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

POSTAL RATE AND FEE CHANGES PURSUANT TO PUBLIC LAW 108-18	Docket No. R2005–1

RESPONSE OF THE UNITED STATES POSTAL SERVICE TO PRESIDING OFFICER'S INFORMATION REQUEST NO. 6
(June 10, 2005)

The United States Postal Service hereby provides the responses to Presiding Officer's Information Request (POIR) No. 6, issued May 27, 2005. The following witnesses are sponsoring the identified responses to this POIR:

Witness Bozzo: Question 8

Witness Bradley (USPS-T-14): Questions 5 and 6

Witness Lewis: Question 4(a)-(b)

Witness Page: Question 3

Witness Stevens: Question 4(c)-(d)

Witness Taufique: Question 1

The responses to Questions 2 and 7 are forthcoming. Each question is stated verbatim and is followed by the response.

Respectfully submitted,

UNITED STATES POSTAL SERVICE

By its attorneys:

Daniel J. Foucheaux, Jr.
Chief Counsel, Ratemaking

_____
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RESPONSE OF POSTAL SERVICE WITNESS TAUFIQUE
TO POIR NO. 6, QUESTION 1

1. Please confirm that in Fee Schedule 1000, Miscellaneous Fees, Attachment A, page 83 of the Postal Service Request, the line identifying current and proposed fees for a Periodicals Original Entry application should read as follows:

	Current	**Proposed**
Periodicals		
A. Original Entry	375.00	395.00

RESPONSE:

Confirmed, consistent with page 56 of my Exhibit A.

3. Library Reference K-59 provides the worksheets for the calculation of final adjustments. Within the worksheets are the forecasted volumes by rate category which include forecasted transactions of various special services. The volumes forecasted for Delivery and Signature Confirmation for the Test Year After Rates, when added together do not equal the combined transactions shown in the worksheet. Please confirm the number of transactions for both Delivery Confirmation and Signature Confirmation in the Test Year After Rates and either confirm or correct the combined transactions for Delivery and Signature Confirmation.

RESPONSE:

The numbers of transactions for both Delivery Confirmation and Signature Confirmation in the Test Year are confirmed. The combined total for Delivery Confirmation and Signature Confirmation should be 695.440 (686.017 + 9.422). The Delivery Confirmation number of 686.017 and the Signature Confirmation number of 9.422 are used in the worksheet calculations, but the combined total is not used.

RESPONSE OF POSTAL SERVICE WITNESS LEWIS
TO POIR NO. 6, QUESTION 4(a)-(b)

4. This question addresses the practice of day-to-day adjustments in routes, which involve pivoting or off-loading volume to other carriers with under time.

(a) Is this the same or similar to the process described by witness Lewis on page 7, lines 13-16 of his USPS-T-30 testimony?

(b) Please confirm that pivoting occurs regularly on city carrier routes and provide an estimate of how frequently this process occurs in terms of the percent of routes affected on a typical day?

RESPONSE:

a) Yes.

b) Pivoting occurs regularly in delivery units with City carrier routes. The Postal Service does not maintain or track data showing instances where routes are pivoted.

RESPONSE OF POSTAL SERVICE WITNESS STEVENS
TO POIR NO. 6, QUESTION 4(c)-(d)

4. This question addresses the practice of day-to-day adjustments in routes, which involve pivoting or off-loading volume to other carriers with under time.

(c) Did any such pivoting route adjustments occur on any of the routes that were chosen to participate in the City Carrier Street Time Study?

(d) If so, how many route days were affected? Please describe the steps taken, if any, to maintain the route integrity of scanned time and reported volumes by carriers delivering mail on such routes.

RESPONSE:

(c) Yes. Route pivots are a normal daily occurrence in city carrier delivery.

(d) Route pivots were not tracked separately in the City Carrier Street Time Study. Workload volumes were collected by routes. Barcode scan pairs were analyzed by routes to ensure that workload volumes matched times captured by the barcodes. Please see USPS LR-K-78, page E-6. General rules 1 and 2 relate to capturing route data such that the data can be matched with mail volumes. First, the route number had to be programmed into the carrier's scanner. Scanning *Clock to Street* would begin the time sequences that would be assigned to the programmed route. *Clock off Street/End Tour* would complete the time sequences that would be assigned to the programmed route. If the carrier had to pivot to another route, he or she would first scan *Clock off Street/End Tour*, then change the route number in the scanner to the new route and then scan *Clock to Street* to start the time sequences that would be assigned to the new route. The process would be repeated for all pivots for the day.

RESPONSE OF POSTAL SERVICE WITNESS BRADLEY
TO POIR NO. 6, QUESTION 5

5. Refer to USPS-T-14. Please confirm that the SAS code in the file entitled "Estimating Delivery Equations, found in LR-K-81, should have included the variable "mspr" in the location shown below where it is underlined, bolded and enlarged.

(a) data elascal1; merge coef1 regmean (drop=_TYPE_);
pdelt=intercept+let*mlet+let2*mlet*mlet+cf*mcf+cf2*mcf*mcf+seq*mseq+seq2*mseq*mseq+spr*mspr+spr2*mspr***mspr**+cv*mcv+cv2*mcv*mcv+dp*mdp+dp2*mdp*mdp+dens*mdens+dens2*mdens*mdens+lf*mlet*mcf+lse*mlet*mseq+lcv*mlet*mcv+lspr*mlet*mspr+ldp*mlet*mdp+fse*mcf*mseq+fcv*mcf*mcv+fspr*mcf*mspr+fdp*mcf*mdp+scv*mseq*mcv+sspr*mseq*mspr+sdp*mseq*mdp+cspr*mcv*mspr+cdp*mcv*mdp+spdp*mspr*mdp+ldns*mlet*mdens+fdns*mcf*mdens+sdns*mseq*mdens+cdns*mcv*mdens+spdns*mspr*mdens+dpdns*mdp*mdens;

(b) data elascal2; merge coef2 regmean
(drop=_TYPE_);pdelt=intercept+let*mlet+let2*mlet*mlet+cf*mcf+cf2*mcf*mcf+seq*mseq+seq2*mseq*mseq+spr*mspr+spr2*mspr***mspr**+cv*mcv+cv2*mcv*mcv+dp*mdp+dp2*mdp*mdp+dens*mdens+dens2*mdens*mdens;

If confirmed, please provide a corrected SAS program, output, and log.

RESPONSE:

Confirmed. For comparison purposes the original recommended variabilities and the variabilities resulting from this correction are presented below. Electronic versions of the SAS program, log and listing are attached to this response.

Variabilities for Regular Delivery

Shape	Corrected Variability	Original USPS-T14 Variability
Letters	22.27%	22.28%
Flats	7.12%	7.12%
Sequenced	1.29%	1.29%
Collection	8.81%	8.82%
Small Parcels	1.58%	1.58%

