RELEVANCE OF THE TAYLOR RULE DURING WORLD ECONOMIC CRISES IN THE SLOVAK REPUBLIC

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Monetary rules as e.g. the Taylor-Type rules are popular thanks to their simplicity and transparency. However, period of crises threatened their position in application of monetary policy. The paper tries to verify validity of the Taylor type rules in times of economic crises. It analyses relevance of the rule especially in Slovakia as the latest member of the euro area. Application of a monetary rule by an individual member state within a monetary union can be questionable. The contribution tries to characterize importance of monetary rule calculations by individual euro area member states especially in the context of world economic crises.
Key words:
monetary rules, Taylor rule, economic crises, the National Bank of Slovakia, euro zone

INTRODUCTION

The economic agents, e.g. investors and bankers, wish to know evolution of base rate that gradually has an impact on other interest rates and has an influence on economy as a whole. It is even in the interest of the central bank to make its reactions more transparent and understandable for public. Eventually, economic agents should know the reaction function of the monetary authority corresponding to the actual situation. If the activities of the monetary authority are transparent, accountable and predictable, the credibility of the central bank rises and application of monetary policy is more effective. Monetary rules enable to calculate besides other indicators, base rates, too. Monetary rules are usually famous for its simplicity and transparency, consequently very popular. However, their application can be more complicated, especially in times of economic crises, or e.g. within a monetary union where monetary policy is implemented in overall for all member states whatever is their particular macroeconomic situation.

1 THE TAYLOR RULE

One of the most known monetary rules is so-called the Taylor rule suggested by an American economist John B. Taylor. Taylor tried to deduce an optimal monetary rule in 1993 [12]. This rule does not create a trade-off between inflation target and economic growth. It encourages price stability as well as stability of economic growth.

In fact, this rule quantifies recommendations for central bank. Its original form was following [13]:

$$i = \pi + gy + h(\pi\text{-}\pi^*) + rf \qquad (1)$$

where, i is a nominal short-term interest rate measured in percentage. π is an inflation rate measured in percentage. π^* is targeted inflation rate. Parameters π^*, rf, g, h have positive values. g and h are weights of output gap and of inflation gap respectively. The last member rf is an equilibrium interest rate of central bank.

Consequently, it is obvious that nominal interest rate depends on gap between actual inflation and targeted inflation as well as on gap between real GDP and potential one. A positive output gap will probably induce increase of inflation. Thus, result of the equation would suggest increase of nominal base rate. Inflation gap that is positive difference between real and targeted level will cause pressure on increase of base rate, too.

Thanks to empirical observations of American economy and base rate of the FED from 1987 till 1994, Taylor specified his rule in following way:

$$i = \pi + 0,5y + 0,5(\pi\text{-}2) + 2 \qquad (2)$$

However, the rule can be applied in this form only in the conditions of the USA. Taylor assumes that the equilibrium interest rate in the USA equals 2, potential output is 2 and weights for inflation gap and for output gap are the same, they equal 0,5. The FED should pay an equal attention to inflation and output stability when calculation base rate. Equal weights in case of output gap and inflation are due to long term economic policy strategy in the USA where the FED targets equally economic growth, employment, and price stability. Consequently, weights and indicators in other countries are different.

2 THE TAYLOR RULE LIMITS

The Taylor rule weaknesses have been discussed already before economic crises [8]. Different base rate will be obtained using different inflation indicators: consumer price index (CPI), harmonised index of consumer prices (HICP), GDP deflator, core inflation, estimated inflation, etc.

Different results will be obtained in case of various real and potential GDP calculations and in case of different weights. In 1999, Kozicki published [8] various outcomes of the Taylor rule and the Taylor-type rules depending on way of calculations. It is obvious from Fig. 1 that a central bank should choose carefully monetary rule manner of calculation. According Kozicki´s analysis, an average variation of recommended interest rate was 3,1%, minimal was 1,8% in 1994 and maximal 5,5% in 1987.
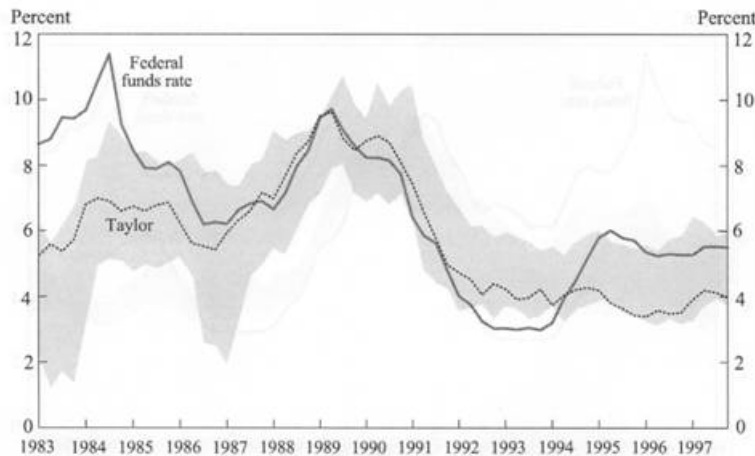
Fig. 1 **The Taylor-type rule recommendation scale depending on different inflation and GDP indicators**

