

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

POSTAL RATE AND FEE CHANGES, 2006

Docket No. R2006-1

INTERROGATORIES OF THE UNITED STATES POSTAL SERVICE TO
THE GREETING CARD ASSOCIATION
(USPS/GCA-1 - 12)

Pursuant to Rules 25 and 26 of the Commission's Rules of Practice and Procedure, the United States Postal Service directs the following interrogatories to GCA: USPS/GCA-1 - 12. It is the Postal Service's understanding that, in light of Presiding Officer's Ruling No. R2006-1/74 (Oct. 2, 2006), it is the intent of GCA to have Prof. Kelejian appear as a separate witness and sponsor the material previously filed as his declaration and appended to the testimony of witness Clifton. Since his testimony, as such, has not been filed yet, the Postal Service is filing these questions as institutional, with the expectation that they will be redirected to Prof. Kelejian once his testimony is filed.

Respectfully submitted,

UNITED STATES POSTAL SERVICE

By its attorneys:

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October 2, 2006

USPS/GCA-1. Please provide a list of all organizations for whom Prof. Kelejian has had occasion to estimate empirical econometric equations. (Within that list, please specifically identify which occasions involved demand analysis and the empirical estimation of price elasticities.) Please provide a description of the econometric techniques which he employed on these occasions.

USPS/GCA-2. If any of the following cannot be confirmed, please explain fully. On page 2 of the document originally filed as Appendix C to GCA-T-1, witness Thress's model is described as follows:

$$\text{Ln}(V) = a + b(X^\lambda) + \dots$$

The "Box-Cox Model" is described as follows:

$$\text{Ln}(V) = a' + b'[(X^\lambda - 1) / \lambda] + \dots$$

- a. Please confirm that the "Box-Cox Model" above could be re-written as follows:

$$\text{Ln}(V) = a' + (b'/\lambda)(X^\lambda) - (b'/\lambda) + \dots$$

- b. Please confirm that the equation in a. could be re-written as follows:

$$\text{Ln}(V) = a + b(X^\lambda) + \dots$$

$$\text{Where } a = a' - (b'/\lambda) \text{ and } b = (b'/\lambda)$$

- c. Please confirm that rewriting the equations in this manner shows that the statement on page 2 that "the transformation that Thress used in formulating the internet variable was not the Box-Cox transform" is not correct.

USPS/GCA-3. Suppose that one believed that the true model for the demand for First-Class single-piece letters was equation (2) hypothesized by Dr. Clifton at line 3 of page 18 of his testimony (GCA-T-1) in this case:

$$(2) \log(Q) = a - b \log(P) + b_2 \log(P_2)$$

Suppose further that the true value of $\log(P_2)$ was not known.

- a. Would it be appropriate in this case to attempt to find some variable, call it z , to serve as a proxy for $\log(P_2)$ within equation (2)? If not, why not?
- b. Suppose that there was some variable, X , and some constant, y , such that X^y appeared to be very highly correlated with $\log(P_2)$. Would it be appropriate in this case to substitute X^y into equation (2) as a proxy for $\log(P_2)$? If not, why not?
- c. If X^y as described in part b. were used instead of $\log(P_2)$ in equation (2), would the estimated value of b be biased? If so, please provide the precise mathematical formulation for the expected value of b expressed as a function of the true value of b ?
- d. If X (not raised to the power y) as described in part b. were used instead of $\log(P_2)$ in equation (2), would the estimated value of b be biased? If so, please provide the precise mathematical formulation for the expected value of b expressed as a function of the true value of b ?

USPS/GCA-4. On page 4 of the document originally filed as Appendix C to GCA-T-1, Prof. Kelejian challenges witness Thress's assertion that "Holding all other factors constant, the total volume leaving First-Class single-piece mail due solely to changes in worksharing discounts should be exactly equal to the volume entering First-Class workshared mail." Specifically, he argues that "the statement relating to these equal but opposite volume flows between First-Class

single-piece mail and First-Class workshare mail rests on an assumption that there are no spill-over effects with respect to any other forms of mail!"