ATTACHMENT TO RESPONSE, POIR NO. 6, ITEM 5

SAS PROGRAM:

```
options linesize=80;
options nocenter;
options nodate;
options nonumber;
filename timedat 'c:\Timepool Mask.prn';
filename lfvol 'c:\LFVolume Mask.prn';
filename pavol 'c:\PAvolume Mask.prn';
filename dense 'c:\density Mask.prn';

*****************************;
*** Read in Time Data ********;
*****************************;
DATA time1; infile timedat;
Input  date $ zip rt $  bud bed bnd bod rud red rnd rod mode $
       lfdt cudt ncdt vmdt cedt dmdt nst prt ttft ntt ddtt trvlt
       rlt gct ect pdt adt padt oct nat;

************************************************************** ;
*** This section of the program converts alphabetic route numbers*** ;
***   and constructs a unique Zip-Route ID for each route*************;
**************************************************************;

Data time2; set time1;
if rt = 'XX' then rt=99.9;
if rt = '0A' or rt = '0B' or rt = '0D' or rt = '0E' or rt = '0W'
or rt = '1A'  or rt = '4A'  or rt = '4B'  or rt = 'A7'  or rt = 'C2'
or rt = 'C3'  or rt = 'CA'  or rt = 'CK'  or rt = 'CT'  or rt = 'CV'
or rt = 'ES'  or rt = 'EV'  or rt = 'F1'  or rt = 'G5'  or rt = 'HK'
or rt = 'IT'  or rt = 'L1'  or rt = 'L3'  or rt = 'L7'  or rt = 'MD'
or rt = 'MF'  or rt = 'O1'  or rt = 'O2'  or rt = 'O5'  or rt = 'O7'
or rt = 'OL'  or rt = 'P1'  or rt = 'P2'  or rt = 'RE'  or rt = 'UX'
or rt = 'VY'  or rt = 'W8'  then nrt=11.1;
else nrt=rt;
rtind=nrt/100;
ziprt=zip+rtind;

************************************************************** ;
*** This section of the program eliminates             ************** ;
***   any duplicate Zip-route, day observations in the time data*******;
**************************************************************;
proc sort; by ziprt date;
proc means noprint; by ziprt date; id zip mode;
var   bud bed bnd bod rud red rnd rod
       lfdt cudt ncdt vmdt cedt dmdt nst prt ttft ntt ddtt trvlt
       rlt gct ect pdt adt padt oct nat;;
output out=time3 mean=bud bed bnd bod rud red rnd rod
       lfdt cudt ncdt vmdt cedt dmdt nst prt ttft ntt ddtt trvlt
       rlt gct ect pdt adt padt oct nat  n=sobs;


*****************************;
** Read in LF Volume Data *******;
*****************************;
DATA lfvol1; infile lfvol;
input  zip  date $ rteno  dpsl cal cnl cf seq ;
```

```
************************************************************************ ;
*** This section of the program converts alphabetic route numbers*** ;
***   and constructs a unique Zip-Route ID for each route**************;
************************************************************************;

data lfvol2; set lfvol1;
cl=cal+cnl;
nrteno=1*rteno;
rtind=nrteno/100;
ziprt=zip+rtind;

************************************************************************ ;
*** This section of the program eliminates any duplicate************ ;
***    Zip-route, day observations in the LF Volume data        *******;
************************************************************************;


proc sort; by ziprt date;
proc means noprint; by ziprt date; id zip;
var dpsl cl cf seq ;
output out=lfvol3  mean=dpsl cl cf seq n=vobs;


*****************************;
** Read in PA Volume Data *******;
*****************************;
DATA pavol1; infile pavol;
input  zip rteno $ date $ pcl sprs act blk slf sli mlf mli sff sfi mff mfi exp
pri othp;

************************************************************************ ;
*** This section of the program converts alphabetic route numbers*** ;
***   and constructs a unique Zip-Route ID for each route**************;
************************************************************************;

data pavol2; set pavol1;
if rteno = "XX" then nrteno=99.9; else
nrteno=1*rteno;
if nrteno="." then nrteno=11.1;
rtind=nrteno/100;
************************************************;
** Convert the collection mail volume from ********;
** feet and inches into piecess            *******;
************************************************;
ziprt=zip+rtind;
slfi=slf*12;
mlfi=mlf*12;
sffi=sff*12;
mffi=mff*12;
sl=slfi+sli;
ml=mlfi+mli;
sf=sffi+sfi;
mf=mffi+mfi;
sl=19*sl;
sf=10*sf;
```

```
ml=19*ml;
mf=10*mf;

******************************************************************* ;
*** This section of the program eliminates any duplicate************ ;
***    Zip-route, day observations in the PA Volume data        *******;
*********************************************************************;
proc sort; by ziprt date;
proc means noprint; by ziprt date;  id zip;
var pcl sprs act blk sl ml sf mf exp pri othp;
output out=pavol3 mean=pcl sprs act blk sl ml sf mf exp pri othp;


******************************;
** Read in Density Data *******;
******************************;
DATA dense1; infile dense;
input  zip  pop units land water;

proc sort data=dense1; by zip;

data dense1; set dense1;
if units= 0 then delete;
if land=0 then delete;


************************************;
*Combine Volume & Time Data ********;
************************************;
proc sort data=time3;  by ziprt date;
proc sort data=pavol3; by ziprt date;
proc sort data=lfvol3; by ziprt date;
data comb; merge pavol3(in=p) lfvol3(in=v) time3(in=s); by ziprt date;
if p=1 and v=1 and s=1 then source='all';

data all3; set comb;
if source='all';

proc sort data=all3; by zip;


*@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@;
*This Section of the Program Estimates the Regular Delivery Equation ;
*@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@;


************************************************;
*Combine Volume, Time, and Density Data ********;
************************************************;

data allchk; merge all3 (in=m) dense1 (in=d); by zip;
if m=1 and d=1 then source = 'mat';

data allsee; set allchk;
if source='mat';

data all; set allsee;
```

```
************************************************;
** Eliminate any negative volumes ***************;
** Create the shape volumes   *******************;
************************************************;

data all; set all;
if cl < 0 then cl = .;
if cf < 0 then cf = .;
if dpsl < 0 then dpsl=.;
if seq<0 then seq=.;
if sprs<0 then sprs=.;
if delt < 0 then delt=.;
if dp < 0 then dep=.;
if cv < 0 then cv = .;
delt=lfdt+cudt+ncdt+vmdt+cedt+dmdt ;
dp= bud+bed+bnd+bod+rud+red+rnd+rod;
let=cl+dpsl;
spr=sprs;
cv=sl+ml+sf+mf+exp+pri+othp;


proc sort; by zip date;


************************************************;
** Elinate Zip Codes with data problems    ********;
************************************************;
data all; set all;
if zip eq 1660939 then delete;
if zip eq 8365476 then delete;
if zip eq 3341404 then delete;
if zip eq 8885626 then delete;
if zip eq 3333330 then delete;
if zip eq 6617639 then delete;
if zip eq 7408660 and date eq '05/18/02' then delete;


************************************************;
** Create Zip Code - Day Data Set for Estimation****;
************************************************;
proc means noprint; by zip date;
var delt let cf seq spr cv blk dp units water land;
output out=poolr sum = delt let cf seq spr scv blk dp units water land