Source: the FED, calculations by Kozicki [8]
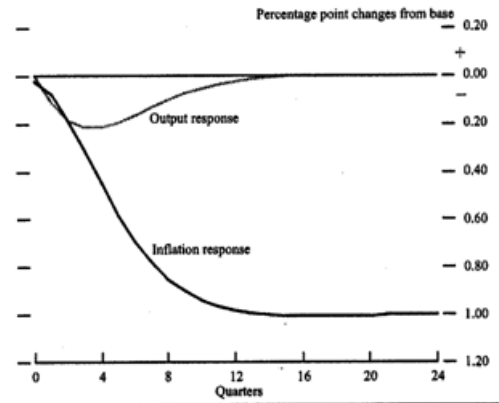
Fig. 2 **Inflation and output reactions on restrictive monetary policy**
Source: [2]

Another limitation of the original Taylor rule is the fact that it applies past inflation and GDP value while suggested interest rate will influence economic situation in the future. Consequently, several economists suggest to rectify the original Taylor rule and to apply predicted inflation and output gap [2]. Monetary authorities in G7 countries have already implemented this approach [4]. Predicted inflation and GDP are calculated from actual and past data. Such monetary rules are considered to be more precise.

The more inflation and output square variation is minimal, the better a monetary rule is.

A very important feature of a monetary policy is its inflation and output „inconsistency". Inflation and GDP growth react on implemented measurements with a certain delay. This monetary delay is a typical macroeconomic phenomenon. Batini deduces that implemented measurements can lead to a desired outcome in 2 or 3 years, i.e. 8 or 12 quarters as it is obvious from Fig. 2 [2].

This analysis underlines importance of monetary rules based on predicted future values.

At the same time it is important to determinate an optimal time horizon of inflation and GDP prediction and control. If the horizon is too long, the central bank reacts to changes too often. Changes in interest rates will influence immediately output and inflation and according to the Taylor assumption, inflation targeting will be at the expense of GDP growth in short term. On the other hand, if the time horizon is too long, monetary policy application is inefficient. Fig. 3 confirms these deductions [2].
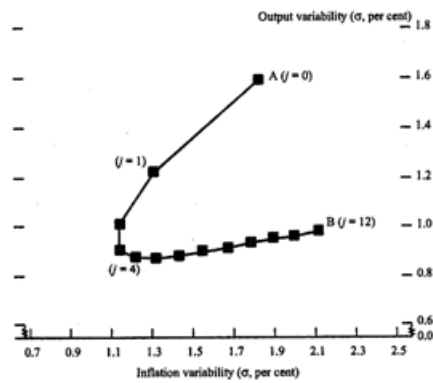

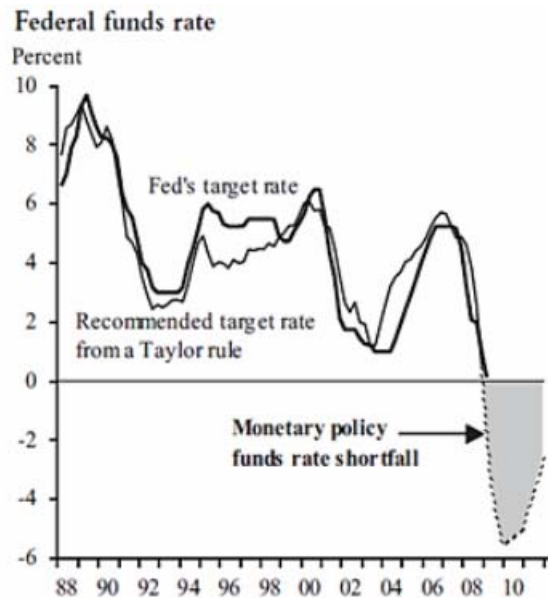**Fig. 3:** *Volatility output-inflation frontier*
Source: [2]

Fig. 4 Comparison of Taylor rule result and real interest rate in the USA from 1988 to 2010
Source: [1]

Period of four quarters seems to be an optimal horizon. Letter j stands for number of quarters.

3 THE TAYLOR RULE ADVANTAGES

Despite mentioned limits, the Taylor rule provides several advantages thanks to which an optimal interest rate for a certain level of inflation anf GDP can be quantified [13]:

1, The Taylor rule helps to solve the aspect of monetary policy time inconsistency mentioned here above.

2, The monetary rule helps to evaluate efficiency of chosen strategies.

3, Monetary rule existence reduces uncertainty in policy decision making process, it enables better orientation.

4, The rule enables easier monetary policy observations. The rule is more transparent for the public and its results are more explicit.

4 THE TAYLOR RULE AND THE ECONOMIC CRISIS

The economic crisis has not only brought uncertainty and chaos to the entire world; it has also discredited the reliability of the Taylor rule.

Results of Glenn Rudebusch [14], vice-president of San Francisco´s National Bank, have showed that the interest rate should reach the values of about -5% in 2009. It is, of course, impossible to implement it in praxis. As current federal funds interest rate is 0%, the difference between calculated and real value is significant, i.e. of 5%. Fig. 4 provides the review of this situation.

