ANALYSIS

Changes in the economy challenge traditional methods of evaluating monetary policy

Monetary policy | 11.10.2017

Euro area monetary policy has provided the economy with strong support in recent years. Many traditional guidelines used for evaluating the policy stance, such as the Taylor rule, would call for a more restrictive form of monetary policy. However, a number of variations can be derived from the relatively simple base formula underlying the Taylor rule, providing alternative paths for benchmark interest rates. Thus we could argue that recent monetary policy has not, in fact, significantly deviated from interest rate paths that are consistent with variations of the Taylor rule. The economy has recently undergone changes that provide justification for the more accommodative policy stance. Thus, monetary policy cannot solely be determined on the basis of simplistic rules.

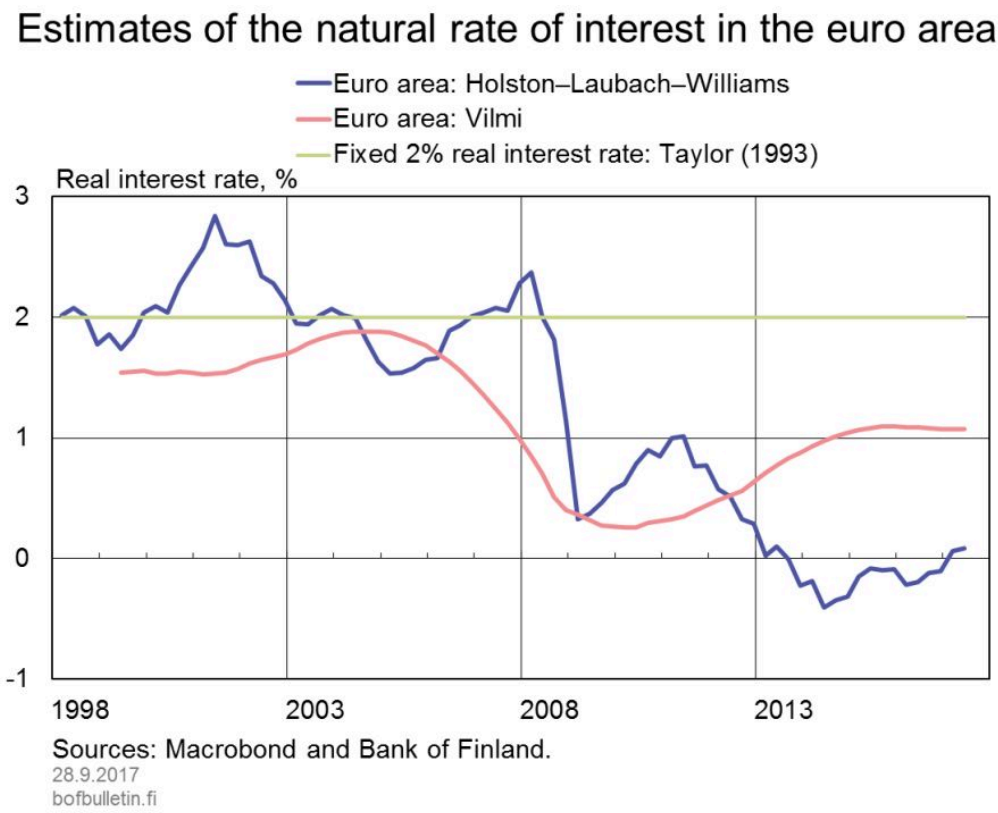
Monetary policy stance more accommodative than under traditional rules

The Taylor rule has served as a ubiquitous guideline for implementing monetary policy ever since the rule's inception in 1993. It determines the key interest rate set by central banks, based on the discrepancy between inflation and the central bank's inflation target, as well as the output gap, which estimates how much gross domestic product (GDP) deviates from potential output. The Taylor rule allows for policy to change in response to fluctuations in the economy; therefore, by following Taylor's rule, the policy stance ought to remain consistent with economic developments.

