

Mgmt 469

Performing a Chow (partial-F) test

Suppose you have a set of related variables X1-X10 that represent a *single theoretical construct* such as a set of industry categories, a set of demographic variables, or a set of year dummies. You are unsure whether to include the *set* of variables in the model. To determine if they belong, you will need to perform a Chow (or partial-F) test.

In Stata, follow your regression by typing:

test X1 X2 etc. X10

If the F-test statistic is not significant, then the category does not add predictive power and you should throw it out.

Suppose that you ignore these instructions. Instead, you take a quick peek at the coefficients on individual predictors and find that X7 is significant at $p < .05$. Should you ignore the test procedure and include X7 in the model?

The answer is that unless you had an *a priori* reason to single out X7, you should exclude it. The reason has to do with simple statistics. If a set of ten predictors collectively add no predictive power to a model, there is still a high probability that at least one will have a significant coefficient, just due to random chance.

Remember, the usual null hypothesis is that a variable is not significant unless there is evidence that its observed coefficient could not be the result of random chance. Observing an insignificant group and one significant member of that group is entirely consistent with random chance.

If the test reveals that the group of variables does add predictive power, this only means that including some members of the group add power. It does not mean that all the variables belong in the model. You have two options:

- Keep the entire group if you have sufficient df
- Pick and choose those variable that add the most power. (Don't forget that if you have a group of categorical variables, the individual coefficients show only comparisons with the omitted category. Be sure to include significant comparisons.)

This leaves one question unanswered: What constitutes a “group” of variables.? The best to answer this is by example. Consider the yogurt problem. If you said “let’s see if competitors’ promotions matter” then the group is competitors’ promotions. If you said, “Let’s see if the promotion of the brand name competitors matter”, then you have a different group. But make sure your groups make sense. If you said “let’s see if promotions matter” and then combined competitors and your own promotions in the same test, I would respond that your group makes no theoretical sense, because your own promotions are likely to affect you very differently.