                 mean = adelt alet acf aseq aspr acv ablk adp aunits awater aland
n=nrts;



************************************************;
**Construct Higher Order Terms                  **;
************************************************;

data poolr; set poolr;
cv=scv;
let2=let**2;
cf2=cf**2;
```

```
seq2=seq**2;
spr2=spr**2;
cv2=cv**2;
dp2 = dp**2;
blk2=blk**2;

lf=let*cf;
lse=let*seq;
lcv=let*cv;
lspr=let*spr;
ldp=let*dp;
fse=cf*seq;
fcv=cf*cv;
fspr=cf*spr;
fdp=cf*dp;
scv=seq*cv;
sspr=seq*spr;
sdp=seq*dp;
cspr=cv*spr;
cdp=cv*dp;
spdp=spr*dp;
sqm=land;

dens=dp/sqm;
dens2=dens**2;
ldns=let*dens;
fdns=cf*dens;
sdns=seq*dens;
cdns=cv*dens;
spdns=spr*dens;
dpdns=dp*dens;


proc means;
var delt let cf seq cv spr dp dens;
output out=regmean mean=mdelt mlet mcf mseq mcv mspr mdp mdens;


************************************************;
**Estimate the Pooled Regular Delivery Model    **;
**Full Quadratic Specification                  **;
************************************************;

proc reg data=poolr outest=coef1;
model delt= let let2 cf cf2 seq seq2 cv cv2 spr spr2 dp dp2 dens dens2
            lf lse lcv lspr ldp fse fcv fspr fdp scv sspr sdp cspr cdp spdp
                ldns fdns sdns cdns spdns dpdns/vif tol acov ;



************************************************;
**Estimate the Pooled Regular Delivery Model    **;
**Restricted Quadratic Specification            **;
************************************************;


proc reg data =poolr outest=coef2;
```

```
model delt= let let2 cf cf2 seq seq2 cv cv2 spr spr2 dp dp2 dens dens2/vif tol
acov;


*********************************************************;
**Calculate Variabilities for Regular Delivery Model    **;
**Full Quadratic Specification                          **;
*********************************************************;

proc print data=coef1;

data elascal1; merge coef1 regmean (drop=_TYPE_);
pdelt=intercept+let*mlet+let2*mlet*mlet+cf*mcf+cf2*mcf*mcf+seq*mseq+seq2*mseq*ms
eq

+spr*mspr+spr2*mspr*mspr+cv*mcv+cv2*mcv*mcv+dp*mdp+dp2*mdp*mdp+dens*mdens+dens2*
mdens*mdens
     +lf*mlet*mcf+lse*mlet*mseq+lcv*mlet*mcv+lspr*mlet*mspr+ldp*mlet*mdp
       +fse*mcf*mseq+fcv*mcf*mcv+fspr*mcf*mspr+fdp*mcf*mdp

+scv*mseq*mcv+sspr*mseq*mspr+sdp*mseq*mdp+cspr*mcv*mspr+cdp*mcv*mdp+spdp*mspr*md
p

+ldns*mlet*mdens+fdns*mcf*mdens+sdns*mseq*mdens+cdns*mcv*mdens+spdns*mspr*mdens+
dpdns*mdp*mdens
;

elasl=(let*mlet +2*let2*mlet*mlet
      +lf*mlet*mcf+lse*mlet*mseq+lcv*mlet*mcv+lspr*mlet*mspr
                                  +ldp*mlet*mdp+ldns*mlet*mdens)/pdelt;

elasf=(cf*mcf   +2*cf2*mcf*mcf
      +lf*mlet*mcf+fse*mcf*mseq+fcv*mcf*mcv+fspr*mcf*mspr
                                  +fdp*mcf*mdp+fdns*mcf*mdens)/pdelt;

elass=(seq*mseq +2*seq2*mseq*mseq
+lse*mlet*mseq+fse*mcf*mseq+scv*mseq*mcv+sspr*mseq*mspr
                                  +sdp*mseq*mdp+sdns*mseq*mdens)/pdelt;

elasc=(cv*mcv   +2*cv2*mcv*mcv
+lcv*mlet*mcv+fcv*mcf*mcv+scv*mseq*mcv+cspr*mcv*mspr
                                  +cdp*mcv*mdp+cdns*mcv*mdens)/pdelt;

elasp=(spr*mspr +2*spr2*mspr*mspr
+lspr*mlet*mspr+fspr*mcf*mspr+sspr*mseq*mspr+cspr*mcv*mspr
                                  +spdp*mspr*mdp+spdns*mspr*mdens)/pdelt;

elasd=(dp*mdp   +2*dp2*mdp*mdp
+ldp*mlet*mdp+fdp*mcf*mdp+sdp*mseq*mdp+cdp*mcv*mdp+spdp*mspr*mdp
                                  +dpdns*mdp*mdens )/pdelt;

elasdns=(dens*mdens +2*dens2*mdens*mdens
+ldns*mlet*mdens+fdns*mcf*mdens+sdns*mseq*mdens+cdns*mcv*mdens+spdns*mspr*mdens
                                  +dpdns*mdp*mdens )/pdelt;
```

```
proc print data=elascal1;
var mdelt pdelt elasl elasf elass elasc elasp elasd elasdns ;



*******************************************************;
**Calculate Variabilities for Regular Delivery Model    **;
**Restricted Quadratic Specification                    **;
*******************************************************;

proc print data=coef2;
data elascal2; merge coef2 regmean (drop=_TYPE_);
pdelt=intercept+let*mlet+let2*mlet*mlet+cf*mcf+cf2*mcf*mcf+seq*mseq+seq2*mseq*ms
eq

+spr*mspr+spr2*mspr*mspr+cv*mcv+cv2*mcv*mcv+dp*mdp+dp2*mdp*mdp+dens*mdens+dens2*
mdens*mdens
     ;

elasl=(let*mlet +2*let2*mlet*mlet)/pdelt;
elasf=(cf*mcf   +2*cf2*mcf*mcf)/pdelt;
elass=(seq*mseq +2*seq2*mseq*mseq)/pdelt;
elasc=(cv*mcv   +2*cv2*mcv*mcv)/pdelt;
elasp=(spr*mspr +2*spr2*mspr*mspr)/pdelt;
elasd=(dp*mdp   +2*dp2*mdp*mdp)/pdelt;
elasdns=(dens*mdens   +2*dens2*mdens*mdens)/pdelt;



proc print data=elascal2;
var mdelt pdelt elasl elasf elass elasc elasp elasd elasdns;


*@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@;
*This Section of the Program Estimates the P/A Delivery Equation ;
*@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@;


*******************************************************;
**Eliminate Observations Without Time or Volume        **;
*******************************************************;

data allpa; set all3;
padelt=pdt+adt+padt+ddtt;
dp= bud+bed+bnd+bod+rud+red+rnd+rod;
vol=pcl+act;
if padelt=0 and vol>0 then delete;
if padelt>0 and vol=0 then delete;

proc sort; by zip date;

*************************************************;
** Create Zip Code - Day Data Set for Estimation****;
*************************************************;
proc means noprint; by zip date;
var padelt pcl act dp;
```

```
output out=poolr sum = padelt pcl act dp mean = apadelt apcl aact adp;

*********************************************************;
**Eliminate Zip Codes with No Parcels, No Accountables or **
** No Parcel/Accountable Delivery Time                    **;
*********************************************************;

data poolr; set poolr;
if padelt=0 then delete;
if pcl=0 then delete;
if act=0 then delete;
if dp =0 then delete;

************************************************;
**Construct Higher Order Terms                  **;
************************************************;
data poolz; set poolr;
dp2 = dp**2;
pcl2=pcl**2;
act2=act**2;
pact=pcl*act;
padp=pcl*dp;
acdp=act*dp;

proc means;
var  padelt pcl act dp;
output out=pregmean mean=mpadelt mpcl mact mdp;

*************************************;
**Estimate the Pooled PA Delivery Model**;
*************************************;

proc reg  data=poolz outest=coefp1;
model padelt= pcl pcl2 act act2 dp dp2 pact padp acdp/vif tol acov ;

proc print data=coefp1;

*********************************************************;
**Calculate Variabilities for P/A Delivery Model        **;
**Full Quadratic Specification                          **;
*********************************************************;

data elasp1; merge coefp1 pregmean (drop=_TYPE_);
ppadelt=intercept+pcl*mpcl+pcl2*mpcl*mpcl+act*mact+act2*mact*mact+dp*mdp+dp2*mdp
*mdp
                +pact*mpcl*mact+padp*mpcl*mdp+acdp*mact*mdp ;

elasp=(pcl*mpcl +2*pcl2*mpcl*mpcl+pact*mpcl*mact+padp*mpcl*mdp)/ppadelt;
elasa=(act*mact +2*act2*mact*mact+pact*mpcl*mact+acdp*mact*mdp)/ppadelt;
elasd=(dp*mdp   +2*dp2*mdp*mdp   +padp*mpcl*mdp+acdp*mact*mdp)/ppadelt;


proc print data=elasp1;
var  mpadelt ppadelt elasp elasa elasd;


run;
```

