) inflation; (ii) interest rate of equilibrium; (iii) difference between inflation and its target; and (iv) output gap.
[2] See evidence found by Clarida, Gali and Gertler (2000) for the Fed.

debt/GDP ratio. As a consequence, the fiscal authority is forced to raise the primary surplus making the fiscal policy an inefficacious instrument in smoothing the economic cycle. On the other hand, if the central bank adopts a loose monetary policy the probable result is: (i) increase in inflation rate; and (ii) the government loosens fiscal policy reducing the primary surplus which in turn can create a lack of stability in the economic cycle.

The main objective of this paper is to analyze the relation between the gradualism in the conduction of monetary policy with the impact of interest rate on public debt. Besides this introduction, the paper is divided into four other sections. The next section shows the specification of the economic model. The third shows the monetary equilibrium and reveals that the optimal inflation depends on central bank taking into consideration the impact of monetary policy on fiscal equilibrium. The fourth evaluates the implications of the model for the Brazilian economy verifying the behavior of the reaction function of the Central Bank of Brazil. The last section concludes the paper.

2. Interest rate consistent with fiscal equilibrium

The practice of smoothing interest rate is common in several countries (e.g. England, Australia, Chile, New Zealand, etc.). This behavior is based on the argument that strong adjustments of the interest rate could imply disastrous effects for the financial market. The high volatility in the interest rate could create a difficulty in the formation of expectations by economic agents thus impairing their decision making. Further, sudden changes in the interest rate may cause an imbalance between assets and passive of financial institutions.[3]

As identified by Goodhart (2004), the simple observation that the interest rate moves sluggishly is not sufficient to affirm that the central bank acts in a gradual way. One possible justification for this behavior is the lag of the action from monetary policy to economy. Sack (2000) argues that the reason for smoothing the interest rate is due to the fact that the central bank unknown the structural parameters of the economy. Since

[3] This argument is used by Fed due to the fact that the average maturity of passives is lower than the average maturity of assets of the banks. Notwithstanding, the behavior is observed in Australia where this imbalance is irrelevant, see Lowe and Ellis (1997).

the central bank does not have a perfect knowledge of the economy, a gradual strategy avoids significant volatilities on inflation and output gap trajectories.

Goodfriend (1991) argues that sudden changes in the conduction of monetary policy are capable of causing uncertainty in relation to the central bank's objectives which in turn reduces credibility. Under this perspective, for example, there is no reason for the central bank aggressively increasing the interest rate today when it had promoted reductions in the past. Besides this, the adoption of an expected path for the interest rate permits the central bank to control the yield on long-term bonds and thus on future economic activity and on inflation rate.

Based on the above arguments, it is assumed that the central bank has in its objective function a term that penalizes departures from equilibrium interest rate. This argument is valid even if the central bank has a high credibility. The gradualism in the conduction of monetary policy has the following features:

(i) successive changes in the interest rate in the same direction;

(ii) stability of the interest rate after successive changes in the same direction;

(iii) sporadic reversal in the movements of increases or decreases in the interest rate.

The model is highly stylized and consists of an aggregate supply curve (which link inflation with the activity level), an IS curve (which shows the relation between interest rate and aggregate demand), an interest rate rule, and the fiscal side through budgetary constraint.[4]

The supply curve (new Keynesian) is

$$\pi_t = \kappa x_t + \beta \pi_{t+1} \qquad \kappa > 0; 0 < \beta < 1. \tag{1}$$

where π_t is the inflation rate, x_t is the output gap, κ is the degree of stickiness (nominal and real) of the economy, and β is the discount rate.

The IS curve is given by:

$$x_t = E_t x_{t+1} - \sigma(i_t - \pi_{t+1} - \bar{r}) \tag{2}$$

where σ is the representative agent's risk aversion, $\bar{r}$ is equilibrium real interest rate, i_t is the nominal interest rate, and E_t is the expectation operator.

