Postal Rate Commission
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BEFORE THE
POSTAL RATE COMMISSION
WASHINGTON, D.C. 20268–0001

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

Docket No. R2005–1

RESPONSES OF POSTAL SERVICE WITNESS BRADLEY TO INTERROGATORIES OF ADVO (ADVO/USPS-T14-16 - 22)
(July 1, 2005)

The United States Postal Service hereby provides the responses of witness Bradley to the following interrogatories of Advo: Advo/USPS-T14-16 – 22, filed on June 17, 2005.

Each interrogatory is stated verbatim and is followed by the response.

Respectfully submitted,

UNITED STATES POSTAL SERVICE

By its attorneys:

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July 1, 2005

Response of Postal Service Witness Michael D. Bradley
To Interrogatories Posed by ADVO

ADVO/USPS-T14-16. Please refer to your response to ADVO/USPS-T14-4 (c) where you claim that a "weighted least squares approach is appropriate when the form of the heteroskedasticity is known" and your statement on page 52 of your testimony:

> "If one assumes that the variance of the regression increases with cross-sectional unit size then one way to attempt to control for this is to divide each unit by a measure of size, thus potentially reducing the disparity in variances."

Please confirm that one measure of cross-sectional unit size in the data used for your regressions is zip-code square miles. If you cannot confirm please explain fully.

ADVO/USPS-T14-16 Response:

Partially confirmed. Cross-sectional unit size generally relates to the level of output. Zip Code square miles is a measure of geographic size, not necessarily the level of output. This is not to say that the Zip Code square miles is not related to output, in the sense that the mail must be delivered over the given geographic area.

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ADVO/USPS-T14-17. Please refer to your response to ADVO/USPS-T14-5 (a) where you present the following city carrier delivery cost function:

$$C = V^{.04} PD^{0.8} A^{-.2}$$

and calculate its marginal cost as:

$$MC_A = -1.2V^{.4} PD^{.8} A^{-1.2} < 0.$$

(a) Please confirm that the marginal cost with respect to A from your example is actually given by:

$$MC_A = -.2V^{.4} PD^{.8} A^{-1.2} < 0.$$

(b) Please explain how negative delivery-related marginal costs with respect to A (zip code total area) is possible.

(c) Please explain how negative marginal costs with respect to area size is consistent with carrier out-of-office delivery costing principles and theory.

(d) Referring to your restricted quadratic formulation (page 38, Table 5) please provide the zip-code marginal cost estimate with respect to zip-code square land mileage at the mean values for all variables using that model and provide the calculation of that estimate.

(e) Referring to your translog model (page 56, Table 18), please provide individual estimates and sums of elasticities (variabilities) for your aggregate volume variable, possible deliveries and total area at their mean values using that model.

ADVO/USPS-T14-17 Response:

a. Confirmed

b. Please recall the original question asked for confirmation of a mathematical property of homogenous functions (that homogeneity ensures positive marginal costs). My answer simply provided a mathematical function that demonstrated that homogeneity, by itself, does not ensure positive marginal cost for all variables. I did not pose the mathematical function as a “carrier delivery cost function” and did not endow it with operational meaning. A

negative marginal cost would occur if, for some reason, the cost of delivery falls as the geographic area to be covered increases.

c. I'm not sure what constitutes "carrier out of office delivery costing principles and theory," but I would generally agree that one expects total delivery time to rise as the geographic area covered by delivery increases. In this sense, I would suggest that a negative marginal cost for geographic area is "counter intuitive."

d. The model does not include a separate geographic area variable. Zip Code land area is included only as part of the density variable. The model is thus not intended to calculate a marginal cost for Zip Code land area.

e. Below I present the requested elasticities. Please note that the translog model includes density, not area square miles. Thus, the provided elasticity is for density, not area square miles.

Variable	**Elasticity**
Volume	0.340
Delivery Points	0.702
Density	-0.095

The question also asked for the sum of these three numbers. I get a sum of 0.947.

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To Interrogatories Posed by ADVO

ADVO/USPS-T14-18. With respect to your fixed effects model described in pages 44 of and 45 of your testimony, please provide the full mathematical specification for your econometric model. In your statement, please show and describe how the particular cost causal characteristics for each zip-code are captured.

