

**Notes:**

- See website for how to submit your answers and how feedback is organized.
- This exercise uses the datafile TestExer3 and requires a computer.

**Goals and skills being used:**

- Experience the process of model selection.
- Apply methods to compare models.
- Apply tests to evaluate a model.

**Questions**

This test exercise is of an applied nature and uses data that are available in the data file TestExer3. We consider the so-called Taylor rule for setting the (nominal) interest rate. This model describes the level of the nominal interest rate that the central bank sets as a function of equilibrium real interest rate and inflation, and considers the current level of inflation and production. Taylor (1993)<sup>1</sup> considers the model:

$$i_t = r^* + \pi_t + 0.5(\pi_t - \pi^*) + 0.5g_t,$$

with  $i_t$  the Federal funds target interest rate at time  $t$ ,  $r^*$  the equilibrium real federal funds rate,  $\pi_t$  a measure of inflation,  $\pi^*$  the target inflation rate and  $g_t$  the output gap (how much actual output deviates from potential output). We simplify the Taylor rule in two manners. First, we avoid determining  $r^*$  and  $\pi^*$  and simply add an intercept to the model to capture these two variables (and any other deviations in the means). Second, we consider production  $y_t$  rather than the output gap. In this form the Taylor rule is

$$i_t = \beta_1 + \beta_2\pi_t + \beta_3y_t + \varepsilon_t. \quad (1)$$

Monthly data are available for the USA over the period 1960 through 2014 for the following variables:<sup>2</sup>

- INTRATE: Federal funds interest rate
- INFL: Inflation
- PROD: Production
- UNEMPL: Unemployment
- COMMPRI: Commodity prices
- PCE: Personal consumption expenditure
- PERSINC: Personal income
- HOUST: Housing starts

<sup>1</sup>"Discretion Versus Policy Rules in Practice", Carnegie-Rochester Conference Series on Public Policy 39, pages 1455-1508.

<sup>2</sup>The data are from the St. Louis Federal Reserve Economic Dataset (FRED), with IDs FEDFUNDS, CPIAUCSL, INDPRO, PAYEMS, NAPMPRI, PCE, A229RX0 and HOUST respectively (all percent change from a year ago, except for the Federal funds rate).

- (a) Use general-to-specific to come to a model. Start by regressing the federal funds rate on the other 7 variables and eliminate 1 variable at a time.
- (b) Use specific-to-general to come to a model. Start by regressing the federal funds rate on only a constant and add 1 variable at a time. Is the model the same as in (a)?
- (c) Compare your model from (a) and the Taylor rule of equation (1). Consider  $R^2$ , AIC and BIC. Which of the models do you prefer?
- (d) Test the Taylor rule of equation (1) using the RESET test, Chow break and forecast test (with in both tests as break date January 1980) and a Jarque-Bera test. What do you conclude?