Several models have shown that adhering to the Taylor rule leads to a policy stance that is close to optimal.[1] It is no surprise, then, that the monetary policy practised by all major central banks in recent decades can be approximated by some variant of the Taylor rule.[2] Indeed, it is partly due to the success of this policy that inflation held steady and business cycles displayed less volatility in the decades leading up to the financial crisis.

Since the onset of the financial crisis in the United States, however, many economic regions have deviated from the conventions of the Taylor rule in their policy stance.[3] This is readily apparent when plotting and comparing interest rate paths based on the original 1993 Taylor rule and on the Eonia rate, the latter of which depicts the effective monetary policy stance in the euro area (Chart 1).[4] As is evident from the chart, the standard Taylor rule calls for a more contractionary policy stance to be implemented from the beginning of 2015. From this perspective, the deviation from the actual short-term rate would have reached up to 2 percentage points by summer 2017. The Eonia rate alone, however, is an imperfect measure of the effective policy stance when central banks are equipped with non-standard policy tools that impact on long-term rates, one such example being the expanded asset purchase programme (EAPP) that was launched in 2015. Indeed, the discrepancy between actual policy rates and the rate path determined by the Taylor rule should be even more pronounced during periods when non-standard policy tools are employed.

Chart 1.



Departure from the standard Taylor rule has led to claims that post-crisis monetary policy has been excessively accommodative.[5] In the United States, policymakers have defended their practices, arguing that the Taylor rule has been subject to refinement over time and that structural changes within the economy have impacted the formula's key variables – particularly the natural rate of interest.[6] Both arguments conclude that, on balance, the policy stance has not significantly deviated from that of the Taylor rule.[7]

The Taylor rule, then, is evidently open to interpretation. The explanation for this is that the variables and multipliers upon which the rule makes its calculations cannot be unambiguously defined. The euro area is no exception, and a variety of Taylor rules can be calculated, using various variables and multipliers, all sourced from common research literature or construed using different research methodologies. Our analysis yields approximately 1,300 different interest rate paths, all based on variations of the Taylor rule. This type of survey helps resolve the ambiguity associated with selecting the correct variables and parameters.

By examining a wide enough array of interest rate rules, it is possible to comprehensively evaluate

euro area policy and compare it with the policy path as determined by the Taylor rule. The results of this analysis show that monetary policy has not significantly departed from past practice, despite appearing to do so when viewed superficially against the standard Taylor rule. Furthermore, there are additional arguments for why prevailing policy should indeed deviate from the stance prescribed by a simplistic policy rule. While monetary policy ought to maintain a degree of consistency, a single rule should not dictate policy outcomes.

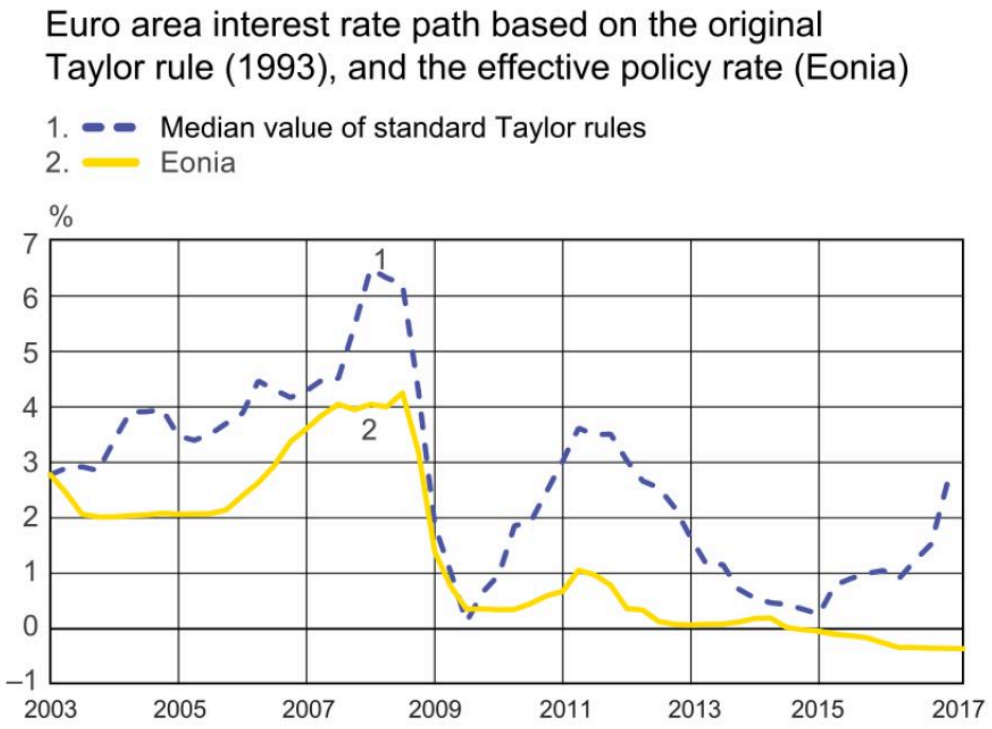
Taylor rule does not lay out an unambiguous strategy for the policy stance

