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

SIX-DAY TO FIVE DAY STREET DELIVERY AND RELATED SERVICE CHANGES, 2010	Docket No. N2010-1

RESPONSES OF THE UNITED STATES POSTAL SERVICE TO QUESTIONS 2-10 OF CHAIRMAN'S INFORMATION REQUEST NO. 3

The United States Postal Service hereby provides its responses to Questions 2-10 of Chairman's Information Request No. 3, dated April 30, 2010. Answers were sought no later than today. Each question is stated verbatim and is followed by the response. An answer to Question 1 will be filed when available.

The responses are sponsored by witnesses in this docket as follows:

Questions 2-3, 5-10 – Bradley (USPS-T-6)

Question 4 – Granholm (USPS-T-3)

Respectfully submitted,

UNITED STATES POSTAL SERVICE

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Response of Postal Service Witness Michael D. Bradley
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2. Witness Bradley states that it is not appropriate to use a volume-variable cost model to estimate costs avoided by moving from 6- to 5-day delivery. USPS-T-6 at 3. He explains that the move from 6-day to 5-day delivery is an operational change, not a volume change. Although it may be an operational change, it results in increased delivery volume on some days. Please explain why volume variability analysis is not appropriate for analyzing cost increases on days when volume is expected to increase due to the shift of Saturday volume.

Response:

I am unable to find a statement in my testimony that it is "not appropriate" to use a volume variable cost model to estimate the reduction in cost caused by moving from six-day delivery to five-day delivery. However, on page 3 of my testimony I do state my belief that such an approach has a "methodological weakness." This weakness has recently been identified and explained by the Postal Regulatory Commission:[1]

> What has not been explicitly recognized by either GMU or IBM is that models used to find the volume variability of individual products for pricing purposes solve a different problem than the one posed by changing the frequency of delivery throughout the network.

The Commission further explains that the volume-variable cost model is focused upon measuring marginal cost and not upon network reconfiguration, and provides a warning about its use:[2]

[1] See, "*Report on Universal Postal Service and the Postal Monopoly,"* Postal Regulatory Commission, December 19, 2008 at 128-129.

[2] Id.

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> The [volume variable] modeling approach is designed to measure the effect on costs of adding the next piece of volume. This is measured to provide the basis for an economically efficient price signal that can guide the buying decision of the mailer. Changing the frequency of delivery throughout the network involves not just huge increments of volume, but also a basic reconfiguring of the delivery function to deal with huge increment of volume.

I believe that this statement suggests a methodological weakness in the application of the volume-variable cost model when analyzing the costs saved by moving to five-day delivery. Moreover, the Commission would seem to share this view because it explicitly states that a different model should be used when analyzing the cost savings caused by moving to five-day delivery:[3]

> This calls for a very different model—one that concerns itself with major changes in total workload and how the processing and delivery functions would be reorganized to meet them.

This is exactly the approach that I describe in my testimony and the Postal Service pursued in estimating the cost savings:[4]

> This testimony presents a methodology, followed by the Postal Service in this docket, which attempts to follow the PRC's admonition. While this new methodology relies upon the general cost structure of postal costs developed by Postal Service and the Postal Regulatory Commission (as embodied in the Annual Compliance Determinations), it does not rely upon the volume variability analysis that underlies it.

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[3] Id.

[4] See, Direct Testimony of Michael D. Bradley on Behalf of the United States Postal Service, Docket No. N2010-1, USPS-T-6 at 5.

> Rather, it recognizes that movement to five-day delivery is an operational change, not a volume change. It thus relies upon a detailed operational analysis of how Postal Service operations would react to five-day delivery.

The Commission's concern can be illustrated mathematically by reviewing the fundamental equation of the volume variable cost model. Volume variable costs are defined as the product of accrued costs, C, and the "volume variability," ε:[5]

$$VVC = \varepsilon C$$

Moreover the "volume variability" is defined as the percentage change in accrued cost caused by a given percentage change in volume:

$$\varepsilon = \frac{\partial C}{\partial V}\frac{V}{C}$$

This means that volume variable cost, VVC, can be defined as:

$$VVC = \frac{\partial C}{\partial V}V$$

Note that this equation includes a partial derivative that measures the change in cost for a change in volume, holding everything else constant. In particular, this partial

[5] For a mathematical treatment of the calculation of volume variable costs please see, Bradley, Michael D., Colvin, Jeff and Panzar, John C., "On Setting Prices and Testing Cross-Subsidy with Accounting Data, Journal of Regulatory Economics, Volume 16, No. 1, July 1999 at 83-100.

derivative is holding the Postal Service's operating procedures, including things like the number of days of delivery and the distribution of volume over the days of the week, constant. I believe that the Commission was pointing out that such an assumption would seem to be at odds with an investigation into the effect of changing the number of delivery days.

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3. Witness Bradley discusses differences between the concepts of "Fixed Office Time" (FOT) and institutional office time. He states:

> FOT captures the amount of time on an individual route that does not vary with changes in daily volume. Institutional office time captures the amount of time in an entire delivery unit that does not change with sustained changes in volume over a three-year to five-year period. The most important way the city carrier delivery network adjusts to changes in volume is through route reconfiguration—changes in the number of routes.

USPS-T-6 at 13. (Emphasis in original.)

Given this statement:

(a) When volumes vary, keeping the number of routes fixed, does total fixed office time for a delivery unit remain constant and total variable office time consist of the sum of the variable office time for each route? If not, please explain.

(b) Should total fixed office time for a delivery unit vary proportionately to changes in the number of routes regardless of the volume level? If not, please explain.

