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

POSTAL RATE AND FEE CHANGES, 2006	Docket No. R2006–1

RESPONSE OF UNITED STATES POSTAL SERVICE WITNESS THRESS
TO INTERROGATORIES OF GCA (GCA/USPS-T7-10 - 16)
(July 13, 2006)

The United States Postal Service hereby provides the response of witness Thress to the following interrogatories of GCA, filed on June 29, 2006: GCA/USPS-T7-10 – 16.

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

Respectfully submitted,

UNITED STATES POSTAL SERVICE

By its attorneys:

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GCA/USPS-T7-10.

For interrogatories 10-14, please refer to the following attachment, Table One, which is compiled from your econometric estimation results for the First-Class Single-Piece equation, and from your experimentation with the Internet variable(s), as reported in R2006-1, USPS, LR-L-65, pages 65-3 to 65-6 and 65-198 to 65-290. Column 1 shows the page number for each experiment; Column 2 shows the Internet variable(s) you included in the equation; Columns 3 and 4 show the estimated SP own price elasticity and the corresponding t-statistic; Columns 5 and 6 show the R-squared and adjusted R-squared for each run. Table-2 is similar to Table-1 but ranked by the elasticity from the largest negative value to the largest positive value.

a. Please confirm that the information in these tables is correct. If you cannot confirm, please provide the correct information.

b. Please confirm that own price elasticity for the First-Class Single-Piece mail ranges from +0.101 to -0.319. If you cannot confirm, please provide the correct numbers.

c. Please confirm on grounds of textbook economic theory that model number 20 with the positive elasticity should be ignored. If you cannot confirm, please explain why.

d. Please confirm that different Internet variable(s) or variations of those variables results in a different own price elasticity. If you cannot confirm, please explain why.

e. Please confirm that based on levels of the R^2, or the adjusted R^2, practically speaking there is no material difference in statistical significance among these models. If you cannot confirm, please explain why and provide the appropriate tests.

f. Please confirm that the differences among the R^2 in these models are so minimal that for forecasting purposes any one of these models could be used. If you cannot confirm, please explain why and provide the appropriate tests.

Table One
Econometric Choice Trail
First-Class Single-Piece Mail
Ranked by Elasticity

Model Number	Page	Internet Variables	Elasticity	T-Statistic	R^2	Adjusted R^2
6	65-215	BROADBAND_LCOEF	-0.319	-2.247	0.987	0.981
5	65-210	CS_ISP_LCOEF BROADBAND_LCOEF	-0.292	-2.274	0.987	0.983
7	65-220	ISP_CUM_LCOEF BB_CUM_LCOEF	-0.287	-3.194	0.989	0.986
4	65-206	ISP_CUM_LCOEF ISP_CUM_LCOEF_T ISP_CUM_LCOEF_T2	-0.224	-2.794	0.992	0.989
16	65-258	CS_ISP_LCOEF BROADBAND_LCOEF	-0.209	-2.334	0.989	0.986
3	65-202	ISP_CUM_LCOEF ISP_CUM_LCOEF_T02	-0.196	-2.569	0.992	0.989
23	65-287	CS_ISP_LCOEF CS_ISP_LCOEF_T CS_ISP_LCOEF_T2	-0.184	-2.354	0.992	0.990
12	65-241	CS_ISP_LCOEF CS_ISP_LCOEF_T CS_ISP_LCOEF_T2	-0.183	-3.128	0.993	0.990
8	65-224	CS_ISP_LCOEF CS_ISP_LCOEF_T	-0.182	-2.338	0.992	0.990
11	65-236	CS_ISP_LCOEF CS_ISP_LCOEF_T CS_ISP_LCOEF_D2	-0.178	-3.083	0.993	0.990
13	65-246	ISP_CUM_LCOEF ISP_CUM_LCOEF_T	-0.177	-2.127	0.991	0.988
14	65-250	ISP_CUM_LCOEF ISP_CUM_LCOEF_T	-0.177	-2.331	0.992	0.989
10	65-232	CS_ISP_LCOEF CS_ISP_LCOEF_T	-0.154	-2.014	0.992	0.989
1	65-3	ISP_CUM_LCOEF	-0.154	-1.896	0.991	0.988
15	65-254	ISP_CUM_LCOEF ISP_CUM_LCOEF_T ISP_CUM_LCOEF_T2	-0.143	-1.789	0.992	0.990
9	65-228	CS_ISP_LCOEF CS_ISP_LCOEF_D	-0.130	-1.674	0.991	0.988
21	65-279	CS_ISP_LCOEF CS_ISP_LCOEF_T02	-0.129	-1.694	0.991	0.989
19	65-270	CS_ISP_LCOEF CS_ISP_LCOEF_T	-0.124	-1.405	0.990	0.987
2	65-198	ISP_CUM_LCOEF ISP_CUM_LCOEF_T	-0.123	-1.499	0.992	0.990
22	65-283	CS_ISP_LCOEF CS_ISP_LCOEF_T CS_ISP_LCOEF_D2	-0.101	-1.142	0.990	0.987
18	65-266	ISP_CUM_LCOEF BB_CUM_LCOEF	-0.100	-1.176	0.991	0.988
17	65-262	ISP_CUM_LCOEF BROADBAND_LCOEF	-0.096	-1.149	0.991	0.988
20	65-274	CS_ISP_LCOEF CS_ISP_LCOEF_D	0.019	0.163	0.987	0.983

