Forecasting the Barbados Money Supply

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The purpose of this paper is to provide an adequate forecasting method for the money supply in the Barbadian economy. This would assist the Central Bank in making decisions on monetary intervention. The performance of ARIMA and vector autoregressive forecasting models are investigated along with combinations of these models. The results of this study suggest that there are reasonable options available for obtaining reliable forecasts of the Barbados money supply. Our findings indicate that seasonal factors and interest rate effects should be comprehended within the forecasting model. We accomplished this through a combination forecasting procedure in which seasonal effects are captured by an ARIMA model and interest rates are introduced through a vector autoregressive forecasting model as exogenous variables. (JEL E40, E41)

Introduction

Economic theory suggests that in a small open economy with a fixed or exogenously determined exchange-rate regime, the nominal money stock is an endogenous variable beyond the control of the Central Bank. In such a setting, the money market is demand-centered and monetary disequilibrium is predominantly resolved by the rapid adjustment of the actual nominal stock of money to its desired level. In these circumstances, any action by the Central Bank that infuses (effuses) high-powered money into (from) the money market would ultimately have an impact only upon the balance of payments.

Since July 5, 1975, the value of the Barbadian dollar has been fixed relative to the U.S. dollar at BDS$2:US$1. Prior to this date, the Barbadian dollar was tied to the pound sterling at a par value of BDS$4.80:£1. Hence, in a Barbadian context, monetary policy impacts predominantly on the balance of payments. Accordingly, a forecast of the money supply could assist the Central Bank in evaluating the impact of such an intervention on the balance of payments.

In this study, we investigate the performance of ARIMA and vector autoregressive (VAR) forecasting models. The study has been organized as follows. In the next section, ARIMA models of the money supply are presented. VAR models oriented toward money market considerations are presented in the third section. We report results obtained by combining univariate and multivariate forecasts in the fourth section. The study concludes with some summary remarks in the fifth section.

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ARIMA Models

As a first step in the construction of the ARIMA models, we investigated the stationarity properties of the money supply and several transformations thereof. The results of Augmented Dickey-Fuller and Phillips-Perron tests indicated that the difference of the money supply, D(MS), the difference of the log of the money supply, D(LMS), the seasonal difference of the money supply, D(MS,0,4), and the seasonal difference of the log of the money supply, D(LMS,0,4), are stationary. We then followed standard search procedures using econometrics views to construct ARIMA models for the above mentioned stationary series pertaining to the money supply. The models based on the first difference and the seasonal difference of the money supply failed some of the diagnostic checks. The null hypothesis of normality was rejected for both of these models. The F-statistic on the ARCH test of the DMS model indicated a significant degree of heteroskedasticity. A visual inspection of a plot of the residuals supported this finding. The D(MS,0,4) model failed the Chow forecast test. Therefore, the DMS and D(MS,0,4) models were rejected. Both of these models were estimated over the period 1969:2 - 1991:4 and the following results were obtained:

\[
D(MS) = 5609.04 - 0.4336 AR(6) + 0.3761 AR(8) + 0.2071 MA(3) - 0.2388 MA(4)
\]

\[
(3.4288)(3.693) (2.962) (1.839) (-2.036)
\]

\[
R^2 = 0.2318 \quad Akaike info criterion = 19.52775 \quad D-W = 2.2574
\]

\[
\bar{R} = 0.1961 \quad Schwarz criterion = 19.6655 \quad Chow Forecast [F] = 1.3529
\]

\[
ARCH[F] = 1.3747 \quad Breusch-Godfrey (LMSC) = 0.4491 \quad Norm[\chi^2(2), Jarque-Bera] = 107.26
\]

\[
D(MS,0,4) = 31078.1 + 0.9479 AR(1) - 0.3514 SAR(4) - 0.8913 MA(4).
\]

\[
(5.356)(32.87) (-2.763) (-21.45)
\]

\[
R^2 = 0.7386 \quad Akaike info criterion = 19.4571 \quad D-W = 2.5216
\]

\[
\bar{R} = 0.7296 \quad Schwarz criterion = 19.5674 \quad Chow Forecast [F] = 9.8711
\]

\[
ARCH[F] = 2.5216 \quad Breusch-Godfrey (LMSC) = 0.53774 \quad Norm[\chi^2(2), Jarque-Bera] = 11.82736
\]

The two models based on the logarithms of the money supply, D(LMS) and D(LMS,0,4), passed all of the diagnostic tests. The D(LMS) model was estimated over the period 1967:2 - 1991:4 and the following results were obtained:

\[
D(LMS) = 0.0273 - 0.1488 MA(1) - 0.7376 MA(14) + 0.2265 SMA(4).
\]

\[
(16.79) (-2.82) (-13.95) (2.456)
\]

\[
R^2 = 0.4155 \quad Akaike info criterion = -5.8844 \quad D-W = 1.9762
\]

\[
\bar{R} = 0.3971 \quad Schwarz criterion = -5.7795 \quad Chow Forecast [F] = 1.6681
\]

\[
Norm[\chi^2(2)] = 0.851012 \quad Breusch-Godfrey (LMSC) = 0.50972 \quad ARCH[F] = 0.0479
\]