Before The
POSTAL RATE COMMISSION
WASHINGTON, D.C. 20268-0001

Postal Rate and Fee Changes, 2000 Docket No. R2000-1

RESPONSE OF THE UNITED STATES POSTAL SERVICE WITNESS BARON TO ADVO INTERROGATORIES (ADVO/USPS-T12-6-10)

The United States Postal Service hereby provides the response of witness Baron to the following interrogatories of Advo, Inc.: ADVO/USPS-T12-6-10, filed on March 20, 2000.

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

Respectfully submitted,

UNITED STATES POSTAL SERVICE

By its attorneys:

Daniel J. Foucheaux, Jr.
Chief Counsel, Ratemaking

Richard T. Cooper

475 L'Enfant Plaza West, S.W.
(202) 268-2993; Fax: -5402
Washington, D.C. 20260-1137
April 4, 2000

ADVO/USPS-T12-6. On page 26 of your testimony, you state that you calculated run-time elasticities for each FAT/CAT route using the Commission's interaction model. Did you run any similar analyses using your basic quadratic model for comparative purposes? If yes, please provide the analyses and all supporting documentation. If no, please explain why not and how the interaction model's results can be assessed relative to the quadratic model's performance, absent results for the latter.

RESPONSE:

I did run similar analyses based on the quadratic model. These analyses and supporting documents are presented in USPS LR-I-273. The results are summarized as follows. 199 separate elasticities were calculated for a corresponding 199 different unique values for possible stops across the three quadratic model regressions. None of these elasticities is negative. None is greater than 2.00. Only one (equaling 0.096) is less than 0.10.

ADVO/USPS-T12-7. When developing or assessing the quadratic CAT/FAT:

(a) Did you consider including a possible stops variable, a coverage variable, or any other variable which could be interpreted as a measure of average run time between covered stops? Please explain your response.

(b) Did you estimate your quadratic model with a possible stops variable, a coverage variable, or any other variable which could be interpreted as a measure of average run time between covered stops? If so, please provide any analyses you conducted with a possible stops variable.

RESPONSE:

(a) and (b). I did not consider any estimation of new specifications of the CAT/FAT models. The purpose of the CAT/FAT analysis presented in my testimony was to evaluate the two competing regression models proposed in earlier dockets by Mr. Colvin and by the Postal Rate Commission, and to demonstrate the compelling logic of the Postal Service's decision to adopt Mr. Colvin's quadratic model.

ADVO/USPS-T12-8. In your Appendix A, you quote Dr. Bradley's R90-1 rebuttal testimony: "...evaluation of a cost function at the mean volume level provides, necessarily, an unbiased estimator of the true volume variability." (USPS-RT-2 at 10)

(a) Please confirm that Dr. Bradley also stated:

"What is important, however, is the set of properties determining the cost function estimated for a particular activity and the measurement of the associated marginal cost at an appropriate level of volume. With the goal of the research well defined, it is clear that the researcher must determine the appropriate level of volume for measuring marginal cost." (USPS-RT-2 at 9).

If you cannot confirm, please explain why not

(b) Please confirm that Dr. Bradley also stated:

"Evaluation at the mean level of volume thus guarantees calculation of marginal cost at the best estimate of the average level of volume. As the Commission has stated, this is the volume level relevant for the theory of pricing at marginal cost of the average level of output." (USPS-RT-2 at 11)

If you cannot confirm, please explain why not.

(c) Please confirm that Dr. Bradley's testimony (quoted by you) presented marginal cost as:

$$\partial C / \partial V = \mathcal{E}\ C / V$$

where $\partial C / \partial V$ (marginal cost) is evaluated from the cost function that includes C as the dependent variable and V as the mean estimate of the independent volume variable (USPS-RT-2 at 9). If you cannot, please explain why not.

(d) Please identify in Dr. Bradley's testimony the location where he states that an unbiased estimate of marginal cost can be derived by applying the variability from a cost function correctly estimated at mean volumes to an average cost that (1) was not developed from the cost function and (2) substantially diverges from the average cost estimated from the cost function (i.e., diverges by far more than can be explained by the Jensen's Inequality phenomenon).

RESPONSE:

(a) Confirmed.

(b) Confirmed.

(c) Not confirmed. There is nothing in Dr. Bradley's testimony that indicates that marginal cost must be calculated at the cost level "C" that you describe as the dependent variable. In fact, the marginal cost (or volume variable cost) is typically calculated at the actual accrued cost for the cost pool. Note that the elasticity is a unit free measure that can be applied to the appropriate accrued cost level.