(c) Is institutional office time for a delivery unit invariant to both changes in volume and the number of routes? If not, please explain.

(d) Will total variable office time for a delivery unit depend on both the total delivery volume for the unit and the number of routes served by the unit?

(e) As the number of routes increase due to changes in other workload factors while volume remains constant, is there an impact on total variable office time? Please explain.

(f) Does this impact on total variable office time relate to efficiency changes because each carrier handles fewer pieces? Please explain.

Response:

a. As the quotation emphasizes, an important distinction between the operations concept of "Fixed Office Time" and the product costing concept of institutional office

time is the "run" over which variations in volume are taking place. In answering the question, therefore, it is important to assess the "run" or time period of adjustment that it implies. The question states "when volumes vary, keeping the number of routes fixed . . ." Because routes are not allowed to vary, this would seem to suggest a very short and perhaps even daily "run." It is my understanding that, from an operational perspective, a daily variation in volume would not change the fixed office time on any route and thus would not change the total fixed office time for that delivery unit for that day. In addition, the total variable office time for the delivery unit on that day would be the sum of the variable office times for the routes in the delivery unit.

b. If one is willing to assume that the fixed office time for each route in a delivery unit is the same, then the total fixed office time for a delivery unit would indeed vary by just "n" times the fixed delivery time per route where "n" is the number of routes.

c. No. The total institutional time for a delivery unit should be positively associated with the number of routes in that delivery unit.

d. It is not clear whether this question is asking for an operational response or a product costing response, so I will attempt to give both. From an operational perspective, a change in volume would lead to a change in variable office time. In terms of a change in routes, I believe the answer would depend upon whether there

are any productivity gains from concentrating the same volume on fewer routes. If there are such productivity gains from concentrating volume on fewer routes, then an increase in the number of routes, with the same volume, would increase total variable office time for the delivery unit because of a corresponding fall in productivity. I am not aware of empirical studies of this issue.

On the other hand, it is my understanding that the Commission-approved approach to product costs relies upon an assumption of no productivity changes when volume changes:[6]

> The office time spent in preparing mail for delivery is directly related to the number of pieces handled. Therefore, the operation is considered fully variable with volume, and the corresponding costs are classified as fully variable.

This means that the variable office time would be the same whether the volume was prepared for one route or for thirty routes.

e. As explained in my response to part d., whether or not there would be an impact on total variable office time would depend upon whether or not there are any productivity gains associated with concentrating the same volume on fewer routes. If so, then there would be an impact on total variable office time from a change in the

[6] See, Summary Description Of USPS Development Of Costs By Segments And Components, Fiscal Year 2008 at 6-2 (available on the Commission's Daily Listings for July 1, 2009).

number of routes without a change in volume. If not, then there would not be an impact of the on total variable office time from a change in the number of routes without a change in volume.

f. Yes. The key issue is whether or not there are any productivity gains associated with concentrating the same volume on fewer routes.

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5. Witness Bradley describes the shift of Saturday variable office time to weekdays, but he does not refer to existing excess capacity for in-office operations. USPS-T-6 at 13-14.

(a) Does the mitigating effect of excess capacity apply to in-office time as well as street time costs?

(b) If so, should a separate absorption factor be applied to variable office time to estimate the amount of this time that should be subtracted prior to shifting such hours to weekdays? If not, please explain.

(c) Is excess capacity a notion that should be applied separately to in-office and street workload or be considered in reference to total in-office and street workload? Please explain.

Response:

To understand the following responses, it is important to bear in mind that excess capacity is not the sole justification for the operations determination that there would be savings in variable street time if Saturday's volume were moved to other days of the week.

a. Yes, to the extent excess capacity would exist in the office, it would be a mitigating factor that would reduce the amount of Saturday variable office time that would be transferred to other days.

b. Yes.

c. Excess capacity issues should be applied separately to in-office and street workload although this point is not limited to excess capacity. The issue of "absorption" should be applied separately as it is quite possible that there are different

technologies at play in the street and in the office and the absorption rates may not be the same.

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6. [The following questions refer to witness Bradley and the file "Carrier Cost Savings.xlsx", filed as USPS-LR-N2010-1/6 (Spreadsheet).] Witness Bradley states that 34 percent of Saturday in-office hours is fixed office time and this portion of time is saved when eliminating Saturday delivery. USPS-T-6 at 18. The Spreadsheet shows that this percentage is applied to total Saturday in-office hours from DOIS for FY 2009, adjusted for FY 2009 ACR control totals. Given that city carrier route adjustments were ongoing during FY 2009, is this the appropriate base to use for in-office savings estimation? Please explain.

Response:

Yes. The costing exercise I was assigned was the comparison of costs under six-day delivery in FY2009 with the costs under five-day day delivery in the same environment. Such an exercise requires holding everything else constant for FY2009 except the number of delivery days, so for this exercise, the FY2009 ACR costs are the appropriate baseline. However, this does not mean that the route adjustments that took place in FY2009 were not accounted for in the analysis. In fact, as mentioned in my testimony at page 14, if one examines Library Reference USPS-LR-N2010-1/3 at Table 1 page 3, one will find the basis for the analysis of city carrier in office and street time (including the 34 percent figure) put forth by the operations experts. At the bottom of that table it states the source for the table is "DOIS data for Saturday city delivery operations during August and September of 2009." These are the last two months in FY2009. It is my understanding that the operations experts used just the last two months of FY2009, rather than all 12 months, specifically to account for the impact of route adjustments. In other words, the cost savings calculations are based upon the operational structure in place in FY2009 after route adjustments took place.

