CAN THE TAYLOR RULE BE A GOOD TOOL TO ANALYSE THE MONETARY POLICY QUALITY AT THE TIME OF RECENT MARKET TURBULENCES?

Abstract

Article deals with the problems of application of the Taylor rule as a practical rule, facilitating monetary authorities’ decision making in the years following financial crisis 2007+. Author comes to the conclusion, that the Taylor rule seems to be a poor tool to articulate postulates for central bank’s monetary policy and even for an ex post assessment of this policy. He proposes to substitute Non-decreasing economic growth rate of inflation (NDEGRI) for the Taylor rule as an indicator of the correctness of authorities actions.

JEL Classification Codes: E52, F43.

Keywords: Non-decreasing economic growth rate of inflation (NDEGRI), low inflation trap.

1. Taylor rule and its practical connotations

The so-called Taylor rule has become an essential element in the discussion on monetary policy meeting the postulate of price stability. It was introduced to economic literature in 1993 by John Taylor, American economist, and it is still present in both theoretical discussions and theoretical analyses of the quality of
monetary policy, typical of the so-called New Consensus between the trends representing neo-classical economics and Keynesian economics, described also by the names of New Neoclassical Synthesis or New Keynesian Economics (Goodfriend, 2007, p.48). The form of the Taylor rule has evolved. This paper presents the version which was analysed by B. Bernanke, Federal Reserve Governor, at the annual meeting of the American Economic Association in January 2010 (Bernanke, 2010). In this:

\[ i_t = 2 + \pi_t + \alpha(\pi_t - \pi^*) + b(y_t - y_t^*) \]

where:
- \( i_t \) – means the desired value of the official interest rate at time \( t \),
- \( \pi_t \) – \( \pi^* \) – are deviations of the real inflation rate (\( \pi_t \)) from the inflation target (\( \pi^* \)) set by the central bank at time \( t \),
- \( y_t \) – \( y_t^* \) – „production gap”, indicating deviation of the real output (\( y_t \)) from its potential value (\( y_t^* \)),
- \( a, b \) – positive numbers

The essence of the Taylor rule consists in pursuing such a level of the official interest rate (in this case interest on federal funds), which would be best from the point of view of the course of inflation and economic growth. In the case when the real inflation diverges upwards from the inflation target or when real GDP diverges upwards from its potential level, a central bank should raise the official interest rate. On the other hand, it should reduce it in the case when inflation diverges downwards from the inflation target or when real GDP is lower than its potential value.

In the presented formula inflation and economic growth are treated „equally” from the point of view of postulated changes in the official interest rate; Taylor adopts the same weights for deviations of inflation and GDP (values of \( a \) and \( b \) equal 0.5). Adoption of the same weights results from a specific „optimisation” of the rule form (model) performed on the basis of econometric studies carried out by the author himself, institutions and individual researchers. A similar justification is offered to account for the use of the real interest rate at the level of 2% and the value of potential GDP in the rule. The value of potential GDP results from a simple extrapolation of the average real GDP growth rate in the USA in the years 1984–1992 (2.2% annually); on the other hand, a 2% level of the real interest rate is reputedly the equilibrium level corresponding to the growth rate calculated in such a way.

From the point of view of econometric or statistical studies it is more difficult to explain a 2% inflation assumed by Taylor as the target of the central bank
The average growth rate of consumer prices in the USA in the years 1981–1991 stood at 4.1% (OECD, 2006, Annex Table 18), whereas in the years 1984–1994 it oscillated around 3.6% (OECD, 2008, Annex Table 18). When Taylor put forward his formula, he assumed from the beginning that the monetary policy target in the USA should be the carrying out of the disinflation process regardless of the practical consequences of such policy for economic growth. Anyway, economic growth in this type of policy must be treated as a resulting value while bringing price dynamics to an a priori (intuitively) defined inflation target is the basic value.

Such a system of targets (goals) in monetary policy is confirmed also by a preliminary analysis of the central bank’s reaction (formulating its decisions on the basis of the Taylor rule) to changes in inflation levels and real GDP growth. As it turns out this reaction must be unsymmetrical, which seems to indicate that the above mentioned „equal” treatment of inflation and economic growth as the economic policy targets is only apparent. For example, if inflation grows by 1 percentage point then authorities face the necessity to raise the official interest rate by 1.5 percentage points, the economic growth rate decreases by 1 percentage point, and a central bank responds by a 0.5% decrease in the official interest rate.