The variables that determine the Taylor rule are inflation and its deviation from the central bank's target, the output gap, the natural rate of interest (i.e. the equilibrium real interest rate) and the prior key interest rate set by the central bank. Each of these variables acts as a multiplier in determining the value of the key interest rate. Various estimates of these multipliers do exist in studies. This analysis relies on values found in the most commonly sourced research literature.[8] In addition, every variable found in the Taylor rule can be construed using a variety of different methodologies. For example, consumer price inflation can be measured using the total index of consumer prices, or by inspecting core inflation, which removes the most volatile price elements from the index.

Moreover, there is particular uncertainty in estimating the actual values of the output gap and natural rate of interest, and as a result, various estimates deviate from one another considerably. This analysis uses four different estimates for the output gap, namely those released by the ECB, the mean value of estimates released by international institutions, and those published by Holston, Laubach and Williams (2017) and by Vilmi (2017). The natural rate of interest has also been sourced from both Vilmi (2017) and Holston, Laubach and Williams (2017). These two estimations of the natural rate of interest are plotted in Chart 2, which also includes a natural rate fixed at 2 %, an assumption used by Taylor (1993).

Contrary to the assumptions held in the standard Taylor rule, the other two estimates display a large fall in the natural rate during the financial crisis. As such, the estimates deviate from one another by as much as one percentage point. Different estimates of the natural rate of interest lead to significantly different rate paths and as such constitute one of the greatest sources of uncertainty when applying the rule.

Chart 2.



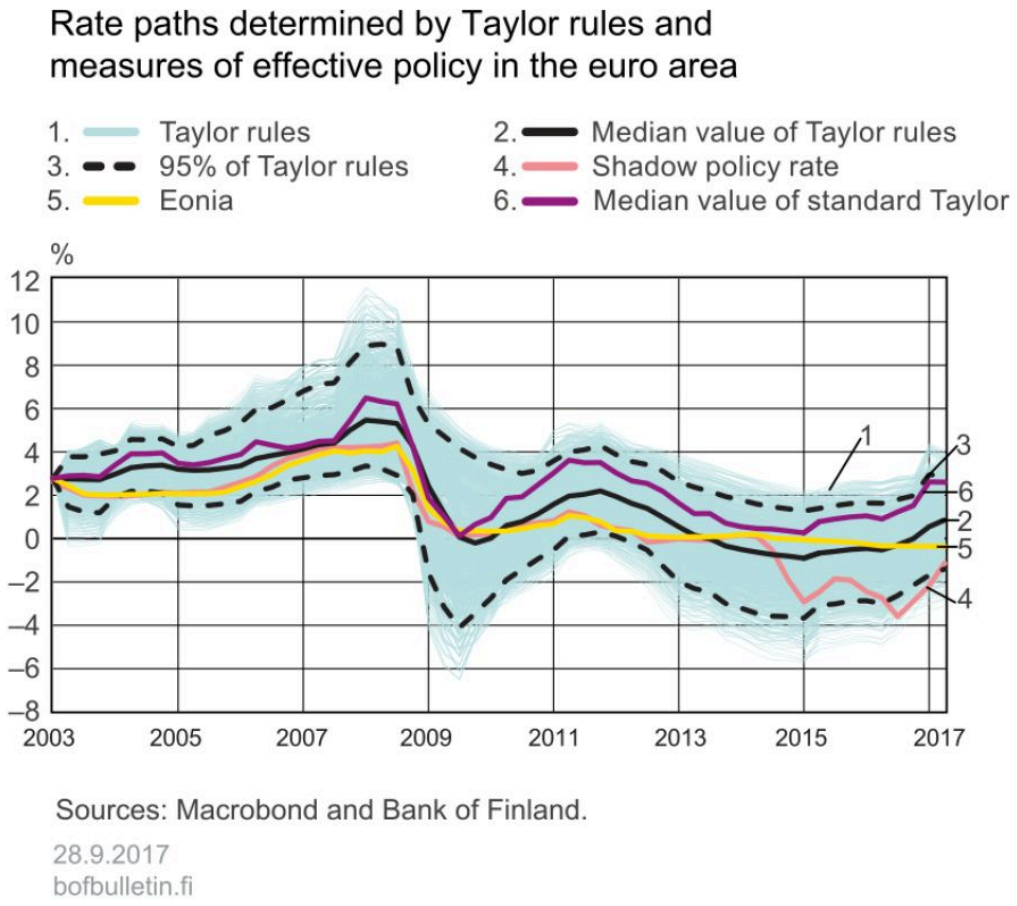
Sources: Macrobond and Bank of Finland.