- a. If "spill-over effects with respect to any other forms of mail" were considered to be one of the "other factors" which witness Thress assumes to be held constant, would witness Thress's assertion be true? If not, why not?
- b. Is it believed that witness Thress has failed to properly account for "spill-over effects" between First-Class and Standard Mail?
- c. If the answer to b. is affirmative, please explain the answer, considering that witness Thress explicitly includes the average price difference between First-Class workshared letters and Standard Regular mail in his demand equation specification for First-Class workshared letters.
- d. If the answer to b. is negative, is there any practical value to the assertion that "the statement relating to these equal but opposite volume flows between First-Class single-piece mail and First-Class workshare mail rests on an assumption that there are no spill-over effects with respect to any other forms of mail!"? If so, please explain.

USPS/GCA-5. a. On page 7 of the document originally filed as Appendix C to GCA-T-1, Prof. Kelejian suggests that witness Thress should have replaced the term $[\ln(d_{ws}) / (V_{ws} / V_{sp})]$ (called "z" by you) with a fitted value \hat{z} . He goes on to assert that "[i]t should be clear that $\hat{z} \neq [\ln(d_{ws}) / (V'_{ws} / V'_{sp})]$. Please explain why $[\ln(d_{ws}) / (V'_{ws} / V'_{sp})]$, as estimated by witness Thress would not represent a satisfactory instrumental variable.

b. Again, on page 7 of the document originally filed as Appendix C to GCA-T-1, Prof. Kelejian states that "[i]f the variable $z = [\ln(d_{ws}) / (V_{ws} / V_{sp})]$... is replaced by a variable such as $[\ln(d_{ws}) / \hat{w}]$, the resulting parameter

estimates will not be consistent, i.e., on an intuitive level, there would be biases.”

Please explain precisely why this substitution of \hat{w} within witness Thress’s demand equation will produce biased elasticity estimates. Please provide the precise mathematical formulation for the expected values of witness Thress’s elasticity estimates relative to their actual values, given witness Thress’s use of $[\ln(d_{ws}) / \hat{w}]$ as an instrumental variable for $[\ln(d_{ws}) / (V_{ws} / V_{sp})]$ in this case.

- c. What is the precise specification which is recommend be used by witness Thress to estimate the elasticity with respect to the average worksharing discount in his First-Class workshared letters equation?

USPS/GCA-6. At the bottom of page 7 of the document originally filed as Appendix C to GCA-T-1, Prof. Kelejian states that witness Thress “implicitly assumed that the error terms in the First Class single piece and worksharing equations are uncorrelated.” At the top of page 8 of that document, he suggests that this assumption “may not be reasonable.”

- a. Is there any specific basis for questioning the reasonableness of this assumption? Please provide all mathematical or statistical evidence that was used to form this basis.
- b. Please confirm that the correlation between the regression residuals for First-Class single-piece letters and First-Class workshared letters calculated by witness Thress in this case, which are presented in Library Reference LR-L-64, sponsored by witness Thress, is equal to -0.056 over the sample period for which both sets of residuals exist.
- c. In general, would two variables which exhibit a correlation of -0.056 be considered to be “uncorrelated”? If not, why not.

USPS/GCA-7. On page 9 in the document originally filed as Appendix C to GCA-T-1, Prof. Kelejian states that “model selection via a minimization of a mean squared error ... could very well lead to an incorrect model.”

- a. He cites, as one example of how a mean-squared error criterion could “lead to incorrect results”, “the case in which the various models considered have different numbers of parameters.” Please explain why a mean-squared error criterion could lead to incorrect results when comparing two equations with different numbers of parameters.
- b. He cites, as another example of how a mean-squared error criterion could “lead to incorrect results”, “the case in which a variety of complicated estimation procedures are considered.”
 - (i) What specific “complicated estimation procedures” are you referring to with respect to witness Thress’s First-Class single-piece letters equation?
 - (ii) Please explain why a mean-squared error criterion could lead to incorrect results when comparing two equations which are estimated using “complicated estimation procedures.”
- c. In discussing alternatives to a mean-squared error selection criterion, William Greene, in the third edition of his Econometric Analysis (1997), says the following on 401: “Although intuitively appealing, these measures are a bit unorthodox in that they have no firm basis in theory.”

In the document originally filed as Appendix C to GCA-T-1, at page 1, Prof. Kelejian criticizes witness Thress because “some rather intuitive procedures were used that have no formal basis. This lack of a formal basis is important and not just a concern raised by an ‘ivory-tower’ academic.”