In this way the rule becomes an inherent part of the monetary policy tradition from the period of the „monetarist experiment” carried out in the United States and Great Britain at the turn of the 1970s and 1980s, when any symptoms of economic growth were suppressed if only symptoms of accelerated price increases had appeared in economy (Bednarczyk, 1990, p. 90-119). J. B. Taylor himself eagerly points to his doctrinal affinity with M. Friedman’s views emphasizing that in fact the only significant difference which relates to its application in comparison to the implementation of the so called monetary rule is that the former one treats the interest rate – and not money supply – as a key instrument to affect the price dynamics (Taylor, 2008). It is interesting that M. Friedman did not entirely get used to such a change in regulation instruments (An Interview with M. Friedman, 2006).

The scope of this paper does not allow a broader SWOT (strengths, weaknesses, opportunities and threats) analysis connected with adoption of the Taylor rule as the basis of the decision-making process in a central bank’s monetary policy. The rule has its advocates and radical opponents. It seems that for example the rule is not able to face up to „Lucas criticism” as it assumes that the relationships between the variables appearing in the rule will remain the same despite changes in monetary policy which, for example, may consist in multi-directional changes.

\[^3\] It should be noted that the same level of inflation target was included in the Maastricht Treaty as a postulate for future EMU participants; it was also cited by B. Bernanke, as „Fed’s assumed inflation target” in the already quoted address of 3 January 2010.
in interest rates. This definitely weakens its usefulness as a tool for shaping future economic conditions although it does not necessarily shatter its usefulness as a tool of describing past events, especially so, that in such a description one can appropriately „select” variables making up the rule (inflation measures, real interest rate of the equilibrium, etc.), as it was done by the already quoted B. Bernanke when he characterised the US monetary policy in the 2000s.

But first and foremost, the Taylor rule should not „aspire” to the role of a central bank’s monetary policy basis. The results of the Kansas City Federal Reserve Bank’s research indicate that although the Federal Reserve System officially has never accepted the Taylor rule as the basis of its monetary policy, yet it has always been „present” in works of the Federal Open Market Committee members and treated as one of key tools in an analysis and assessment of the current monetary policy (Asso, Kahn, Leeson, 2007, pp. 25–27).

Eventually assuming that a central bank bases in its activities on the relationships described in the Taylor rule, it should be expected that that the policy implemented by it will be particularly dangerous for the economy in the early phase of boom when the GDP growth indicators deviate rapidly from the trend and a natural tendency towards accelerated price increases occurs due to increased demand (not only for raw materials but also for e.g. modern, more productive technologies). Monetary policy following the Taylor rule will react by an increase (a major one) in interest rates, thus shaping expectations of economic units unfavourable for further boom development and knocking economy out of its natural development rhythm.

It must be noted that the effect of the nominal interest rate growth on the behaviour of real interest rates will be stronger than it may appear from simple arithmetic (deduction of the inflation index from the actual nominal interest rate level) as economic units will see in the increased interest rates the start of the whole series of interest rate increases (which is in accordance with the actual practice of central banks) and will start to consider in their decisions a future, much higher level of the real interest rate which, in turn, will have a stronger effect on their limiting business activity than it might appear from a simple calculation of the actual increase in credit costs. An ill-considered decision of a central bank will trigger off a specific mechanism of „economic hysteria” which is capable of nipping processes of investment in fixed assets in the bud and shift economic resources from the sphere of production to the sphere of speculation thus putting the whole economy at risk of further negative shocks.

This type of policy is equally useless at the time of violent demand-side or supply-side shocks triggered off by internal or external factors, when the policy of interest rates must quickly and decisively react (in a broad scope) in order to at least partly absorb the effect of shocks on the real sphere. A weak response of the interest rate to the economic growth slow-down which is built-in in the rule makes such a reaction impossible.
Table 1 presents a simulation of the official interest rate levels of selected central banks in 2010, if they had followed the Taylor rule in their policy and actual interest rate levels. It appears from the simulation that e.g. in Japan the official interest rate should have had a negative value, which, as it is widely known, cannot happen. On the other hand, in the United States and, in particular, in Great Britain very big differences occur between the values of the interest rate recommended by the Taylor rule and their actual values. In the case of Great Britain the actual value is lower by as much as 295 base points and in the United States by 145–170 base points. It is interesting that in the United States this difference has a negligible effect on the price increase rate (table 2). This effect seems to be much stronger in the case of Great Britain, but it would be very difficult to defend the thesis that the price increase in this country has got out of the authorities’ control in the sense that it generates expectations of economic units which assume further significant acceleration of inflation. The data included in Table 2 suggests something quite opposite; in 2012 inflation in Great Britain should significantly slow down.

