The Taylor Rule in Times of Crisis – Empirical Evidence of the Financial Turmoil 2007-08

Motivation*

In 1993, John B. Taylor proposed a new and simple rule to model the interest rate setting behavior of the US central bank, the Federal Reserve. This so-called Taylor rule has by now become the most widely used benchmark for practitioners to forecast interest rate changes by central banks all over the world. But also among scientists this approach has reached considerable attention. It has been extended in time, in the studied central bank and the variables used. In general, the literature shows that the Taylor rule or its extensions are able to model the interest rate decisions of various central banks quite well.

Taylor himself proposed the following rule:

$$i_t = \bar{r}_t + \pi_t^e + a_\pi(\pi_t - \pi^*) + a_y(y_t - \bar{y}_t)$$

The Taylor interest rate reacts to the equilibrium real interest rate the inflation expectations, the inflation gap and the output gap. While this rule is simple to apply its shortcomings became evident in the recent financial crisis. The European Central Bank like other central banks faces since August 2007 a serious financial crisis which has its roots in the US housing market and spread over to other countries and sectors with an increased speed after the investment bank Lehman Brothers got bankrupt in 2008. Many central banks soon reached the zero lower bound on nominal interest rates, so the traditional Taylor rule was no longer applicable and the focus has to be shifted to non-standard measures of monetary policy.

Taylor Reaction Functions under the Zero Lower Bound

To add these unconventional measures to the Taylor reaction function a state-space-model for the US Federal Reserve and the European Central Bank is applied which estimates besides the unobservable equilibrium real interest rate and the output gap also the adjustments in inflation expectations associated with quantitative easing, measured as the expansion of central bank balance sheets.

With these unconventional monetary measures the central banks have thus introduced a new toolkit which enables them to influence the inflation expectations because they can credibly commit to keep the key interest rates close to zero even though a recovery of the economy is foreseeable, because quantitative measures have to be reduced first before it is possible to raise interest rates.

So the central banks do no longer tackle the nominal interest rate but the **real** interest rate.

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

A comparison of the unadjusted with this modified Taylor reaction function reveals that the Federal Reserve and the European Central Bank indeed still react to the inflation rate and the output gap.

Using asymmetric Taylor reaction functions that assumed a breakpoint at the beginning of the crisis, I was able to show that the reaction of both central banks towards inflation and output shifted during the financial turmoil. Moreover, other variables became more important for the central banks in the crisis period like asset price inflation or credit growth.

Additional Contributions

Because of the cumulative nature of this dissertation there are several other contributions made to the literature.

1. Asymmetries and non-linearities in the European Central Bank Taylor reaction function have been identified depending on the "State of the Economy", meaning whether the inflation rate or output are above or below its target or potential level, respectively.

2. Differences in Taylor reaction functions have been shown depending on whether ex-post revised or real-time data are used, the latter being the data the central bank has at hand when making its interest rate decision.

3. Political business cycles in monetary policy have been identified and the conclusion has been drawn that central banks directly support the incumbent before elections.

4. The European sovereign debt crisis is at least partly driven by the non-optimality of the European Central Bank interest rate policy, which lead to too low rates in the southern countries and too high rates in e.g. Germany. This result casts doubts on whether the Euro area is an optimal currency area.

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