(d) Although this issue was not explicitly addressed, one way or the other, in Dr. Bradley's Docket No R90-1 testimony, it is addressed in his Docket No. R2000-1 incremental cost testimony. In particular, see pages 5-8 of USPS-T-22 where Dr. Bradley describes, in mathematical terms, the Commission's method for calculating attributable cost. There he makes clear that the established methodology takes the accrued cost for a cost pool from the Postal Service's accounting system and multiplies it by variabilities (and distribution keys) derived from special studies. He explains that this process is called "calibration."

ADVO/USPS-T12-9. Please refer to Dr. Bradley's quote that "...evaluation of a cost function at the mean volume level provides, necessarily, an unbiased estimator of the true volume variability". (R90-1, USPSRT2, at 10)

(a) Please confirm that the per stop load cost function evaluated at average stop volume is the g(V/S) function you use in your testimony. If you cannot confirm, please explain why.

(b) Using this notation, please confirm that the variability of per stop load time evaluated at the average per stop volume is (dg(v)/dv)*(v/g(v)), where v = V/S. If you cannot confirm, please explain.

(c) Please confirm that using Dr. Bradley's criteria, this variability must be an unbiased estimator of true variability. If you cannot confirm, please explain why.

(d) Please confirm that using Dr. Bradley's criteria, dg(v)/dv must be an unbiased estimator of true marginal cost. If you cannot confirm, please explain why.

RESPONSE:

(a) Confirmed.

(b) Not confirmed. The variability formula includes the partial derivative with respect to volume evaluated at mean volume, not the total derivative with respect to average volume per stop as is in your formula.

(c) Not confirmed due to an erroneous formula.

(d) Not confirmed due to an erroneous formula.

ADVO/USPS-T12-10. Please examine equation (5) in page 10 of your testimony.

(a) Please confirm that dividing by L yields witness Crowder's system wide load time variability: $[(\partial L / \partial V) * (V / L)] = E_e + (1 - E_e)) * E_s$. If you cannot confirm, please explain why.

(b) Please confirm that E_e is elemental load variability, (dg(v)/dv) * v/g(v), evaluated at average stop volume and, therefore, this component value of witness Crowder's total system variability is an unbiased estimator of true variability, using Dr. Bradley's criteria. If you cannot confirm, please explain why.

RESPONSE:

(a) Please note that this "equation" is invalid. As I point out on page 10 of my testimony, equation (5) is derived from Ms. Crowder's equation (4): $L = g(V / S) * S$. My testimony further shows that, in fact, $L = g(V / S) * S$ does not hold. L does not equal $g(V / S) * S$, because $g(V / S)$ is nonlinear. The degree of this nonlinearity is especially large for MDR and BAM. Therefore, the symbol that correctly relates the left-hand side and the right-hand side of what Ms. Crowder calls "equation" (4) as well as the left-hand and right-hand sides of (5) is an inequality. In other words, the left-hand sides of (4) and (5) do not equal the respective right-hand sides.

The correct formula that Ms. Crowder should use in place of (4) is:

$$L(V) = \bar{L}_i(V) * S(V),$$

where the bar indicates average load time per stop. Differentiating this accurate expression with respect to volume (V) yields:

$$\partial L(V) / \partial V = \partial \bar{L}_i(V) / \partial V * S(V) + \partial S(V) / \partial V * \bar{L}_i(V)$$

Dividing through by L and multiplying through by V yields:

$(\partial L(V)/\partial V)V/L = (\partial \bar{L}_i(V)/\partial V * S(V))V/L + (\partial S(V)/\partial V * \bar{L}_i(V))V/L.$

By recognizing that $L(V) = \bar{L}_i(V) * S(V)$ we can cancel terms to yield:

$\mathcal{E}_V = \mathcal{E}_e + \mathcal{E}_s$, where $\mathcal{E}_V$ is the overall elasticity of load time with respect to volume.

This can be contrasted with Ms. Crowder's erroneous expression listed in part (a) of this question, which can be written as: $\mathcal{E}_V = \mathcal{E}_e + \mathcal{E}_s - \mathcal{E}_e\mathcal{E}_s$.

However, if Ms. Crowder's expression (5) could be regarded as correct, then the subsequent algebra does yield:

$[(\partial L/\partial V) * (V/L)] = E_e + (1 - E_e)) * E_s$

(b) Not confirmed. The elemental load variability is given by:

$\partial L/\partial V * \bar{V}/L(\bar{V})$. That is, the econometric equation, evaluated at mean volume, provides an unbiased estimator of the load time variability.

DECLARATION

I, Donald M. Baron, declare under penalty of perjury that the foregoing answers are true and correct to the best of my knowledge, information, and belief.

Donald M. Baron

Date: 4-4-00

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon all participants of record in this proceeding in accordance with section 12 of the Rules of Practice.

Richard T. Cooper

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