SAS LOG

```
NOTE: Copyright (c) 1999-2000 by SAS Institute Inc., Cary, NC, USA.
NOTE: SAS (r) Proprietary Software Release 8.1 (TS1M0)
      Licensed to IBM CORP, Site 0040699057.
NOTE: This session is executing on the WIN_PRO  platform.


NOTE: SAS initialization used:
      real time           4.06 seconds
      cpu time            1.12 seconds

1    options linesize=80;
2    options nocenter;
3    options nodate;
4    options nonumber;
5    filename timedat 'c:\ Timepool Mask.prn';
6    filename lfvol 'c:\LFVolume Mask.prn';
7    filename pavol 'c:\PAvolume Mask.prn';
8    filename dense 'c:\density Mask.prn';
9
10   ******************************;
11   *** Read in Time Data ********;
12   ******************************;
13   DATA time1; infile timedat;
14   Input  date $ zip rt $  bud bed bnd bod rud red rnd rod mode $
15          lfdt cudt ncdt vmdt cedt dmdt nst prt ttft ntt ddtt trvlt
16          rlt gct ect pdt adt padt oct nat;
17
18   ********************************************************************* ;
19   *** This section of the program converts alphabetic route numbers*** ;
20   *** and constructs a unique Zip-Route ID for each route**************;
21   *********************************************************************;
22

NOTE: The infile TIMEDAT is:

      File Name=c:\Timepool Mask.prn,
      RECFM=V,LRECL=256

NOTE: 36655 records were read from the infile TIMEDAT.
      The minimum record length was 76.
      The maximum record length was 133.
NOTE: The data set WORK.TIME1 has 36655 observations and 32 variables.
NOTE: DATA statement used:
      real time           0.87 seconds
      cpu time            0.48 seconds


23   Data time2; set time1;
24   if rt = 'XX' then rt=99.9;
25   if rt = '0A' or rt = '0B' or rt = '0D' or rt = '0E' or rt = '0W'
26   or rt = '1A'  or rt = '4A'  or rt = '4B'  or rt = 'A7'  or rt = 'C2'
27   or rt = 'C3'  or rt = 'CA'  or rt = 'CK'  or rt = 'CT'  or rt = 'CV'
28   or rt = 'ES'  or rt = 'EV'  or rt = 'F1'  or rt = 'G5'  or rt = 'HK'
29   or rt = 'IT'  or rt = 'L1'  or rt = 'L3'  or rt = 'L7'  or rt = 'MD'
30   or rt = 'MF'  or rt = 'O1'  or rt = 'O2'  or rt = 'O5'  or rt = 'O7'
```

```
31   or rt = 'OL'  or rt = 'P1'  or rt = 'P2'  or rt = 'RE'  or rt = 'UX'
32   or rt = 'VY'  or rt = 'W8'  then nrt=11.1;
33   else nrt=rt;
34   rtind=nrt/100;
35   ziprt=zip+rtind;
36
37   ********************************************************************* ;
38   *** This section of the program eliminates             ************** ;
39   *** any duplicate Zip-route, day observations in the time data*******;
40   ********************************************************************;

NOTE: Numeric values have been converted to character
      values at the places given by: (Line):(Column).
      24:22
NOTE: Character values have been converted to numeric
      values at the places given by: (Line):(Column).
      33:10
NOTE: There were 36655 observations read from the data set WORK.TIME1.
NOTE: The data set WORK.TIME2 has 36655 observations and 35 variables.
NOTE: DATA statement used:
      real time           0.14 seconds
      cpu time            0.13 seconds


41   proc sort; by ziprt date;

NOTE: There were 36655 observations read from the data set WORK.TIME2.
NOTE: The data set WORK.TIME2 has 36655 observations and 35 variables.
NOTE: PROCEDURE SORT used:
      real time           5.37 seconds
      cpu time            0.28 seconds


42   proc means noprint; by ziprt date; id zip mode;
43   var   bud bed bnd bod rud red rnd rod
44          lfdt cudt ncdt vmdt cedt dmdt nst prt ttft ntt ddtt trvlt
45          rlt gct ect pdt adt padt oct nat;;
46   output out=time3 mean=bud bed bnd bod rud red rnd rod
47          lfdt cudt ncdt vmdt cedt dmdt nst prt ttft ntt ddtt trvlt
48          rlt gct ect pdt adt padt oct nat  n=sobs;
49
50
51   ****************************;
52   ** Read in LF Volume Data *******;
53   ****************************;

NOTE: There were 36655 observations read from the data set WORK.TIME2.
NOTE: The data set WORK.TIME3 has 36647 observations and 35 variables.
NOTE: PROCEDURE MEANS used:
      real time           0.90 seconds
      cpu time            0.73 seconds


54   DATA lfvol1; infile lfvol;
55   input  zip  date $ rteno  dpsl cal cnl cf seq ;
56
57
```

```
58   ********************************************************************* ;
59   *** This section of the program converts alphabetic route numbers*** ;
60   *** and constructs a unique Zip-Route ID for each route**************;
61   ********************************************************************;
62

NOTE: The infile LFVOL is:

      File Name=c:\LFVolume Mask.prn,
      RECFM=V,LRECL=256

NOTE: 40668 records were read from the infile LFVOL.
      The minimum record length was 27.
      The maximum record length was 42.
NOTE: The data set WORK.LFVOL1 has 40668 observations and 8 variables.
NOTE: DATA statement used:
      real time           0.26 seconds
      cpu time            0.13 seconds


63   data lfvol2; set lfvol1;
64   cl=cal+cnl;
65   nrteno=1*rteno;
66   rtind=nrteno/100;
67   ziprt=zip+rtind;
68
69   ********************************************************************* ;
70   *** This section of the program eliminates any duplicate************ ;
71   ***  Zip-route, day observations in the LF Volume data        *******;
72   ********************************************************************;
73
74

NOTE: There were 40668 observations read from the data set WORK.LFVOL1.
NOTE: The data set WORK.LFVOL2 has 40668 observations and 12 variables.
NOTE: DATA statement used:
      real time           0.10 seconds
      cpu time            0.06 seconds


75   proc sort; by ziprt date;

NOTE: There were 40668 observations read from the data set WORK.LFVOL2.
NOTE: The data set WORK.LFVOL2 has 40668 observations and 12 variables.
NOTE: PROCEDURE SORT used:
      real time           0.15 seconds
      cpu time            0.15 seconds


76   proc means noprint; by ziprt date; id zip;
77   var dpsl cl cf seq ;
78   output out=lfvol3  mean=dpsl cl cf seq n=vobs;
79
80
81   ****************************;
82   ** Read in PA Volume Data *******;
83   ****************************;
```

```
NOTE: There were 40668 observations read from the data set WORK.LFVOL2.
NOTE: The data set WORK.LFVOL3 has 40653 observations and 10 variables.
NOTE: PROCEDURE MEANS used:
      real time           0.42 seconds
      cpu time            0.42 seconds


84   DATA pavol1; infile pavol;
85   input  zip rteno $ date $ pcl sprs act blk slf sli mlf mli sff sfi mff mfi
85 ! exp pri othp;
86
87   ******************************************************************* ;
88   *** This section of the program converts alphabetic route numbers*** ;
89   *** and constructs a unique Zip-Route ID for each route**************;
90   *******************************************************************;
91

NOTE: The infile PAVOL is:

      File Name=c:\PAvolume Mask.prn,
      RECFM=V,LRECL=256

NOTE: 47531 records were read from the infile PAVOL.
      The minimum record length was 47.
      The maximum record length was 65.
NOTE: The data set WORK.PAVOL1 has 47531 observations and 18 variables.
NOTE: DATA statement used:
      real time           0.82 seconds
      cpu time            0.24 seconds


92   data pavol2; set pavol1;
93   if rteno = "XX" then nrteno=99.9; else
94   nrteno=1*rteno;
95   if nrteno="." then nrteno=11.1;
96   rtind=nrteno/100;
97   ************************************************;
98   ** Convert the collection mail volume from ********;
99   ** feet and inches into piecess            *******;
100  ************************************************;
101  ziprt=zip+rtind;
102  slfi=slf*12;
103  mlfi=mlf*12;
104  sffi=sff*12;
105  mffi=mff*12;
106  sl=slfi+sli;
107  ml=mlfi+mli;
108  sf=sffi+sfi;
109  mf=mffi+mfi;
110  sl=19*sl;
111  sf=10*sf;
112  ml=19*ml;
113  mf=10*mf;
114
115  ******************************************************************* ;
```

```
116  *** This section of the program eliminates any duplicate************ ;

117  ***  Zip-route, day observations in the PA Volume data        *******;
118  ************************************************************************;

NOTE: Character values have been converted to numeric
      values at the places given by: (Line):(Column).
      94:10   95:11
NOTE: There were 47531 observations read from the data set WORK.PAVOL1.
NOTE: The data set WORK.PAVOL2 has 47531 observations and 29 variables.
NOTE: DATA statement used:
      real time           0.32 seconds
      cpu time            0.17 seconds


119  proc sort; by ziprt date;

NOTE: There were 47531 observations read from the data set WORK.PAVOL2.
NOTE: The data set WORK.PAVOL2 has 47531 observations and 29 variables.
NOTE: PROCEDURE SORT used:
      real time           6.10 seconds
      cpu time            0.26 seconds


120  proc means noprint; by ziprt date;  id zip;
121  var pcl sprs act blk sl ml sf mf exp pri othp;
122  output out=pavol3 mean=pcl sprs act blk sl ml sf mf exp pri othp;
123
124
125  ******************************;
126  ** Read in Density Data *******;
127  ******************************;

NOTE: There were 47531 observations read from the data set WORK.PAVOL2.
NOTE: The data set WORK.PAVOL3 has 47531 observations and 16 variables.
NOTE: PROCEDURE MEANS used:
      real time           0.64 seconds
      cpu time            0.64 seconds


128  DATA dense1; infile dense;
129  input  zip  pop units land water;
130

NOTE: The infile DENSE is:

      File Name=c:\density Mask.prn,
      RECFM=V,LRECL=256

NOTE: 31913 records were read from the infile DENSE.
      The minimum record length was 14.
      The maximum record length was 33.
NOTE: The data set WORK.DENSE1 has 31913 observations and 5 variables.
NOTE: DATA statement used:
      real time           0.17 seconds
      cpu time            0.09 seconds
```

```
131  proc sort data=dense1; by zip;
132

