Economic Forecasting
Exercise Sheet 6

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1. (a) Open the *EViews* file **liquor.wf1**, which contains monthly data on US liquor expenditure from 1967q1 to 1994q4. Estimate an equation for **LIQUOR** including a constant, trend and 11 additive monthly seasonal dummies. Compare this with a seasonal trend model which includes additional interactive seasonal dummies equal to the product of the trend and seasonal variables. Compare the two specifications. Which is better?

   Hint: Seasonal dummies can be included in an *EViews* equation as regressors **@SEAS(1)**, **@SEAS(2)** up to **@SEAS(11)**. The interactive seasonal terms can be defined as regressors **@TREND*@SEAS(1)**, **@TREND*@SEAS(2)** up to **@TREND*@SEAS(11)**.

   (b) Estimate the equation

$$\Delta_{12}\text{LIQUOR}_t = \sum_{i=1}^{12} \delta_i d_{it} + \alpha_s \text{LIQUOR}_{t-12} + \epsilon_t$$

   where d_{it} are seasonal dummies and test for the presence of seasonal unit roots in the variable **LIQUOR**. Is there evidence of seasonal unit roots?

   Hint: The seasonal difference operator Δ_{12} can be specified in EViews as **D(LIQUOR,0,12)**. The significance levels for the *Dickey-Hasza-Fuller* t-test for monthly data including seasonal dummies (240 observations) are -6.47 (1%), -5.82 (5%) and -5.49 (10%).

   (c) Estimate the *multiplicative seasonal ARMA(2,0)(2,0)* model for the seasonal difference Δ_{12} of **LIQUOR**.

   Hint: You can include seasonal *AR* terms as **SAR(1)**, **SAR(2)** *etc.* and seasonal *MA* terms as **SMA(1)**, **SMA(2)** *etc.* In this case you need **SAR(1)** and **SAR(2)** as well as **C**, **AR(1)** and **AR(2)**.

(d) Seasonally adjust **LIQUOR** using the *X-12* procedure and the *TRAMO/SEATS* procedure and compare the two resulting seasonally adjusted series.

Hint: Seasonal adjustment is an option on the *Proc* tab of the *Series* window. There are many available options to control both the seasonal adjustment procedures. For simplicity I suggest going with the default options except that you will want to choose different base names to distinguish the two **_SA** series that will be created.