Note: #1 is similar to R2006-1 and #23 is the final estimation for R2006-1.

Source: R2006-1, USPS witness Thress, LR-L-65, Pages 65-3 to 65-6 and 65-198 to 65-290.

RESPONSE:

a. The equation identified by you as Model Number 6 includes the Internet variables ISP_CUM_LCOEF and BROADBAND_LCOEF. Beyond that, I can confirm everything in Table One.

b. Not confirmed. The estimates of the own-price elasticity which are shown in Table One range from -0.319 to +0.019. See my response to part d. below.

c. Confirmed that I would reject Model Number 20 out of hand on the grounds that the positive own-price elasticity does not conform to standard economic theory.

d. Not confirmed. The estimated own-price elasticities differ across the 23 models shown in Table One. The true own-price elasticity of First-Class single-piece letters is not a function of the model chosen to estimate that elasticity, but instead is a function of the attitudes and preferences of consumers of First-Class single-piece letters. I believe that the best estimate of this own-price elasticity is -0.184.

e. Not confirmed. Although the range of R^2 and adjusted-R^2 values in Table One may appear to be relatively narrow, between 0.983 and 0.993, in fact, this apparent narrowness is a result of two factors which make your statement that "there is no material difference in statistical significance among these models" incorrect.

First, the nature of R^2, which expresses the percentage of variance in the dependent variable which is explained by a particular model, may give the illusion that most of the variance for a particular dependent variable, when, if fact, a large amount of the variance remains unexplained or inadequately explained. This is particularly true when much of the variance in a variable takes the form of a persistent trend. In such a case, any variable which exhibits a similar trend (as is the case here) will appear to explain the vast majority of the variance of the dependent variable. In many cases, however, such high R^2 values are largely illusory and indicative of nothing more than the existence of an underlying trend in the dependent variable of interest.

For example, the demand equation for Mailgrams used in this case has a reported R^2 value of 0.961, suggesting that nearly all of the variance in Mailgrams volume is explained by this equation. Yet, the standard error of the Mailgrams model in this case is 0.223, meaning that the average in-sample error term for this equation is greater than 20% in absolute value.

Second, the goal of econometric estimation is not to maximize the explained variation but to minimize the unexplained variation within a model. While these two goals are, in some sense, literally identical there is an important distinction. Improving the adjusted-R^2 value in an equation from 0.986 (Model Number 7) to 0.990 (Model Number 23, which is used by me to make volume forecasts in this case) increases the explained variation in the model by 0.4 percent. Yet, reducing the percentage of variance which is unexplained from 0.014 (1 – 0.986) to 0.010 (1 – 0.990) reduces the unexplained variation in the model by nearly 30 percent.

Because of these limitations of R^2 and adjusted-R^2 measures, my preferred diagnostic measure for evaluating demand equations is mean-squared error. Mean-squared error is equal to the sum of the squared residuals divided by the number of degrees of freedom. This is equivalent to the square of the standard error of the model and can therefore be thought of as measuring the variance of a model.

The mean-squared errors (which are reported within Library Reference LR-L-65) for the models presented in Table One range in value from 0.000232 to 0.000453. The latter of these is 95 percent greater than the former, a range which is far more indicative of the true range of these models.

f. Not confirmed. Please see my response to part e. above.

GCA/USPS-T7-11.