Please confirm, therefore, that the “lack of a formal basis” for these alternative model selection criteria is a serious problem, and that Prof. Kelejian’s statement argues strongly in support of a mean-squared error selection criterion, since the mean-squared error selection criterion has a “firm basis in theory”. If not confirmed, please explain.

USPS/GCA-8. On page 9 of the document originally filed as Appendix C to GCA-T-1, Prof. Kelejian states that, in order for a model selection procedure to be valid “the complete set of models that are being considered ... must include the correct model.” Please confirm that, as a practical matter, it is never possible to know the “correct model” in any empirical econometric work. If not confirmed, please explain fully.

USPS/GCA-9. Based on the selection criteria of his choosing, which of the First-Class single-piece letters models presented by witness Thress in LR-L-65 would Prof. Kelejian choose? If the choice is different from the model used by witness Thress in this case, please explain the basis for the choice and describe the ways in which the chosen model is superior to the model used by witness Thress.

USPS/GCA-10. Dr. Harry Kelejian, in the document originally filed as Appendix C to GCA-T-1, says the following with respect to witness Thress’s estimate of the Box-Cox coefficient, λ .

“The implication of this statement is that λ was first estimated in a preliminary step which was which was prior to full model estimation which, I assume, would incorporate his stochastic symmetry conditions, etc. Now this may seem to be a very intuitive thing to do, but on a formal level problems are raised. For example, suppose the estimated value of λ is λ' . This statement then suggests that the internet variable that was used in the full estimation of the model was X^{λ} . If this is true, problems arise! Actually, one’s intuition may lead one to think that problems should not arise is λ is properly estimated in that preliminary step.

Unfortunately this is not the case. That is, even if λ is properly estimated in a preliminary step, the explanatory variable X^λ is not an ordinary explanatory variable because it is based on an estimated coefficient and therefore has a random component. This random component should be obvious since Thress himself on page 37 gives t-ratios relating to it! If an explanatory variable has such a random component that randomness can not be ignored in the model's estimation, nor can it be ignored in the inferences that come from that model! Assuming there are no other problems with the model, all of this suggests that the estimation of λ must be done in the final model considered which should incorporate all the other parameter restrictions that are considered. On a somewhat intuitive level, problems arise because the randomness in such a model would not only come from the model's error terms, but also from the explanatory variable, X^λ ."

What are the specific problems to which Dr. Kelejian refers here? Will the inclusion of X^λ directly in the model estimated by witness Thress bias the estimated values of the other coefficients in witness Thress's model (e.g., the estimated own-price elasticity)? Please provide citations to econometrics literature in support of the answer.

USPS/GCA-11. At page 9 in the document originally filed as Appendix C to GCA-T-1, Prof. Kelejian indicates an understanding that "Thress indicates that he tested for autocorrelation via the model which is his equation III.12."

- a. In his testimony, on page 321, at lines 1 – 4, witness Thress describes the procedure whereby he tests for the presence of autocorrelation as follows:

The exact nature of the autoregressive process is identified by testing the significance of the partial autocorrelation of the residuals at one, two, and four lags. In general, a 95 percent confidence level is used to test for the presence of autocorrelation.

Is the methodology described by witness Thress in the above quote, testing the significance of the partial autocorrelation of the residuals, an appropriate method of testing for the presence of autocorrelation? If not, why not?

- b. At page 9 in the document originally filed as Appendix C to GCA-T-1, Prof. Kelejian states that “since the parameter λ in Thress’s version of the Box-Cox procedure was estimated **prior** to the full estimation of his model, and given the errors in the way he imposed the stochastic symmetry conditions, it is difficult to deduce just how to make proper inferences in terms of a model such as III.12.”

If the Box-Cox coefficient, λ , and the stochastic symmetry condition were introduced as you have suggested they should have been by witness Thress, would there be any objection to the procedure which he used to test for and correct autocorrelation? Is so, please explain.

USPS/GCA-12. Please provide copies of a Statement of Work, or any other documents or correspondence containing instructions or directions defining the nature and scope of the task(s) that Prof. Kelejian was asked to perform in the preparation of the document which became the declaration originally attached to GCA-T-1 as Appendix C.

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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