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**FORECASTING WITH DSGE MODELS: THE CASE OF
SOUTH AFRICA**

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M.Com., Stellenbosch University, 2004

A Thesis

Submitted in Fulfillment of the Requirements for the Degree of

Doctor of Philosophy (Economics)

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ABSTRACT

The objective of this thesis is to develop alternative forms of Dynamic Stochastic General Equilibrium (DSGE) models for forecasting the South African economy and, in turn, compare them with the forecasts generated by the Classical and Bayesian variants of the Vector Autoregression Models (VARs). Such a comparative analysis is aimed at developing a small-scale micro-founded framework that will help in forecasting the key macroeconomic variables of the economy.

The thesis consists of three independent papers. The first paper develops a small-scale DSGE model based on Hansen’s (1985) indivisible labor Real Business Cycle (RBC) model. The results suggest that, compared to the VARs and the Bayesian VARs, the DSGE model produces large out-of-sample forecast errors.

In the basic RBC framework, business cycle fluctuations are purely driven by real technology shocks. This one-shock assumption makes the RBC models stochastically singular. In order to overcome the singularity problem in the RBC model developed in the first paper, the second paper develops a hybrid model (DSGE-VAR), in which the theoretical model is augmented with unobservable

errors having a VAR representation. The model is estimated via maximum likelihood technique. The results suggest DSGE-VAR model outperforms the Classical VAR, but not the Bayesian VARs. However, it does indicate that the forecast accuracy can be improved alarmingly by using the estimated version of the DSGE model.

The third paper develops a micro-founded New-Keynesian DSGE (NKDSGE) model. The model consists of three equations, an expectational IS curve, a forward-looking version of the Phillips curve, and a Taylor-type monetary policy rule. The results indicate that, besides the usual usage for policy analysis, a small-scale NKDSGE model has a future for forecasting. The NKDSGE model outperforms both the Classical and Bayesian variants of the VARs in forecasting inflation, but not for output growth and the nominal short-term interest rate. However, the differences of the forecast errors are minor. The indicated success of the NKDSGE model for predicting inflation is important, especially in the context of South Africa — an economy targeting inflation.

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Chapter two of the thesis has been published in the June issue of 2007 of the South African Journal of Economics. In this regard, I would like to thank an anonymous referee for valuable comments. Chapter three of the thesis has been published as a working paper of Economic Research Southern Africa (ERSA). It was also presented at the 27th Annual International Symposium of Forecasting (ISF), in New York, U.S.A, and in the 12th Annual African Econometric Society (AES) conference in Cape Town. I thank members of the audiences at these presentations for many helpful comments and suggestions. I also presented the preliminary results of this paper in the ERSA macroeconomic workshop, held at South African Reserve Bank in May 2007. For this, I am grateful to Prof. Nicola Viegi of the University of Cape Town for his invitation and valuable comments. Finally, I would also like to thank the Department of Economics at University of Cape Town for inviting me to present the fourth chapter of my thesis in their seminar series in September 2007.

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