However, Taylor´s answer was that his rule showed that the FED´s policy is appropriate [14]. He criticized formula used by the FED. "They say they're using the Taylor Rule, but they're not." While the coefficients for both inflation and output gap in the original Taylor rule are 0,5, the FED uses higher coefficient for the output. Moreover, Taylor works with actual data, as has been mentioned before. However, the FED calculates this rule using predictions. Based on the results, Rudebusch emphasizes necessity of other tools (to pump money into the economy). On the contrary, Taylor defends his rule as a convenient formula even during the financial crisis.

5 APPLICATION OF MONETARY RULES IN A MONETARY UNION, CASE OF THE SLOVAK REPUBLIC

It would seem that it is not necessary to formulate a particular monetary rule for each monetary union member state separately as monetary policy is applied in a common way for whole union. However, if a National central bank knows a monetary rule for its country, it can defend economic interests of that country in more obvious and transparent way. It can give to the central bank more arguments in common decision making process.

Since January 2009, the Slovak Republic is a member state of the euro area. Consequently, goal of Slovak central bank corresponds to the one of the ECB that is price stability. Inflation target is announced officially at the level of 2 %. Slovak monetary policy is based on inflation targeting. It can seem that a member state of the European Monetary Union does not need an own monetary rule as a common monetary policy is applied for whole euro area. Lost of independent monetary policy is one of the most cited disadvantages of euro adoption. However, a common monetary policy is often a compromise taken during the Governing Council sessions where the Executive Board and the governors, respectively presidents of all national central banks of the euro area meet usually twice a month. The Governing Council takes the monthly monetary policy decisions, which means setting the key interest rates for the euro area [5]. As governors of national central banks can intervene and vote, they should know an optimal monetary rule for their country and to defend its position. An optimal monetary rule can facilitate their decision making process even if it is not a binding commitment.

Several authors have already tried to suggest an appropriate monetary rule for Slovak conditions. Although they are not officially announced, the central bank in Slovakia uses the monetary Taylor-Type rule as well. I have already suggested Taylor rule for the Slovak Republic in 2006 using quarter data from 1998 to 2005 [9]. The suggested form was:

$$LOG(BR) = 0.00959503697 + 0.9177638276*LOG(BR(-1)) + 0.110379389*LOG(IGAP) + 0.04060861773*LOG(YGAP) \qquad (3)$$

Where BR stands for key interest rate set by the NBS, BR(-1) is lagged value by one quarter, IGAP is inflation gap (difference between real and targeted inflation), YGAP is output gap (difference between real and potential output).

Updated form of the Taylor-type rule convenient for Slovakia was calculated by Pavlickova [10] and it has following form:

$$diff(BR)= 1.02215*diff(INF) + 3.14749*diff(Y) - 0.05192*diff(PB) \qquad (4)$$

The formula is based on quarter data from the second quarter 2000 till the end of 2008 gained from the Eurostat and the National Bank of Slovakia (NBS) statistics [62], [7]. BR stands for key interest rate set by the NBS. INF represents inflation rate expressed as geometric average from monthly data of HICP and smoothed by HP filter. The reason to apply HICP as a measure of inflation was that it is used in the whole euro area. PB expresses balance of payment deficit. Y is the output gap derived from the formula:

$$output\ gap = \frac{actual\ GDP - potential\ GDP}{potential\ GDP} \qquad (5)$$

As we can see the differences between Slovak formula and the original Taylor rule are significant. First of all, this rule offers inflation rate while Taylor has taken inflation gap into account. Using inflation gap in Slovak formula has lead to failure in residual normality test. Moreover, our derived formula includes beside inflation and output parameters the information about balance of payments, as well. The main reason for the formula expansion is the fact, that Slovak economy is significantly open as it is obvious from several studies [11].

Every central bank should apply active and open communication strategy that would inform public in accountable and understandable manner. Communication strategy should consist of e.g.: regular announcements of inflation indicators development, information about monetary policy principles, inflation predictions, publication of prediction principles and methodology, explanations of measurements applied in case of missed monetary goals, early announcements in monetary policy changes, etc. [3]. The monetary rules help to fulfil this transparency.

However, Taylor rule or other rule outcomes should be just some kind of recommendation and not a binding commitment. Results of the rules should be rectified to practise respective specific situation such as economic crisis, monetary union, etc.

CONCLUSION

Many experts question nowadays, during the world crisis, the accuracy of the Taylor-Type rules. They claim that rules bring negative results, which cannot be applied. Although Taylor himself states that his original rule works even now and the FED does not use right data, positive opinion on this easy formula is discredited.

However, in long term such a formula can be helpful. Central banks are able to decide about the level of key interest rate more precisely. Naturally, monetary rule should not be followed blindly; nevertheless, it should serve as a certain guideline. After all, this has been the original message of the Taylor rule.

The Slovak Republic should not be an exception. The Taylor rule could represent a monetary tool that helps to direct the requirements of the country when deciding about the level of interest rates to be set in the euro area. Although, monetary decisions are valid in all member countries, they can take part on discussions where final consensus is achieved.

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