NOTE: There were 31913 observations read from the data set WORK.DENSE1.
NOTE: The data set WORK.DENSE1 has 31913 observations and 5 variables.
NOTE: PROCEDURE SORT used:
      real time           0.10 seconds
      cpu time            0.10 seconds


133  data dense1; set dense1;
134  if units= 0 then delete;
135  if land=0 then delete;
136
137
138  ***********************************;
139  *Combine Volume & Time Data ********;
140  ***********************************;

NOTE: There were 31913 observations read from the data set WORK.DENSE1.
NOTE: The data set WORK.DENSE1 has 31827 observations and 5 variables.
NOTE: DATA statement used:
      real time           0.03 seconds
      cpu time            0.03 seconds


141  proc sort data=time3;  by ziprt date;

NOTE: There were 36647 observations read from the data set WORK.TIME3.
NOTE: The data set WORK.TIME3 has 36647 observations and 35 variables.
NOTE: PROCEDURE SORT used:
      real time           1.39 seconds
      cpu time            0.17 seconds



142  proc sort data=pavol3; by ziprt date;

NOTE: There were 47531 observations read from the data set WORK.PAVOL3.
NOTE: The data set WORK.PAVOL3 has 47531 observations and 16 variables.
NOTE: PROCEDURE SORT used:
      real time           2.51 seconds
      cpu time            0.15 seconds


143  proc sort data=lfvol3; by ziprt date;

NOTE: There were 40653 observations read from the data set WORK.LFVOL3.
NOTE: The data set WORK.LFVOL3 has 40653 observations and 10 variables.
NOTE: PROCEDURE SORT used:
      real time           0.14 seconds
      cpu time            0.14 seconds


144  data comb; merge pavol3(in=p) lfvol3(in=v) time3(in=s); by ziprt date;
145  if p=1 and v=1 and s=1 then source='all';
```

```
NOTE: There were 47531 observations read from the data set WORK.PAVOL3.
NOTE: There were 40653 observations read from the data set WORK.LFVOL3.
NOTE: There were 36647 observations read from the data set WORK.TIME3.
NOTE: The data set WORK.COMB has 53907 observations and 52 variables.
NOTE: DATA statement used:
      real time           2.51 seconds
      cpu time            0.26 seconds


data all3; set comb;
if source='all';

NOTE: There were 53907 observations read from the data set WORK.COMB.
NOTE: The data set WORK.ALL3 has 31255 observations and 52 variables.
NOTE: DATA statement used:
      real time           0.12 seconds
      cpu time            0.12 seconds


proc sort data=all3; by zip;

*@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@;
*This Section of the Program Estimates the Regular Delivery Equation ;
*@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@;

************************************************;
*Combine Volume, Time, and Density Data ********;
************************************************;

NOTE: There were 31255 observations read from the data set WORK.ALL3.
NOTE: The data set WORK.ALL3 has 31255 observations and 52 variables.
NOTE: PROCEDURE SORT used:
      real time           3.03 seconds
      cpu time            0.28 seconds


data allchk; merge all3 (in=m) dense1 (in=d); by zip;
if m=1 and d=1 then source = 'mat';

NOTE: There were 31255 observations read from the data set WORK.ALL3.
NOTE: There were 31827 observations read from the data set WORK.DENSE1.
NOTE: The data set WORK.ALLCHK has 62932 observations and 56 variables.
NOTE: DATA statement used:
      real time           5.43 seconds
      cpu time            0.24 seconds


data allsee; set allchk;
if source='mat';
```

```
NOTE: There were 62932 observations read from the data set WORK.ALLCHK.
NOTE: The data set WORK.ALLSEE has 31041 observations and 56 variables.
NOTE: DATA statement used:
      real time           0.14 seconds
      cpu time            0.14 seconds


168  data all; set allsee;
169
170  ************************************************;
171  ** Eliminate any negative volumes ***************;
172  ** Create the shape volumes   *******************;
173  ************************************************;
174

NOTE: There were 31041 observations read from the data set WORK.ALLSEE.
NOTE: The data set WORK.ALL has 31041 observations and 56 variables.
NOTE: DATA statement used:
      real time           3.28 seconds
      cpu time            0.10 seconds


175  data all; set all;
176  if cl < 0 then cl = .;
177  if cf < 0 then cf = .;
178  if dpsl < 0 then dpsl=.;
179  if seq<0 then seq=.;
180  if sprs<0 then sprs=.;
181  if delt < 0 then delt=.;
182  if dp < 0 then dep=.;
183  if cv < 0 then cv = .;
184  delt=lfdt+cudt+ncdt+vmdt+cedt+dmdt ;
185  dp= bud+bed+bnd+bod+rud+red+rnd+rod;
186  let=cl+dpsl;
187  spr=sprs;
188  cv=sl+ml+sf+mf+exp+pri+othp;
189
190

NOTE: Missing values were generated as a result of performing an operation on
      missing values.
      Each place is given by: (Number of times) at (Line):(Column).
      15 at 186:7
NOTE: There were 31041 observations read from the data set WORK.ALL.
NOTE: The data set WORK.ALL has 31041 observations and 62 variables.
NOTE: DATA statement used:
      real time           0.17 seconds
      cpu time            0.14 seconds


191  proc sort; by zip date;
192
193
194  ************************************************;
195  ** Elinate Zip Codes with data problems    ********;
196  ************************************************;
```

```
NOTE: There were 31041 observations read from the data set WORK.ALL.
NOTE: The data set WORK.ALL has 31041 observations and 62 variables.
NOTE: PROCEDURE SORT used:
      real time           4.54 seconds
      cpu time            0.34 seconds


197  data all; set all;
198  if zip eq 1660939 then delete;
199  if zip eq 8365476 then delete;
200  if zip eq 3341404 then delete;
201  if zip eq 8885626 then delete;
202  if zip eq 3333330 then delete;
203  if zip eq 6617639 then delete;
204  if zip eq 7408660 and date eq '05/18/02' then delete;
205
206
207  ************************************************;
208  ** Create Zip Code - Day Data Set for Estimation****;
209  ************************************************;

NOTE: There were 31041 observations read from the data set WORK.ALL.
NOTE: The data set WORK.ALL has 30087 observations and 62 variables.
NOTE: DATA statement used:
      real time           0.10 seconds
      cpu time            0.09 seconds


210  proc means noprint; by zip date;
211  var delt let cf seq spr cv blk dp units water land;
212  output out=poolr sum = delt let cf seq spr scv blk dp units water land
213                  mean = adelt alet acf aseq aspr acv ablk adp aunits awater
213! aland n=nrts;
214
215
216
217  ************************************************;
218  **Construct Higher Order Terms                 **;
219  ************************************************;
220

NOTE: There were 30087 observations read from the data set WORK.ALL.
NOTE: The data set WORK.POOLR has 1545 observations and 27 variables.
NOTE: PROCEDURE MEANS used:
      real time           0.09 seconds
      cpu time            0.07 seconds


221  data poolr; set poolr;
222  cv=scv;
223  let2=let**2;
224  cf2=cf**2;
225  seq2=seq**2;
226  spr2=spr**2;
227  cv2=cv**2;
228  dp2 = dp**2;
```

```
229  blk2=blk**2;
230
231  lf=let*cf;
232  lse=let*seq;
233  lcv=let*cv;
234  lspr=let*spr;
235  ldp=let*dp;
236  fse=cf*seq;
237  fcv=cf*cv;
238  fspr=cf*spr;
239  fdp=cf*dp;
240  scv=seq*cv;
241  sspr=seq*spr;
242  sdp=seq*dp;
243  cspr=cv*spr;
244  cdp=cv*dp;
245  spdp=spr*dp;
246  sqm=land;
247
248  dens=dp/sqm;
249  dens2=dens**2;
250  ldns=let*dens;
251  fdns=cf*dens;
252  sdns=seq*dens;
253  cdns=cv*dens;
254  spdns=spr*dens;
255  dpdns=dp*dens;

256
257

NOTE: There were 1545 observations read from the data set WORK.POOLR.
NOTE: The data set WORK.POOLR has 1545 observations and 58 variables.
NOTE: DATA statement used:
      real time           0.04 seconds
      cpu time            0.04 seconds


258  proc means;
259  var delt let cf seq cv spr dp dens;
260  output out=regmean mean=mdelt mlet mcf mseq mcv mspr mdp mdens;
261
262
263  ************************************************;
264  **Estimate the Pooled Regular Delivery Model    **;
265  **Full Quadratic Specification                  **;
266  ************************************************;
267

NOTE: There were 1545 observations read from the data set WORK.POOLR.
NOTE: The data set WORK.REGMEAN has 1 observations and 10 variables.
NOTE: PROCEDURE MEANS used:
      real time           0.78 seconds
      cpu time            0.14 seconds


268  proc reg data=poolr outest=coef1;
```

```
269  model delt= let let2 cf cf2 seq seq2 cv cv2 spr spr2 dp dp2 dens dens2
270              lf lse lcv lspr ldp fse fcv fspr fdp scv sspr sdp cspr cdp spdp

271              ldns fdns sdns cdns spdns dpdns/vif tol acov ;
272
273
274
275  ************************************************;
276  **Estimate the Pooled Regular Delivery Model    **;
277  **Restricted Quadratic Specification           **;
278  ************************************************;
279
280

WARNING: The variable _NAME_ or _TYPE_ exists in a data set that is not
         TYPE=CORR, COV, SSCP, etc.
NOTE: 1545 observations read.
NOTE: 1545 observations used in computations.
NOTE: There were 1545 observations read from the data set WORK.POOLR.
NOTE: The data set WORK.COEF1 has 1 observations and 41 variables.
NOTE: PROCEDURE REG used:
      real time           0.96 seconds
      cpu time            0.14 seconds


281  proc reg data =poolr outest=coef2;
282
283  model delt= let let2 cf cf2 seq seq2 cv cv2 spr spr2 dp dp2 dens dens2/vif
283! tol acov;
284
285
286  ********************************************************;
287  **Calculate Variabilities for Regular Delivery Model    **;
288  **Full Quadratic Specification                          **;
289  ********************************************************;
290

WARNING: The variable _NAME_ or _TYPE_ exists in a data set that is not
         TYPE=CORR, COV, SSCP, etc.
NOTE: 1545 observations read.
NOTE: 1545 observations used in computations.
NOTE: There were 1545 observations read from the data set WORK.POOLR.
