

BEFORE THE
POSTAL RATE COMMISSION
WASHINGTON, DC 20268-0001

POSTAL RATE AND FEE CHANGES
PURSUANT TO PUBLIC LAW 108-18

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: Docket No. R2005-1
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INTERROGATORIES OF ADVO INC. TO UNITED STATES POSTAL
SERVICE WITNESS MICHAEL D. BRADLEY (ADVO-USPS-T14-3-14)

(May12, 2005)

Pursuant to sections 25 and 26 of the Rules of Practice, ADVO, Inc. (Advo) directs the following interrogatories to United States Postal Service witness Michael Bradley (USPS-T-14). If the witness is unable to respond to any interrogatory, we request that a response be provided by appropriate USPS witness capable of providing an answer.

Respectfully submitted,

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ADVO, INC. INTERROGATORIES TO USPS WITNESS MICHAEL BRADLEY

ADVO/USPS-T14-3. On page 33 of your testimony, you state: “Because of the large cross-sectional variation in the data, it is likely that econometric estimates for the delivery equations suffer from heteroskedasticity.”

- (a) Do you mean that cross-sectional data normally exhibit characteristics that cause error variances to change in size with variations in one or more of the independent variables? Please explain fully.
- (b) Did you conduct any diagnostic tests to detect heteroskedasticity in your recommended and alternative models? If so, please provide results from these tests. If not, please explain why these tests were not conducted.
- (c) Please confirm that use of ordinary least squares when heteroskedasticity is present leads to unbiased but inefficient parameter estimates. If not, please explain fully.

ADVO/USPS-T14-4. On page 52 of your testimony, you state that the “actual form of heteroskedasticity is unknown”.

- (a) Please provide and explain in general terms alternatives to ordinary least squares that correct for heteroskedastic data, when the actual form of heteroskedasticity is known, and what form of heteroskedasticity each corrects.
- (b) When the actual form of heteroskedasticity is unknown, as you state, is it accepted econometric procedure to infer possible causes, apply the corresponding corrective procedure and then test for heteroskedasticity ex-post to determine whether the initial inference was correct?
- (c) Please note that on page 52 you also describe certain assumptions leading to a weighted least squares procedure. Please confirm that if the standard error of city carrier street time cost is suspected to be correlated with zip-code area size, then it would be appropriate to run a weighted least squares regression using the inverse of area square mileage as the weighting factor. If you cannot confirm, please explain why.
- (d) If you do confirm in (c) above, then is it appropriate to determine whether or not the transformed error term (through the weighted least

squares procedure) is now homoskedastic through appropriate diagnostic testing? Please explain fully.

- (e) Are there circumstances when the heteroskedasticity form can be known a-priori and the appropriate corrective procedure applied without further diagnostic testing? If so what are these circumstances? Please explain fully.

ADVO/USPS-T14-5. Please assume a simple zip-code delivery cost model stated in functional form for N number of zip-codes as:

$$C_i = f(V_i, PD_i, A_i) + e_i,$$

where: $i = 1, 2, \dots, N$ and,

C_i = zip-code i delivery cost,

V_i = zip-code i volume,

PD_i = the number of zip-code i possible deliveries,

A_i = the zip-code i total area in square miles.

Further the function is assumed to be homogenous to the first degree so that:

$$C_i \cdot k = f(V_i \cdot k, PD_i \cdot k, A_i \cdot k) + e_i \cdot k.$$

- (a) Please confirm that such a model would predict positive marginal cost effects with respect to the three workload variables independently. If you cannot confirm, please explain why not.
- (b) Please confirm that in such a model, if values for the three explanatory variables were twice as high in one zip-code compared to another, the model would predict total delivery costs that were also twice as high in the former zip-code compared to the latter. If not, please explain why not.
- (c) Please confirm that such a model would predict a volume variability less than one. If not, please explain why not.
- (d) Please comment on the general characterization of delivery costs that are assumed to behave as described by the model. Please explain fully under what conditions such a behavioral structure might be expected. Alternately, might one expect systematic deviations from model predictions as zip-code square miles increase and all other variables grow in the same proportion? If so, please explain fully.