28.9.2017
bofbulletin.fi

Using these different variables and multipliers, it is possible to calculate 1,300 different interest rate paths that all follow the Taylor rule (turquoise lines in Chart 3). The key finding here is that different variables and multipliers lead to markedly different interest rate paths. As a result, some of these permutations outline a much more accommodative policy stance than the standard Taylor rule.

These various rate paths begin to deviate significantly in the presence of economic change, such as during the peak of the 2008 business cycle and the recession that followed the global financial crisis. For example, in mid-2009, the key rates determined by the Taylor rule vary between a low of -6% and a high of 5%. This result highlights the degree of uncertainty in selecting the variables underlying the Taylor rule, and this ambiguity grew even greater during the upheaval of the financial crisis. To further illustrate this point, the spread in suggested interest rate levels only reached approximately 4 percentage points in 2005.

Chart 3.



Comparing the actual policy stance with the interest rate path laid out by the Taylor rule is useful when trying to evaluate the consistency of euro area monetary policy. A good point of comparison is the median interest rate path of all the various outcomes of the rule (black line in chart 3).[9] While the Eonia rate can be used to depict the policy stance, the so-called shadow policy rate does a better job of capturing the effects of non-standard policy tools.[10]

The policy rate tracked the Taylor rule median up until 2014. Consequently, euro area monetary policy appears consistent with the majority of Taylor rules during this period. The short term rate also tracked the median relatively well during the crisis years of 2008 and 2009, despite the considerable diversion of rate paths amongst the Taylor rules themselves. Taking these various interest rate paths into consideration, it can be concluded that monetary policy had not

meaningfully deviated from the Taylor rule median in the long term, at least until 2014. Even since then, the Eonia rate has stayed relatively true to the Taylor rule median.

The non-standard monetary policy measures launched in 2014, and particularly the EAPP which began in early 2015, have reduced long-term interest rates and increased the expansionary effects of policy, which is illustrated in the shadow policy rate dropping below the Eonia rate (Chart 3). During this period, the majority of the Taylor rules plot only a slight decrease in interest rates. Consequently, it is at this point that the shadow policy rate enters its long term pattern of falling under the Taylor rule median. To be sure, there are Taylor rules that determine low interest rate paths similar to those observed: in particular, variations of the rule that allow the natural rate of interest to fall tend towards lower interest rate paths than others.

Nevertheless, it does actually appear that euro area monetary policy has recently begun to deviate from the Taylor rule. A similar departure from traditional interest rate policy can be observed in the United States.[11] The Taylor rule relies on only a limited number of important variables in delineating monetary policy, and it is therefore inevitable that it ignores many variables. This is both the strength and the weakness of the Taylor rule. Its simplified approach to setting policy rates has turned it into a ubiquitous tool for assessing broader monetary policy issues, but this very characteristic means that it ignores many variables within the economy.

