

Kliem, Martin; Kriwoluzky, Alexander

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IMPLEMENTABLE FISCAL POLICY RULES*

Martin Kliem[†] Alexander Kriwoluzky[‡]
Deutsche Bundesbank Universiteit van Amsterdam

PRELIMINARY VERSION, COMMENTS WELCOME

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Abstract

We use a novel procedure to identify fiscal feedback rules for the US: We start by estimating a DSGE model and on that basis compute the Ramsey optimal responses to structural shocks. Then we let the policy maker choose from a general set of rules to match the dynamic behavior of a number of key variables like output, debt, and consumption, in the competitive equilibrium with their corresponding dynamic behavior in the Ramsey equilibrium. In the next step we estimate the model again but employ the contingency derived previously. The policy rules derived are general, not as complex as Ramsey and easily implementable.

JEL classification: E62, H30, C51.

Keywords: Fiscal policy, Bayesian model estimation, Global Sensitivity Analysis

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[†]Deutsche Bundesbank, Economic Research Center, Wilhelm-Epstein-Str. 14, 60431 Frankfurt am Main, Germany, email: martin.kliem@bundesbank.de, tel: +49 69 9566 4759

[‡]Universiteit van Amsterdam, Department of Economics, Roeterstraat 11, 1018 Amsterdam, The Netherlands, email: a.kriwoluzky@uva.nl, tel: +31 20 525 43 97.

1 Introduction

What is fiscal policy and what are its effects? The latter part of the question cannot be answered without taking an explicit stand on the former. This paper sheds light on the former part, thus providing insights into the latter. While the literature agrees on how the private sector should be modeled, the fiscal policy sector is either modeled as a simple ad-hoc process or as welfare-optimizing (Ramsey). However, the first way to model fiscal policy probably assumes too little purposeful action by the policymaker, while the second implies an omnipotent and omniscient one. We develop a novel procedure to identify and estimate fiscal feedback rules for the US economy: First, we estimate a medium scale DSGE model using Bayesian estimation techniques. Second, we employ a Smyrnov-test to identify those policy coefficients significantly influencing the dynamics of the observable variables around the Ramsey steady state computed at the posterior mode. Third, we estimate the model again but employ the contingency derived previously. Thus we sidestep the pitfalls of both common approaches by on the one hand modeling fiscal policy behavior endogenously and not ad-hoc, while on the other hand, not assuming Ramsey optimal behavior.

We start by estimating a benchmark medium scale DSGE model as recently put forward by Forni, Monteforte, and Sessa (2009). We think of the DSGE model as containing two sets of behavioral equations: one describing the private sector and one describing the fiscal policy sector. The private sector is solely characterized by the solution to the households' and firms' problems and the corresponding structural model parameters.

We identify candidates for extensions of the stylized policy rules employed so far in the following way: Given the posterior distribution we compute the Ramsey solution at the posterior mode. For taxes on capital, private consumption, and labor, we specify very general policy rules consisting of policy coefficients linking the tax rates to a large set of key economic variables as current and lagged output, government debt, private consumption, real wages, inflation, hours worked as well as the capital stock. The policy coefficients that

influence significantly the dynamic behavior of the observable variables¹ around the Ramsey steady state constitute the extended policy rules to be estimated. They are determined using global sensitivity analysis (GSA) techniques.

More precisely, we apply Monte Carlo filtering techniques as described in Ratto (2008): we draw from a wide prior distribution of the policy coefficients and analyze these draws based on their importance for the reduced form model solution. Based on a set of constraints (such as the rank condition), a target region for the DSGE model as a whole is defined. Each draw of the policy coefficients is categorized as either within or outside the target region. We identify the parameters of the policy rules, as those which are important for driving the DSGE model into the target region by applying a Smirnov test statistic. This test allows to identify the important coefficients of the policy rules as well as to rank the coefficients by their importance. Finally, we estimate the new contingencies by re-estimating the DSGE model.

2 Related literature

After the study of Christiano, Eichenbaum, and Evans (2005), who have been among the first to extend a standard DSGE model with various features and frictions, DSGE models have been increasingly employed to estimate the dynamic effects of policy changes². Fiscal policy in these models is, if at all present, modeled as an additional exogenous disturbance to the economy³. However, as recently put forward by Curdia and Reis (2009), this way of describing the fiscal sector comes at the cost of misspecified models.

Building on the work of Baxter and King (1993), Galí, López-Salido, and Vallés (2007) and Leeper and Yang (2008) recent studies aimed at empirically characterizing the behavior of the fiscal policy sector. Jones (2002) estimates policy rules and the DSGE model using

¹As a starting point we consider the observable variables. However, it is straightforward to consider some unobserved variables, which are more relevant for welfare instead.

²See for instance Smets and Wouters (2003) and Smets and Wouters (2007) for further examples.

³Which probably reflects the view many economists have on the fiscal sector.

a generalized methods-of-moments estimator. Coenen and Straub (2005) estimate a DSGE model employing Bayesian model estimation. The specified policy rule for lump sum taxes responds to government debt and government expenditure. Forni et al. (2009) estimate feedback rules on debt following Bohn (1998). Leeper, Plante, and Traum (2009) include output as additional variable into the policy rules to capture the behavior fiscal stabilizers. Furthermore they consider potential correlations of the tax rates. In this paper we allow for a much richer specification of feedback rules and demonstrate how these rules can be estimated to further improve the fit of the standard DSGE models and correspondingly there usage in policy analysis.

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