Table 1. Using the Taylor rule to determine a recommended level of the official interest rate in selected countries in 2010

<table>
<thead>
<tr>
<th>Specification</th>
<th>Interest rate level recommended by the Taylor rule</th>
<th>Official interest rate level</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>+1.7</td>
<td>0.0–0.25</td>
</tr>
<tr>
<td>Great Britain</td>
<td>+3.45</td>
<td>+0.5</td>
</tr>
<tr>
<td>Japan</td>
<td>-1.0</td>
<td>+0.3</td>
</tr>
<tr>
<td>Euro zone</td>
<td>+1.2</td>
<td>+1.0</td>
</tr>
<tr>
<td>Poland</td>
<td>+3.55</td>
<td>+3.75</td>
</tr>
</tbody>
</table>

Source: Author’s own calculations based on OECD and central banks’ data.

Table 2. Selected macroeconomic indices in the USA, Great Britain, Euro zone and Poland in the years 2010–2012 (%)

<table>
<thead>
<tr>
<th>Specification</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>United States</td>
<td>Great Britain</td>
<td>Euro zone</td>
</tr>
<tr>
<td>Real GDP growth rate</td>
<td>3.0</td>
<td>1.8</td>
<td>3.8</td>
</tr>
<tr>
<td>Consumer price increase rate</td>
<td>1.6</td>
<td>3.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>9.6</td>
<td>7.9</td>
<td>9.9</td>
</tr>
</tbody>
</table>

Source: Author’s own compilation on the basis (OECD, 2011, Annex Table 1, 13, 18; OECD, 2013, Annex Table 1, 13, 18).
The relationships between the recommended and real levels of interest rates look quite different in the case of the euro zone countries and Poland\textsuperscript{4}. Here we deal with almost full convergence. Nevertheless, in the case of euro zone countries the official interest rate was lower (by 20 base points) whereas in the case of Poland it was higher by 20 base points. Thus in 2010, the National Bank of Poland implemented even a more restrictive monetary policy than it appears from the Taylor rule.

Convergence between the ECB’s and the Taylor rule recommendations caused that in 2010 the price growth rate got stabilised at the level of 1.6%, that is the one that is lower from the ECB’s inflation target (2%), but this was paid for with a much slower (even slower than in the US) recovery of the euro zone economy from the crisis. Besides, there were many other premises indicating that in 2012 the economic growth rate in Europe would further deteriorate whereas the US economy began to show clear symptoms of recovery.

When it comes to Poland, the EU’s assistance, especially in the form of financing infrastructural investments, had a great impact on maintaining a favourable economic situation. The above mentioned investments provided employment which, in turn, contributed to maintaining domestic demand. Another important factor was a relatively smaller dependence of the country on trade with abroad as well as a relative underdevelopment of the Polish financial sector due to which Poland has not suffered the consequences of the financial crisis as acutely as the other, economically well-developed countries of Europe. „Observation” of the Taylor rule in Poland was of secondary nature rather. To some extent it resulted from the character of the ECB’s policy (Poland is not a member of the euro zone, yet it is obliged to fulfill the Maastricht criteria and participate in the work of the ECB) and the desire to prevent the depreciation of the zloty which was under the constant pressure as the aversion to risk was growing as more and more EU member countries turned out to be threatened by insolvency.

In summary of theoretical and practical aspects of the Taylor rule it must be concluded that its main message consists in pursuing the means to stabilise inflation at low level (ca. 2%), which is believed to be the foundation for the long-term economic growth. In this way it is assumed \textit{a priori} that a certain price increase rate is the optimum one for economy and it is economically viable in long- and short-term to incur even high costs to reach it. However here some questions arise: is the 2%-inflation the optimum price rise rate in any economy? Is not the price rise rate dependent on the phase of the economic cycle? Cannot the price

\textsuperscript{4}In this table Poland is included as the only EU country and one of very few OECD countries which has not noted the negative GDP growth rate during the time of the recent crisis.
rise be used to some extent to absorb external shocks; or is it more appropriate to absorb these shocks by adjustments in the field of production and employment?

2. Neutral inflation as the monetary policy basis

While answering the question about the optimum price increase rate one cannot ignore the data characterising the fastest developing economies at present which the BRIC group countries belong to. In these countries inflation rates are as a rule at the level of 7–10 per cent with the exception of China where inflation approaches 6%. In the most rapidly growing European economy, which Turkey has been for years, inflation fluctuates between 8 to even above 10%. The above quoted data provide fairly strong evidence confirming the thesis that in the situation of variable currency exchange rates, economic authorities have still quite a lot of freedom in the field of shaping inflation indices.