A simple rule does not account for changes in the economy

Recovery from the current financial crises has been exceptionally sluggish in many economic regions, pointing towards long-term changes within these economies. Indeed, recent policy departures from the Taylor rule can be explained by looking into these developments.

In the first place, the structure of the economy has changed in the advanced economies, and they have also experienced diminished economic growth. These factors offer justification for adjusting the Taylor rule multipliers and changing the estimate of the natural rate of interest; in fact, most estimates put the euro area natural rate at a minimum of one percentage point lower than it was before the financial crisis.[12] This alone should result in lower policy rates.

Secondly, past data on the Taylor rule's behaviour in various economic models have often relied on results where the effect of business cycles on long term trends has been relatively slight. In the present situation, where the economy is far removed from its historical trends, it remains unclear how much weight should be placed on past studies. Far-reaching structural changes within the economy might necessitate a prolonged period of accommodative monetary policy.

Thirdly, the policy options have been limited by the effective lower bound on interest rates in

recent years. This has possibly resulted in lowered inflation expectations, which in turn necessitates even stronger policy measures.[13]

It is also important to consider the effects of the non-standard monetary policy measures, as these have a different impact on the economy than conventional policy. While the shadow policy rate is used to quantify these effects, calculating the shadow policy rate itself is not entirely straightforward. Thus, it is possible that the shadow rate does not measure the policy stance as effectively as short-term rates. Some of the Taylor rules outline extremely negative interest rate values for the euro area – values that are impossible to achieve by simply cutting the benchmark rate. Unfortunately, the Taylor rule does not offer a solution as to what measures should actually be undertaken to make the policy stance correspond to highly negative policy rates.

A simple policy rule is not a sufficient guideline for monetary policy

Upon initial review, it might seem that the euro area policy stance has departed from the standard Taylor rule, but closer analysis reveals that this deviation is much less when alternative rules are taken into account. The policy rule produces different results by appropriately selecting the values of variables and multipliers used in the rule; therefore, it is in fact more accurate to speak of policy rules, in the plural. Indeed, some of these variations call for significantly more accommodative policy stances than the standard version of the Taylor rule in the period following the financial crisis. For example, factoring in the fall in the natural rate of interest leads to more accommodative interest rate paths than the standard rule.

The Taylor rule considers a limited number of key factors that should be taken into account when deciding the policy stance. Due to the complex nature of the economy, other factors should also be considered, despite their absence in the formula underlying the Taylor rule. It appears that the financial crises of recent years have had a lasting impact on several areas of the economy. This being the case, it would seem intuitively sound that the rules that worked before the financial crisis no longer suffice.

Sources

Bernanke, B. (2015) The Taylor Rule: A benchmark for monetary policy? Brookings Blog 28 April 2015.

Del Negro, M., Giannone, D., Giannoni, M. & Tambalotti, A. (2017) Safety, liquidity, and the natural rate of interest. BPEA Conference Drafts, 23.–24 March 2017.

German Council of Economic experts (GCEE), (2016). Low interest rates not appropriate for either euro area or Germany. Annual Report 2016/17, Chapter 5.

Hills, T., Nakata, T. & Schmidt, S. (2016) The Risky Steady State and the Interest Rate Lower Bound. Working Paper. December.

Hofmann, B. & Bogdanova, B. (2012) Taylor rules and monetary policy: a global 'Great Deviation'? BIS Quarterly Review. September.

Holston, K., Laubach, T. & Williams, J. (2017) Measuring the Natural Rate of Interest: International Trends and Determinants. Due for publication shortly. Journal of International Economics.

Kortela, T. (2016a) Nykyisin ohjauskorko on varjo entisestään. Blog entry 9 August 2016: Euro & talous web page.

Kortela, T. (2016b) A Shadow Rate Model with Time-Varying Lower Bound of Interest Rates. Bank of Finland Research Discussion Paper No. 19/2016.