From the attached Table One, please refer to model #7 and your chosen model for the single piece demand equation, model #23. The own price elasticity for model #7 is -0.287 which is significantly higher than -0.184 for your chosen model. These two models seem to have, practically and statistically, the same R^2 values (0.986 for model #7 and 0.990 for model #23). With respect to the t−statistic, however, model #7 greatly outperforms your chosen model #23 (−3.194 vs. -2.354).

a. Please confirm that with regard to the t-statistic for the elasticity coefficient, model #7 outperforms model #23, the final model you chose for R2006-1. If you cannot confirm, please explain why and provide the appropriate tests.

b. Please explain fully why you did decide to choose model #23 over model #7, since it appears that the latter model has an essentially equivalent R^2 and a much higher t-statistic.

RESPONSE:

Per your request, this response refers to the Table One attached to your question GCA/USPS-T7-10.

The own-price elasticity for model #7 (-0.287 with a standard error of 0.090) is not significantly higher than -0.184, differing by a mere 1.1 standard errors. In addition, the percentage of variation in First-Class single-piece letters volume which is unexplained in model #7 (0.014) is 40 percent greater than the percentage of variation in First-Class single-piece letters volume which is unexplained in model #23 (0.010), so that these two models do not have "the same R^2 values" either practically or statistically.

a. Not confirmed. The greater t-statistic for the own-price elasticity in model #7 is simply an artifact of the fact that the own-price elasticity in model #7 is further from zero. In fact, the own-price elasticity for model #23 has a lower standard deviation (0.078) than the own-price elasticity for model #7 (0.090).

b. As I explain in my response to GCA/USPS-T7-10, mean-squared error is a better measure of goodness of fit than R^2. Model #7 has a mean-squared error of 0.000345 which is more than 40 percent greater than the mean-squared error of model #23 (0.000246).

GCA/USPS-T7-12.

a. Please confirm that none of the Internet variables that you have experimented with can capture the pure textbook substitution effect due to the declining relative price of the substitute product. If you cannot confirm, please explain why and provide the appropriate tests.

b. Please confirm that none of the Internet variables you have experimented with reflects the price of the substitute product. If you cannot confirm, please explain why and provide the appropriate tests.

RESPONSE:

Per your request, this response refers to the Table One attached to your question GCA/USPS-T7-10.

a. Not confirmed. To the extent that First-Class single-piece letters volume has declined because of "the declining price of substitute product[s]", this effect can be captured econometrically by any variable which includes a similar trend. This would be particularly true of variables, such as measures of aggregate Internet usage by households, which are driven by the same price. That is, to the extent that Internet penetration among households is driven by "the declining price of" Internet usage, then such a variable can, in fact, serve well as an econometric proxy for this "declining price" within the First-Class single-piece letters demand equation.

b. Not confirmed. None of the Internet variables with which I have experimented explicitly measure "the price of the substitute product." Nevertheless, as explained in my answer to part a. above, all of these variables will "reflect" such a price.

GCA/USPS-T7-13.

Please refer to model #1 which is similar to R2005-1 and model #7 which is similar to your R2005-1 model but includes the cumulative Broadband variable. Please confirm that the inclusion of the broadband variable almost doubles the FCLM single piece own price elasticity of demand.

RESPONSE:

Per your request, this response refers to the Table One attached to your question GCA/USPS-T7-10.

Confirmed that the own-price elasticity estimate in model #7 of −0.287 is 87 percent greater than the own-price elasticity estimate in model #1. Please see my response to GCA/USPS-T7-10(d).

GCA/USPS-T7-14.

Please refer to model #1 and model #6. Model #1 is similar to your R2005-1 model and model #6 is similar to model #1 but you have replaced the ISP_CUM with BROADBAND_CUM. However, model #6 has an elasticity over twice that for model #1 (-0.319 vs -0.154).

a. Since broadband technology seems to have the most dramatic effect on mail volume, and since it is the most rapidly growing type of Internet service replacing dial-up, please confirm that you did the same experiment with the broadband variable in R2005-1, and if so why you did not choose a model like #6 in that case rather than a model like #1.

b. Given the paramount importance of Broadband, why did you not choose a model like #6 for this case instead of the model you did choose?

c. Given the seriousness of the persistent fall in single piece FCLM in recent years due to competition from the Internet, wouldn't it be better to err on the side of having too high an own price elasticity than too low a figure?