ADVO/USPS-T14-18. Response:

The fixed effects model has the following the mathematical structure:

$$y_{it} - \bar{y}_{it} = \beta(x_{it} - \bar{x}_i).$$

where x_i is the vector of right-hand-side variables and the "bar" notation represents the unit specific means. For example, the regular delivery time equation looks like:

$$\begin{aligned}\left(DT_{it} - \overline{DT}_i\right) &= \beta_1\left(L_{it} - \bar{L}_i\right) + \beta_2\left(L_{it}^2 - \bar{L}_i^2\right) + \beta_3\left(F_{it} - \bar{F}_i\right) + \beta_4\left(F_{it}^2 - \bar{F}_i^2\right) \\ &+ \beta_5\left(S_{it} - \bar{S}_i\right) + \beta_6\left(S_{it}^2 - \bar{S}_i^2\right) + \beta_7\left(C_{it} - \bar{C}_i\right) + \beta_8\left(C_{it}^2 - \bar{C}_i^2\right) \\ &+ \beta_9\left(P_{it} - \bar{P}_i\right) + \beta_{10}\left(P_{it}^2 - \bar{P}_i^2\right) + \beta_7\left(X_{it} - \bar{X}_i\right) + \beta_8\left(X_{it}^2 - \bar{X}_i^2\right) \\ &+ \beta_5\left(Z_{it} - \bar{Z}_i\right) + \beta_6\left(Z_{it}^2 - \bar{Z}_i^2\right) + \varepsilon_{it}\end{aligned}$$

where DT is delivery time, L is letter volume, F is flat volume, S is sequenced volume, C is collection volume, P is small parcel volume, X is delivery points and Z is density. The "bar" notation represents the unit (Zip Code) specific means. The cost causal characteristics for each Zip Code are captured through the response in DT through the

observed time periods for that Zip Code to changes in volumes over the same time periods.

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ADVO/USPS-T14-19. With respect to your use of the panel data, did you consider testing for a random effects model? If you did, please describe fully why you rejected such an approach. If you did not, please describe why such an approach would or would not have been appropriate for your research agenda.

ADVO/USPS-T14-19 Response:

My recommendation of the pooled model results over the fixed effects model results was based upon operational and intuitive considerations, not pure econometric ones. The fixed effects variabilities and marginal times were quite low relative to previous results and seemed to be low relative to operational interpretations. An important reason for this result may be the fact that the fixed effects model focuses on the "within" unit variation as opposed to the "across" unit variation. Given that the time dimension is short, in calendar time, there may be a limited response in delivery time to volume changes and that is being captured by the fixed effects model. Based upon this reason for preferring the pooled model results over the fixed model results, as opposed to pure econometric ones, I did not further pursue the fixed effects model and did not test for fixed vs. random effects.

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ADVO/USPS-T14-20. Please refer to your response to ADVO/USPS-T14-8 where you state that "under various assumptions about the structure of the error variance, such tests exist." Please describe such tests and/or cite appropriate references where such tests are described.

ADVO/USPS-T14-20 Response:

Please see Green, William H., Econometric Analysis, Macmillan Publishing Co., New York, 1993 at 211-212 and 215-216.

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ADVO/USPS-T14-21. Please confirm that the variable PREP listed in page 4 of LR K-81 and PRT, as read in on page 1 of your listed program (page 9 of LR K-81), are the same and SAS identifies PRT as PREP.

ADVO/USPS-T14-21 Response

Confirmed.

Response of Postal Service Witness Michael D. Bradley
To Interrogatories Posed by ADVO

ADVO/USPS-T14-22. Please provide your interpretation of the positive coefficient on the squared density term in your recommended restricted quadratic regular delivery model.

ADVO/USPS-T14-22 Response:

The first order coefficient on the density term is negative, indicating that as the density of the delivery points increases, the time associated with delivering a given volume of mail decreases. The positive second order term means that the rate of decline in delivery time is reduced as density increases. In other words, as density gets higher and higher, there is little additional cost saving from further increases in density.

CERTIFICATE OF SERVICE

I hereby certify that I have this date served the foregoing document in accordance with Section 12 of the Rules of Practice and Procedure.

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