BEFORE THE
POSTAL RATE COMMISSION

POSTAL RATE AND FEE CHANGES, 1997	:	DOCKET NO. R97-1

ANSWERS OF UNITED PARCEL SERVICE WITNESS KEVIN NEELS TO INTERROGATORIES OF MAGAZINE PUBLISHERS OF AMERICA (MPA/UPS-ST1-1 through 4)

(February 26, 1998)

Pursuant to the Commission's Rules of Practice, United Parcel Service ("UPS") hereby serves and files the responses of UPS witness Kevin Neels to interrogatories MPA/UPS-ST1-1 through 4 of Magazine Publishers of America.

Respectfully submitted,

EJC 2/26/98

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MPA/UPS-ST1-1. Please refer to your supplemental testimony at page 2, line 20, through page 3, line 5.

a. Please confirm that in constructing the F statistic to test the fixed-effects model with common slope parameters against the unrestricted model with varying slope parameters, you chose to use the autocorrelation coefficient from the fixed-effects model to perform the serial correlation correction in your unrestricted model. If you do not confirm, please explain.

b. If part a is confirmed, please explain why you believe that, in an unrestricted model in which every other parameter is allowed to vary freely from one facility to another, the autocorrelation coefficient should be restricted to being equal across all facilities.

Response to MPA/UPS-ST1-1.

a. Confirmed.

b. In allowing the slope coefficients of the model to differ by facility I was responding to the request of the Commission as set forth in Notice of Inquiry No.4 on Mail Processing Variability. That request was silent on the issue of whether or not the autocorrelation coefficient should be restricted, or should also be allowed to vary by facility.

In my Supplemental Testimony I point out that alternative treatments of the autocorrelation coefficient are possible. Specifically, in footnote 1 on page 3 I state:

> Using the value for the serial correlation coefficient estimated from the residuals of Bradley's fixed effects model is but one of a number of possible approaches to handling the problem of serial correlation. One could also maintain

> the assumption that there is a single correlation coefficient that is common to all facilities, but then estimate the value of that coefficient from the residuals of the model that allows slope coefficients to vary by facility. One could also allow the serial correlation coefficient to vary by facility. In the latter case one would have to take the separate serial correlation coefficients into account in testing whether or not the model coefficients differ significantly by facility.

I concede the validity of these alternative approaches. They constitute slightly different alternative hypotheses, and hence also slightly different statistical tests.

If a decision is made to allow autocorrelation coefficients to vary by facility one needs to account appropriately for the fact that a large number of new parameters have been added to the model. The resulting unrestricted model is no longer linear in parameters, and so a simple F test is no longer appropriate. If one were to estimate the parameters (both slope coefficients and autocorrelation coefficients) of the individual facility-specific equations using maximum likelihood techniques one could construct a likelihood-ratio test of the null hypothesis that the facilities share a common set of slope and autocorrelation coefficients against the alternative that those coefficients differ by facility.

The specific approach I adopted in my analysis was based upon two considerations. The Commission specifically mentioned an F test in the Notice of Inquiry, which seemed to rule out the different approaches that varying autocorrelation coefficients would require. I also sought a test that included Bradley's exact model as the null hypothesis. Using Bradley's autocorrelation coefficient produced just such a test.

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MPA/UPS-ST1-2. Please refer to your supplemental testimony at page 2, lines 16-18, and confirm that you estimated the unrestricted model using data that had been deviated from the overall sample means. If you do not confirm, please explain.

Response to MPA/UPS-ST1-2. Confirmed.

