

DOCKET SECTION

BEFORE THE  
POSTAL RATE COMMISSION  
WASHINGTON, D.C. 20268-0001

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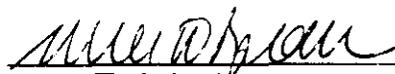
Docket No. R97-1

RESPONSE OF THE DIRECT MARKETING ASSOCIATION, INC. WITNESS BUC TO  
INTERROGATORIES OF THE UNITED STATES POSTAL SERVICE  
(USPS/DMA-T1-6-14)

The Direct Marketing Association, Inc. hereby provides responses of witness  
Buc to the following interrogatories of the United States Postal Service (USPS/DMA-  
T1-6-14), filed January 14, 1998.

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

Respectfully submitted,

  
\_\_\_\_\_  
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January 28, 1998

## USPS/DMA-T1-6.

- (a) Please confirm that the IOCS tally cost weight (field F9250) is the ratio of the cost associated with a craft/IOCS CAG stratum combination to the number of tallies in the craft/IOCS CAG stratum combination. If you do not confirm, please explain.
- (b) Please confirm that the IOCS tally cost weight field (F9250) assumes that each unit of time (tally) in a craft/IOCS CAG stratum combination has the same associated cost. If you do not confirm, please explain.
- (c) If there is wage dispersion within a craft/IOCS CAG stratum combination, will the IOCS tally cost weight (field F9250) overstate the cost associated with observations of lower-wage employees and understate the cost associated with higher-wage employees? Please explain your response fully.
- (d) If lower-wage employees are more likely to be found in a specific operation, will the total IOCS tally cost weight (field F9250) for tallies associated with that operation tend to overstate the true cost of the operation? Please explain your response fully.
- (e) If higher-wage employees are more likely to be found in a specific operation, will the total IOCS tally cost weight (field F9250) for tallies associated with that operation tend to understate the true cost of the operation? Please explain your response fully.
- (f) Would wage dispersion within craft/IOCS CAG stratum combinations be a reason to modify the IOCS tally cost weights? Please explain fully and reconcile your answer with your responses to parts c-e of this interrogatory.

## USPS/DMA-T1-6 Response:

- (a) Confirmed
- (b) Confirmed
- (c) Yes. To the extent the tally weight is the same for each employee, it overstates the cost of a tally associated with a lower wage employee and understates the cost of a tally associated with a higher wage employee. Note, however, that IOCS/LIOCATT was designed to find the cost of mail processing by class and subclass and not the cost of single observations.

(d) I do not believe that the sampling frame in IOCS is designed to find the cost of specific mail processing operations. If it is used to do so, it will likely produce estimates with high variance. If the sampling frame is used for an unintended purpose (to find the cost of a particular operation) and if lower wage employees are more likely to be found in this particular operation, using the tallies and their associated costs will tend to overstate the true costs of the operation. If the Postal Service is interested in determining the costs for a specific purpose, it must design a sampling scheme for that purpose.

(e) I do not believe that the sampling frame in IOCS is designed to find the cost of specific mail processing operations. If it is used to do so, it will likely produce estimates with high variance. If the sampling frame is used for an unintended purpose (to find the cost of a particular operation) and if higher wage employees are more likely to be found in a specific operation, using the tallies and their associated costs will tend to understate the true costs of the operation. If the Postal Service is interested in determining the costs for a specific purpose, it must design a sampling scheme for that purpose.

(f) No. Given that within a craft/IOCS CAG strata, each employee has an equal probability of being selected, the fact that wage rates are different will not bias the estimate.

USPS/DMA-T1-7. Please refer to DMA-T-1, page 17. Is the principle "that cost (within a CAG and craft) for an activity is directly proportional to the number of tallies for that activity" a "basic underpinning of the... IOCS sampling system" or an assumption of the tally cost weighting procedure? Please provide a detailed justification of your response.

USPS/DMA-T1-7 Response:

As I stated in my direct testimony, the principal "that cost is proportional (within a CAG and craft) for an activity is directly proportional to the number of tallies for that activity" is a "basic underpinning of the ...IOCS sampling system". Given how IOCS tally weight costs are computed (see USPS/DMA-T1-6(a)), it is true by definition rather than assumption.

USPS/DMA-T1-8. Please refer to your testimony at page 27, line 25. You state that "in my system, a dollar of cost is always a dollar of cost."

- (a) Please confirm that by this, you mean that you propose not to reweight IOCS tally dollar values in response to any of the issues raised by witness Degen at Tr. 17/8134-8139, including the within-craft wage dispersion issue. If you do not confirm, please explain what your statement means.
- (b) Please confirm that your "dollar of cost", like witness Degen's, is an allocation of cost to tallies which is based on assumptions not integral to the sampling system. If you [do] not confirm, please explain fully your understanding of the IOCS tally cost weights.

