**Review and Implementation of the Taylor rule in Romania**

DANIEL BELINGHER  
DUMITRU-ALEXANDRU BODISLAV  
Academy of Economic Studies  
Caderea Bastilei Street, no. 2-10, Bucharest  
ROMANIA  
daniel.belingher@gmail.com; alexandru.bodislav@infinitumgroup.com

**Abstract:** - In these days of economic uncertainty macroeconomic policies must be used to set in line with the economic deployment of the evolution of the country’s government. This research paper studies the evolution in the last 9 years of the monetary policy interest rate (MPIR) and the actual development of some macroeconomic indicators of Romania compared with Taylor rule generated interest rate. One of the first hand macroeconomic influencers is the Taylor rule, because it underlines the connection between the Central Bank of a country, through its nominal interest rate, the economic momentum-cycle, through the output gap, and other economic conditions, especially inflation. Actually, in particular the rule stipulates that for each 1 percent increase in inflation, the central bank needs to raise the nominal interest rate with more than 1 percent, this being entitled as the **Taylor principle**.

**Key-Words:** Central Bank, Gross Domestic Product, inflation, interest rate, monetary policy, output gap, Taylor rule

1 **Introduction**

In 1993 the U.S. economist John Taylor proposed his rule and principle as a mild mathematic overview of where should the policy of the Central Bank, especially the Federal Reserve, should act. This rule was intended to foster the stability of prices and sustain full employment by reducing uncertainty in the system and creating confidence in the future actions taken by central banks. The rule plays a safe game when is under the pressure of time.

The original Taylor rule was represented through a general equation created from the nominal interest (monetary policy interest rate, in the studied case), actual and targeted inflation rates and of the actual and potential Gross Domestic Product [1].

\[
\begin{align*}
\hat{I}_t &= \pi_t + \pi^*_t + \alpha_1 (\pi_t - \pi^*_t) + \alpha_2 (y_t - \bar{y}_t), \\
\end{align*}
\]

\(i_t\) - targeted short term nominal interest rate (MPIR);  
\(\pi_t\) - inflation (measured with the GDP deflator);  
\(\alpha_1\) - desired rate of inflation;  
\(\bar{y}_t\) - equilibrium real interest rate;  
\(\pi^*_t\) - real GDP (logarithm);  
\(\pi_t\) - potential output (logarithm).

The GDP is under a logarithm because the resulted graphs from the Taylor equation should have a linear trend.

Taylor’s paper from 1993 sets \( \alpha_1 = \alpha_2 = 0.5 \) that results in a high interest rate (tight monetary policy) when we deal with a higher than targeted actual inflation, a low interest rate (easy monetary policy) when an output stimulus is wanted. In case of stagflation, when full employment is below the target and inflation is higher than the target, the rule becomes an indicator for when to reduce inflation or increase output.

2 **The optimal Interest Rate**

This Taylor principle consists in the specification of \( \alpha_1 > 0 \), where the Taylor rule says that increasing inflation with 1 percent will pressure the central bank to raise the nominal interest rate (MPIR) with more than 1 percent. From the real interest rate formula which is equal with the difference between the monetary policy interest rate and inflation rate, this resulting in the fact that when inflation rises, the real interest rate should be increased, this fact being called the Taylor principle and has as first tier effect the cooling of the entire economy.

In 2009, Taylor sustained that in real values the situation should be observed like following: if inflation rises with 1% the central bank’s reaction should be of raising the interest rate with 1.5% (the optimal is reached if the increase is bigger than
1%). If the GDP decreases by 1%, the response of the central bank is to cut the interest rate by 0.5% [2]. Establishing the measures that should be taken by a Central Bank can be easily underlined, but are they quantified at their optimal value. We take for implementation the Taylor rule and principle on Romania’s Monetary Policy Interest Rate (MPIR) comparison. It is desirable that economic measure (MPIR) should be in line with the theoretical measure (the Taylor rule) to validate that the economy is heading the right direction, with the help of the government, and in this research paper’s focus, the Central Bank.

2.1 The macro-framework of Romania
The actual economic crisis brings to the table the need for using new economic policies to tune the public sector, controlled by the government and by the central bank. Globally, after the events that occurred in the ’70 and the ’80 the fiscal and monetary policies where in the spotlight again [3]. There were done many studies on fiscal policies that should stabilize the economy, but our research paper will be based on a particular component of the other type of policies, the monetary policy, in particular the Taylor rule.

