



A structural VAR business cycle model for a volatile small open economy

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Accepted 2 April 2007

Abstract

New Zealand is a small economy exposed to a volatile climate, relatively volatile international trade prices, and its exposure to international financial markets has increased markedly since economic reforms in the 1980s. This paper applies identification techniques suggested by Cushman and Zha [Cushman, D.O. and Zha T.A., 1997. Identifying monetary policy in a small open economy under flexible exchange rates, *Journal of Monetary Economics*, 39, pp. 433–448.], Zha [Zha, T.A., (1999). Block recursion and structural vector autoregression, *Journal of Econometrics*, 90, pp. 291–316.] and Dungey and Pagan [Dungey, M. and Pagan, A., 2000. A structural VAR model of the Australian economy, *The Economic Record*, 76, pp. 321–342.] to develop a large four block structural VAR model of the New Zealand business cycle to capture these features. The model reveals that climate and international trade price shocks have been more important sources of business cycles fluctuations than international or domestic financial shocks. Furthermore, the model does not encounter the price and exchange rate puzzles that have bedevilled attempts to identify monetary policy shocks in small open economy SVAR models.

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JEL classification: C22, Time-series models; E32, Business fluctuations, cycles; E44, Financial markets and the macroeconomy; F41, Open economy macroeconomics

Keywords: Open economy; Structural VAR models; New Zealand, business cycles; Climate; Commodity prices; International linkages; Financial conditions

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1. Introduction

This paper develops a structural VAR model to identify the impact and relative importance of international and domestic factors in the New Zealand business cycle since widespread market deregulation. New Zealand is an interesting case study because it has historically been subject to large international commodity price shocks, but since widespread market deregulation in the 1980s (see Evans et al., 1996) it has also become more internationally integrated and more exposed to international financial market shocks. Furthermore, for a developed economy New Zealand has an unusually large primary sector. This feature coupled with heavy reliance on hydroelectricity and a volatile climate means that New Zealand's business cycle is potentially vulnerable to climate shocks. Indeed, New Zealand has displayed more volatile business cycles compared to most other developed economies (see Schmidt-Hebbel, 2006; Buckle et al., 2004). Unresolved explanations for this volatility have ranged from the influence of international commodity prices, overly aggressive monetary policy, volatile exchange rates, while the "Asian crisis" is a popular explanation for the 1998 recession. The role of climate has been accorded little attention.

Since its introduction by Sims (1980), VAR modelling has become a standard empirical method for evaluating the properties of macroeconomic systems (See Blanchard, 2000). Nevertheless, satisfactorily capturing the consequences for the business cycle of New Zealand's open economy and industrial features poses several major modelling challenges. To meet these challenges, the model developed in this paper applies and extends several important VAR modelling techniques developed in recent years. These include procedures suggested by Blanchard and Watson (1986), Bermanke (1986) and Sims (1986) permitting non-recursive structures and the specification of restrictions based on prior theoretical and empirical information, and the block exogeneity procedures introduced by Cushman and Zha (1997), Zha (1999) and Dungey and Pagan (2000).

The model presented here has 13 variables, including a wider range of international and domestic variables than have previously been included in New Zealand VAR models and than is typically found in single economy VAR models. The model has four blocks, an international economy block, a terms of trade block, a domestic economy block and a domestic climate block. The international variables and climate are block exogenous and the model includes restrictions on contemporaneous and lagged variables. The use of exogenous variables and sectors has become a more standard procedure in recent years enabling researchers to differentiate between the impacts of shocks from a selection of large economies on a small open economy (Dungey and Fry, 2003), to better understand international linkages and regional dependencies (Dees et al., 2007; Pesaran et al., 2004), and to understand the relative importance of financial, trade and policy mechanisms by which shocks are transmitted across countries (Artis et al., 2007). The four block structure developed in this paper is another variation on this approach.

Interesting results to emerge from the model are as follows. The block exogeneity procedure makes it possible to satisfactorily incorporate a large number of international and domestic variables in SVAR models of small open economies. This procedure has enabled clarification of some ongoing debates concerning some of the principal sources of shocks to New Zealand's business cycle. A particularly interesting insight from the model is that variations in domestic climatic conditions have been a significant source of shocks to New Zealand's business cycle suggesting that climate may warrant more serious attention in international research on business cycles modelling and VAR models of the business cycle. Furthermore, the model does not encounter the price puzzle nor the exchange rate puzzle frequently encountered in small open economy VAR models. The model also generates 'sensible' responses by domestic equities to the various shocks. These latter features provide some assurance that the model does a good job at identifying domestic interest rate shocks

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