Optimal Macroeconomic Policies with and without the Monetary Instrument

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Abstract

In this paper, we show by example how techniques of econometrics and operations research can be used to give answers to macroeconomic policy problems. We consider the question of the design of macroeconomic policies, both with and without money supply as an instrument. Using the optimum control algorithm OPTCON, we determine approximately optimal stabilization policies for Austria for the period 1993 to 2000 within the framework of a problem of quantitative economic policy. An intertemporal objective function is minimized subject to the constraints of the macroeconometric model FINPOL2, estimated for Austria using 3SLS. Exogenous variables of the model are forecast by time series methods. The results show that optimal budgetary policies can improve upon the performance of the Austrian economy with respect to some policy objectives as compared to a simulation using extrapolations of policy variables. It is shown that optimal policies depend strongly on the assumptions made about the exogenous variables, which reflect alternative scenarios of global economic developments. In all cases considered, it turns out that the results for the objective variables are very close to each others in scenarios with and without active (optimizing) monetary policy.

1. Introduction

Methods of statistics and operations research have been frequently used to provide answers to questions posed by decision-makers within a firm or at the level of economic policy-making. Recently, they are increasingly being integrated into decision support systems which ideally should be user-friendly tools for practical decision-making. Most of these decision support systems are based on rather

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simple models of the firm or the economy under consideration and don't use very sophisticated mathematical methods (see, e.g., Buede 1993). In particular, most of these decision support systems do not take into account dynamic relations between economic variables and their consequences for decision-making.

On the other hand, there is by now a large bulk of research, accumulated over the past thirty years, on optimal decision-making over time, starting from dynamic programming and Pontryagin's maximum principle. These optimum control methods have been used in various theoretical studies to determine optimal intertemporal decisions for many problems in economics and operations research (e.g., Feichtinger and Hartl 1986). For actual problems of policy-making at the macroeconomic level, however, an analytical approach has only limited relevance, because these problems are usually characterized by a great number of constraints as embodied in an econometric model of medium or large size. Therefore, simulation analyses and numerical methods of dynamic optimization are the only means to solve problems of actual macroeconomic policy-making.

In this paper, we use an algorithm for determining optimal policies for nonlinear dynamic models to deal with the problem of designing optimal macroeconomic (fiscal and monetary) policies for Austria. We choose an approach of quantitative economic policy to determine numerically optimal budgetary and monetary policies for the nineties by minimizing an intertemporal objective function subject to the constraints given by an econometric model called FINPOL2. The objective function penalizes deviations of objective variables from their desired ("ideal") values. Exogenous variables of the model are forecast over the planning horizon, which is assumed to be 1993 to 2000, using time series methods. Optimal macroeconomic policies are calculated over this time horizon using the optimum control algorithm OPTCON. As the forecasts of the exogenous variables are rather uncertain, we conduct a sensitivity analysis of optimal policies with respect to the assumptions about the developments of these variables. It turns out that the design of optimal budgetary policies depends strongly upon the assumptions about the exogenous variables, in particular exports and import prices. Hence, optimal policies for the small open economy of Austria are to be regarded as contingent upon the assumed future developments of the world economy. Policy recommendations based on optimum control experiments therefore must be treated with great caution. On the other hand, the results are robust with respect to whether monetary policy is used as an active policy instrument in addition to fiscal policy or not. This indicates that monetary policy does not have an important potential role in stabilizing the Austrian economy.

2. The Econometric Model FINPOL2

The model FINPOL2 is based on traditional Keynesian macroeconomic theory in the sense of conventional IS-LM/aggregate demand-aggregate supply models.