

**Package Name:** DMA

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**Add-in Type:** Global

**Default Proc Name:** dma

**Default Menu Text:** Dynamic Model Averaging

**Interface:** Dialog and command line

## Description

Suppose that we have a set of  $K$  models that are characterized by having different subsets of  $z_t$  as predictors. Denoting these by  $z_t^{(k)}$  for  $k = 1, \dots, K$  our set of models can be written as

$$y_t = z_t^{(k)} \theta_t^{(k)} + \varepsilon_t^{(k)}$$
$$\theta_{t+1}^{(k)} = \theta_t^{(k)} + \eta_t^{(k)}$$

where  $\varepsilon_t^{(k)}$  is  $N(0, H_t^{(k)})$  and  $\eta_t^{(k)}$  is  $N(0, Q_t^{(k)})$ . Let  $L_t \in \{1, 2, \dots, K\}$  denote which model applies to at each time period  $\Theta_t = (\theta_t^{(1)'}, \dots, \theta_t^{(k)'})'$  and  $y^t = (y_1, \dots, y_t)'$ .

When forecasting time  $t$  variables using information through time  $t - 1$ , DMA involves calculating  $\Pr(L_t = k | y^{t-1})$  for  $k = 1, \dots, K$  and averaging forecast across models using these probabilities. DMS involves selecting the single model with highest value for  $\Pr(L_t = k | y^{t-1})$  and using this to forecast. Details on on calculation of this model is provided in Koop and Korobilis (2012).

## Dialog

Upon running the add-in from the menus, a dialog will appear:

The screenshot shows a dialog box titled "Dynamic Model Averaging" with a close button (X) in the top right corner. The dialog is divided into several sections:

- Dependent variable:** A text input field containing the letter "I".
- Exogenous variables:** An empty text input field.
- Forecast horizon:** An empty text input field.
- Transformation code:** An empty text input field.
- Include intercept:** A checked checkbox.
- Lags of dependent and exogenous variable:** A text input field containing "0 0".
- Apply DMA:** Three radio button options: "Only on the exogenous variables" (selected), "On the exogenous and the lags of the dependent", and "On the exog, the lags of the dep and intercept".
- Forgetting Method:** Two radio button options: "Linear" and "Exponential" (selected).
- Expert opinion:** Two radio button options: "Equal weights on all models" and "No prior expert opinion" (selected).
- Forgetting factors: lambda, alpha, kappa:** A text input field containing "0.99 0.99 0.95".
- Prior on theta:** Two radio button options: "Diffuse" and "Data-based" (selected).
- Training sample:** A text input field containing "40".
- Initialize measurement error covariance:** Three radio button options: "small positive value", "a quarter of the variance of the initial data" (selected), and an unlabeled option.
- Sample size:** A text input field containing "1948Q1 2008Q4".
- Out of sample forecast:** An unchecked checkbox.

At the bottom of the dialog are two buttons: "OK" and "Cancel".

The first box lets you specify the dependent variable to forecast. On the next box enter the forecast horizon. On the third box enter the transformation code for the dependent variable.

code	explanation
1	Level
2	First Difference
3	Second Difference
4	Log-Level
5	Log-First-Difference
6	Log-Second-Difference

On the fourth box put the exogenous variables. On the next blank box enter the transformation code vector for the exogenous variables. For example, 1,2,2,5,4,1. Don't forget commas. Other boxes are optional.

## Command line:

`dma(options) dep_variable f_horizon t_code tcode @ exog_variables`

for example:

`vector tcode=@fill(1,1,4)`

`dma(phlag="2 0") y 4 5 tcode @ z1 z2 z3`

## Options

<code>intercept</code>	Include intercept ( <code>intercept=1</code> )
<code>phlag</code>	Lag number for dep and exog variables ( <code>phlag="0 0"</code> )
<code>adma</code>	Apply DMA: 1 – only on exog variables 2 - on exog variables and lagged dep variables 3 - on exog variables, lagged dep variables and intercept
<code>fmethod</code>	Forgetting method: 1 – linear 2 – exponential
<code>eopinion</code>	Expert opinion 1 – equal weights on all models 2 – no prior expert opinion
<code>ffactors</code>	Forgetting factors: ( <code>ffactors = "0.90 0.90 0.99"</code> )
<code>prtheta</code>	Prior on theta: 1 – diffuse prior 2 – data based prior
<code>prsample</code>	Training sample ( <code>prsample="40"</code> )
<code>initial_v_0</code>	Initialize measurement error covariance 1 – small positive value

	2 – quarter of the variance of initial data
sample	Sample size (sample="1990q1 2015q4")
out	Out of sample forecasting (out=1)

References:

Koop, G., and Korobilis, D., 2012, "Forecasting Inflation Using Dynamic Model Averaging" International Economic Review, 53-3, 867-886.