

Mgmt 469

Performing an Analysis of Variance in Stata

Analysis of Variance (ANOVA) allows you to identify the sources of variation (i.e., the “action”) in any variable. A concrete example should help. Using the *yogurtall* data, here is the Stata output from the command `anova price3 store week`

```
. anova price3 store week
```

	Number of obs =	352	R-squared =	0.964	
	Root MSE =	.001565	Adj R-squared =	0.952	
Source	Partial SS	df	MS	F	Prob >
Model	.017272908	90	.000191921	78.36	0.000
store	4.5099e-06	3	1.5033e-06	0.61	0.606
week	.017268398	87	.000198487	81.04	0.000
Residual	.00063924	261	2.4492e-06		
Total	.017912148	351	.000051032		

The “Total Sum of Squares” is .0179. This is the same as the SS_{Total} that we discussed when we covered R^2 . (That is, it is the sum of the squared differences between each value of *price3* and the mean value of *price3*.) We can think of the SS_T as the total variation of *price3* around its mean value.

The store and week “Partial SS” values show how much of the SS_T is due to variation from one store to the next and how much is due to variation from one week to the next. We see that almost all of the variation in *price3* is week to week variation ($SS=.01727$) and there is virtually no variation from one store to the next ($SS=.0000045$).

The Mean Square (MS) = (Partial SS)/df and is used to compute the F-statistic and perform the statistical test to determine if the amount of variation is statistically significant. As you can see, the week to week variation in *price3* is significant at $p=.000$ but the store to store variation is not significant ($p=.606$).

Use of ANOVA as a Complement to Regression

ANOVA complements regression by helping the researcher determine the source of action in a key predictor variable, and whether fixed effects will eliminate that action. Continuing the above regression, the researcher can feel confident that include store fixed effects will not materially reduce the action in *price3*. There is still a lot of week to week variation in *price3*.

There are no hard and fast rules as to how much action is sufficient. So let ANOVA aid your judgment, but do not rely on ANOVA to make your decisions for you.