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7. [The following questions refer to witness Bradley and the file "Carrier Cost Savings.xlsx", filed as USPS-LR-N2010-1/6 (Spreadsheet).] Witness Bradley states, "Operational analysis has estimated that no more than 10 percent of delivery time will be transferred, so 10 percent of both the Delivery Activities and Delivery Support should be transferred to the Monday through Friday cost." USPS-T-6 at 18. In the Spreadsheet, this figure is applied to Delivery Activities and Delivery Support workhours derived from FY 2009 DOIS Saturday street hours, adjusted to the same FY 2009 ACR control totals. Given that city carrier route adjustments were ongoing during FY 2009, is this the appropriate base for estimating street savings? Please explain.

Response:

Yes. Please see my response to Question 6 of this Information Request.

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8. The Technical Appendix, Initial Comments of the United States Postal Service on the Commission Report, February 17, 2009, provides average cost savings by ZIP Code when moving to 5-day delivery, calculated using quadratic and translog cost functions.

(a) Can the approach used for the calculation of cost savings be characterized as an incremental costing approach? Please explain.

(b) Is this approach still a viable method for estimating cost savings from 5-day delivery when updated for FY 2009 data? If not, please explain.

(c) This analysis indicated absorption rates on variable costs of 19.1 percent using the quadratic model and 26.6 percent using the translog function. Witness Bradley states the pass-through of 10 percent of Saturday variable city carrier street costs. USPS-T-6 at 18. This implies absorption of 90 percent of such costs. Please explain how the new absorption rate can be reconciled with the earlier study.

Response:

a. No. The calculation of incremental costs involves identifying all of the cost caused by a specific product or group of products. There is no such product identification in the cited analysis.

b. The analysis was very useful for demonstrating that, even under the assumptions of the volume variable cost model, there would be absorption of variable cost when the same volume is concentrated across five days instead of six days. In other words, it demonstrated that absorption of volume variable cost arises from economies of density as well as any other source. However, it does suffer from two drawbacks. First, it is not informed by any explicit operational analysis and is thus subject to the

concern raised by the Commission that I discussed in my response to question 2 of this Information Request. Second, it is based upon data collected in 2002.

c. The analysis presented in the Technical Appendix to the Initial Comments of the Postal Service was not a full blown investigation into the cost savings the Postal Service could achieve by moving to five-day delivery. It was a first step in that investigation, and served to demonstrate that not only institutional cost but also volume variable cost would be saved by elimination of Saturday delivery. Since that analysis was done, the Postal Service has carefully investigated, from an operations perspective, how it believes the city carrier network would function under five-day delivery. It is this explicit operational analysis that underlies the current estimates of cost savings, and operational experience and planning, not a statistical analysis of historical data, are the basis for the absorption rate posed in the question.

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9. Consider the following aggregate model used to explain a marginal change in city carrier costs with respect to delivery days for your comments.

   Let system level carrier costs be explained by C = c(V/N, Z)N, where V is aggregate city carrier volume, N is the total number of delivery days, Z is a vector of control variables influencing city carrier costs (such as the number of possible deliveries, density, etc.). The function c() represents daily carrier costs shown as a function of average daily volume v = V/N and the control variables. Note that this formulation explains city carrier costs for the same time period (daily) using the same volume measure (daily volumes) as applied in the econometric models developed from the CCSTS database. The exception is that the model is a system level model rather than a zip level model. The marginal effect of delivery days on carrier costs can then be shown as: $\partial C/\partial N = c(V/N, Z) - (\partial c/\partial v)V/N$.

   Multiplying $\partial C/\partial N$ by N/C yields the following elasticity of carrier costs with respect to the number of delivery days:

   $$(\partial C/\partial N)N/C = c(V/N, Z)N/C - (\partial c/\partial v)V/C.$$

   Substituting c(V/N, Z)N for C gives:

   $$(\partial C/\partial N)N/C = 1 - (\partial c/\partial v)v/c.$$

   The delivery day elasticity is shown as one less the variability of daily cost with respect to average daily volume v = V/N. Note that if volume variability is one, then $(\partial C/\partial N)N/C = 0$ because there are no fixed costs and all variable costs vary in proportion to volume (the constant marginal cost case). At the other extreme, if $(\partial c/\partial v)v/c = 0$, then all costs are fixed costs and these must vary in proportion to delivery days. Hence $(\partial C/\partial N)N/C = 1$ in this case. Further, note that the marginal effect $\partial C/\partial N$ can be used to approximate the effect on costs from eliminating one delivery day. Therefore, multiplying both sides by c = C/N produces the following first order estimate of the cost effect from eliminating one Saturday delivery day.

   $$\partial C/\partial N = c(1 - (\partial c/\partial v)v/c).$$

   The city carrier cost savings from eliminating a delivery day can be approximated as the product of average daily carrier costs and one less the volume variability measured at average daily volume. Note that for estimation purposes, the result does not depend on any particular quantitative specification. All that is needed to approximate savings is a volume variability estimate derived from any quantitative model or from appropriate secondary sources, and an estimate of average daily costs from accounting data.

   Please comment on the basic model structure used to develop this result and any appropriate elaborations or modifications that might prove useful in the future.

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Response:

The proposed approach focuses on using a delivery day cost function in an effort to build a system-wide approach to estimating the cost savings from a reduction in the number of delivery days. This approach has some appeal because it has an easy translation to the data -- one only gets a single observation on the annual system-wide costs and volume in a year but gets about 303 observations on daily system-wide costs and volumes. In fact, the approach can be considered either as a theoretical construct or as an empirical estimation strategy. I look at both approaches in this response.

In evaluating the daily approach as a theoretical construct, it is important to be aware of several assumptions that, when considered, could reduce its appeal. First, while the approach is commendable for its generality, the specification of the daily model, as written, implies some restrictions on the underlying system-wide model. Using the same notation as provided in the question, we can represent the system-wide model as:

$$C = C(V, N, Z).$$

This implies that the cost per day is necessarily given by:

$$C / N = C(V, N, Z) / N.$$

However the proposed approach requires that:

$$C / N = c(V/N, Z).$$

This, in turn, implies that:

$C(V, N, Z) / N$ must equal $c(V/N, Z)$.

Such a condition will hold if the system-wide cost function is linear, but will generally not hold for nonlinear system-wide cost functions such as quadratic or translog. Generally carrier costs are thought to be nonlinear in volume.

Another assumption required for application of this approach is that "the marginal effect $\partial C/\partial N$ can be used to approximate the effect on costs from eliminating one delivery day." On the face of it this may seem reasonable because elimination of one delivery day is a small change relative to the total delivery days in the year. In a typical year there are 303 delivery days so, the change in one delivery day is just 1/303 or 0.0033. However, recall that this is not issue at hand. Rather, the Postal Service is not proposing to eliminate one delivery day but 52, one for each Saturday in the year. Thus, the reduction in delivery days being contemplated is 52/303 or about 17 percent. A change of this size raises a serious issue whether the marginal effect produced by the daily model can be used to approximate the change associated with elimination of Saturday delivery.

Third, this approach assumes that there are no changes to the daily cost function, c(V/N, Z) as a result of the elimination of Saturday delivery. This requires assuming that there would be no operational changes that could lead to a shift or movement in the cost surface. If such operational changes did occur, then a revision of the function would also be required.

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As an empirical strategy, the use of granular daily data represents a time series approach to estimating a system-wide function. The data set suggested in the question would be repeated daily observations on system-wide hours, volumes, and control variables and could be used as the basis for estimating the elasticity presented therein. While such an analysis suffers from a number of potential drawbacks, it may be of interest as an update to the analysis discussed in question 8 of this Information Request. Specifically, daily DOIS data for FY2009 could be used to estimate the elasticity of hours with respect to changes in delivered volumes.

To aid the Commission in its evaluation of this approach, I estimated both an office time and a street time model using the daily DOIS data from FY2009. This data set matches the hours data that were used for the operational-based approach and thus provides a common basis of comparison for the two approaches. The dependent variable in each regression was the total hours for each delivery day in FY2009, which I believe matches the specification in the question. In one case, the dependent variable is total office hours and in the other case it is total street hours. Following the specification in the question, there are two independent variables, the daily delivered volume and the number routes, which serves as the control variable. The number of routes is included as a network variable and to control for the effect of route adjustments mentioned in questions 6 and 7 of this Information Request.

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There are two functional forms that are generally used to estimate delivery cost function, a quadratic form and a translog form. I thus estimated the office time equation and the street time equation twice, once using the full quadratic form and once using the translog form. The results of these estimations are presented in an appendix to this response, as is the program that estimates the equations. The delivery day elasticity posed in the question can be directly calculated from the estimated equations and the four estimated elasticities are presented below:

Elasticity of Daily Hours with Respect to Daily Volume, FY2009

	Quadratic Model	Translog Model
Office	47.4%	48.3%
Street	13.0%	13.6%

The question states "The city carrier cost savings from eliminating a delivery day can be approximated as the product of average daily carrier costs and one less the volume variability measured at average daily volume." In the following table, I present the percentage reduction in Saturday hours hours for both office and street estimated by this approach along with the percentage reduction in hours estimated by the operational approach.

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Estimated Cost Savings as a Percentage of Saturday Hours

	Quadratic Model	Translog Model	Operational Approach
Office	52.6%	51.7%	34.0%
Street	87.0%	86.4%	89.9%

This table demonstrates that the daily volume approach corroborates the operational approach in terms of street time savings but suggests that the operational approach has understated the cost savings in office time. This may be because, as suggested in question 5 of this Information Request, the operational approach did not allow for the impact of any productivity gains or excess capacity in office time.

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APPENDIX TO THE QUESTION 9 RESPONSE

This appendix contains the program and description of the estimation of both a full quadratic and a translog version of the model proposed in the question. The quadratic model has the following form:

$$HRS_{it} = \beta_{0i} + \beta_{1i} Vol_t + \beta_{2i} RTS_t + \beta_{3i} Vol_t RTS_t + \beta_{4i} VOL_t^2 + \beta_{5i} RTS_t^2$$

$$where\ i = Office, Street.$$

The associated elasticity is given by:

$$\varepsilon_i = \frac{(\beta_{1i} + \beta_{3i} RTS_t + 2\beta_{4i} VOL_t) VOL_t}{HRS_i},$$

where the right-hand-side variables are evaluated at their mean values. The translog model is of the form:

$$\ln(HRS_{it}) = \gamma_{0i} + \gamma_{1i} \ln(Vol)_t + \gamma_{2i} \ln(RTS)_t + \gamma_{3i} \ln(Vol)_t \ln(RTS)_t + \gamma_{4i} \ln(VOL)_t^2 + \gamma_{5i} \ln(RTS)_t^2$$

When the right-hand-side variables are mean centered, the associated elasticity is given by the first-order term on volume:

$$\varepsilon_i = \gamma_{1i}.$$

The model was estimated on the FY2009 DOIS data provide in an Excel spreadsheet in response to question 10 of this Information Request. The SAS program, log and listing follow. The file read into the SAS program is just the PRN version of the Excel spreadsheet.

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SAS Program Used to Estimate the Model and Calculate the Daily Elasticities

```
OPTIONS LINESIZE = 80;
OPTIONS PAGESIZE = 3200;
OPTIONS NOCENTER NODATE NONUMBER;
filename DOIS 'C:\Users\Michael D. Bradley\Documents\Five Day
Delivery\Case Documents\DOIS FY2009.prn';
**********************************************
Daily Delivery Analysis

Estimates elasticity of hours with respect to
volume using all delivery days.
**********************************************;

****************************************
* Read in data
* "Date" is the date
* "Day" is the day of the week
* "Week" is a numerical variable indicating the week
* "DOW" is a numerical variable indicating the day of the week
* "RTS" is the number of routes on which the volume is delivered
* "HRS_OFC" is the Office hours for that day
* "HRS_ST" is the Street hours for that day
* "CLTR" is the volume of cased letters
* "CFLT" is the volume of cased flats
* "DPS" is the volume of DPS letters
* "FSS" is the volume of FSS flats
* "SEQ" is the volume of sequenced mail
* "PCL" is the volume of parcels

****************************************;

****************************************;

Data USPS; Infile DOIS ;

Input Date $ DAY $ WEEK DOW RTS HRS_OFC HRS_ST CLTR CFLT DPS FSS SEQ PCL;

****************************************
* Eliminate Satuday June 13, 2009 which reported 32 million parcels;
* Average parcels per day is about 1.6 million;
**************************************** ;

if HRS_ST eq 842206 then delete;


Proc means;

Data USPS; Set USPS;
VOLUME=CLTR+CFLT+DPS+FSS+SEQ+PCL;
```

```
Data USPSDD; Set USPS;
if HRS_OFC lt 10000 then delete;
ROUTES=rts;
VOLRTS=Volume*Routes;
VOl2=Volume*Volume;
RTS2=Routes*Routes;


*****************************************
Estimate full quadratic models
*****************************************;
TITLE1 "FULL QUADRATIC MODEL";
TITLE2 "ESTIMATED USING ALL BUSINESS DAYS, FY2009";
PROC REG DATA=USPSDD OUTEST=QUAD_FULL;
MODEL HRS_ST = VOLUME ROUTES VOLRTS VOL2 RTS2;
MODEL HRS_OFC = VOLUME ROUTES VOLRTS VOL2 RTS2;
RUN; QUIT;


*****************************************
Mean center data and estimate translog models
*****************************************;
**********
Mean center
**********;
PROC MEANS NOPRINT DATA=USPSDD;
VAR VOLUME ROUTES VOLRTS VOL2 RTS2 HRS_ST HRS_OFC;
OUTPUT OUT = REGMEAN_FULL MEAN = MVOL MRTS MVOLRTS MVOL2 MRTS2 MHRS_ST
MHRS_OFC; RUN;

DATA USPS_FULL;
IF _N_=1 THEN SET REGMEAN_FULL (DROP = _TYPE_); SET USPSDD;
VOL   = VOLUME/MVOL;
LVOL  = LOG(VOL);
LVOL2 = LVOL**2;
RTS   = ROUTES/MRTS;
LRTS  = LOG(RTS);
LRTS2 = LRTS**2;
CROSS = LVOL*LRTS;
LHRS_ST = LOG(HRS_ST);
LHRS_OFC= LOG(HRS_OFC);
RUN;


*************************************************
Estimate translog model
*************************************************;
TITLE1 "FULL TRANSLOG MODEL";
TITLE2 "ESTIMATED USING ALL DELIVERY DAYS, FY2009";
PROC REG DATA=USPS_FULL OUTEST=LOG2_FULL;
MODEL LHRS_ST = LVOL LRTS CROSS LVOL2 LRTS2;
```

```
MODEL LHRS_OFC = LVOL LRTS CROSS LVOL2 LRTS2;
RUN; QUIT;


************************************************
Calculate elasticity of hours with respect to volume
************************************************;
DATA QUAD_FULL1;
IF _N_=1 THEN SET REGMEAN_FULL; SET QUAD_FULL (DROP =_TYPE_);
IF _DEPVAR_ = "HRS_ST" THEN ELAS_QUAD = (VOLUME + VOLRTS*MRTS +
2*VOL2*MVOL)*(MVOL/MHRS_ST);
IF _DEPVAR_ = "HRS_OFC" THEN ELAS_QUAD = (VOLUME + VOLRTS*MRTS +
2*VOL2*MVOL)*(MVOL/MHRS_OFC);
RUN;

DATA LOG2_FULL1; SET LOG2_FULL (DROP=_TYPE_);
RENAME LVOL=ELAS_FULL_LOG;
IF _DEPVAR_= "LHRS_ST" THEN _DEPVAR_= "HRS_ST";
IF _DEPVAR_= "LHRS_OFC" THEN _DEPVAR_="HRS_OFC";
RUN;

PROC SORT DATA=QUAD_FULL1;
BY _DEPVAR_; RUN;

PROC SORT DATA=LOG2_FULL1;
BY _DEPVAR_; RUN;

DATA FULL; MERGE QUAD_FULL1 LOG2_FULL1;
BY _DEPVAR_; RUN;

DATA PRINT; SET FULL;
IF _DEPVAR_ = "HRS_ST" THEN _DEPVAR_ = "Street";
IF _DEPVAR_ = "HRS_OFC" THEN _DEPVAR_ = "Office";
LABEL _DEPVAR_ = "Hours Type"
ELAS_QUAD = "Full Quadratic"
ELAS_FULL_LOG = "Full Translog"; RUN;

TITLE1 "Elasticity of Hours with Respect to Volume";
TITLE2 "(Estimated Using Delivery Days, FY2009)";
PROC PRINT DATA=PRINT NOOBS LABEL;
VAR _DEPVAR_ ELAS_QUAD ELAS_FULL_LOG;
RUN;
```

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SAS Log of the Program Used to Estimate the Model and Calculate the Daily Elasticities

```
358  OPTIONS PAGESIZE = 3200;
359  OPTIONS NOCENTER NODATE NONUMBER;
360  filename DOIS 'C:\DOIS FY2009.prn';
361  ***********************************************
362  Daily Delivery Analysis
363
364  Estimates elasticity of hours with respect to
365  volume using all delivery days.
366  ***********************************************;
367
368  ****************************************
369  * Read in data
370  * "Date" is the date
371  * "Day" is the day of the week
372  * "Week" is a numerical variable indicating the week
373  * "DOW" is a numerical variable indicating the day of the week
374  * "RTS" is the number of routes on which the volume is delivered
375  * "HRS_OFC" is the Office hours for that day
376  * "HRS_ST" is the Street hours for that day
377  * "CLTR" is the volume of cased letters
378  * "CFLT" is the volume of cased flats
379  * "DPS" is the volume of DPS letters
380  * "FSS" is the volume of FSS flats
381  * "SEQ" is the volume of sequenced mail
382  * "PCL" is the volume of parcels
383
384  ****************************************;
385
386  ****************************************;
387
388  Data USPS; Infile DOIS ;
389
390  Input Date $ DAY $ WEEK DOW RTS HRS_OFC HRS_ST CLTR CFLT DPS FSS SEQ
PCL;
391
392  ****************************************
393  * Eliminate Saturday June 13, 2009 which reported 32 million parcels;
394  * Average parcels per day is about 1.6 million;
395  **************************************** ;
396
397  if HRS_ST eq 842206 then delete;
398
399

NOTE: The infile DOIS is:

      Filename=C:\\DOIS FY2009.prn,
      RECFM=V,LRECL=256,File Size (bytes)=50598,
```

```
      Last Modified=11May2010:14:16:14,
      Create Time=11May2010:14:16:03

NOTE: 365 records were read from the infile DOIS.
      The minimum record length was 134.
      The maximum record length was 137.
NOTE: The data set WORK.USPS has 364 observations and 13 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.01 seconds


400  Proc means;
401

NOTE: There were 364 observations read from the data set WORK.USPS.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.00 seconds
      cpu time            0.01 seconds


402  Data USPS; Set USPS;
403  VOLUME=CLTR+CFLT+DPS+FSS+SEQ+PCL;
404

NOTE: There were 364 observations read from the data set WORK.USPS.
NOTE: The data set WORK.USPS has 364 observations and 14 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.01 seconds


405  Data USPSDD; Set USPS;
406  if HRS_OFC lt 10000 then delete;
407  ROUTES=rts;
408  VOLRTS=Volume*Routes;
409  VOl2=Volume*Volume;
410  RTS2=Routes*Routes;
411
412
413  ****************************************
414  Estimate full quadratic models
415  ****************************************;
416  TITLE1 "FULL QUADRATIC MODEL";
417  TITLE2 "ESTIMATED USING ALL BUSINESS DAYS, FY2009";

NOTE: There were 364 observations read from the data set WORK.USPS.
NOTE: The data set WORK.USPSDD has 302 observations and 18 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds
```

```
418  PROC REG DATA=USPSDD OUTEST=QUAD_FULL;
419  MODEL HRS_ST = VOLUME ROUTES VOLRTS VOL2 RTS2;
420  MODEL HRS_OFC = VOLUME ROUTES VOLRTS VOL2 RTS2;
421  RUN;

421!      QUIT;

NOTE: The data set WORK.QUAD_FULL has 2 observations and 12 variables.
NOTE: PROCEDURE REG used (Total process time):
      real time           0.02 seconds
      cpu time            0.03 seconds


422
423
424  ********************************************
425  Mean center data and estimate translog models
426  ********************************************;
427  ***********
428  Mean center
429  **********;
430  PROC MEANS NOPRINT DATA=USPSDD;
431  VAR VOLUME ROUTES VOLRTS VOL2 RTS2 HRS_ST HRS_OFC;
432  OUTPUT OUT = REGMEAN_FULL MEAN = MVOL MRTS MVOLRTS MVOL2 MRTS2
MHRS_ST MHRS_OFC; RUN;

NOTE: There were 302 observations read from the data set WORK.USPSDD.
NOTE: The data set WORK.REGMEAN_FULL has 1 observations and 9 variables.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.00 seconds
      cpu time            0.01 seconds


433
434  DATA USPS_FULL;
435  IF _N_=1 THEN SET REGMEAN_FULL (DROP = _TYPE_); SET USPSDD;
436  VOL     = VOLUME/MVOL;
437  LVOL    = LOG(VOL);
438  LVOL2   = LVOL**2;
439  RTS     = ROUTES/MRTS;
440  LRTS    = LOG(RTS);
441  LRTS2   = LRTS**2;
442  CROSS   = LVOL*LRTS;
443  LHRS_ST = LOG(HRS_ST);
444  LHRS_OFC= LOG(HRS_OFC);
445  RUN;

NOTE: There were 1 observations read from the data set WORK.REGMEAN_FULL.
NOTE: There were 302 observations read from the data set WORK.USPSDD.
```

```
NOTE: The data set WORK.USPS_FULL has 302 observations and 34 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


446
447
448  ************************************************
449  Estimate translog model
450  ************************************************;
451  TITLE1 "FULL TRANSLOG MODEL";
452  TITLE2 "ESTIMATED USING ALL DELIVERY DAYS, FY2009";
453  PROC REG DATA=USPS_FULL OUTEST=LOG2_FULL;
454  MODEL LHRS_ST = LVOL LRTS CROSS LVOL2 LRTS2;
455  MODEL LHRS_OFC = LVOL LRTS CROSS LVOL2 LRTS2;
456  RUN;

456!      QUIT;

NOTE: The data set WORK.LOG2_FULL has 2 observations and 12 variables.
NOTE: PROCEDURE REG used (Total process time):
      real time           0.05 seconds
      cpu time            0.06 seconds


457
458
459  ************************************************
460  Calculate elasticity of hours with respect to volume
461  ************************************************;
462  DATA QUAD_FULL1;
463  IF _N_=1 THEN SET REGMEAN_FULL; SET QUAD_FULL (DROP =_TYPE_);
464  IF _DEPVAR_ = "HRS_ST" THEN ELAS_QUAD = (VOLUME + VOLRTS*MRTS +
464! 2*VOL2*MVOL)*(MVOL/MHRS_ST);
465  IF _DEPVAR_ = "HRS_OFC" THEN ELAS_QUAD = (VOLUME + VOLRTS*MRTS +
465! 2*VOL2*MVOL)*(MVOL/MHRS_OFC);
466  RUN;

NOTE: There were 1 observations read from the data set WORK.REGMEAN_FULL.
NOTE: There were 2 observations read from the data set WORK.QUAD_FULL.
NOTE: The data set WORK.QUAD_FULL1 has 2 observations and 21 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


467
468  DATA LOG2_FULL1; SET LOG2_FULL (DROP=_TYPE_);
469  RENAME LVOL=ELAS_FULL_LOG;
470  IF _DEPVAR_= "LHRS_ST" THEN _DEPVAR_= "HRS_ST";
```

```
471  IF _DEPVAR_= "LHRS_OFC" THEN _DEPVAR_="HRS_OFC";
472  RUN;

NOTE: There were 2 observations read from the data set WORK.LOG2_FULL.
NOTE: The data set WORK.LOG2_FULL1 has 2 observations and 11 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.01 seconds


473
474  PROC SORT DATA=QUAD_FULL1;
475  BY _DEPVAR_; RUN;

NOTE: There were 2 observations read from the data set WORK.QUAD_FULL1.
NOTE: The data set WORK.QUAD_FULL1 has 2 observations and 21 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.01 seconds


476
477  PROC SORT DATA=LOG2_FULL1;
478  BY _DEPVAR_; RUN;

NOTE: There were 2 observations read from the data set WORK.LOG2_FULL1.
NOTE: The data set WORK.LOG2_FULL1 has 2 observations and 11 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


479
480  DATA FULL; MERGE QUAD_FULL1 LOG2_FULL1;
481  BY _DEPVAR_; RUN;

NOTE: There were 2 observations read from the data set WORK.QUAD_FULL1.
NOTE: There were 2 observations read from the data set WORK.LOG2_FULL1.
NOTE: The data set WORK.FULL has 2 observations and 28 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.00 seconds


482
483  DATA PRINT; SET FULL;
484  IF _DEPVAR_ = "HRS_ST" THEN _DEPVAR_ = "Street";
485  IF _DEPVAR_ = "HRS_OFC" THEN _DEPVAR_ = "Office";
486  LABEL _DEPVAR_ = "Hours Type"
487  ELAS_QUAD = "Full Quadratic"
488  ELAS_FULL_LOG = "Full Translog"; RUN;
```

Response of Postal Service Witness Michael D. Bradley
To Chairman's Information Request No. 3

```
NOTE: There were 2 observations read from the data set WORK.FULL.
NOTE: The data set WORK.PRINT has 2 observations and 28 variables.
NOTE: DATA statement used (Total process time):
      real time           0.00 seconds
      cpu time            0.01 seconds


489
490  TITLE1 "Elasticity of Hours with Respect to Volume";
491  TITLE2 "(Estimated Using Delivery Days, FY2009)";
492  PROC PRINT DATA=PRINT NOOBS LABEL;
493  VAR _DEPVAR_ ELAS_QUAD ELAS_FULL_LOG;
494  RUN;
```

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SAS Listing of the Program Used to Estimate the Model and Calculate the Daily Elasticities

Elasticity of Hours with Respect to Volume
(Estimated Using Delivery Days, FY2009)

The MEANS Procedure

Variable	N	Mean	Std Dev	Minimum	Maximum
WEEK	364	27.1126374	15.0876577	1.0000000	53.0000000
DOW	364	3.9917582	1.9965364	1.0000000	7.0000000
RTS	364	154142.70	2571.68	147524.00	157322.00
HRS_OFC	364	278951.07	130463.02	26.0000000	458741.00
HRS_ST	364	753347.20	342190.28	580.0000000	1043218.00
CLTR	364	18897405.09	9391251.55	0	41485690.00
CFLT	364	66713414.79	33526293.86	704.0000000	140323388
DPS	364	178072659	90226384.70	0	406940849
FSS	364	166125.18	114753.73	0	627945.00
SEQ	364	24238451.31	16722089.52	-1521.00	80369879.00
PCL	364	1320111.15	681260.48	0	4356295.00

FULL QUADRATIC MODEL
ESTIMATED USING ALL BUSINESS DAYS, FY2009

The REG Procedure
Model: MODEL1
Dependent Variable: HRS_ST

Number of Observations Read 302
Number of Observations Used 302

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	1.30711E11	26142208978	41.51	<.0001
Error	296	1.864175E11	629788777		
Corrected Total	301	3.171285E11			

Root MSE	25096	R-Square	0.4122
Dependent Mean	907600	Adj R-Sq	0.4022
Coeff Var	2.76505		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1274037	5263746	0.24	0.8089
VOLUME	1	0.00341	0.00197	1.73	0.0841
ROUTES	1	-15.18319	70.06922	-0.22	0.8286
VOLRTS	1	-2.02451E-8	1.348353E-8	-1.50	0.1343
VOl2	1	7.11961E-14	3.52733E-13	0.20	0.8402
RTS2	1	0.00007851	0.00023486	0.33	0.7384

FULL QUADRATIC MODEL
ESTIMATED USING ALL BUSINESS DAYS, FY2009

The REG Procedure
Model: MODEL2
Dependent Variable: HRS_OFC

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Number of Observations Read 302
Number of Observations Used 302

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	3.658685E11	73173690723	785.35	<.0001
Error	296	27579159673	93172837		
Corrected Total	301	3.934476E11			

Root MSE	9652.60777	R-Square	0.9299
Dependent Mean	336071	Adj R-Sq	0.9287
Coeff Var	2.87219		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	34307961	2024613	16.95	<.0001
VOLUME	1	-0.00183	0.00075638	-2.42	0.0160
ROUTES	1	-446.15969	26.95098	-16.55	<.0001
VOLRTS	1	1.763067E-8	5.186219E-9	3.40	0.0008
VOl2	1	-6.1277E-13	1.35673E-13	-4.52	<.0001
RTS2	1	0.00145	0.00009033	16.10	<.0001

FULL TRANSLOG MODEL
ESTIMATED USING ALL DELIVERY DAYS, FY2009

The REG Procedure
Model: MODEL1
Dependent Variable: LHRS_ST

Number of Observations Read 302
Number of Observations Used 302

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	0.15641	0.03128	40.35	<.0001
Error	296	0.22950	0.00077534		
Corrected Total	301	0.38591			

Root MSE	0.02784	R-Square	0.4053
Dependent Mean	13.71792	Adj R-Sq	0.3953
Coeff Var	0.20298		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	13.71936	0.00289	4749.96	<.0001
LVOL	1	0.13554	0.01597	8.48	<.0001
LRTS	1	0.28881	0.18745	1.54	0.1245
CROSS	1	-1.23939	0.84181	-1.47	0.1420
LVOL2	1	0.04392	0.06177	0.71	0.4777

```
LRTS2         1        1.24591        6.14230       0.20      0.8394
FULL TRANSLOG MODEL
ESTIMATED USING ALL DELIVERY DAYS, FY2009

The REG Procedure
Model: MODEL2
Dependent Variable: LHRS_OFC

Number of Observations Read         302
Number of Observations Used         302


                           Analysis of Variance

                                     Sum of           Mean
Source                    DF        Squares         Square    F Value    Pr > F

Model                      5        3.04614        0.60923     778.96    <.0001
Error                    296        0.23150     0.00078211
Corrected Total          301        3.27764


Root MSE              0.02797    R-Square     0.9294
Dependent Mean       12.71955    Adj R-Sq     0.9282
Coeff Var             0.21987


                        Parameter Estimates

                     Parameter       Standard
Variable     DF       Estimate          Error    t Value    Pr > |t|

Intercept     1       12.70106        0.00290    4378.35      <.0001
LVOL          1        0.48176        0.01604      30.03      <.0001
LRTS          1        3.68741        0.18826      19.59      <.0001
CROSS         1        2.50470        0.84548       2.96      0.0033
LVOL2         1       -0.22747        0.06204      -3.67      0.0003
LRTS2         1       97.39007        6.16903      15.79      <.0001
Elasticity of Hours with Respect to Volume
(Estimated Using Delivery Days, FY2009)

Hours        Full        Full
 Type     Quadratic    Translog

Office     0.47409      0.48176
Street     0.12975      0.13554
```

Response of Postal Service Witness Michael D. Bradley
To Chairman's Information Request No. 3

10. Please provide the DOIS daily volumes by product type that accompany each observation of the daily hours data provided in USPS-LR-N2010-1/6.

Response:

The requested data are included, along with the hours, in the attached spreadsheet entitled, "ChIR.3.Q.10.DOIS.Attach.xlsx."

RESPONSE OF POSTAL SERVICE WITNESS GRANHOLM
TO CHAIRMAN'S INFORMATION REQUEST NO. 3

4. Witness Bradley states, "transferring delivery of current Saturday volume to other days of the week will not cause a transfer of much of this time to those days… the reduction of volume has outstripped the reduction in street time capacity and there is available capacity on the street." USPS-T-6 at 16.

(a) In the absence of 5-day delivery, does the Postal Service expect to eliminate excess capacity in the long run?

(b) How does the Postal Service identify excess capacity in delivery operations?

(c) Would it be possible to construct an excess capacity measure and adjust this measure through time in response to both drops in volume and workhours? Please explain.

RESPONSE:

a. The Postal Service has been, and will continue to be, identifying and minimizing excess capacity in Delivery Operations. The processes available to identify and minimize excess capacity vary based on each specific delivery craft.

b. Excess capacity is identified in situations where a city carrier's expected work load is less than eight hours daily. This is identified through the use of tools such as DOIS.

c. While it may be possible, it would be extremely difficult to measure due to the individual characteristics of each delivery route, whether city or rural, as well as work loads, delivery types and modes, weather, distances traveled, local driving conditions, etc. Moreover, the ability to capture excess capacity is limited by the National Agreements, the evaluated pay process for rural delivery, and the individual contracts utilized on Contract Delivery Service (CDS) routes.