USPS/DMA-T1-8 Response:

- (a) Not confirmed. Please recall that I recommend that the Commission use the method it approved in R94-1. In this method, MODS pool costs play no role so there is no reason to reweight, since reweighting in Degen's method only occurs to make IOCS tally cost equal to MODS pool costs. If the Commission decides to accept any part of witness Degen's proposals, which I believe would be a serious mistake, I have suggested that they fix several of his most egregious flaws. Among these is reweighting. See DMA-T-1 at 27.
- (b) Not confirmed. The IOCS tally cost weight is by definition the ratio of the cost associated with a craft/IOCS CAG stratum combination to the number of tallies in the craft/IOCS CAG stratum combination.

USPS/DMA-T1-9. Please refer to DMA-T-1, page 12, in which you describe the process whereby "volume-variable MODS pool cost" is computed.

- (a) For MODS 1&2 cost pools, is the tally reweighting step necessary to produce "volume-variable MODS pool cost"? Please explain fully.
- (b) In witness Degen's proposed methodology, can the "volume-variable MODS pool cost" be derived without the use of IOCS data form MODS 1&2 cost pools? Please explain fully.

USPS/DMA-T1-9 Response:

- (a) No. The tally reweighting step is not necessary to produce volume-variable MODS pool costs. Rather, the reweighting of IOCS tally costs is a necessary consequence of the process used to produce volume-variable MODS pool costs.
- (b) Yes. The volume variable MODS pool cost, however, cannot be distributed without the use of IOCS tallies.

USPS/DMA-T1-10. Please refer to DMA-T-1, page 17, especially footnote 24. Is a simple but false assumption to be preferred over a complex but correct assumption? Please explain.

USPS/DMA-T1-10 Response:

Correct complex assumptions are preferred over simple false ones. Determining whether assumptions are correct or false, however, is important. As witness Shew described in his testimony, the best way to determine whether an assumption is false or correct is to gather data and statistically test its validity. Witness Degen admitted that he did not statistically test the validity or correctness of the assumptions he made when distributing mail processing costs. (See Tr. 12/6666-66). In the absence of information on whether a set of complicated assumptions is correct, I have recommended using simple assumptions instead of complicated ones.

USPS/DMA-T1-11 - Please refer to programs DMA\_mods.sas, DMA\_bmcs.sas, and DMA\_nmod.sas, DMA-LR-1.

- (a) Please confirm that the mixed-mail distribution method implemented by this program ignores all information on the characteristics of mixed-mail recorded in IOCS other than the office group. If you do not confirm, please describe what the programs do.
- (b) Is the mixed mail distribution method you propose designed primarily to maximize the number of distributing tallies, and therefore minimize the variance of the distributed costs? Please explain.
- (c) In designing the mixed-mail distribution method you propose, did you consider the tradeoff between bias and variance? If so, please explain how your proposed distribution method addresses this issue. If not, why not?
- (d) If the mixed-mail characteristics recorded in IOCS (activity code, item type, etc.) contain information that the subclass distribution of certain types of mixed-mail differs from that of direct mail, under what conditions will your distribution method result in an unbiased distribution of mixed-mail cost? Please explain fully.

USPS/DMA-T1-11 Response:

- (a) Confirmed that the program does not use any IOCS data other than office group to distribute mixed mail costs.
- (b) No. As I stated in my testimony, I recommend that the Commission use the IOCS/LIOCATT distribution procedure which, among other attributes, uses distributing sets with many more tallies than witness Degen's method. The SAS programs to which you refer are a second best, and much worse, method for distributing mixed mail and not handling costs to subclass. This method was designed to solve three major problems I have with the Postal Service-proposed distribution method: (1) data thinness in distributing sets; (2) distribution of mixed mail costs by item type and cost pool and distribution of not handling mail costs within cost pool; and (3) reweighting of tally dollars. The IOCS/LIOCATT procedure also solves these problems.
- (c) Yes. A good distribution method will minimize bias and variance subject to a budget constraint. As compared to witness Degen's method, there was no tradeoff. I believe that my method is less biased than that proposed by witness Degen. As I stated in my testimony, witness Degen's distribution method uses distributing sets that are fraught with sampling error. Also, his distribution methods for not handling

costs are biased because Postal Service managers sometimes assign excess labor to allied operations where productivity cannot be calculated. This results in high not handling costs at allied operations. Witness Degen's method then unfairly assigns these high not handling costs to classes of mail that receive a large percentage of the handlings in allied operations. Because not handling costs comprise more than 40 percent of mail processing costs, this bias has a significant effect on the distribution of mail processing costs to subclass. The mixed mail and not handling mail distribution methods presented in my testimony correct these problems, therefore reducing bias and variance. Please note that adopting my recommended method, the IOCS/LIOCATT procedure, for distributing mail processing costs also solves these problems.

(d) All methods for identifying the subclass composition of mixed and not handling tallies for which the IOCS data collector did not record subclass information will contain some bias. Therefore, the probability that the method presented in my testimony is unbiased is zero. However, the method proposed by witness Degen contains significantly greater bias, as described in subpart (c) above.

The reason that the probability is zero in my method is that IOCS does not contain any information regarding the subclass composition of mixed items and containers and the subclasses of mail that cause not handling mail costs. One can reduce bias by testing the assumptions underlying a mixed mail distribution method and using "more correct" assumptions. Witness Shew described some ways to test the assumptions underlying witness Degen's distribution method.

