Available online at www.sciencedirect.com
ScienceDirect
Economics Letters 97 (2007) 32–38
economics letters
www.elsevier.com/locate/econbase

Some analytics on bias in DSVARs ☆

Martial Dupaigne [a], Patrick Fève [b,c,*], Julien Matheron [c]

[a] University of Western Brittany and TSE (GREMAQ), France
[b] University of Toulouse and TSE (GREMAQ and IDEI), France
[c] Banque de France (Research Division), France

Received 16 December 2005; received in revised form 12 January 2007; accepted 9 February 2007
Available online 27 June 2007

Abstract

This paper examines the ability of Structural Vector Autoregressions (SVARs) to properly uncover the impulse response functions of hours after a technology improvement. Using a simple model in which hours do not react to technology shocks, we determine the main sources of distortions in an SVAR model which includes labor productivity growth and labor input in first difference.

Keywords: Structural Vector Autoregressions; Hours worked; Long-run restrictions; Biases

JEL classification: E24; E32

1. Introduction

The response of hours to a technology shock is the subject of many controversies in quantitative macroeconomics. Galí (1999) and Francis and Ramey (2004) show that the short-run response of hours to a technology shock is significantly negative in the US economy. They obtain this result using a Structural

☆ We would like to thank F. Collard, A. Guay, H. Le Bihan, F. Mihoubi, F. Portier and H. Ulhig for discussions, and an anonymous referee for helpful comments. The traditional disclaimer applies. The views expressed herein are those of the authors and not necessarily those of the Banque de France.
* Corresponding author. GREMAQ-Université de Toulouse I, manufacture des Tabacs, Aile J.J. Laffont, bât. F, 21 allée de Brienne, 31000 Toulouse, France. Tel.: +33 5 6112 8575; fax: +33 5 6122 5563.
E-mail address: patrick.feve@univ-tlse1.fr (P. Fève).

0165-1765/$ - see front matter © 2007 Elsevier B.V. All rights reserved.
doi:10.1016/j.econlet.2007.02.010

Vector Autoregression (SVAR) of labor productivity growth and hours in first difference (DSVAR) with long-run restriction (Blanchard and Quah, 1989). However, recent contributions proceeding with simulation experiments have shown that the DSVAR specification can induce large distortions, suggesting that the estimated response from DSVAR can be heavily downward biased (Erceg et al., 2005; Chari et al., 2005).

This paper makes some analytical progress on this issue. We use a simple model as the Data Generating Process and investigate under which conditions DSVARs may lead to unbiased estimates of the effects of technology improvements. The model is sufficiently simple to clearly locate the main sources of distortions in DSVARs.[1]

The paper is organized as follows. Section 1 expounds the model. Section 2 presents and discusses our results. The last section briefly concludes.

2. The model

We consider a flex price version of the simple model analyzed in Galí (1999). The representative household seeks to maximize

$$\log(C_t) + \overline{\chi}\exp(\chi_t)(1-N_t), \quad \overline{\chi}>0, \tag{1}$$

subject to the per period budget constraint $C_t \leq W_t N_t + \Pi_t$. The quantity of good consumed in period t is C_t. The variable N_t denotes hours worked, W_t is the real wage, and Π_t represents the profit that the household receives from the firm. The utility function is separable, logarithmic in consumption, and without loss of generality linear in leisure. Finally, χ_t is a random variable that shifts utility every period. This variable is assumed to follow an AR(1) process

$$\chi_t = \rho_\chi \chi_{t-1} + \sigma_\chi \varepsilon_{\chi,t},$$

where $\varepsilon_{\chi,t}$ is *iid* with zero mean and unit variance. As noticed by Galí (2005), this shock can be an important source of fluctuations, as it accounts for persistent shifts in the marginal rate of substitution between goods and labor. Such shifts capture persistent fluctuations in labor supply following changes in labor market participation and/or changes in the demographic structure.[2]

The representative firm produces a homogenous good with a technology

$$Y_t = Z_t N_t^\alpha,$$

where $\alpha \in (0,1]$. Z_t follows a random walk

$$Z_t = Z_{t-1}\exp(\sigma_z \varepsilon_{z,t}),$$

[1] Our results only apply to SVARs that identify technology shocks and ignore the widely used monetary VARs, which rely on short-run restrictions.

[2] Note that this shock is observationally equivalent to a tax on labor income.