

Reports from the Economic Research Centre*

Monetary and fiscal policy rules in a model with capital accumulation and potentially non-superneutral money

Discussion paper 22/02

by Leopold von Thadden

Building on the work of John Taylor, the advantages of an “active” interest rate rule have featured in many empirical and theoretical studies over the past decade in connection with the debate on appropriate strategies for central banks. Taylor-type interest rate rules react to inflationary pressures by temporarily raising the real interest rate. From a theoretical perspective, the particular characteristic of such rules in many model situations is that equilibrium dynamics are determinate. More recently, however, several studies have indicated that simple interest rate rules which (have to) respect the zero bound on nominal interest rates may indeed lead to multiple steady states and globally indeterminate adjustment processes.¹

In the light of this ongoing debate, the aim of this discussion paper is to indicate a further potential source of multiple steady states and globally indeterminate adjustment processes, under a simple interest rate rule within a model framework that models the process of capital accumulation endogenously and also

* These reports present summaries of selected discussion papers. All recent discussion papers may be found on the Bundesbank's website at <http://www.bundesbank.de>.

¹ See, in particular, J Taylor, *Discretion versus policy rules in practice*, Carnegie Rochester Conference Series on Public Policy, 39, 195-214, 1993, J Benhabib, S Schmitt-Grohé and M Uribe, *The perils of Taylor rules*, Journal of Economic Theory, 96, 40-69, 2001. L Christiano and M Rostagno, *Money growth monitoring and the Taylor rule*, NBER Working paper, No 8539, 2001.

includes flexible prices and the dynamics of government debt as elements of a long-run approach. A further particular feature of the modelling is the paper's assumption of an overlapping generations economy in which the real long-run interest rate is not constant but depends instead on the arrangement of monetary and fiscal policy and the long-run inflation rate. In general, it becomes apparent that, given an interdependency of the long-run real interest rate and the long-term inflation rate, even a linear interest rate rule can generate globally indeterminate dynamics, whereas a simple policy of monetary targeting – assuming a correctly predicted change in the velocity of circulation – is accompanied by a unique steady state and determinate adjustment dynamics.

This finding is illustrated for two different monetary and fiscal policy arrangements in which fiscal policy is fundamentally subordinated to monetary policy. In the former case, it is assumed that fiscal policy aims for a constant debt level ratio. In the latter case, a constant deficit ratio is assumed.

When interpreting the model results, it should be noted that the model disregards a number of short-run frictions (especially nominal rigidities) which are typically taken into account in the literature inspired by Taylor. For that reason, it is proposed that future work expanding the findings of this paper should also, when discussing properties of monetary policy rules, go into short-run properties of the modelling in greater depth than hitherto.

Time variation in the tail behaviour of Bund futures returns

Discussion paper 25/02

by Thomas Werner and Christian Upper

For the purpose of estimating market risks, it is important to know how probable extreme price fluctuations in the financial markets are. Essentially, account needs to be taken of price movements in both directions as a sharp increase in prices affecting holders of short positions can imply large losses just as much as sharply falling prices among investors with long positions. If the probability of extreme values occurring is greater than implied by the normal distribution, the term "fat tails" is used. Recent developments in extreme value theory enable this phenomenon to be analysed without explicit assumptions having to be made about the distribution of returns. A tail index can be used to measure the fatness of the tails.

The literature on extremes of the distribution of returns has so far dealt primarily with exchange rates and share prices. By contrast, hardly any consideration has yet been given to the prices of bonds and notes or futures contracts on bonds. This is surprising as banks, in particular, often hold fairly large open positions in interest rate futures during a trading day. This discussion paper endeavours to fill this gap. To this end, high frequency data for the Bund future – especially five-minute returns – are analysed. Three questions are at the forefront of the analysis: (i) Does the distribution of Bund futures returns have "fat tails"?; (ii) Is the probability of

extreme price movements constant over time?; (iii) Can a tail index provide information about the degree of market uncertainty which cannot be gained using classical indicators such as volatility?

We were able to show that the "fat tails" phenomenon does occur in the distribution of Bund futures returns. A tail index of approximately 3 implies that the fourth and all higher moments of the distribution do not exist. This shows kurtosis-based analyses to be problematic and justifies the use of the extreme value theory. Recently developed tests have revealed breaks in the fatness of the tails in the distribution of returns. The tail index does not always move in the same direction as volatility. The two indicators may

well even send different signals at times. For instance, a decline in volatility might be offset by an increase in the fatness of the tail. For this reason, risk estimates based solely on volatility are to be viewed with extreme caution. Observing the tails of the distribution of returns thus provides information relevant to risk management which cannot be derived using conventional methods.

The results of this research project may be viewed as the first step towards modelling the fatness of tails. Future research projects could identify factors affecting the fatness of the tails in order to gain a better understanding of its development over time and, where appropriate, to enable measures to be taken to influence it.