Because using proxies to determine subclass information introduces a great deal of uncertainty into any mail processing costing methodology, I think that the Postal Service should make every reasonable effort to record subclass composition for all mixed items and containers and analyze whether there is a link between not handling costs and subclass or whether they are caused by inefficiency.

USPS/DMA-T1-12. Consider the ratio of two random numbers which are positively correlated. Can the variance of the ratio be lower than that of the numerator and/or the denominator individually? Please explain.

USPS/DMA-T1-12 Response:

Strictly speaking, random *numbers* have neither nonzero variances nor nonzero covariances, since they are the individual realizations of random *variables*, not the variates themselves. That is, suppose  $X$  and  $Y$  are random variables with joint probability density function  $f(x,y)$  where  $f$  is a scalar function such that  $f(x,y) \geq 0$  and  $\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(x,y) dy dx = 1$ . While the expectations, variances, and covariances of  $X$  and  $Y$  are given by:

$$E(X) = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} x \cdot f(x,y) dy dx$$

$$E(Y) = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} y \cdot f(x,y) dy dx$$

$$V(X) = E[X - E(X)]^2,$$

$$V(Y) = E[Y - E(Y)]^2, \text{ and}$$

$$C(X,Y) = E\{[X - E(X)][Y - E(Y)]\},$$

respectively, the variances and covariances of  $X=x$  and  $Y=y$ , where  $x$  and  $y$  are specific numeric values, are uniformly zero because they are numbers and therefore fixed. Obviously, the variance of  $x/y$  would also equal zero (assuming  $y \neq 0$ ).

From the context of your question, however, I assume you meant to ask whether the variance of the ratio of two random *variables* which are positively correlated can be lower than that of the numerator and/or the denominator individually. The answer to that question is yes, it is possible for the variance of the ratio to be smaller than that of either of its components. Consider the simple three-point distribution, where  $(X,Y)$  is a discrete, jointly distributed pair with  $f(x,y) = 1/3$  at each of three mass points, namely  $(-1,-1)$ ,  $(2,2)$ , and  $(3,3)$ , and  $f(x,y) = 0$  everywhere else. Now define  $Z = X/Y$ . Clearly,  $X$  and  $Y$  have a correlation of unity and positive variances, yet the variance of  $Z$  is zero.

On the other hand, possibility does not imply necessity: if  $X$  and  $Y$  are instead joint standard normal, then  $Z$  would be a standard Cauchy, which has no defined expectation but an infinite variance.

USPS/DMA-T1-13.

- (a) Are the coefficients of variation discussed at pages 20-23 of your testimony derived from the data provided by witness Degen in USPS-LR-H-305? If not, please provide a detailed description of the methods and assumptions you used to produce the coefficients of variation.
- (b) If you confirm in part a, have you applied any mathematical transformations to the data in USPS-LR-H-305? If so, please describe in detail any such transformations.

USPS/DMA-T1-13 Response:

- (a) Yes.
- (b) No.

USPS/DMA-T1-14. Please refer to your testimony at pages 20-23.

- (a) When you state that "over three percent of the tally cost [for empty and uncounted items] is distributed on the basis of one tally" (page 20, lines 22-23), do you mean that between 96 and 97 percent of empty and uncounted item cost is distributed using more than one tally? What fraction of total mail processing costs does this represent? Please also provide your result and any intermediate calculations in electronic spreadsheet format.
- (b) When you state that "nine percent of the distributing sets for identified mixed containers contain only one tally" (page 22, lines 2-3), what fraction of identified mixed container cost does this represent? What fraction of total mail processing cost does this represent? Please also provide your result and any intermediate calculations in electronic spreadsheet format.
- (c) What fraction of unidentified/empty container cost is distributed using one tally? What fraction of total mail processing cost does this represent? Please also provide your result and any intermediate calculations in electronic spreadsheet format.

USPS/DMA-T1-14 Response:

- (a) Yes. This represents approximately 0.1 percent of total mail processing costs. The requested spreadsheet will be filed as DMA-LR-3, spreadsheet USPS14.xls.
- (b) This represents approximately 0.9 percent of identified mixed containers costs and 0.04 percent of total mail processing costs. The requested spreadsheet will be filed as DMA-LR-3, spreadsheet USPS14.xls.
- (c) This represents 1.3 percent of unidentified and empty container costs and 0.05 percent of total mail processing costs. The requested spreadsheet will be filed as DMA-LR-3, spreadsheet USPS14.xls.

## DECLARATION

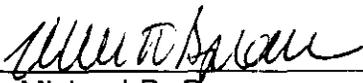
I, Lawrence G. Buc, declare under penalty of perjury that the foregoing answers are true and correct, to the best of my knowledge, information, and belief.

Lawrence G. Buc

Dated: January 28, 1995

**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, as modified by the Special Rules of Practice.

  
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Michael D. Bergman

January 28, 1998

Washington, D.C.