NOTE: The data set WORK.COEF2 has 1 observations and 20 variables.
NOTE: PROCEDURE REG used:
      real time           0.14 seconds
      cpu time            0.03 seconds


291  proc print data=coef1;
292

NOTE: There were 1 observations read from the data set WORK.COEF1.
NOTE: PROCEDURE PRINT used:
      real time           0.03 seconds
      cpu time            0.01 seconds
```

```
293  data elascal1; merge coef1 regmean (drop=_TYPE_);
294  pdelt=intercept+let*mlet+let2*mlet*mlet+cf*mcf+cf2*mcf*mcf+seq*mseq+seq2*ms
294! eq*mseq
295       +spr*mspr+spr2*mspr*mspr+cv*mcv+cv2*mcv*mcv+dp*mdp+dp2*mdp*mdp+dens*md
295! ens+dens2*mdens*mdens
296       +lf*mlet*mcf+lse*mlet*mseq+lcv*mlet*mcv+lspr*mlet*mspr+ldp*mlet*mdp
297       +fse*mcf*mseq+fcv*mcf*mcv+fspr*mcf*mspr+fdp*mcf*mdp
298       +scv*mseq*mcv+sspr*mseq*mspr+sdp*mseq*mdp+cspr*mcv*mspr+cdp*mcv*mdp+sp
298! dp*mspr*mdp
299       +ldns*mlet*mdens+fdns*mcf*mdens+sdns*mseq*mdens+cdns*mcv*mdens+spdns*m
299! spr*mdens+dpdns*mdp*mdens
300  ;
301
302  elasl=(let*mlet +2*let2*mlet*mlet
302! +lf*mlet*mcf+lse*mlet*mseq+lcv*mlet*mcv+lspr*mlet*mspr
303                                      +ldp*mlet*mdp+ldns*mlet*mdens)/pdelt;
304
305  elasf=(cf*mcf   +2*cf2*mcf*mcf
305! +lf*mlet*mcf+fse*mcf*mseq+fcv*mcf*mcv+fspr*mcf*mspr
306                                      +fdp*mcf*mdp+fdns*mcf*mdens)/pdelt;
307
308  elass=(seq*mseq +2*seq2*mseq*mseq
308! +lse*mlet*mseq+fse*mcf*mseq+scv*mseq*mcv+sspr*mseq*mspr
309                                      +sdp*mseq*mdp+sdns*mseq*mdens)/pdelt;
310
311  elasc=(cv*mcv   +2*cv2*mcv*mcv
311! +lcv*mlet*mcv+fcv*mcf*mcv+scv*mseq*mcv+cspr*mcv*mspr
312                                      +cdp*mcv*mdp+cdns*mcv*mdens)/pdelt;
313
314  elasp=(spr*mspr +2*spr2*mspr*mspr
314! +lspr*mlet*mspr+fspr*mcf*mspr+sspr*mseq*mspr+cspr*mcv*mspr
315                                      +spdp*mspr*mdp+spdns*mspr*mdens)/pdelt;

316
317  elasd=(dp*mdp   +2*dp2*mdp*mdp
317! +ldp*mlet*mdp+fdp*mcf*mdp+sdp*mseq*mdp+cdp*mcv*mdp+spdp*mspr*mdp
318                                      +dpdns*mdp*mdens )/pdelt;
319
320  elasdns=(dens*mdens +2*dens2*mdens*mdens
320! +ldns*mlet*mdens+fdns*mcf*mdens+sdns*mseq*mdens+cdns*mcv*mdens+spdns*mspr*m
320! dens
321                                      +dpdns*mdp*mdens )/pdelt;
322
323

NOTE: There were 1 observations read from the data set WORK.COEF1.
NOTE: There were 1 observations read from the data set WORK.REGMEAN.
NOTE: The data set WORK.ELASCAL1 has 1 observations and 58 variables.
NOTE: DATA statement used:
      real time           0.03 seconds
      cpu time            0.03 seconds


324  proc print data=elascal1;
325  var mdelt pdelt elasl elasf elass elasc elasp elasd elasdns ;
326
327
```

```
*********************************************************;
**Calculate Variabilities for Regular Delivery Model    **;
**Restricted Quadratic Specification                    **;
*********************************************************;

NOTE: There were 1 observations read from the data set WORK.ELASCAL1.
NOTE: PROCEDURE PRINT used:
      real time           0.00 seconds
      cpu time            0.00 seconds


proc print data=coef2;

NOTE: There were 1 observations read from the data set WORK.COEF2.
NOTE: PROCEDURE PRINT used:
      real time           0.00 seconds
      cpu time            0.00 seconds


data elascal2; merge coef2 regmean (drop=_TYPE_);
pdelt=intercept+let*mlet+let2*mlet*mlet+cf*mcf+cf2*mcf*mcf+seq*mseq+seq2*mseq*mseq
     +spr*mspr+spr2*mspr*mspr+cv*mcv+cv2*mcv*mcv+dp*mdp+dp2*mdp*mdp+dens*mdens+dens2*mdens*mdens
     ;

elasl=(let*mlet +2*let2*mlet*mlet)/pdelt;
elasf=(cf*mcf   +2*cf2*mcf*mcf)/pdelt;
elass=(seq*mseq +2*seq2*mseq*mseq)/pdelt;
elasc=(cv*mcv   +2*cv2*mcv*mcv)/pdelt;
elasp=(spr*mspr +2*spr2*mspr*mspr)/pdelt;
elasd=(dp*mdp   +2*dp2*mdp*mdp)/pdelt;
elasdns=(dens*mdens   +2*dens2*mdens*mdens)/pdelt;

NOTE: There were 1 observations read from the data set WORK.COEF2.
NOTE: There were 1 observations read from the data set WORK.REGMEAN.
NOTE: The data set WORK.ELASCAL2 has 1 observations and 37 variables.
NOTE: DATA statement used:
      real time           0.01 seconds
      cpu time            0.01 seconds


proc print data=elascal2;
var mdelt pdelt elasl elasf elass elasc elasp elasd elasdns;

*@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@;
*This Section of the Program Estimates the P/A Delivery Equation ;
*@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@;
```

```
360
361
362  ********************************************************;
363  **Eliminate Observations Without Time or Volume        **;
364  ********************************************************;
365

NOTE: There were 1 observations read from the data set WORK.ELASCAL2.
NOTE: PROCEDURE PRINT used:
      real time           0.04 seconds
      cpu time            0.00 seconds


366  data allpa; set all3;
367  padelt=pdt+adt+padt+ddtt;
368  dp= bud+bed+bnd+bod+rud+red+rnd+rod;
369  vol=pcl+act;
370  if padelt=0 and vol>0 then delete;
371  if padelt>0 and vol=0 then delete;
372

NOTE: There were 31255 observations read from the data set WORK.ALL3.
NOTE: The data set WORK.ALLPA has 26072 observations and 55 variables.
NOTE: DATA statement used:
      real time           0.09 seconds
      cpu time            0.09 seconds


373  proc sort; by zip date;
374
375  ****************************************************;
376  ** Create Zip Code - Day Data Set for Estimation****;
377  ****************************************************;

NOTE: There were 26072 observations read from the data set WORK.ALLPA.
NOTE: The data set WORK.ALLPA has 26072 observations and 55 variables.
NOTE: PROCEDURE SORT used:
      real time           2.10 seconds
      cpu time            0.21 seconds


378  proc means noprint; by zip date;
379  var padelt pcl act dp;
380  output out=poolr sum = padelt pcl act dp mean = apadelt apcl aact adp;
381
382  ********************************************************;
383  **Eliminate Zip Codes with No Parcels, No Accountables or **
384  ** No Parcel/Accountable Delivery Time                  **;
385  ********************************************************;
386

NOTE: There were 26072 observations read from the data set WORK.ALLPA.
NOTE: The data set WORK.POOLR has 1629 observations and 12 variables.
NOTE: PROCEDURE MEANS used:
      real time           0.54 seconds
      cpu time            0.07 seconds
```

```
387  data poolr; set poolr;
388  if padelt=0 then delete;
389  if pcl=0 then delete;
390  if act=0 then delete;
391  if dp =0 then delete;
392
393  ************************************************;
394  **Construct Higher Order Terms                  **;
395  ************************************************;
```

```
NOTE: There were 1629 observations read from the data set WORK.POOLR.
NOTE: The data set WORK.POOLR has 1535 observations and 12 variables.
NOTE: DATA statement used:
      real time           0.03 seconds
      cpu time            0.03 seconds
```

```
396  data poolz; set poolr;
397  dp2 = dp**2;
398  pcl2=pcl**2;
399  act2=act**2;
400  pact=pcl*act;
401  padp=pcl*dp;
402  acdp=act*dp;
403
404
405
```

```
NOTE: There were 1535 observations read from the data set WORK.POOLR.
NOTE: The data set WORK.POOLZ has 1535 observations and 18 variables.
NOTE: DATA statement used:
      real time           0.01 seconds
      cpu time            0.01 seconds
```

```
406  proc means;
407  var  padelt pcl act dp;
408  output out=pregmean mean=mpadelt mpcl mact mdp;
409
410
411  ***************************************;
412  **Estimate the Pooled PA Delivery Model**;
413  ***************************************;
414
```

```
NOTE: There were 1535 observations read from the data set WORK.POOLZ.
NOTE: The data set WORK.PREGMEAN has 1 observations and 6 variables.
NOTE: PROCEDURE MEANS used:
      real time           0.01 seconds
      cpu time            0.01 seconds
```

```
415  proc reg  data=poolz outest=coefp1;
416  model padelt= pcl pcl2 act act2 dp dp2 pact padp acdp/vif tol acov ;
417
```

```
WARNING: The variable _NAME_ or _TYPE_ exists in a data set that is not
         TYPE=CORR, COV, SSCP, etc.
NOTE: 1535 observations read.
NOTE: 1535 observations used in computations.
NOTE: There were 1535 observations read from the data set WORK.POOLZ.
NOTE: The data set WORK.COEFP1 has 1 observations and 15 variables.
NOTE: PROCEDURE REG used:
      real time           0.06 seconds
      cpu time            0.04 seconds


418  proc print data=coefp1;
419
420  ********************************************************;
421  **Calculate Variabilities for P/A Delivery Model        **;
422  **Full Quadratic Specification                          **;
423  ********************************************************;
424

NOTE: There were 1 observations read from the data set WORK.COEFP1.
NOTE: PROCEDURE PRINT used:
      real time           0.00 seconds
      cpu time            0.00 seconds


425  data elasp1; merge coefp1 pregmean (drop=_TYPE_);
426  ppadelt=intercept+pcl*mpcl+pcl2*mpcl*mpcl+act*mact+act2*mact*mact+dp*mdp+dp
426! 2*mdp*mdp
427                    +pact*mpcl*mact+padp*mpcl*mdp+acdp*mact*mdp ;
428
429  elasp=(pcl*mpcl +2*pcl2*mpcl*mpcl+pact*mpcl*mact+padp*mpcl*mdp)/ppadelt;
430  elasa=(act*mact +2*act2*mact*mact+pact*mpcl*mact+acdp*mact*mdp)/ppadelt;
431  elasd=(dp*mdp   +2*dp2*mdp*mdp   +padp*mpcl*mdp+acdp*mact*mdp)/ppadelt;
432
433

NOTE: There were 1 observations read from the data set WORK.COEFP1.
NOTE: There were 1 observations read from the data set WORK.PREGMEAN.
NOTE: The data set WORK.ELASP1 has 1 observations and 24 variables.
NOTE: DATA statement used:
      real time           0.01 seconds
      cpu time            0.01 seconds


434  proc print data=elasp1;
435  var  mpadelt ppadelt elasp elasa elasd;
436
437
438
439  run;

NOTE: There were 1 observations read from the data set WORK.ELASP1.
NOTE: PROCEDURE PRINT used:
      real time           0.00 seconds
      cpu time            0.00 seconds
```