The monetary policy rule is given by:

$$i_t = i^* + \alpha_1(i_{t-1} - \bar{i}_{t-1}) + \alpha_2(\pi_t - \pi^*) + \alpha_3(x_t - x^*). \tag{3}$$

[4] The model follows Woodford (2003) and Clarida, Gali and Gertler (1999).

This rule (see Clarida, Gali and Gertler, 2000) shows that the central bank calibrates the interest rate taking into consideration departures of inflation from target and to output gap. Furthermore, the interest rate is smoothed down based on target $\bar{i}$.

The introduction of the public sector in the model is made by budget constraint used by Bohn (1992),

(4) $$G_t + i_{t-1}B_{t-1} = T_t + (B_t - B_{t-1}) + (H_t - H_{t-1}),$$

where G_t is the government expenditure (not including expenditure with interest), B_t is the stock of public debt, T_t is the government revenue, H_t is the revenue that the government receives from the central bank (seignorage).

Dividing the above equation by price level yields:

(5) $$\frac{G_t}{P_t} + i_{t-1}\frac{B_{t-1}}{P_t} = \frac{T_t}{P_t} + \frac{(B_t - B_{t-1})}{P_t} + \frac{(H_t - H_{t-1})}{P_t}.$$

Dividing and multiplying B_{t-1} by P_{t-1}, then

(6) $$g_t + i_{t-1}\frac{b_{t-1}}{\pi_t} = t_t + (b_t - b_{t-1}) + (h_t - h_{t-1}),$$

where the lower case variables correspond to real values.

Assuming that the central bank is concerned with the public debt stability ($b_t - b_{t-1} = 0$) and that there is no use of seignorage ($h_t - h_{t-1} = 0$), the interest rate compatible with the public debt equilibrium is

(7) $$\bar{i}_{t-1} = (t_t - g_t)\frac{\pi_t}{b_{t-1}}.$$

The equation (7) has important implications to monetary policy. It reveals that an increase in fiscal effort (represented by $(t_t - g_t)\frac{\pi_t}{b_{t-1}}$) denotes a higher interest rate consistent with the fiscal equilibrium. In other words, there is more flexibility afforded to the central bank in the conduction of monetary policy.

3. Optimal inflation under commitment

Friedman (1969) researched the subject optimal inflation rate. The focus of Friedman's analysis was the externality given by the differential between the private cost of holding (assuming a positive nominal interest rate) and the social advantage of

creating money. With the objective of avoiding this externality, the nominal interest rate must be zero. As a consequence, the optimal inflation rate is

(8) $(1+i_t) = (1+\pi_t)(1+r_t)$.

Assuming i_t =0, then

(9) $\pi_t = \frac{-r}{1+r} \cong -r$. [5]

Therefore, under Friedman's view the optimal inflation rate would be a deflation rate that is close to the rate of return on capital. Woodford (2003) shows a generalization of this result in a context where there are negligible transaction frictions and a perfect forecast by the economic agents. Under this perspective, the central bank objective is to minimize a loss function which takes into consideration departures of output gap, inflation, and interest rate from their targets, i.e.

(10) $L = \sum_{t=0}^{\infty} \beta^t \left\{ \frac{1}{2} \left[\pi^2 + \lambda_x (x - x^*)^2 + \lambda_i (i_t - \bar{i}_t)^2 \right] \right\}$ $\lambda_x, \lambda_i > 0$..

The central bank minimizes the loss function (L) considering constraints given by structural equations of the economy (equations 1 and 2). Thus, the Lagrangian corresponds to:

(11) $$\zeta = \sum_{t=0}^{\infty} \beta^t \left\{ \begin{array}{l} \frac{1}{2} \left[\pi^2 + \lambda_x (x - x^*)^2 + \lambda_i (i_t - \bar{i}_t)^2 \right] \\ +\varphi_{1t} \left[x_t - x_{t+1} + \sigma (i_t - \pi_{t+1} - \bar{r}) \right] \\ +\varphi_{2t} \left[\pi_t - \kappa x_t - \beta \pi_{t+1} \right] \end{array} \right\} - \beta^{-1} \varphi_{1,-1} \left[x_0 + \sigma \pi_0 \right] - \varphi_{2,-1} \pi_0,$$

where φ_{1t} and φ_{2t} r represent the Lagrangian multipliers associated with the equations (2) and (1) respectively, and the multipliers $\beta^1 \varphi_{1,-1}$, $\varphi_{2,-1}$ correspond to the constraints on the values of x_0 and π_0, respectively.[6]

The first-order conditions are:

(12) $\pi_t - \beta^{-1} \sigma \varphi_{1,t-1} + \varphi_{2,t} - \varphi_{2,t-1} = 0$

(13) $\lambda_x (x - x^*) + \varphi_{1t} - \beta^{-1} \varphi_{1,t-1} - \kappa \varphi_{2t} = 0$

[5] With this approximation valid for small values of r.

[6] As stated by Woodford (2003), the choice of notation of the last multipliers is made considering that the first order conditions are constant over time.

(14) $\lambda_i(i_t - \bar{i}) + \sigma\varphi_{1t} = 0$.

The condition (14) is accepted for a constant differential of interest rate only if the multiplier associated with this equation is constant. Substituting the value of the first multiplier and verifying that the first difference of the second multiplier is zero the following equation to inflation rate is reached:

(15) $$\pi_t = -\frac{\lambda_i(i - \bar{i})}{\beta}.$$

Since the IS is satisfied for constant values only when ($i_t = \bar{r} + \pi_t$), the inflation rate of equilibrium in a regime under the commitment of monetary authority is

(16) $$\bar{\pi} = -\frac{\lambda_i}{\lambda_i + \beta}(\bar{r} - \bar{i}).$$

Therefore, the inflation is negative (assuming that $\bar{r} > \bar{i}$) and represents a generalization of Friedman's result.[7] It is important to note that if the interest rate which is compatible with the fiscal equilibrium exceeds the real interest rate, the optimal inflation rate becomes positive. In the opposite way, the inflation rate is negative and Friedman's result is not changed.

Using the equation that defines the relation of fiscal equilibrium for interest rate (equation 7), the inflation rate of equilibrium can be rewritten as:

(17) $$\bar{\pi} = -\frac{\lambda_i \bar{r} b}{(\lambda_i + \beta)b - \lambda_i(t - g)}.$$

Considering the case where the central bank takes into consideration the budget constraint (equation 7), the objective function is equivalent to

(18) $$\zeta = \sum_{t=0}^{\infty} \beta^t \left\{ \begin{array}{l} \frac{1}{2}\left[\pi^2 + \lambda_x(x - x^*)^2 + \lambda_i(i_t - \bar{i}_t)^2\right] \\ +\varphi_{1t}\left[x_t - x_{t+1} + \sigma(i_t - \pi_{t+1} - \bar{r})\right] \\ +\varphi_{2t}\left[\pi_t - \kappa x_t - \beta\pi_{t+1}\right] \\ +\varphi_{3t}\left[\bar{i}_{t-1} - (t_t - g_t)\frac{\pi_t}{b_{t-1}}\right] \end{array} \right\} - \beta^{-1}\varphi_{1,-1}\left(x_0 + \sigma\pi_0\right) - \varphi_{2,-1}\pi_0 - \beta^{-1}\varphi_{3,-1}\frac{(t-g)}{b_{t-1}}\pi_0,$$

[7] For this result it is supposed that β=1 and $\bar{i} = 0$, i.e., central bank has an interest rate target equal to zero.

where φ_{3t} is the Lagrangian multiplier associated with the equation of fiscal equilibrium, and the first-order conditions are:

$$(19) \quad \pi_t - \beta^{-1}\sigma\varphi_{1t-1} + \varphi_{2t} - \varphi_{2t-1} - \beta^{-1}\varphi_{3t-1}\frac{(t_t - g_t)}{b_{t-1}} = 0,$$

$$(20) \quad \lambda_x(x - x^*) + \varphi_{1t} - \beta^{-1}\varphi_{1t-1} - \kappa\varphi_{2t} = 0,$$

$$(21) \quad \lambda_i(i_t - \bar{i}) + \sigma\varphi_{1t} = 0.$$

Following the same procedure as the last steps, it is possible to show that the solution of this problem generates the equation of steady equilibrium for the inflation rate which corresponds to

$$(22) \quad \bar{\pi} = -\frac{\lambda_i \bar{r} + \varphi_3(t-g)/b}{\beta + \lambda_i(1 + \frac{(t-g)}{b})}.$$

The above equation reveals that the signal of the optimal inflation rate depends on the weight the central bank gives to the budget constraint (φ_{3t}). This result has important implications for the management of the monetary policy because it denotes that the use of inflation targeting must be embedded in the fiscal question. According to the above result, a high concern by the central bank on fiscal equilibrium may imply a high inflation target. This relation is constant and is given by

$$(23) \quad \frac{d\bar{\pi}}{d\varphi_3} = \frac{(t-g)/b}{\beta + \lambda_i(1 + \frac{(t-g)}{b})}.$$

Figure 1 illustrates the above results using the values present in table 1. It is observed that for each increase of 0.01 in the weight of the central bank toward the fiscal side implies an increase in inflation by 0.08%. For example, when the parameter φ_{3t} is equal to 0.5 the optimal inflation rate is 4.02%. It is important to note that the result is slightly sensitive to the parameter determined by λ_i, especially for small values.

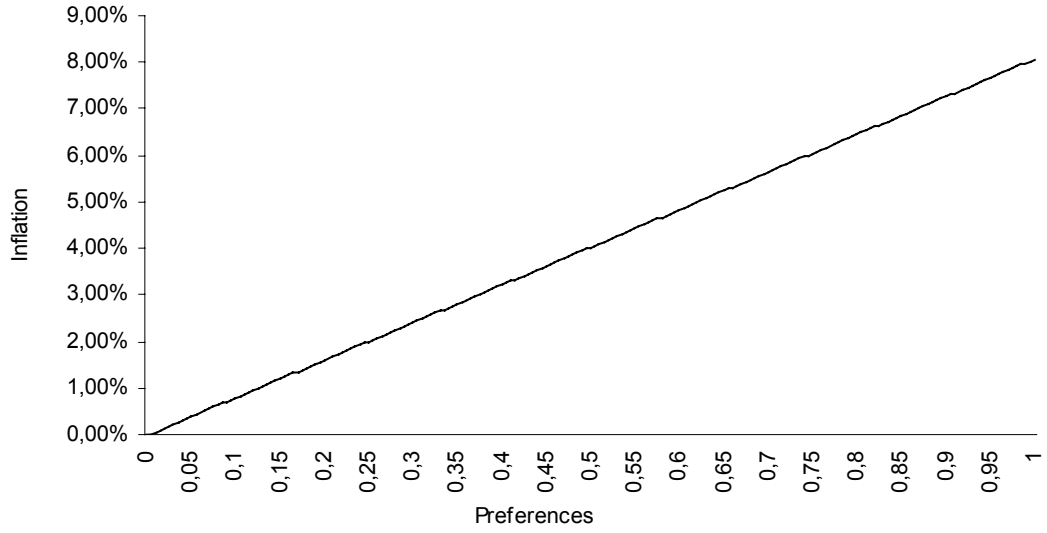
Table 1

Simulated parameters

Parameters	Simulated value
$(t\text{-}g)$	0.045
b	0.55
λ_i	0.02
$\bar{r}$	0.01
β	0.99

Figure 1

Optimal inflation rate and central bank fiscal preferences



4. An analysis of the Brazilian case

In June of 1999 the National Monetary Council (NMC) defined the inflation targeting as the new framework for the conduction of monetary policy. Before the adoption of inflation targeting as the nominal anchor, variations of fixed exchange rate regime and monetary aggregate targets were used. The main motivation for introducing inflation targeting was due to the expectation that the use of this strategy could eliminate the uncertainty caused by devaluation of the currency in January of 1999 and would restore the control on inflation.