McCallum, B. & Nelson, E. (1999) Performance of Operational Policy Rules in an Estimated Semiclassical Structural Model. See Taylor, J. (ed.) (1999) Monetary Policy Rules, Business Cycles Series. Volume 31.

Michaelis, H. & Wieland, V. (2017) R-Star and the Yellen rules. VoxEU.org 3.2.2017.

Taylor, J. (1993) Discretion versus Policy Rules in Practice. Carnegie-Rochester Conference Series on Public Policy 39, 195–214.

Taylor, J. (1999) Introduction in Taylor, J. (ed.) (1999) Monetary Policy Rules, Business Cycles Series. Volume 31.

Taylor, J. (2016a) Remarks on Monetary Rules for a Post-Crisis World. Conference presentation: Monetary Rules for a Post-Crisis World 7 September 2016.

Taylor, J. (2016b) Central Bank Models: Lessons from the Past and Ideas for the Future. Keynote Presentation at the Workshop 'Central bank Models: The Next Generation'. Bank of Canada 17 November 2016.

Taylor, J. (2017) Sound Monetary Policy. Testimony before the Subcommittee on Monetary Policy and Trade Committee on Financial Services. US House of Representatives 16 March 2017.

Vilmi, L. (2017) Two Tales of the Natural Rate of Interest. BoF Economics Review 1/2017.

Woodford, M. (2003) Interest & Prices: Foundations of a Theory of Monetary Policy. Princeton

University Press.

Yellen, J. (2015) Normalizing Monetary Policy: Prospects and Perspectives. Speech given on 27 March 2015 at the research conference 'The New Normal Monetary Policy'.

Yellen, J. (2017) The Economic Outlook and the Conduct of Monetary Policy. Speech given on 19 January 2017, the Stanford Institute for Economic Policy Research, Stanford University, Stanford, California.

Footnotes

1. See e.g. Woodford (2003) and Taylor (1999). ↑
2. McCallum & Nelson (1999) and Taylor (2016a). ↑
3. See e.g. Hofmann & Bogdanova (2012). ↑
4. The Taylor rule (1993) policy stance described here is the median value of different interest rate paths, each based on various inflation figures and output gap estimates. There are considerable differences in the methodologies used to estimate the output gap. By using the median of this data, it is possible to even out possible flaws or weaknesses in any given method. Inflation can also be measured as core inflation or headline inflation. ↑
5. For the United States, see e.g. Taylor (2016a, 2016b, 2017). For the euro area, Volker Wieland, who evaluates Germany's economic policy as member of the German Council of Economic Experts, has given several speeches where he has characterised the prevailing policy stance as too expansionary (see e.g. GCEE 2016, chapter 5). See also Michaelis & Wieland (2017). ↑
6. The natural rate of interest is the real interest rate that brings the economy into equilibrium and would prevail if the output of the economy were at its potential level, i.e. in a situation where the economy is in neither an upswing nor a downswing. ↑
7. According to Bernanke (2015), the parameters of the Taylor rule and its variables have evolved over time. Yellen (2015, 2017) has postulated that the natural rate of interest has fallen. ↑
8. Three different values were selected for each parameter. Another way to define the Taylor rule parameters is by estimation, where statistical estimators are used to select parameters that match historical policy stances. Since this analysis attempts to find changes in the Taylor rule itself, the application of statistical inference to this end is difficult. Nevertheless, it is, statistically speaking, highly probable that the estimated Taylor rule for the euro area is indeed amongst the Taylor rules used in this analysis. ↑
9. The Taylor rule median is calculated on a period-by-period basis, using the spread of

every Taylor rule for each period in question. ↑

10. The shadow policy rate provides a gauge of the hypothetical policy rate in the absence of a zero lower bound on nominal interest rates. For further detail on using the shadow policy rate to evaluate monetary policy, see Kortela (2016a) and Kortela (2016b). ↑
11. See e.g. Michaelis & Wieland (2017). ↑
12. See e.g. Vilmi (2017) and Del Negro et al. (2017). ↑
13. See e.g. Hills, Nakata & Schmidt (2016). ↑

Key words

monetary policy in the euro area, Taylor rule