For this research paper it is wanted to calculate and demonstrate if the National Bank of Romania through the nomination of the interest rate if it was in tune with the appliance of the Taylor rule. For creating this demonstration the following data for Romania was processed:

1. The Output Gap (the output is equal with the difference between the actual GDP and the potential GDP – source: [3]);
2. The Inflation Rate (source: National Bank of Romania database);
3. The Targeted Inflation Rate (source: National Bank of Romania database);
4. The Monetary Policy Interest Rate (that is imposed by the National Bank of Romania);
5. The generated Interest Rate according to the Taylor equation, after using this formula:

\[ \text{Interest Rate} = \text{Inflation Rate} + 0.5 \times (\text{Output Gap} + 0.5 \times (\text{Inflation Rate} - \text{Targeted Inflation Rate})) + \text{Targeted Inflation Rate} \]

The data’ time frame is 2002 – 2010 (9 observations) and was chosen only for this period because at the beginning of the year 2001 the Romanian economy started to have an established structure and didn’t needed any external influencers, or help to be sustainable in its development to a mature and healthy economy. The Output Gap can be positive or negative, depending on the actual status of the economy and the forecast. When the output gap is positive we are facing the situation of an inflationary gap that has as cause an extra pressure on the aggregate demand, sometimes created by the sudden rise of government spending. The negative output gap is created by a smaller actual GDP than the potential GDP, sometimes this situation is born from the sudden fall of the aggregate demand or a shock on the aggregate offer.

The traditional economics underlines the fact that the economy usually adjusts itself automatically and the actual and the future GDP equals the potential GDP, but the adjustments are done in time and with high social costs. That’s why the government and the central bank are working together to solve any syncope in the economic environment.

In this paper the focus is on the measures taken by the central bank, in our case the National Bank of Romania, so when the economy is in the positive output situation – economic expansion, money have to be more expensive through the following measure: selling bonds through the open market, raising the minimum reserve rate and increasing the nominal interest rate. In the actual situation of global economy, therefore Romania’s economy we are close to another dip into recession. When the economy enters a recession, bonds are bought on the open market, the minimum reserve rate is lowered and the nominal interest rate is decreased, with the purpose to stimulate the aggregate demand and to lower the unemployment rate by offering cheaper credits and facilitate the injection of money in the economy.

As a specific for Romania, its central bank and its governor have as main purpose the direct targeting the inflation rate. The strategy based on targeting the inflation is in tune with the Taylor rule because it has as direct pressuring variable on the inflation the monetary policy interest rate. Direct targeting of the inflation is done through direct settlement on only one indicator and has a faster reaction on prices stability, but sometimes tends to inflationary states of the economy. What is specific for this strategy is that for a period of time the inflation rate is settled by the monetary authority and this way a strategy based on the direct targeting of the inflation rate that is created with transparency for the general public, and this way they know the direction of the Central Bank’s action [4].
In the same time, to secure the fulfillment of this objective, the Central Bank must have access to more information on the stability of prices, because it needs to create realistic forecasts on the inflation rate movement.

The analysis of the factors that influence the inflation’s level must include an overview on:

1. The variables that influence the labor market (including here the minimum wage and the productivity level in the economy);
2. Import prices;
3. Production prices;
4. Monetary policy and real interest rate (the components that are directly influenced by the Central Bank);
5. The real and nominal exchange rate;
6. The budgetary deficit, through which is settled the direct intervention of the government in the economy.

Even if these monetary measures are adopted, there are to be considered the pressure created by the globalization phenomena through the liberalization of the capital market or the creation of new financial innovation, like CDOs or CDSs. All these factors represent new needed information on the way monetary measures are created and implemented, and their accuracy depends on their relevance.

Direct targeting of inflation helps create a better image and increases credibility in the Central Bank and its actions.

3 The development of Romania’s economic environment

The variables that are needed to create the overview on the monetary policy interest rate imposed by the National Bank of Romania and the interest rate generated according to the Taylor rule.

