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05.05.2014

Taylor's rule

Technical box extracted from:

Inflation Report no.2, May 2014 [1]

If the main monetary policy instrument is the interest rate, then monetary policy can conceived in terms proposed by the well-known American economist *John B. Taylor*. John B. Taylor, a professor at Stanford, issued in the 90s the theory that the central bank should take into account two elements in determining the interest rate: the rate of inflation and the gap between achieved GDP and potential GDP (*output gap*). The original version proposed by Taylor may be represented as follows:

$i_t = \pi_t + r_t^* + a_\pi (\pi_t - \pi_t^*) + a_y (y_t - \bar{y}_t)$, where:

i_t - base rate; π_t - inflation rate; π_t^*- targeted rate of inflation; r_t^* - equilibrium real base rate;

y_t - natural logarithm of real GDP; $\bar{y}_t$ - natural logarithm of potential GDP.

In this equation, parameters a_π and a_y must be positive. However, Taylor in the work published in 1993 proposed to set these parameters at the level of 0.5 each ($a_\pi = a_y = 0.5$). Operating principle of Taylor's rule is very simple, but also very effective and suggestive. Thus, the central bank can quantify and promote a coherent monetary policy. Therefore, in case of inflationary pressures, the central bank tightens the monetary policy (by increasing the base rate), or loosens it (by reducing the base rate). It should be mentioned that monetary policy instruments have long and variable lags, which requires a decision taken now to have a future effect. In general, these lags can range from three quarters to six quarters. Therefore, monetary policy taken now will be based mainly on future signals and on the forecasts carried out. Thus, the main difficulties faced by central banks around the world are the accurate quantification of the interest rate channel and the development of certain consistent forecasts of the main macroeconomic indicators.

The following are some scenarios created based on artificial data, but which would explain simplistically with concrete data the way the Taylor's rule works.

Table no. 1

Scenario	a_π	a_y	r_t^*	π_t	π_t^*	y_t	$\bar{y}_t$	i_t
1	0.5	0.5	2 %	1 %	2 %	1 %	2 %	2.0 %
2	0.5	0.5	2 %	2 %	2 %	2 %	2 %	4.0 %
3	0.5	0.5	2 %	3 %	2 %	3 %	2 %	6.0 %
4	0.5	0.5	2 %	3 %	2 %	2 %	2 %	5.5 %

Table no.1 shows that if the inflation rate is equal to the targeted inflation ($\pi_t = \pi_t^*$) and GDP growth is equal to potential GDP ($y_t = \bar{y}_t$), the base rate will be equal to 4.0 percent (scenario 2). In these conditions, the economy is in equilibrium and the situation can be considered ideal or basic. According to the scenario 1, if inflation falls below the targeted rate and GDP growth falls below the potential GDP, the central bank should loosen monetary policy to stimulate the economy and to orient the inflation towards its target (i_t=2.0 l percent < 4.0 percent) respectively. From scenarios 3 and 4 may be inferred the decision of the central bank in case of inflationary pressures. Thus, with the emergence of inflationary pressures, the central bank increases the base rate to stabilize the macroeconomic environment.

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