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MPA/UPS-ST1-3. Please refer to your supplemental testimony at page 6, lines 1-6, where you stated that "[t]he failure of Bradley's fixed effects model to pass the *F* test for any of the MODS direct activities does not by itself prove that volume variability differs across facilities. It is possible that the differences in slope coefficients detected by the *F* test occur in other parts of Bradley's specification. The only way to determine whether or not this is...the case is to inspect the individual facility-specific volume variability estimates."

a. Please confirm (i) that in order to test the restriction implied in the passage quoted above - namely the null hypothesis that volume variability is constant across sites while the other slope parameters are not against the alternative that volume variability is not constant across sites - it would be necessary to take the variances and covariances among the parameter estimates at the individual sites into account; and (ii) that while the *F* test of this hypothesis would take these variances and covariances into account, visual inspection of the numbers presented in your Table 2 does not. If you do not confirm, please explain.

b. Please confirm that you did not formulate the restriction discussed in part a. (namely that, for each MODS direct cost pool, volume variability is stable across facilities while the remaining slopes differ by site) as a hypothesis and test it statistically using an *F* test or similar procedure. If you do not confirm, please explain.

c. If part b. is confirmed, please explain how one should take the variances and covariances of the separate parameter estimates into account when inspecting the numbers you present in Table 2 at page 7 of your supplemental testimony.

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Response to MPA/UPS-ST1-3.

a. An appropriately designed F test could determine whether volume variability is constant across sites even though other slope coefficients differ. Volume variability in Bradley's model is the sum of two coefficients – the coefficient on the log of current period TPH and the coefficient on the log of TPH in the prior accounting period. One could test the significance of the restriction that each of these two coefficients is the same across all facilities. Alternatively, one could test the significance of the restriction that the sum of these coefficients is the same for all facilities even though the contributions to that sum made by the coefficients of current period TPH and lagged TPH differ by facility. The F statistics one would calculate for either of these two tests would reflect the residual sums of squares and degrees of freedom of the restricted and unrestricted models, and would not directly take into account "variances and covariances among the parameter estimates at the individual sites." I believe, therefore, that the correct answer is "not confirmed," although I find the wording of the question confusing.

I confirm that visual inspection of the numbers presented in Table 2 does not take into account the "variances and covariances among the parameter estimates at the individual sites."

b. Confirmed.

c. As I stated above in my answer to (a), this can be done in two ways. The first would involve estimation of separate equations for each facility subject to the cross-equation constraint that the coefficients for the log of current TPH and the log of lagged TPH are the same for all facilities. One would then construct the following F statistic:

$$F_1 = ((SSR_1 - SSR_U)/(2(N-1)))/(SSR_U/(M - N(K+1))$$

Where SSR_1 is the sum of squared residuals for the set of equations described above, SSR_U is the sum of squared residuals obtained by estimating separate equations by facility without the cross-equation constraint, N is the number of sites, M is the overall sample size, and K is the number of non-intercept parameters in Bradley's model. Note that adjustments to the denominator degrees of freedom may be required if data limitations necessitate the dropping of variables from some of the site specific regressions.

The second would involve estimation of separate equations for each facility subject to the cross-equation constraint that the sum of the coefficients for the log of current TPH and the log of lagged TPH is the same for all facilities. One would then construct the following F statistic:

$$F_2 = ((SSR_2 - SSR_U)/(N-1))/(SSR_U/(M - N(K+1))$$

Where SSR_2 is the sum of squared residuals for the set of equations described above, SSR_U is the sum of squared residuals obtained by estimating separate equations by facility without the cross-equation constraint, N is the number of sites, M is the overall sample size, and K is the number of non-intercept parameters in Bradley's model. Again, adjustments to the denominator degrees of freedom may be required for the reasons set forth above.

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MPA/UPS-ST1-4. In addition to testing the fixed-effects model against the unrestricted model in each of the direct MODS cost pools, did you also perform a test of the pooled model against the unrestricted model? If you did perform such a test, please supply the SAS program(s), SAS log file(s), and SAS listing file(s) used to do so, as well as a summary of your results.

Response to MPA/UPS-ST1-4. No.

DECLARATION

I, Kevin Neels, hereby declare under penalty of perjury that the foregoing answers are true and correct to the best of my knowledge, information, and belief.

Kevin Neels

Dated: February 26, 1998

CERTIFICATE OF SERVICE

I hereby certify that I have this date served the foregoing document in accordance with section 12 of the Commission's Rules of Practice.

John E. McKeever JK 2/26/98

John E. McKeever

Dated: February 26, 1998
Philadelphia, PA