SAS LISTING

The SAS System

The MEANS Procedure

Variable	N	Mean	Std Dev	Minimum	Maximum
delt	1545	222595.34	155029.70	2711.00	843493.00
let	1545	36007.95	26665.41	425.0000000	212665.00
cf	1545	11799.20	9984.98	103.0000000	61573.00
seq	1545	3528.40	6333.08	0	67595.00
cv	1545	4969.46	6975.64	0	88201.00
spr	1545	373.2679612	326.3759862	0	3470.00
dp	1545	9462.31	5817.34	196.0000000	34378.00
dens	1545	71.4975563	105.9993942	0.4480750	738.8297872

The SAS System

The REG Procedure
Model: MODEL1
Dependent Variable: delt

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	35	3.161705E13	9.033442E11	248.22	<.0001
Error	1509	5.491768E12	3639342384		
Corrected Total	1544	3.710882E13			

Root MSE	60327	R-Square	0.8520
Dependent Mean	222595	Adj R-Sq	0.8486
Coeff Var	27.10163		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Tolerance
Intercept	1	-13416	5170.03967	-2.59	0.0096	.
let	1	1.65973	0.37902	4.38	<.0001	0.02308
let2	1	0.00000332	0.00000419	0.79	0.4278	0.01054
cf	1	1.77838	0.81842	2.17	0.0299	0.03530
cf2	1	-0.00007339	0.00001958	-3.75	0.0002	0.03192
seq	1	1.19988	0.87984	1.36	0.1729	0.07592
seq2	1	0.00003010	0.00001639	1.84	0.0664	0.21725
cv	1	2.89920	1.09084	2.66	0.0079	0.04071

cv2	1	0.00001721	0.00001026	1.68	0.0937	0.14922
spr	1	-19.99274	23.45878	-0.85	0.3942	0.04021

Parameter Estimates

Variable	DF	Variance Inflation
Intercept	1	0
let	1	43.33661
let2	1	94.84567
cf	1	28.33147
cf2	1	31.33313
seq	1	13.17236
seq2	1	4.60295
cv	1	24.56470
cv2	1	6.70162
spr	1	24.86976

The REG Procedure
Model: MODEL1
Dependent Variable: delt

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Tolerance
spr2	1	-0.03286	0.01342	-2.45	0.0145	0.03906
dp	1	17.92620	1.36341	13.15	<.0001	0.03747
dp2	1	-0.00055680	0.00008397	-6.63	<.0001	0.01336
dens	1	-22.49610	57.91776	-0.39	0.6978	0.06254
dens2	1	0.13666	0.08543	1.60	0.1099	0.10429
lf	1	-0.00003992	0.00001428	-2.80	0.0052	0.01020
lse	1	0.00002413	0.00001870	1.29	0.1972	0.04486
lcv	1	4.387093E-7	0.00002167	0.02	0.9839	0.02739
lspr	1	-0.00053443	0.00039696	-1.35	0.1784	0.01035
ldp	1	0.00003417	0.00003103	1.10	0.2709	0.00604
fse	1	-0.00004598	0.00003638	-1.26	0.2064	0.10545
fcv	1	0.00016363	0.00003920	4.17	<.0001	0.07364
fspr	1	0.00115	0.00083926	1.37	0.1717	0.02260
fdp	1	0.00036350	0.00006068	5.99	<.0001	0.01497
scv	1	-0.00039998	0.00005278	-7.58	<.0001	0.12614
sspr	1	0.00204	0.00128	1.60	0.1109	0.07965
sdp	1	-0.00004283	0.00006871	-0.62	0.5331	0.05234
cspr	1	-0.00334	0.00087407	-3.82	0.0001	0.09718
cdp	1	0.00005436	0.00008930	0.61	0.5428	0.03241
spdp	1	0.00707	0.00200	3.54	0.0004	0.01084
ldns	1	-0.00146	0.00122	-1.20	0.2321	0.04969
fdns	1	-0.01216	0.00332	-3.67	0.0003	0.08876
sdns	1	0.00488	0.00488	1.00	0.3180	0.36673
cdns	1	-0.00918	0.00373	-2.46	0.0139	0.13030
spdns	1	-0.27399	0.10434	-2.63	0.0087	0.10092
dpdns	1	0.00847	0.00453	1.87	0.0615	0.04905

Parameter Estimates

Variable	DF	Variance Inflation
spr2	1	25.60418
dp	1	26.68854
dp2	1	74.85065
dens	1	15.99023
dens2	1	9.58862
lf	1	98.04595
lse	1	22.29321
lcv	1	36.50874
lspr	1	96.61249
ldp	1	165.55972
fse	1	9.48315

The REG Procedure
Model: MODEL1
Dependent Variable: delt

Parameter Estimates

Variable	DF	Variance Inflation
fcv	1	13.57871
fspr	1	44.25224
fdp	1	66.80544
scv	1	7.92763
sspr	1	12.55432
sdp	1	19.10572
cspr	1	10.29057
cdp	1	30.85853
spdp	1	92.26812
ldns	1	20.12307
fdns	1	11.26671
sdns	1	2.72678
cdns	1	7.67486
spdns	1	9.90907
dpdns	1	20.38741

The REG Procedure
Model: MODEL1
Dependent Variable: delt

Consistent Covariance of Estimates

Variable	Intercept	let	let2	cf	cf2
Intercept	12078313.908	-268.078506	-0.000703507	-17.61988476	0.0020465008
let	-268.078506	0.2551319892	6.2840511E-7	-0.255181102	1.6628809E-6
let2	-0.000703507	6.2840511E-7	2.848118E-11	-2.104808E-7	1.400181E-11
cf	-17.61988476	-0.255181102	-2.104808E-7	0.8225748138	-8.44726E-6
cf2	0.0020465008	1.6628809E-6	1.400181E-11	-8.44726E-6	5.942056E-10
seq	-533.7097405	0.0415578458	-5.394829E-7	-0.039712221	1.2063097E-6

seq2	-0.008921686	8.5851902E-7	-3.17681E-12	5.2005062E-7	-3.30546E-11
cv	-845.5649586	0.0018419884	-5.616691E-7	-0.1486875	1.0469485E-6
cv2	-0.008689722	7.8271218E-7	3.397225E-12	-1.827134E-7	-4.27446E-11
spr	-7681.790926	-3.172725127	5.7230558E-7	0.0457697148	-7.80995E-6
spr2	-1.808936839	0.0001227996	2.2848181E-8	-0.000368773	7.0625897E-8
dp	-868.3147145	-0.418916978	-1.589999E-6	0.0848629344	9.1079601E-7
dp2	-0.031038624	0.0000217756	2.225872E-10	-0.000012425	2.864572E-10
dens	-46956.71314	-2.134431803	0.0000391505	-0.088439877	0.0000135636
dens2	33.433241833	0.0040904375	-2.112645E-8	0.0037431262	-8.33661E-8
lf	0.0024636438	-2.016324E-6	-7.0587E-11	1.8886818E-6	-1.60126E-10
lse	0.020204845	-5.970345E-6	1.859554E-11	4.6000357E-6	3.361814E-11
lcv	-0.003043641	-5.500963E-6	-1.08461E-11	6.7498858E-6	4.497385E-12
lspr	-0.029826206	-0.000027061	-1.289304E-9	-0.000013886	2.315696E-10
ldp	0.0206638321	-0.000012886	-1.41319E-10	0.0000113912	6.269945E-12
fse	0.0046180278	3.0636534E-6	-1.07612E-11	-8.138855E-6	-4.76138E-11
fcv	-0.004304311	5.2073625E-6	2.720824E-11	-0.00001265	-1.533E-10
fspr	-0.026248525	0.0000732821	2.6543219E-9	5.4836925E-6	-4.044489E-9
fdp	-0.002263897	0.0000111398	1.57975E-10	-0.000022869	-4.66792E-10
scv	0.0387530143	-4.798545E-6	-3.36247E-11	3.3860369E-7	-6.56102E-11
sspr	0.0703746861	0.0001521212	7.974195E-10	-0.000036431	-4.83653E-11
sdp	-0.045676708	8.9336006E-6	-2.66027E-11	-7.788185E-6	1.371854E-11
cspr	0.4219742437	0.0000619145	-9.66861E-11	-0.000135251	-4.50845E-10
cdp	0.0718432326	0.0000133664	7.842404E-11	3.3102072E-6	2.772265E-10
spdp	0.5261891177	0.0001649962	-3.96252E-10	0.0001316734	-3.367363E-9
ldns	-0.057630996	-0.00018653	-3.507161E-9	0.0000704626	-5.585617E-9
fdns	-0.266342101	0.0002972548	6.526529E-10	-0.001326206	2.2488625E-8
sdns	1.3943704375	0.0000488005	1.4468628E-9	0.0003161185	-3.330112E-9
cdns	3.7450733814	-0.000088824	9.85161E-10	0.0004864929	5.0293757E-9
spdns	79.637536465	-0.002120818	-5.841759E-8	-0.001928035	1.1198478E-7
dpdns	1.214577758	0.0002860801	7.2538309E-9	0.0006744778	-3.411181E-9

Consistent Covariance of Estimates

Variable	seq	seq2	cv	cv2	spr
Intercept	-533.7097405	-0.008921686	-845.5649586	-0.008689722	-7681.790926
let	0.0415578458	8.5851902E-7	0.0018419884	7.8271218E-7	-3.172725127
let2	-5.394829E-7	-3.17681E-12	-5.616691E-7	3.397225E-12	5.7230558E-7

