Chapter 10

Statistical Evaluation of the RBC Model

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Abstract

The aim of this paper is to test, on French data, the main RBC proposition according to which technological innovations are sufficient for a calibrated neoclassical growth model to mimic the business cycle. An intertemporal optimization model with a stationary technology shock and non time-separability in consumption and leisure is developed. Using the Generalized Method of Moments, we estimate the structural parameters and then, test using statistical grounds the model’s ability to reproduce the cyclical features of the French economy. We propose an extension of Eichenbaum [1991]'s methodology to show the limit of calibration-simulation methods: as in standard macroeconometric models, the stochastic simulation takes into account the sampling uncertainty on estimated structural parameters. The model is estimated on quarterly data from 1951 to 1989. While the tests do not reject the assumption of balanced growth, they point out the model’s inability to reproduce the French business cycle.

Introduction

The analysis of impulse and propagation mechanisms as explanations of economic fluctuations is one of the most discussed issue in macroeconomics. During the eighties, the Real Business Cycle theory deeply renewed this debate. This theory describes the essentials of the business
cycle from a set of indicators, as suggested by Lucas [1977] (set of second order moments). In this view, the volatility of macroeconomic data would be the result of optimal responses to technology innovations of a representative agent in a Walrasian framework.

On the basis of the results obtained from the simulation of various RBC models, Prescott [1986] and Hansen [1988] consider that 70% to 100% of output fluctuations could be explained, despite some difficulties concerning the reproduction of the labor market.

Whatever the different extensions proposed to this method of analysis ¹, an essential criticism addressed to these theoretical papers concerns their validation procedure. As d'Autume pointed out:

"Considering the calibration and simulation methods as the equivalent of an econometric approach is very excessive because the observation procedure is not codified enough as to evaluate its discriminating power." (d'Autume [1992], p.15)

In macroeconomics, the procedure of testing theories by testing their implications rather than their assumptions relies on the methodology espoused by Friedman [1953]. According to him, every theoretical model is incomplete and is necessarily an abstraction, a simplification and it can never be realistic. Every model is an inaccurate descriptive representation of reality. A selection criterion between models can be simplicity:

"A hypothesis is important if it explains such by little, that is, if it abstracts the common and crucial elements from the mass of complex and detailed circumstances surrounding the phenomena to be explained and permits valid predictions on the basis of them alone." (Friedman [1953], p. 14)

According to Friedman, a selection criterion between alternative hypotheses equally consistent with available evidence must be to some extent arbitrary, though there is agreement that a relevant way is suggested by the criterion of simplicity and "fruitfulness": theory is more

¹For example, imperfect competition, price rigidity and monetary shocks (Hairault and Portier in chapter 6 of this book), labor hoarding and government expenditures shocks (Burnside, Eichenbaum and Rebelo [1993], Fairise and Langot [1994]). See Hénin [1991] or McCallum [1989] for different surveys of this literature.