<table>
<thead>
<tr>
<th>Year</th>
<th>Output Gap</th>
<th>Inflation Rate</th>
<th>Targeted Inflation Rate</th>
<th>MPIR (year average)</th>
<th>TrIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>-0.48</td>
<td>22.5</td>
<td>22.0</td>
<td>28.47</td>
<td>44.51</td>
</tr>
<tr>
<td>2003</td>
<td>-0.97</td>
<td>15.3</td>
<td>14.0</td>
<td>18.81</td>
<td>29.47</td>
</tr>
<tr>
<td>2004</td>
<td>1.04</td>
<td>11.9</td>
<td>9.0</td>
<td>20.27</td>
<td>22.87</td>
</tr>
<tr>
<td>2005</td>
<td>-1.09</td>
<td>9.0</td>
<td>7.5</td>
<td>9.59</td>
<td>16.71</td>
</tr>
<tr>
<td>2006</td>
<td>-0.81</td>
<td>6.56</td>
<td>5.0</td>
<td>8.44</td>
<td>11.94</td>
</tr>
<tr>
<td>2007</td>
<td>2.17</td>
<td>4.84</td>
<td>4.0</td>
<td>7.46</td>
<td>10.35</td>
</tr>
<tr>
<td>2008</td>
<td>6.2</td>
<td>7.85</td>
<td>3.8</td>
<td>9.46</td>
<td>16.78</td>
</tr>
</tbody>
</table>

The used data was gathered from databases of INSSE, BNR, previous articles and was processed with Microsoft Office – Excel 2010 and STATA 10 for generating the needed data for the Monetary Policy Interest Rate and the Taylor rule Interest Rate (TrIR) and creating the figures that were inserted in this research paper.

According to the output gap, Romania’s economy had three years of economic boom, in 2004, 2007 and 2008. The evolution of the inflation rate is positive going from 22.5% in 2002 to 6.09 in 2010, but with a minimum of 5.59 in 2009. Future calculations on the year 2011 will show an anomaly on observing the inflation rate because of government’s decision to increase the Value Added Tax in July 2010 from 19% to 24%, but the Inflation will continue its descending trend after absorbing the VAT’s year on year influence.

According to the equation created through the Taylor rule:

\[ \text{Interest Rate} = 1.5 \times \text{Inflation Rate} + 0.5 \times \text{Targeted Inflation Rate} + 0.5 \times \text{Output Gap} \]

From (3) equation it results an interest rate that can be described through this graph:

**Figure 1. Taylor rule Interest Rate**

The National Bank of Romania practiced the following Monetary Policy Interest Rates:
The trends of the Monetary Interest Rate (MPIR) and of the Taylor rule Interest Rate (trIR) is the same and results in the following combined graph:

From this graph the obvious can be stated that during the last 9 years the economic development of Romania by measuring the output gap and the evolution of the inflation rate with a decreasing trend, with the monetary policy interest rate created for targeting the inflation rate it can be observed that the National Bank of Romania took the right measures, but not at their maximum potential. In the year 2004 the Monetary Policy Interest Rate was at the smallest gap than the Taylor rule generated Interest Rate because of the fact that the economy entered in a zone of inflationary development of the economy and because the fact that the Monetary Policy Interest Rate is created after the valuation of the past economic situation (T-1 moment) to implement an actual measure (the Monetary Policy Interest Rate in the T moment).

4 Conclusion
Considering the actual development of the world economy and regarding the evolution of some „Black Swan” phenomena that cannot be forecasted by the National Bank of Romania we can realise that governments are slow in adapting and adopting proactive measures to stop recessions or the deployment of general crisis in their countries and they can create delays and impediments in reactive measures taken by the NBR. The „early adopters” of economic measures are from the private sector and they have the tendency to pull after their model the entire economy, they are shortly followed by the monetary policy makers – the NBR and as a result the governments are in tune the private sector with the almost right macroeconomic complementary measures (but with a delay). The Taylor rule was created to show a general path for the adopted monetary policy by the monetary policy makers and it uses general macroeconomic indicators, so it is not always the optimal model to use, but offers general guidance. In its defense we can add the fact that the Federal Reserve under Alan Greenspan’s and Paul Volcker’s issued measures are in line with the Taylor rule, the same for Canada, New Zealand and Germany, countries that adopted inflation targeting rules. Under the syncope created by the housing bubble the Taylor rule is not so accurate, that’s why in the generated graphs for the comparison between the two interest rates of the years 2008 and 2009 the trends were not in line, especially for the year 2009 when MPIR was higher than TrIR with 0.67% so it can be underlined the fact that the National Bank of Romania took a risk measure to cut the easy money flow because that was the period when the real effect of the housing bubble reached Romania, for the period 2010 – 2011 the influence of the VAT’s increase will create a large gap between the MPIR
and the Taylor rule interest rate until the 5% VAT increase is absorbed. The fact that the trend of the MPIR was in then with the Taylor rule interest rate but under its absolute value underlines the fact that the NBR has the tendency to play a safe game and wants to put away the pressure, but because it nominated smaller interest rates than what it could nominate puts under the spotlight the fact that in Romania for the last 9 years credit was cheap, not only in the used measures, but in the price of money.

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References: