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 UPS INTERROGATORIES (UPS/USPS-T12-12-17)

The United States Postal Service hereby provides the response of witness Baron to the following interrogatories of the United Parcel Service: UPS/USPS-T12-12-17, filed on May 18, 2000.

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

Respectfully submitted,

UNITED STATES POSTAL SERVICE

By its attorneys:

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RESPONSE OF UNTED STATES POSTAL SERVICE WITNESS BARON TO INTERROGATORIES OF UNITED PARCEL SERVICE

UPS/USPS-T12-12. Refer to Library Reference USPS-LR-I-310, filed on May 12, 2000, in response to interrogatory ADVO/USPS-T12-11. Provide the data and programs that were used to perform the analyses discussed in that library reference in electronic form, along with the log and output files for all of the programs.

RESPONSE:

See my response to interrogatory UPS/USPS-T12-16, and, in particular, to footnote 1 in that response.

UPS/USPS-T12-13. In your response to ADVO/USPS-T12-11, you indicate that "a draft of a report on this analysis will be completed in approximately two weeks and will be provided as Library Reference USPS-LR-I-310." Is Library Reference USPS-LR-I-310 a draft report? If so, what remains to be completed before the report is no longer considered a draft? When is the final version of the analysis expected to be completed?

RESPONSE:

USPS-LR-I-310 is the draft report referred to in my response to ADVO/USPS-T12-11. It is impossible to say what additional analysis might be conducted before a final version of this report is completed. The reason I referred to the report as a draft is that I did not have time to consider all of the implications of the new approach. In addition, I anticipated continuing to review the approach and believed that revisions might be necessary.

In any event, the exact date of the completion of the final version of the LR-I-310 report, and the exact contents of that final version are at this point less important than the immediate question of which load time regression analysis should be used to derive final BY 98 volume-variable load-time costs for Docket R2000-1. The latest revised regression that is estimated through use of ES volume and deliveries data, and that produces the results summarized in Tables 3B and 4B presented in my interrogatory UPS/USPS-T12-16 response, produces volume-variabilities that are more reliable than those produced by the SDR, MDR, and BAM regressions currently used by the Commission and the Postal Service, or by any other regressions submitted into evidence to date. Therefore, I believe that these new ES-based variabilities should replace the current Base Year SDR, MDR, and BAM variabilities.

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I have prepared a new library reference, USPS-LR-I-398, to implement this proposed change. This library reference derives the new segment 7 volume-variable costs by mail subclass that result from the substitution of the ES-based variabilities for the variabilities used in USPS-LR-I-80.

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UPS/USPS-T12-14. Refer to witness Raymond's response to interrogatory UPS/USPS-T13-10, in which he defines a parcel as "a package that weighs two pounds or more, and/or is larger than a shoe box."

(a) Confirm that the definition of "parcel" in the new regression data set based on the Engineered Standards data (described in Library Reference USPS-LR-I-310, at 6-7) is identical to that provided by witness Raymond. If not confirmed, provide the exact definition of "parcel" in the new regression data.

(b) Is the definition of "parcel" used in the new regression data different from that used in the City Carrier Cost System data used in the previous load time variability analysis?

(c) Is the number of parcels as defined by the City Carrier Cost System substantially less than the number of parcels as defined in the new regression data? If so, provide an explanation as to why the numbers differ. Provide FY 1998 parcel volume using both the City Carrier Cost System and the new regression data.

(d) Confirm that the City Carrier Cost system data include parcel volume for Standard (A) mail.

(i) Do the new regression data include parcel volume for pieces less than 2 pounds?

(ii) Does the "parcel" variable in the new regression analysis exclude Standard (A) mail?

(iii) If your answer to (ii) above is anything other than an unqualified "yes," explain why.

RESPONSE:

(a) Confirmed.

(b) The definitions are essentially the same. The City Carrier Cost System (CCS) defines a parcel as a mail piece that is "too large or cumbersome to case into either a letter case or a flat case." A package that weighs two pounds or more, and/or is larger than a shoebox is considered to be a parcel because the heavy weight (two pounds or more) and/or large size are the characteristics that make it

too large or cumbersome to be cased into a letter or flat case. I am also told that the Engineered Standards/Delivery-Redesign analysis team regarded the concept of a parcel as weighing two pounds or more, or shaped larger than a shoe box as strictly a guideline for classifying mail pieces. The analysis team certainly classified as parcels all pieces that were two pounds or more or larger than a shoebox. However, the team also applied different classification rules to so-called small parcels and rolls (SPRs), which are less than two pounds and often smaller in size than a shoe box. Although lighter and usually smaller than other parcels, SPRs are processed separately from letters and flats, and they are maintained in separate parcel containers when sent to delivery units. They consist of packages such as boxes of checks, jewelry boxes, and floppy and CD ROM disks in shrink-wrapped cardboard. The analysis team classified SPRs that could not be cased due to unfavorable shape characteristics as parcels. However, it classified SPRs that carriers were able to case as flat pieces.

Thus, in effect, through its methodology of classifying mail pieces that are handled outside the regular letter and flat mail streams as either flats or parcels, depending on whether they were cased, the analysis team applied the same definition of parcels that the CCS applies. The team identified as parcels all pieces that were too heavy or in any way too cumbersome to be cased. Conversely, it identified SPR pieces that were small enough to be cased as flats.

(c) The new regression data set consists of 750 route-day records of data collected during FY 1997 and FY 1998. 576 of these route days, about 77 percent, occurred in FY 1997, and 174 route days, or about 23 percent, occurred

in FY 1998. Based on the definition of parcels as regular parcels (pieces weighing two or more pounds or shaped larger than a shoebox) plus uncased SPRs, I used the ES data to calculate an average parcels per possible delivery of 0.055 pieces. The average parcels per possible delivery derived from the City Carrier Cost System (CCS) data equaled 0.056 pieces in FY 1997 and 0.057 pieces in FY 1998.

(d) Confirmed.

(i) Yes

(ii) and (iii) The ES data set does not identify the mail subclass of the pieces reported in the regression data set. Therefore, it is impossible to determine whether the parcels variable in that data set excludes any particular subclass. However, certainly no effort was made during the study to deliberately exclude any subclass.

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UPS/USPS-T12-15. Does the new regression data set include volumes by class/subclass of mail within shape?

Response:

The new regression data set reports volumes only by shape, not by

class/subclass within shape.

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UPS/USPS-T12-16. Refer to Library Reference USPS-LR-I-310, Tables 2 and 4.

(a) Provide an explanation as to why marginal load time with respect to parcels is less in Table 2 than in Table 4.

(b) Provide an explanation as to why the elasticity of load time with respect to parcels is greater in Table 2 than in Table 4.

(c) Provide an explanation as to why the elasticity of load time with respect to parcels decreased from Table 2 to Table 4 at the same time that the marginal load time with respect to parcels increased. Include in your explanation the role that any different definition of parcels between the analysis in Table 2 and that in Table 4 may contribute to this difference.

RESPONSE:

(a) and (b). I believe the reason the marginal load time with respect to parcels is so much higher in Table 4 than in Table 2 is that I applied an incorrect definition of parcels to derive values for the parcels variable in the initial version of the new regression data, which is the one used to derive the Table 4 results. The reason for this error is as follows. The data set obtained from the ES database reports separate variables for flats, SPRs, and parcels. To convert this dataset into the regression data set that produced the Table 4 results, I defined total flats as the sum of the flats and SPR variables, under the mistaken assumption that volumes recorded for the SPR variable are cased SPRs. In fact, cased SPRs are already included along with all other flat pieces in the total volumes recorded for the flats variable. The volumes recorded for the SPR variable are therefore uncased flats, and should be regarded as parcels.

To correct this error, I have now revised the regression data set. SPRs are no longer added to flats, but are added to the pieces recorded for the parcels

variable. This ensures that total parcels now equal the sum of uncased SPRs and all other parcels.

I have also used this revised regression data set to reestimate the regressions. The new results are presented below in Tables 3A and 4B, which are comparable to Tables 3 and 4, respectively, from the LR-I-310 report.

TABLE 3A. REVISED QUADRATIC LOAD-TIME EQUATION BASED ON THE 1996-1998 ENGINEERED STANDARDS DATA BASE (t-Statistics Are In Parentheses)

Independent Variable	Coefficient Estimated
Intercept	-4,734.34 (2.29)
Load Time/Letters Dummy	2,846.04 (8.75)
Load Time/Flats Dummy	1,959.29 (6.10)
Load Time/Accountables Dummy	2,174.17 (8.68)
Load Time/Parcels Dummy	855.52 (2.80)
Letters Delivered	1.24 (1.92)
Letters Delivered Squared	-0.0004 (3.33)
Flats Delivered	1.03 (0.70)
Flats Delivered Squared	-0.002 (2.41)
Accountables Delivered	169.64 (1.62)
Accountables Delivered Squared	-6.99 (3.38)
Parcels Delivered	69.99 (3.46)
Parcels Delivered Squared	-0.28 (2.34)
Letters*Flats	0.00003 (0.07)
Letters*Accountables	0.040 (1.41)
Letters*Parcels	0.003 (0.55)
Flats*Accountables	0.058 (0.87)
Flats*Parcels	-0.014 (0.89)
Accountables*Parcels	-0.790 (0.81)
Deliveries	-0.011 (0.004)
Deliveries Squared	-0.0006 (0.23)
Letters*Deliveries	0.002 (2.67)
Flats*Deliveries	0.005 (2.38)
Accountables*Deliveries	-0.057 (0.52)
Parcels*Deliveries	-0.047 (1.65)
% of Deliveries That Are Residential Other	5,646.66 (3.04)
% of Deliveries That Are Residential Curb	8,277.82 (4.42)
% of Deliveries That Are Residential Central	7,136.93 (3.70)
% of Deliveries That Are Residential NDCBU	7,022.63 (3.61)
% of Deliveries That Are Business Other	4,334.02 (2.08)
% of Deliveries That Are Business Curb	2,560.43 (0.99)
% of Deliveries That Are Business Central	9,348.22 (3.12)
R-Square	56.27%
F Statistic	29.80
Number of Observations	750

TABLE 4A. REVISED TOTAL LOAD TIME PER ROUTE-DAY, MARGINAL LOAD TIMES, AND LOAD-TIME ELASTICITIES DERIVED FROM THE NEW LOAD-TIME REGRESSION DATASET	
Predicted Daily Load Time	9,168.29 Seconds
Marginal Load Times (in seconds)	
Letters	1.11
Flats	1.59
Accountables	172.33
Parcels	125.88
Deliveries	4.66
Estimated Elasticities	
Letters	22.95%
Flats	9.34%
Accountables	7.36%
Parcels	8.00%
Deliveries	25.09%

After reviewing the results in Tables 4A and 4B, I further concluded that the estimated coefficients for the entire set of variables defined as the interaction of the different volume variables (letters, flats, parcels, and accountables) are jointly insignificant. This determination is based on the F value of 0.817 that I calculated for this set of coefficients. At 6 numerator and 718 denominator degrees of freedom, this F value implies a probability value of 0.557, which clearly mandates acceptance of the null hypothesis that the volume-interaction coefficients are jointly zero.

In response to this discovery, I have further revised the regression analysis by re-estimating the load-time equation after first eliminating all volume-interaction variables. The results of this latest revised model are presented in Tables 3B and 4B, below.

TABLE 3B. FINAL REVISED QUADRATIC LOAD-TIME EQUATION BASED ON THE 1996-1998 ENGINEERED STANDARDS DATA BASE (t-Statistics Are In Parentheses)	
Independent Variable	Coefficient Estimated
Intercept	-4,322.22 (2.14)
Load Time/Letters Dummy	2,884.95 (8.94)
Load Time/Flats Dummy	1,878.43 (5.90)
Load Time/Accountables Dummy	2,176.28 (8.72)
Load Time/Parcels Dummy	860.26 (2.84)
Letters Delivered	1.41 (2.44)
Letters Delivered Squared	-0.0004 (3.82)
Flats Delivered	0.733 (0.52)
Flats Delivered Squared	-0.001 (2.43)
Accountables Delivered	282.06 (3.75)
Accountables Delivered Squared	-6.96 (3.48)
Parcels Delivered	57.20 (3.43)
Parcels Delivered Squared	-0.25 (2.28)
Deliveries	-0.54 (0.19)
Deliveries Squared	-0.0003 (0.11)
Letters*Deliveries	0.002 (2.88)
Flats*Deliveries	0.005 (2.35)
Accountables*Deliveries	-0.106 (1.08)
Parcels*Deliveries	-0.036 (1.34)
% of Deliveries That Are Residential Other	5,284.46 (2.90)
% of Deliveries That Are Residential Curb	7,905.29 (4.32)
% of Deliveries That Are Residential Central	6,785.69 (3.59)
% of Deliveries That Are Residential NDCBU	6,673.70 (3.50)
% of Deliveries That Are Business Other	3,756.13 (1.86)
% of Deliveries That Are Business Curb	2,045.74 (0.80)
% of Deliveries That Are Business Central	9,192.44 (3.08)
R-Square	55.97%
F Statistic	36.81
Number of Observations	750

TABLE 4B. FINAL REVISED TOTAL LOAD TIME PER ROUTE-DAY, MARGINAL LOAD TIMES, AND LOAD-TIME ELASTICITIES DERIVED FROM THE NEW LOAD-TIME REGRESSION DATASET

Predicted Daily Load Time	9,153.16 Seconds
Marginal Load Times (in seconds)	
Letters	1.13
Flats	1.49
Accountables	174.94
Parcels	26.13
Deliveries	4.52
Estimated Elasticities	
Letters	23.41%
Flats	8.76%
Accountables	7.49%
Parcels	7.80%
Deliveries	24.39%

The Table 3B and Table 4B regression results are, in my view, the most statistically reliable and operationally representative results that have been computed to date. They preserve all of the positive features of the original Table 3 and Table 4 results presented in LR-I-310. Furthermore, they include a high R-square, and an overall F value of 36.81, which is over 6 points higher than the comparable F value produced by the original Table 3 regression.[1]

The most critical improvement obtained by the new model, however, is the estimation of coefficients that imply a marginal load time for parcels at mean daily volumes equal to 26.13 seconds. This estimate is clearly more reasonable than the previous estimates of 126 seconds or higher produced by the Table 3 and

[1] The SAS program and input data for that program that I used to estimate the revised regressions summarized in Tables 3A, 3B, 4A, and 4B are presented in a new library reference, USPS-LR-I-386. This library reference includes a floppy disk containing the input data and the SAS log and output files.

Table 3A regressions. One indication of this greater plausibility is that at 26.13 seconds, the marginal load time for parcels now falls below the marginal load time for accountables, which is estimated at 174.94 seconds. Clearly, an additional accountable service should be expected to require more time, due to the customer contact, than should the loading of an additional parcel piece that can be delivered without any customer contact.

Not surprisingly, these improvements also complete the answers to this interrogatory. First, the final revised marginal parcels load time of 26.13 seconds is now much closer to the corresponding LR-I-310 Table 2 marginal load times, which were derived from the SDR, MDR, and BAM regressions, than are the marginal load times presented in LR-I-310 Table 4. I do not regard the remaining differences among the marginal load times as critical. The reason is that the 26.13 seconds produced by the new regression also produces an elasticity of load time with respect to parcels of 7.80%, which is virtually identical to the corresponding SDR, MDR, and BAM elasticities shown in Table 2.[2] In any event, the 26.13 second estimate is a more credible result than the lower estimates derived from the SDR, MDR, and BAM regressions, since it is much closer to the estimate implied by the accepted rural carrier cost analysis. According to this latter analysis, volume-variable costs for the delivery of parcels to rural boxes equaled $74,684,000 in FY 1998. (USPS-LR-I-80, Cs10.xls, at Line No. 4, Column L in Sheets 10.1.1 and 10.2.1).

[2] The cost-weighted average of the SDR, MDR, and BAM parcels elasticities shown in Table 2 of LR-I-310 is 7.95%

The corresponding estimated volume of parcels delivered, as derived from FY 1998 Rural Carrier Cost System data, equaled 529,427,000 pieces. (USPS-LR-I-80, Cs10.xls, Sheet 10.0.4, Line No. 53, Column D). At an average FY 1998 rural carrier wage rate of $21.07, these costs and volumes translate into a marginal delivery time per parcel delivered of about 24.10 seconds. This result is much closer to the 26.13 seconds derived from the Table 3B load-time regression than it is to the marginal load times per parcel derived from the old load-time regressions.

The operationally sensible marginal load time for parcels achieved by the revised ES-based load time regression, as summarized in tables 3B and 4B, adds to the list of positive features that this new model offers relative to the old SDR, MDR, and BAM regressions. An objective evaluation of this enhanced list of advantages compels, in my view, a judgement in favor of substituting the revised ES-based model for these old regressions. The strengths of the revised ES-based model outweigh the few disadvantages. The Table 3B regression is derived from up-to-date measure-ments of mail volumes by shape. These measurements incorporate into the load time analysis all the major changes in mail composition, including the advent of DPS mail, that have occurred since 1985, when the data used to produce the old regressions were collected. Thus, the Table 3B regression quantifies operational reality far more effectively than do the old regressions.

The Table 3B regression also directly measures the elusive coverage-effect of volume growth on load time. This new measure is simple, straight -

forward and highly robust across the various model specifications that have been tested based on the ES data. Literally all of the new regressions that have been considered show that at mean volumes, the marginal load time of accessing a new delivery point (which, in the case of the single residential delivery is also a new stop) falls between 4 and 5 seconds, and that the corresponding elasticity of load time with respect to deliveries falls between 24 and 26 percent. These results convincingly resolve the coverage-related load-time controversy. Volume-variable elemental load time is now the aggregate of the elasticities of load time with respect to letters, flats, accountables, and parcels times accrued load time. Volume-variable coverage-related load time is the product of accrued load time and the elasticity of load time with respect to deliveries times the elasticity of deliveries with respect to volumes.

These advantages of the newly revised ES-based regression model clearly outweigh its two apparent disadvantages – the failure to measure the effects of collections volume on load time, and the failure to account explicitly for the effects of changes in stop-type composition on load time.

The first problem can be neutralized through use of the weighted average of the collections variabilities obtained from the SDR, MDR, and BAM regressions. There is no basis for concluding that these elasticities cannot be applied independently of the other SDR, MDR, and BAM results. The second disadvantage – namely, the failure to account for load time differences across stop types – turns out to not be a problem to begin with. The new model already accounts for the same factors that cause stop type to affect load time. The stop

type effect accounts for differences in load time per delivery that result from differences between loading mail at single delivery residential stops and loading mail at business locations and all locations containing multiple centralized and NDCBU delivery points. In the new ES-based model, these differences are just as effectively accounted for, if not more so, by the delivery type variables on the right hand side of the regression. These variables measure the percentage of total possible delivery points on a route-day that fall within the centralized, NDCBU, curbside, and other delivery categories, and the coefficients on these variables directly account for the effects of changes in delivery type composition on load times.

The final evidence that conclusively shows why the strong points of the new regression model offset its limitations is the fact that the new Table 3B model predicts total accrued load time cost far more accurately than does the current Base Year model. As observed in the LR-I-310 report, the predicted load times derived from the old SDR, MDR, and BAM regressions based on load time at the average stop imply an aggregate FY 1998 accrued load time costs of only $1,462,151,000. This is 49% below the current Base Year accrued load time cost of $2,856,175,000 derived from the new street-time proportions. In contrast, the corresponding predicted load time derived from the new Table 3B regression implies an aggregate FY 1998 accrued load time cost of $3,294,774,000, which is only about 15% higher than the current Base Year cost.

I see no basis to continue to advocate use of the old regressions in the face of their inferior predictive capabilities compared to that of the new Table 3B

model. This superior predictive capability of the new model combined with its compelling additional advantages described in the preceding paragraphs and in LR-I-310 make it the preferred choice among the available alternatives.

Because I believe that the Table 3B regression and the Table 4B elasticities are the best available, I have prepared a version of Cs06&7.xls that substitutes these elasticities for the current Base Year elasticities used in the version of Cs06&7.xls included in USPS-LR-I-80. This new Cs06&7.xls is documented in Library Reference USPS-LR-I-398.

(c) The elasticity of load time with respect to parcels derived from the revised regression summarized in tables 3B and 4B in my response to 16 (a) and (b) is now approximately the same as the elasticity presented in Table 2 of USPS-LR-I-310. However, the marginal load time with respect to parcels presented in Table 4B is still somewhat higher than that presented in Table 2. The reason marginal load times and load-time elasticities do not always move together is that elasticity is defined as marginal load time divided by the average load time, where the latter is total load time per route-day divided by corresponding total parcels delivered.

Consider two alternative regression analyses. If the second analysis derives a higher marginal load time than the first analysis, it will likely derive a higher average load time as well. Thus, both the numerator and the denominator of the elasticity formula will be higher in the second analysis. The increase in the denominator will offset the increase in the numerator, thereby negating the

increase in elasticity that would otherwise occur. Indeed, if the average and marginal load times of the second analysis exceed their respective values in the first analysis by the same proportion, the elasticities in the two analyses will be equal. It is even possible that the elasticity in the second analysis will be less than in the first analysis. This will occur if the proportional increase in average load time exceeds the proportional increase in marginal load time.

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UPS/USPS-T12-17. Define the term "marginal load time" as used in Tables 2 and 4 on pages 5 and 11 of Library Reference USPS-LR-I-310. Is the term "load time" defined the same in Library Reference USPS-LR-I-130 as in witness Raymond's testimony, USPS-T-I 3 at 35?

RESPONSE:

Marginal load time is the additional time that results from the delivery of one additional mail piece. It is sometimes referred to as the marginal load-time cost, since marginal load-time cost equals the marginal load time multiplied by the average city carrier wage rate expressed in costs per second. This definition of marginal load time is the same as the definition in USPS-T-13 at 35.

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: 6/2/00

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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