RESPONSE:

Per your request, this response refers to the Table One attached to your question GCA/USPS-T7-10.

a. I see no basis for your assertion that "broadband technology seems to have the most dramatic effect on mail volume." As shown in my Library Reference LR-L-65, adding the number of Broadband subscribers to the R2005-1 demand equation specification (Model Number 6) increases the mean-squared error of the First-Class single-piece letters demand equation by more than 50 percent from 0.000294 (Model Number 1, page 65-5 of LR-L-65) to 0.000453 (Model Number 6, page 65-217). This suggests to me that broadband technology, at least as measured by the number of Broadband subscribers, has not had "the most dramatic effect on mail volume" as compared to alternative Internet measures.

b. I do not understand your use of the term "paramount importance" here. Regardless, I chose Model Number 23 from Table One over Model Number 6 because Model Number 23 produced a mean-squared error (0.000246) more than 45 percent less than the mean-squared error associated with Model Number 6 (0.000453).

c. I see no relevance to the magnitude of the own-price elasticity vis-à-vis the "seriousness of the persistent fall in single piece FCLM in recent years due to competition from the Internet."

Given the seriousness of the persistent fall in First-Class single-piece letters volume in recent years due to competition from the Internet, I thought it would be best to err on the side of including the Internet measure which provided the best econometric fit for First-Class single-piece letters subject to the restriction that all of the explanatory variables included in the demand equation had reasonable coefficient estimates.

For the models presented in Table One, the lowest mean-squared error (0.000232) was obtained using Model #12 (page 65-241, ff.). This model included a time trend starting in 2002Q4 which had a coefficient of 0.129. "Given the seriousness of the persistent fall in single piece FCLM in recent years due to competition from the Internet" this seemed to be an inappropriate result and was therefore rejected.

Removing Model #12 from consideration, the lowest mean-squared error among the models shown in Table One was for Model #11 (0.000234). This model interacted ISP consumption with a dummy variable starting in 2002Q4. This term had a coefficient of 0.021, suggesting that the impact of the Internet on First-Class single-piece letters volume became less negative at this time. "Given the seriousness of the persistent fall in single piece FCLM in recent years due to competition from the Internet" this too seemed to be an inappropriate result and was also rejected.

Finally, removing Models #11 and #12 from consideration, the lowest mean-squared error was obtained from Model Number 23, which was therefore chosen by me to be used in this case.

GCA/USPS-T7-15.

Please refer to the following table compiled from R2005-1, USPS LR-K-64, pages 64-1 to 64-10 and LR-K-65, pages, 65-22 to 26, 65-57 to 61, and 65-62 to 65-65.

Model #	Page	Internet Variable	Elasticity	T-Statistic	R^2	Adjusted R^2
1	64-1	ISP_CUM	-0.1747	-2.1755	0.989	0.986
2	65-22	BROADBAND_CUM	-0.4162	-2.6.315	0.983	0.976
3	65-57	COMPPAY	-0.3797	-2.8713	0.984	0.977
4	65-62	NACHA	-0.3269	-3.7625	0.987	0.983

As you have defined these variables on page 65-4, ISP_CUM is Internet experience, BROADBAND is the number of broadband subscribers, COMPPAY is the percentage of households which paid at least one bill via computer, and NACHA is automated clearing house transactions. Model #1 is the final model you chose in R2005-1.

a. Please confirm that the information given in the above table is correct. If you cannot confirm, please provide the correct information.

b. Please confirm that models 2-4 all have elasticity values several times larger than the model you decided to choose in R2005-1. If you cannot confirm, please explain why.

c. Please confirm that models 2-4 also have larger t-statistic values than model #1, your chosen model for R2005-1. If you cannot confirm, please explain why.

d. Please confirm that, as far as the t-statistic is concerned, any one of the models 2-4 is superior to model #1, your chosen model. If you cannot confirm, please explain why.

e. Please confirm, that with respect to R^2, there is essentially no difference among the four models given in this table. If you cannot confirm, please explain why.

f. Please confirm that, as far as the adjusted R^2 is concerned, there does not seem to be much of the difference among these models; more specifically, between your chosen model #1 and model #4. If you cannot confirm, please explain why.

g. Please confirm that considering the t-statistic and R^2 or adjusted R^2, model #4 is superior to your chosen model #1. If you cannot confirm, please explain why.

h. Please confirm that had you chosen model #4, with the NACHA as the Internet variable instead of model #1, with your ISP Internet experience variable, the elasticity would have been –0.3269 rather than –0.1747. If you cannot confirm, please explain why.

i. Please confirm that had you chosen model #2, with the BROADBAND as the Internet variable instead of model #1, with your ISP Internet experience variable, the elasticity would have been –0.41629 rather than –0.1747. If you cannot confirm, please explain why.

