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Business cycles asymmetry and monetary policy: a further investigation using MRSTAR models

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Abstract

This paper investigates the asymmetric effects of monetary shocks when the impact of monetary policy on real activity works through state-dependent variables. We use a nonlinear model, the multiple regime smooth transition autoregressive model, that allows the effects of shocks to vary across the business cycles when monetary innovations modify both the endogenous and state variables. Our impulse response functions show a history-dependence property. Indeed, hitting the economy at a given time induces persistence and asymmetric responses across histories and shocks. The empirical application concerns the US over the period 1975:1–1998:2.

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1. Introduction

The past years have witnessed an increasing number of papers dealing with the asymmetry of business cycles. Although the idea is ancient, empirical studies have

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grown rapidly since the beginning of the 1980s. The recognition that structural changes affect the economies at any period has encouraged the use of multiple regimes models, instead of previous empirical approaches that mostly distinguished between two phases in business cycles: expansion and contraction. The varying slopes of expansion and contraction phases that induce time variations from the mean to the trough or peak of cycles, is an old stylized fact—at least it dates back to Mitchell (1927). However, for a long time, the problem has been the following: how can the theoretical concept be made operational? In an attempt to answer this question, econometricians have suggested the use of nonlinear time series models that enable the study of different dynamics over the business cycles. A plethora of papers on this topic started emerging in the 1980s and in the 1990s (see, among others, Neftçi, 1984; Falk, 1986; Lüükkonen and Teräsvirta, 1991; Teräsvirta and Anderson, 1992; Emery and Koening, 1992; Sichel, 1994; Ramsey and Rothman, 1996; Verbrugge, 1997; Pesaran and Potter, 1997; van Dijk and Franses, 1999).

Among the arguments that motivate the use of nonlinear structures, a simple idea is that the output fluctuations are influenced by variables that distort the business cycle shape. Such variables cause changes in regime in the sense that output variations follow a different time series process over different periods. This may be a cause of asymmetric dynamics. With regard to linear or VAR models, the 'asymmetry' of business cycles suggests that contractions last a longer period than expansions, or that shocks have stronger effects on certain variables during one of the two phases. With regard to nonlinear models, the meaning of 'asymmetry' is more general in the sense that we simply say that shocks have time-varying effects on the real activity. This variability occurs because the parameters of the equations describing the dynamics of the output change as a result of a regime-shift variable. Such a view modifies our comprehension of how demand and supply shocks contribute to movements in the real GDP over the business cycle. Indeed, when one perturbs the present to produce information on the dynamics of a nonlinear model, the response does not only depend on the sign of the shocks, but it is also a function of the history and of the magnitude of the shocks. This is a new challenge to econometricians.

In this paper, we study the effects of monetary policy on the real sector of the US economy, assuming that output fluctuations are governed by regime-shift models, here the multiple regime smooth transition autoregressive (henceforth MRSTAR) models. These models were introduced by van Dijk and Franses (1999) who analyzed how regime-shift variables cause asymmetries in the US business cycle. They generalized the smooth transition autoregressive (STAR) models that were extensively used in the literature.[1] Why is it interesting to use an MRSTAR model to evaluate the asymmetric effects of monetary policy on real GDP? If we were using a linear model (for instance a VAR process), we would proceed as follows. We would, firstly estimate a money–output equation, secondly create two series of respectively positive and negative monetary shocks, and thirdly study the properties

[1] STAR models were originally introduced by Lüükkonen et al. (1988) and Teräsvirta and Anderson (1992).