First of all they do not have to react in advance to changes in prices conditioned by the economic situation (e.g. by „prohibitive” increases in interest rates), which enables free development of a favourable economic situation. The time for stronger corrections of monetary policy comes when economic revival is under way. In this manner inflation is kept under control without negative consequences for economic growth. The same applies also to absorption of external shocks. For instance, the higher price of oil reflected in the higher prices of fuels in internal market does not have to be treated by monetary policy as an inflation impulse which must immediately be suppressed. The effect of such an action would be the transfer of the „supply-side shock” directly to the economic growth indices. Inflation would remain at low level but with damage for the real sphere (production, employment). In this case allowing a temporary increase in inflation would give the real sector the time indispensable for adjustment to new market conditions as well as time for implementation of technologies limiting consumption of the „expensive” factor of production.

Observation of interdependencies between the price increase rate and economic growth in both industrialised countries and countries of most dynamic economies allows us to formulate the thesis that the economic policy based on tight control of inflation in order to keep it at an a priori set low level does not create good conditions for long-term, stable economic growth and must be replaced by a totally different theoretical approach, more friendly for economic growth.

An alternative model of determining the inflation target by a central bank could be based on the neutral inflation hypothesis or the Non-Decreasing Economic Growth Rate of Inflation (NDEGRI) understood as an average price increase in the course of 5–10 years, which co-exists with the highest economic growth indices at which inflation expectations are of stable character (i.e. inflation does not reveal a tendency towards acceleration). An attempt at graphic
determination of the neutral inflation level for the United States is presented in figure 1. The data used are the OECD data for the years 1995–2012. On the OY axis the economic growth rate at time t is marked, whereas on the OX axis – consumer price increase rate at time t-1. Adoption of the previous year inflation as the explanatory variable seems to be justified by the fact that according to the theory of rational expectations, economic entities make their economic decisions at time t on the basis of expectations formulated at time t-1. Therefore the dynamics of price increases, nominal revenues from sales, profits and individual incomes (and other economic phenomena and information) in a given year affect to a large extent decisions concerning expenditures in the following year, which in turn affect the GDP growth rate.

According to the figure 1, in the examined period the real GDP growth rate and inflation in the United States, with nearly 78% accuracy, were in the ranges: inflation 1.5–3.4, economic growth 1.6–4.5. Only in the years 2008, 2009 and 2010 inflation and economic growth indices deviated significantly from them, which can be accounted for by the crisis. Yet, as the economy recovered from the crisis the indices returned to previous values. Thus, it seems that inflation

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5 It results from the division of 14 (the number of observations included in the ABCD rectangle in figure 1) by 18 (total number of observations).
indices within the 1.5–3.4 range reflect the natural cyclical nature of the US economy development: they threaten it neither with fuelling of the inflation expectations nor with shaping deflation expectations. First and foremost they are neutral for economic growth as they can „co-exist” with relatively high indices of real GDP growth.

The data shown in the figure 1 (despite their narrow scope) concerning dynamics of price increase and real GDP growth in the United States in the years 1995–2012 do not confirm the existence of a positive interdependence between economic growth and stable inflation frequently referred to in economic journalism and reports of central bank decision makers. Changes in prices and in real GDP periodically take the same direction, or opposite directions. Sometimes the periods of rapid GDP growth are accompanied by lower and sometimes by higher inflation. And the other way round: the periods of slowed down GDP growth are accompanied by lower or higher inflation. The character of the inflation-economic growth relationship depends on many factors, such as: budget (Krawczyk-Sawicka, 2016, pp. 41–48) and external balance, a central bank’s policy of interest rates, situation of currency exchange rates, changes in expectations, etc., which in every single case may affect this relationship in a different way.

Consequences of the monetary policy based on a central bank’s pursuit of the a priori set inflation target (different from the NDEGRI ) can be theoretically analysed with the use of figure 2. In this figure oblique lines on both sides of the OY axis mean two opposing cases of disinflation: the first one – the line on the right side of the OY axis – illustrates a disinflation process carried out in the circumstances of flexible prices and wages and low tolerance for inflation processes indicated by economic life participants; the second one – on the left side from the OY axis – illustrates a disinflation process in the situation of rigid prices and wages and more tolerance on behalf of economic entities for the price increases.