RESPONSE:

a. Confirmed

b. Not confirmed. Dictionary.com defines the word several as "[b]eing of a number more than two or three but not many." None of the elasticity estimates shown above exceed the own-price elasticity which I used in R2005-1 by a factor of more than 2.4 and, in fact, the own-price elasticity estimate in model 4 is not even twice as large as my R2005-1 own-price elasticity.

c. Confirmed

d. Not confirmed. The fact that models 2, 3, and 4 exhibit higher t-statistics on the own-price elasticity is simply a function of the fact that the own-price elasticities in models 2, 3, and 4 are further from zero than the model 1 own-price elasticity. In fact, the variances associated with the own-price elasticity are larger for models 2, 3, and 4 than in the case of model 1.

e. Not confirmed. The percentage of total variance that is unexplained (i.e., one minus R^2) is 15 to 35 percent greater in models 2, 3, and 4, as compared to model 1.

f. Not confirmed. Please see my response to e.

g. Not confirmed. The demand equation for First-Class single-piece letters which was adopted and used by the Postal Rate Commission in R2005-1 (model 1 here) is clearly superior to models 2, 3, and 4 above for the reasons given in my answers to parts d and e above.

h. Confirmed that the choice of an inferior model in R2005-1 might have led to a less accurate own-price elasticity estimate.

i. Confirmed that the choice of an inferior model in R2005-1 might have led to a less accurate own-price elasticity estimate.

GCA/USPS-T7-16.

Please refer to R2006-1, USPS LR-L-65, pages 65-3 to 65-6 and 65-198 to 65-290, specifically to the coefficient for the worksharing discount variable, D1_3WS.

a. Please confirm that the estimated values of D1_3WS coefficient in all 23 model runs you have conducted for FCLM single piece mail are different. If confirmed, please fully explain why the estimated coefficient of D1_3WS variable differs across these 23 model runs. If you cannot confirm, please explain why.

b. Please confirm that the coefficient of the D1_3WS variable is not directly estimated in any of the 23 FCLM single piece model runs, that instead it is a predetermined fixed value which is obtained from your worksharing equation and essentially converted to a negative sign and inserted into the FCL single piece equation. If you cannot confirm, please explain why.

c. If your answer to (b) is affirmative, please confirm that given the apparent fixed nature of the coefficient of the D1_3WS variable when estimating the FCLM single piece equation, this coefficient will not change. If you cannot confirm, please explain why. If this is a recursive process, please explain how it is conducted.

d. For comparing these models shouldn't the value of this coefficient for the D1_3WS variable, be kept constant across these runs? Please fully explain.

e. If you had kept the value of this coefficient for the D1_3WS variable, the same across these models, wouldn't it have a different effect on the estimated own price elasticity of FCLM single piece mail? Please fully explain.

f. To be econometrically appropriate, should you not first finalize the worksharing model with an Internet variable assumption, and then experiment with the FCLM single piece equation? Please fully explain.

RESPONSE:

a. Confirmed. The estimated coefficient of D1_3WS differs across the 23 model runs outlined in Table One because the set of explanatory variables used to estimate all of the coefficients in the First-Class single-piece letters equation differ across these 23 models.

b. Not confirmed. The coefficient of D1_3WS is estimated within the First-Class single-piece letters equation subject to a stochastic restriction which is estimated from the First-Class workshared letters equation. This restriction is not imposed with certainty; instead, the coefficient is estimated within the First-Class single-piece letters equation based, in part, on information drawn from the First-Class workshared letters equation. Please see my testimony at pages 53 – 55 and page 311, line 10 through page 312, line 8.

c. Not applicable.

d. The stochastic restriction on D1_3WS was kept constant across each of the 23 models for First-Class single-piece letters presented in Table One.

e. As stated in my response to part d. above, the restriction on D1_3WS was kept constant across each of the 23 models for First-Class single-piece letters which are being discussed here.

f. Yes. This was, in fact, exactly what I did in this case.

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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