ADVO/USPS-T14-6. Please provide correlation matrices for all regression results presented in your testimony, including all alternative models you present but do not recommend for development of volume variable costs.

ADVO/USPS-T14-7. Please consider the translog model you present on page 56 of your testimony.

- (a) Please provide the anti-log form of this model in equation form.
- (b) Of the 1,545 zip-code-day observations available for your quadratic general and parcel/accountable delivery models, how many instances (observations) of zero volumes for one or more shapes did you find?
- (c) Did you attempt to run translog regressions using the disaggregated volume shapes on the remaining zip-code-day observations? If so, please provide all results for model runs. If not, please explain why translog regressions were not attempted using the remaining non-zero volume observations.

ADVO/USPS-T14-8. Suppose your translog specification using aggregate volume was run twice, once using the full data set as you did, and the second time run only on the data set containing non-zero volumes.

- (a) Are you aware of any statistical tests that could test for the null hypothesis that both models are identical (collectively have the same coefficient values)? If so, would it be appropriate to test for a disaggregated model, considering all shape volumes as separate variables, using the reduced data set? Please explain fully.
- (b) Is there any reason to believe that the translog model using the reduced aggregate volume data set would be considered biased or inconsistent? How would the percentage of zero-volume observations affect such circumstances, if at all? Please explain fully.

ADVO/USPS-T14-9. On page 55 of your testimony, referring to your translog model, you state:

Because the data were mean centered before estimation of the equation, the volume variability is just the first-order coefficient on the aggregate volume term.

- (a) Please explain fully why you mean centered the data before estimating the translog model. Please explain fully when it is appropriate to perform regressions on the original (non-mean centered) data.

- (b) In the above statement, do you mean that the volume variability should be based on the first order coefficient on the aggregate volume term only if the data are mean centered? If so, why? When is it appropriate to include the second order coefficient for the volume variability calculation when data are mean centered? Please explain fully.
- (c) Please explain fully circumstances when only the first order coefficient and, separately, both the first and second order coefficients should be part of the marginal cost calculation when data are not mean centered.
- (d) Please demonstrate the marginal cost calculation for your aggregate volume variable from your translog model with: a) only the first order coefficient included, and b) both the first and second order coefficients included.

ADVO/USPS-T14-10. From a conceptual or specification view point, are you aware of any advantages to using a translog specification instead of the quadratic models you recommend to generate variability estimates? Or is the preference established only after generation of the statistical properties of particular models? Please explain fully.

ADVO/USPS-T14-11. For all the alternative runs in Section G of your testimony,

- (a) Please provide the estimated coefficients, HC standard errors and HC t-statistics. To report the data, please use the format you used in Table 18, page 56 of your testimony for your translog specification.
- (b) Please provide all SAS logs for these alternative runs.

ADVO/USPS-T14-12. Please refer to page 47 of your testimony where you describe and report results for your alternative volume model.

- (a) Explain fully why you did not use the alternative letters definition in your restricted quadratic specification.
- (b) Wouldn't recognition of the DPS-cased letters marginal cost difference as confirmed by the model provide a more accurate distribution of total volume variable costs by shape and technology employed? Please explain fully.

ADVO/USPS-T14-13. Please refer to your fixed effects model described in pages 44 and 45 of your testimony.

- (a) Please confirm that the methodology employed for your fixed effects model only required estimation of coefficients for each of the independent variables included in that model. If not, please explain.
- (b) Please confirm that your fixed effects model explains differences in average delivery-times by zip code, fully through zip-code specific intercepts. If not, please explain.
- (c) If so, please explain how your fixed effects model calculates the zip-code specific intercept values.
- (d) Please explain in detail how the zip-code specific delivery times are used to calculate the shape-specific volume variabilities from the model.

ADVO/USPS-T14-14. On page 29 of your testimony, you refer to a Box-Cox transformation “which can permit the estimation of a logarithmic function.”

- (a) Please confirm that you are referring to an estimation when zero volumes are present in the data base. If not, please explain fully.
- (b) Please demonstrate the Box-Cox function mathematically and describe the non-linear properties of this estimator. Please explain fully how it estimates a logarithmic function when zero volumes are present.