In the former case, a slowed down rate of money supply (determining the disinflation process) may not cause a decline of the real amount of money in economy as it will be prevented by a quick decline in the inflation rate. The decline will be possible due to the lack of social tolerance for the price increase exceeding the historically acceptable levels (for example, exceeding the upper level of neutral inflation). Because in this type of economy inflation processes entail high social costs, welfare costs as well as costs in the form of restricting output growth (caused by reduced market mechanism efficiency due to the distortion of the relative price structure) (Thorton, 1996, 1996, p. 57 and onwards), full support for disinflation policy will translate into rapid suppression of inflation expectations. What is more, it is quite likely that the appropriately quick decrease in the inflation rate will be followed by an increase in the real amount of money, decrease in interest rates and stimulation of economic growth. Economy will move along the AC’’ line up to point B’, which corresponds to the potential
output \((P_p)\) and neutral inflation value \((i_n)\). The balance in point \(B'\) will be of a relatively stable character and will ensure optimum development conditions to economy in the medium length term.

Figure 2. Variants of achieving economic balance after the period of strenuous inflation suppression

Source: author’s own compilation.

The situation will change dramatically if the authorities define their goal as lowering and than maintaining inflation at the level \(i_c\), lower than the NDEGRI. Theoretical economic equilibrium may shift from point \(B'\) towards points: \(C''\), \(C'\) or \(C\), for which the inflation index assumes this value. A move towards point \(C''\) – i.e. in the situation in which exceeding a potential output size is accompanied by decrease in inflation – is less likely. The shift towards point \(C'\) (impact of anchored inflation expectations allowing to keep real interest rates at a low level) is highly probable. However, there is a risk of the equilibrium being shifted to point \(C\), which will result from exhaustion of advantages and deepening of disadvantages that the economy may experience due to lower inflation \(i_c\). The weaker the impact of anchored inflation expectations is, the more probable the

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6 Disadvantages can arise e.g. due to the lack of possibilities of the "inflation-related" reduction of labour costs, lack of possibilities to use monetary stimulation, etc.
shifting of the equilibrium to point C is. What is more, with time authorities may become a peculiar hostage of the policy aiming at maintaining the anchored inflation expectations at $i_c$ level which may force them to overreact to fluctuations in expected prices. This can result in maintaining exceedingly high levels of interest rates which do not favour economic recovery (see: the ECB's policy of interest rates after the 2007 crisis). Economy will find itself in a peculiar trap which can be described as „low liquidity trap”, characterized by low inflation which is accompanied by stagnative economic growth and high and still growing unemployment.

In the case of the disinflation process in an economy characterized by lesser flexibility of prices and wages and higher tolerance for price increases, suppression of inflation will be a slower process. Restricting the money supply rate will entail a decrease in real amount of money and an increased interest rate which will trigger off recession processes. Economy will move to point B, which corresponds to inflation at $i_c$ level (an a priori adopted inflation target), but also negative economic growth and high unemployment (the case of Polish economy in 2002). Depending on the country, the scale of the output decrease as a rule will be different and it will depend on the slope of AB curve. The equilibrium in point B is characterized by low inflation but at the same time a tendency toward growing budget deficit (if the authorities do not find an effective method of curbing public expenditure). The need to anchor inflation expectations at $i_c$ level will entail a tendency towards maintaining excessively high interest rates which can cause a durable stagnative tendency at low inflation levels and incomplete utilization of production capacity. The economy will become a specific hostage of good looking inflation statistics – it will find itself in the „low inflation trap”.

A way out of this difficult situation – provided that in the meantime no durable deflation expectations are established – is an attempt to shift the equilibrium to point B where inflation is slightly higher than $i_c$ (attains values corresponding to the NDEGRI), but economy uses its production capacity to the full. To this end authorities can use both monetary policy tools (reduction of interest rates) and fiscal policy tools (reduction of tax rates). Indeed, in the situation of not fully utilised production capacity, reduced tax rates should not lead to deeper budget deficit as the decline in budget revenues caused by lower taxes will be compensated by higher revenues resulting from the increased tax base.7

7 The case of Poland in 2003 when by reducing CIT from 27% to 19% the economic boom lasting until 2008 was initiated.
3. Concluding remarks

The Taylor rule referred to in economic literature and, in particular, in the materials of some central banks seems to be a poor tool to articulate postulates for monetary policy and even for an ex post assessment of this policy. This conclusion concerns mainly the post-crisis reality in which we must definitely give up the practice of treating the *a priori* set central banks’ inflation targets as a kind of a „sacred cow” on which the entire interest of the centres making decisions on economic policy is focused. We must make an authentic attempt of taking the economies of industrialised countries out of the vicious circle of stagnation and lack of future prospects. It seems that the NDEGRI may become the right tool to shape conditions for long-term economic growth as it allows us to enhance flexibility of market mechanisms and their immunity to both domestic and external turbulences.

References


OECD (2008), *Economic Outlook*, No. 84.