Although the adoption of inflation targeting in Brazil has been convenient, the disinflation process did not show the expected results. In the first year of the regime, the inflation targets determined were 8%, 6% and 4% for 1999, 2000 and 2001, respectively, with a tolerance interval of ±2%.[8] In 2000 (a year of good performance in the Brazilian economy) the NMC defined an inflation target for 2002 of 3.5%, which in turn would conclude the disinflation process thus achieving a satisfactory level for the Brazilian economy.

After several shocks on the economy, the NMC decided to change the tolerance interval to ±2.5%. Notwithstanding, this procedure was not sufficient to assure the success of the disinflationary process. After the confidence crisis caused by the presidential election in 2002, the targets were revised. The target for 2003 became 8.5%

[8] The official price index that is used in inflation targeting is the National Consumer Price Index (extended) – IPCA (official price index).

(without tolerance interval) and the target for 2004 changed from 3.75% to 5.5% (with tolerance interval of ±2.5%).

Another important point that must be considered in the Brazilian economic policy is the ratio debt/GDP because it reveals the risk of fiscal collapse. During the validity of the variation of fixed exchange rate regime (1994-1998) there was a tendency to increase the ratio debt/GDP. The failure in maintaining the nominal anchor based on the exchange rate implied a stock of public debt close to 50% of the GDP after January of 1999.

After the introduction of the inflation targeting the interest rate became the main instrument in the management of the monetary policy.[9] It is important to note that a consequence of an environment where the interest rate is higher than the economic growth rate combined with a strong increase in public debt due to the devaluation of currency raises the ratio debt/GDP.[10]

Table 2 shows the annual inflation targets, the annual inflation measured by IPCA, and the net public sector debt (as a percentage of the GDP). It is possible to conjecture the existence of a relation between the departures of inflation from its targets with the net public sector debt (NPSD). Thus, it is relevant to verify if this correlation means that the Central Bank of Brazil (CBB) attempts smoothing the interest rate with the objective of not accelerating the public debt.

Table 2
Inflation and net public sector debt (NPSD)

Years	Inflation target	Inflation	NPSD
1999	8.0%	8.94%	48.68%
2000	6.0%	5.97%	48.78%
2001	4.0%	7.67%	52.63%
2002	3.5%	12.53%	55.50%
2003	4.0%	9.30%	57.18%
2004	5.5%	7.60%	51.67%

Source: Central Bank of Brazil and Brazilian Institute of Geography and Statistics.

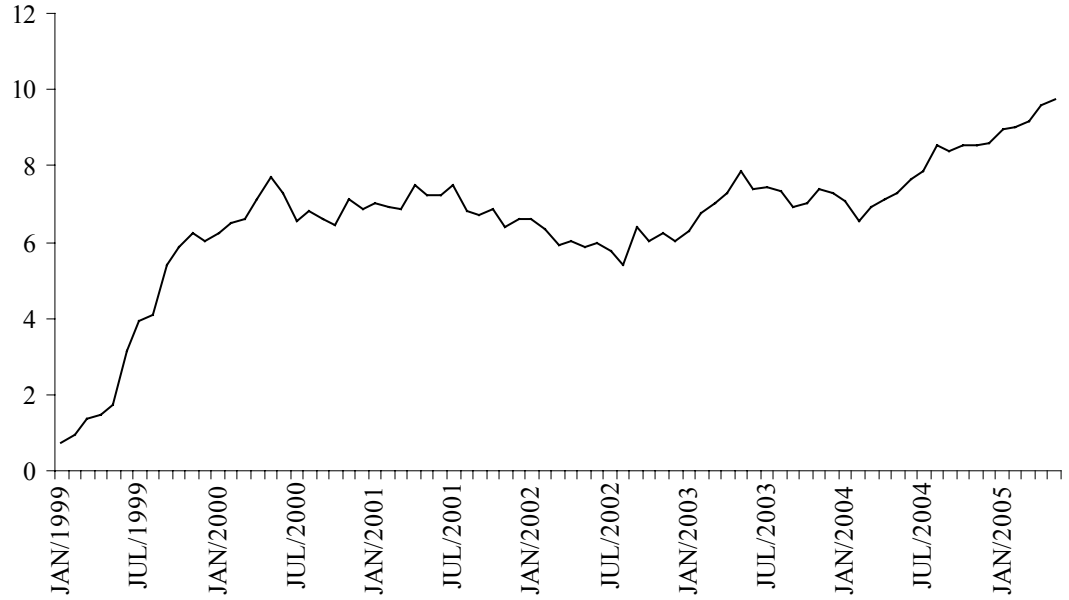
With the objective to evaluate the above question, a CBB's reaction function is estimated including a term capable of reflecting the smoothing in the interest rate. Thus,

[9] In Brazil, the basic interest rate level (Selic) is defined, every month, through monthly meetings of the Committee of Monetary Policy (COPOM) with the objective to achieve the inflation target.
[10] The effort of the National Treasury creating a successive primary surplus was not sufficient to avoid the problem.

the reaction function is given by equation 3.[11] The interest rate consistent with the fiscal equilibrium ($\bar{i}_t$) was obtained considering equation 7. The variables used were primary surplus in the last twelve months and the net public sector debt, both deflationed with IPCA. The inflation rate is the variation of the IPCA in the last twelve months. The output gap was obtained through deviations of GDP in relation to the linear trend. The interest rate is the Over/Selic rate. The deviation of the inflation from it target is given by the difference between the inflation rate (last twelve months) and the inflation target.

Figure 2 shows that the interest rate consistent with the fiscal equilibrium is increasing over time. This observation suggests that the fiscal effort by the National Treasury has given more flexibility to the conduction of the monetary policy. The justification is that while the interest rate of fiscal equilibrium rises, the CBB has more freedom for increasing the interest rate in the search for the inflation target.

Figure 2
Interest rate (%) consistent with fiscal equilibrium



A first condition to be analyzed before estimating the equation is to check if series have unit root. In the case that series are not stationary there is a high possibility that results are spurious. Therefore, with the objective of testing the existence or not of unit root in the series, the tests Augmented Dickey-Fuller (ADF) and Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) were made (see table 3).

[11] For convenience it is assumed that the target for the output gap is zero (x^* =0).

Table 3

ADF and KPSS test

	ADF-test		KPSS-test	
Series	t-Statistic	Critical values	LM-Statistic	Critical values
i_t	-7.688	-2.900	0.123	0.146
$i_t - \bar{i}_t$	-7.646	-2.900	0.135	0.146
$\pi - \pi^*$	-2.328	-2.900	0.069	0.146
$d(\pi - \pi^*)$	-5.800	-2.900		
x	-1.707	-2.901	0.074	0.146
dx	-4.907	-2.587		

The results of both tests (ADF and KPSS) denote that the interest rate (i_t) and the deviation of the interest rate from the interest rate compatible with the fiscal equilibrium ($i_t - \bar{i}_t$) are stationeries. On the other hand, there is a divergence between the tests for the output gap (x) and for the departure of inflation from its target ($\pi - \pi^*$).

With the objective of identifying the order of integration in the above-mentioned series, a graphical analysis of the correlogram from the original values of the series is made (see figure 3). It is observed that the series ($\pi - \pi^*$) and x decrease slowly and gradually while lags increase. Thus, it can be seen that the present values depend on past values suggesting a presence of unit root in the series. The series in the first difference denotes that $d(\pi - \pi^*)$ is stationary while *dx* still is not stationary. Using second difference it was verified that *d2x* is I(2).

After the analysis of the order of integration in the series, the following interest rate equation was estimated:

(24) $$i_t = i^* + \alpha_1(i_{t-1} - \bar{i}_{t-1}) + \alpha_2 d(\pi - \pi^*) + \alpha_3 d2x\,.$$

Since there is the possibility of the variables of interest being equilibrium points, the least squares estimator may be inconsistent. As a consequence, with the objective of avoiding this problem, the generalized method of moments (GMM) was applied. The instruments used in the estimation were the lagged variables and the constant. Thus, the estimation result is:[12]

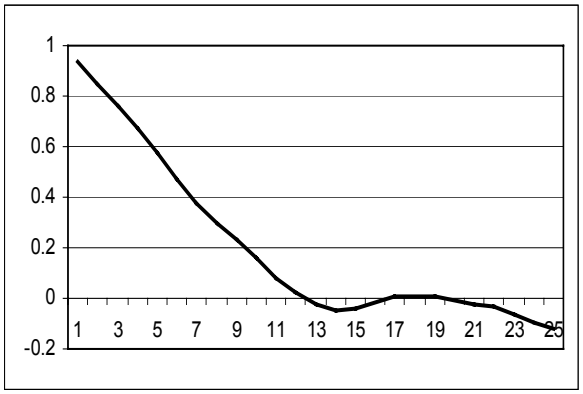
[12] As the model is identified the J-statistics become unnecessary. The standard-errors were estimated in a consistent way (HAC – using Bartlett kernel).

$$(25)\ i_t = \underset{7.3393^{***}}{10.511} + \underset{5.1559^{***}}{0.6786}(i_{t-1} - \bar{i}_{t-1}) + \underset{1.8977^{*}}{0.7650}\, d(\pi_t - \pi^*) - \underset{0.0339}{4.49}(10^{-6})\, d2x_t\,,\ R^2=0.7,\ n=71.$$ [13]

