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Chow Test

Here is an alternative to using Models 1, 2, and 3 to estimate whether subgroup regression coefficients differ significantly. If you recall, comparing Model 2 with Model 1 tests whether the average values of the dependent variable differ for groups of a categorical variable (e.g., male vs. female). Comparing Model 3 to Model 2 tests whether the slopes vary across categories (male vs. female).

Below is an example of the Chow Test using the same typesetter and compositor data we used to calculate models 1, 2, and 3 (see the SAS Log and Listing).

The Chow Test formula is:

$$F_{(k, N_1+N_2-2k)} = \frac{[SSE_p - (SSE_1 + SSE_2)]/k}{(SSE_1 + SSE_2)/(N_1 + N_2 - 2k)}$$

where, SSE_p = sum of squared error term for pooled model
SSE_1 = sum of squared error term for group 1
SSE_2 = sum of squared error term for group 2
k=# of estimated parameters (including constant)
$N_1 + N_2$ = N's for each of group 1 and group 2, respectively

For a great online description of the Chow test (from STATA):
http://www.stata.com/support/faqs/stat/chow.html

Substituting from dummy variable output:

$$F_{(15, 3514)} = \frac{[1.310993E11 - (27263726310 + 77914830179)]/15}{(27263726310 + 77914830179)/[1935+1609-2\ (15)]}$$

= 1728049567.4/29931290.9758

F=57.73 (significant*)

Note: this formula will tell you whether the slopes differ on average, but you don't know which slopes differ significantly. Calculating Model 3, and looking at the significance of the relevant interaction terms will give you that information.