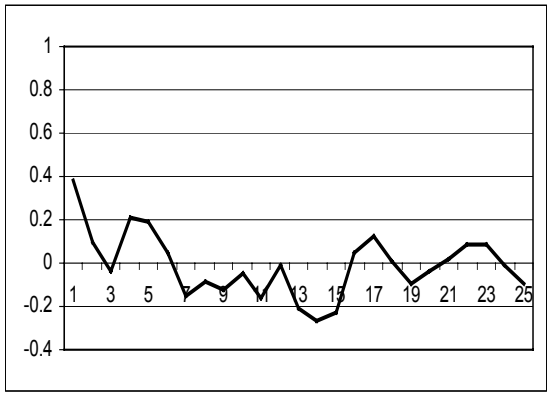
Figure 3

Correlogram of series

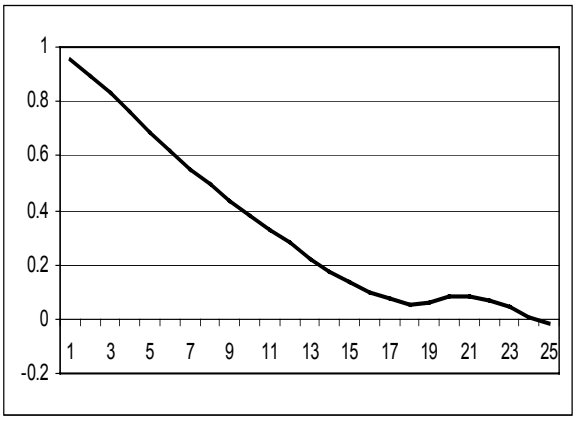
Correlogram of $\pi - \pi^*$



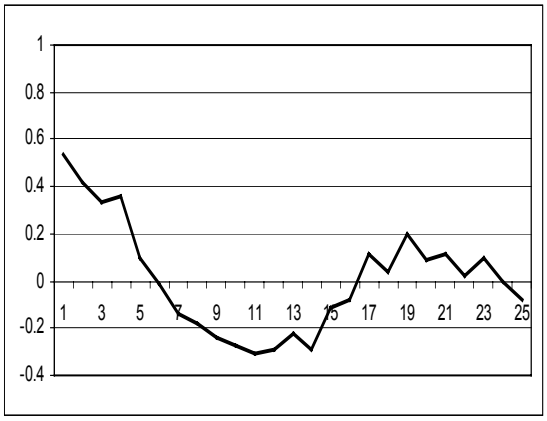
Correlogram of $d(\pi - \pi^*)$



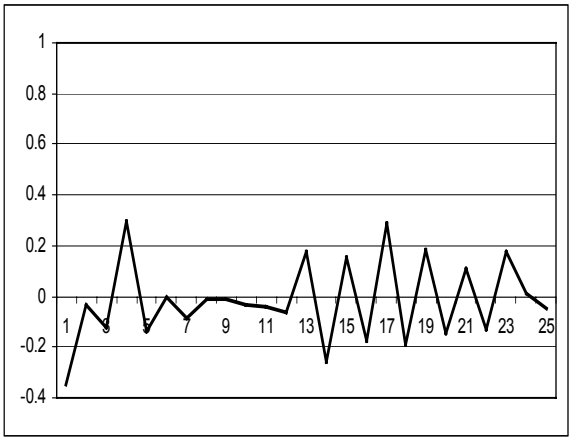
Correlogram of x



Correlogram of dx



Correlogram of $d2x$



[13] Where *** denotes significance at the 1% level and * significance at the 10% level. The estimations of the equation with the series in level, as suggested by Clarida, Gali and Gertler (2000), does not imply any substantial changes in the findings.

The equation (26) shows that the smoothing of the interest rate in Brazil is relevant and that the CBB avoid deviations of the interest rate from that which is consistent with the fiscal equilibrium. Furthermore, it is observed that the equilibrium interest rate is close to 10%. Therefore, this result implies that when the fiscal equilibrium, output target and inflation target are reached, the interest rate tends to be stabilized at this high level.[14] Another point is that the output gap has no significance. On the other hand, the inflation coefficient has statistical significance in the estimation. Although the coefficient reveals the expected sign, its value is lower than 1, therefore, the response of the interest rate to an increase in the departure of inflation from its target is not sufficiently strong to neutralize the inflationary pressure. This result is important because it suggests that the conduction of the monetary policy is not adequate for reducing neither inflation nor the public debt.

The found result reveals that the CBB takes into consideration the public debt in its reaction function. This observation suggest that, in contrast to countries where there is a trade-off between inflation and output gap, the Brazilian monetary policy has a trade-off between inflation rate and public debt. This result is important to the structure of the inflation targeting because the NMC must consider it when it defines the inflation targets with the intention of avoiding the problem with credibility.

5. Concluding remarks

This paper shows that there is a relation between the equilibrium inflation rate and the sensitiveness of monetary policy to the deviations of the equilibrium interest rate. When the equilibrium interest rate is consistent with the fiscal equilibrium, a direct relation between optimal inflation rate and public debt is achieved. This is an important result because it reveals the existence of a trade-off between inflation target and public debt stability.

The above observation indicates that the determination of an inflation target must take into consideration the above-mentioned trade-off. A too tight inflation target can imply a loss of the central bank credibility in its attempt to stabilize the economy.

[14] This result denotes that if the inflation rate finds the equilibrium to be around 4%, the real interest rate is close to 6%, which in turn would indicate a high level of the interest rate during the period under analysis (June of 1999 – July of 2005).

On the other hand, a loose inflation target can indicate that the central bank objective is only the stability of the public debt.

The Brazilian case denotes that the CBB smooths the Selic rate taking into consideration the departures of the interest rate from that rate which is consistent with fiscal equilibrium. In other words, there is evidence that the CBB takes into consideration the impact of monetary policy on public debt. This result is particularly important because the NMC defines the inflation targets and it is CBB's responsibility to achieve the targets. Thus, this is relevant point for the NMC to define a consistent plan for its targets which is capable of building credibility in the conduction of the macroeconomic policies.

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