The REG Procedure
Model: MODEL1
Dependent Variable: delt

Consistent Covariance of Estimates

Variable	seq	seq2	cv	cv2	spr
cf	-0.039712221	5.2005062E-7	-0.1486875	-1.827134E-7	0.0457697148
cf2	1.2063097E-6	-3.30546E-11	1.0469485E-6	-4.27446E-11	-7.80995E-6
seq	0.8506351179	-7.524892E-7	0.1273942783	5.1657613E-7	-2.574756272
seq2	-7.524892E-7	3.048242E-10	2.4617789E-6	7.873217E-11	0.0000824864
cv	0.1273942783	2.4617789E-6	1.3521311385	-2.004243E-6	-3.890217543
cv2	5.1657613E-7	7.873217E-11	-2.004243E-6	1.821645E-10	0.0000738995
spr	-2.574756272	0.0000824864	-3.890217543	0.0000738995	742.36706937
spr2	-0.000369808	-1.122231E-8	-0.000163509	-1.032989E-8	0.1249848029
dp	-0.205025727	-4.865035E-6	-0.045357529	-1.987182E-6	-12.25540998

dp2	7.8503735E-6	2.364069E-10	-7.899414E-6	1.74424E-10	0.0005954981
dens	0.2977885499	-8.912808E-6	0.663279735	0.0000918912	197.64139165
dens2	0.0022836003	4.8017463E-8	0.0015272866	-1.145634E-7	-0.153720822
lf	1.3893847E-6	-7.98153E-12	1.505732E-7	-8.17914E-12	-0.000015365
lse	-5.652697E-6	-6.14919E-11	-7.484902E-6	-3.47461E-11	0.0000894148
lcv	-4.30452E-6	8.894613E-11	1.1652493E-6	-5.80046E-12	0.0001887389
lspr	7.3035949E-6	3.493646E-10	0.0000231964	1.533928E-10	0.0004640313
ldp	1.8783292E-6	-2.63899E-11	4.2945468E-6	-7.99205E-11	0.0001040594
fse	-0.000010633	2.423779E-11	6.1895455E-7	1.859201E-11	-9.107757E-6
fcv	-4.938907E-7	-1.44106E-10	-5.406001E-6	1.348954E-10	-0.000210755
fspr	-0.0000374	7.105544E-10	-0.000086125	1.1056918E-9	-0.004125021
fdp	-5.045162E-6	5.412471E-11	0.0000118802	6.964069E-11	0.0004002245
scv	-0.000015579	-6.04707E-10	-0.000014732	-3.5759E-10	-0.000176447
sspr	0.0000992938	-1.034384E-8	0.0000138694	-1.064033E-9	-0.012655466
sdp	-0.000013512	2.304578E-10	0.0000223662	1.56949E-10	0.0002915217
cspr	0.0000102006	-7.8666E-9	-0.000051294	-7.019738E-9	-0.011623026
cdp	0.0000163095	1.112167E-10	-0.000063582	2.565771E-11	0.000067401
spdp	0.0000920893	-3.996739E-9	0.0000712391	-2.369054E-9	-0.042431186
ldns	0.0001177329	-2.80306E-10	0.0004256757	1.9336142E-9	-0.001009078
fdns	-0.000023705	2.9890587E-9	-0.000212082	1.3898469E-9	-0.005534267
sdns	-0.001882956	1.4824743E-8	-0.000192165	-8.26898E-10	0.0099731643
cdns	-0.000446744	-1.916998E-8	-0.003731923	-2.165271E-8	0.0001958434
spdns	0.0207680031	-6.994641E-9	0.0229207651	-2.414243E-7	-1.12868543
dpdns	-0.000897818	-5.338347E-9	-0.001245467	-2.27613E-9	0.0262612057

Consistent Covariance of Estimates

Variable	spr2	dp	dp2	dens	dens2
Intercept	-1.808936839	-868.3147145	-0.031038624	-46956.71314	33.433241833
let	0.0001227996	-0.418916978	0.0000217756	-2.134431803	0.0040904375
let2	2.2848181E-8	-1.589999E-6	2.225872E-10	0.0000391505	-2.112645E-8
cf	-0.000368773	0.0848629344	-0.000012425	-0.088439877	0.0037431262
cf2	7.0625897E-8	9.1079601E-7	2.864572E-10	0.0000135636	-8.33661E-8
seq	-0.000369808	-0.205025727	7.8503735E-6	0.2977885499	0.0022836003

The REG Procedure
Model: MODEL1
Dependent Variable: delt

Consistent Covariance of Estimates

Variable	spr2	dp	dp2	dens	dens2
seq2	-1.122231E-8	-4.865035E-6	2.364069E-10	-8.912808E-6	4.8017463E-8
cv	-0.000163509	-0.045357529	-7.899414E-6	0.663279735	0.0015272866
cv2	-1.032989E-8	-1.987182E-6	1.74424E-10	0.0000918912	-1.145634E-7
spr	0.1249848029	-12.25540998	0.0005954981	197.64139165	-0.153720822
spr2	0.000221133	-0.004316924	4.3361432E-7	0.0481590945	0.0000216902
dp	-0.004316924	2.1478491078	-0.000085956	-1.278377964	-0.005662602
dp2	4.3361432E-7	-0.000085956	1.2927905E-8	0.000251331	3.8914507E-7
dens	0.0481590945	-1.278377964	0.000251331	1995.257589	-2.596894917
dens2	0.0000216902	-0.005662602	3.8914507E-7	-2.596894917	0.0042995568
lf	-4.74314E-8	4.38323E-6	-3.1046E-10	-0.00007824	3.4782653E-8
lse	-1.797658E-8	0.0000110368	1.738268E-10	0.0000299411	-1.298678E-7
lcv	3.032691E-8	6.4003237E-6	-1.77065E-10	0.0001784136	-1.758114E-7

lspr	-2.495928E-6	0.0000917794	8.7236284E-9	-0.001774785	9.6571651E-7
ldp	-1.875093E-8	0.0000223749	-3.815258E-9	-0.000140709	-8.014584E-9
fse	-1.746057E-8	-4.6264E-7	-2.73402E-10	0.0000860905	-8.363663E-8
fcv	-8.918346E-8	8.6681136E-6	-8.9741E-10	-0.000037469	-1.693284E-7
fspr	-1.283634E-6	-0.000022347	1.1725621E-8	-0.00250701	3.4304442E-6
fdp	1.1016409E-7	-0.000029146	1.198817E-9	0.0004808008	-1.751855E-7
scv	-7.86372E-8	0.0000256586	-2.487773E-9	-0.00003813	-1.888056E-7
sspr	4.5207806E-6	-0.000100268	8.864877E-9	-0.000758098	4.9405391E-6
sdp	8.8926009E-9	-0.000020636	-7.97986E-10	0.0000288397	-1.4723E-7
cspr	-3.729418E-6	0.0002830246	-2.822488E-8	-0.005100092	1.8261605E-6
cdp	2.639947E-7	-0.000058426	4.6258965E-9	-0.000772367	1.2213526E-6
spdp	-0.000019524	0.0006418816	-1.36913E-7	0.0004903673	-0.000013651
ldns	-6.673925E-6	0.0004267593	1.1962731E-8	-0.00572825	3.8212634E-6
fdns	-1.512455E-6	0.0005621837	6.4506129E-9	-0.008053814	-0.000043475
sdns	-4.005767E-7	-0.000544548	6.4643022E-8	-0.044143648	0.0000659804
cdns	2.4276832E-6	0.0004353677	-8.817021E-9	-0.03072549	0.0000328219
spdns	0.0000246092	0.0212813999	2.9163948E-7	-1.706511509	0.0023744282
dpdns	0.0000128267	-0.001803042	-1.726157E-7	0.0160967112	-0.000013301

Consistent Covariance of Estimates

Variable	lf	lse	lcv	lspr	ldp
Intercept	0.0024636438	0.020204845	-0.003043641	-0.029826206	0.0206638321
let	-2.016324E-6	-5.970345E-6	-5.500963E-6	-0.000027061	-0.000012886
let2	-7.0587E-11	1.859554E-11	-1.08461E-11	-1.289304E-9	-1.41319E-10
cf	1.8886818E-6	4.6000357E-6	6.7498858E-6	-0.000013886	0.0000113912
cf2	-1.60126E-10	3.361814E-11	4.497385E-12	2.315696E-10	6.269945E-12
seq	1.3893847E-6	-5.652697E-6	-4.30452E-6	7.3035949E-6	1.8783292E-6
seq2	-7.98153E-12	-6.14919E-11	8.894613E-11	3.493646E-10	-2.63899E-11
cv	1.505732E-7	-7.484902E-6	1.1652493E-6	0.0000231964	4.2945468E-6
cv2	-8.17914E-12	-3.47461E-11	-5.80046E-12	1.533928E-10	-7.99205E-11

The REG Procedure
Model: MODEL1
Dependent Variable: delt

Consistent Covariance of Estimates

Variable	lf	lse	lcv	lspr	ldp
spr	-0.000015365	0.0000894148	0.0001887389	0.0004640313	0.0001040594
spr2	-4.74314E-8	-1.797658E-8	3.032691E-8	-2.495928E-6	-1.875093E-8
dp	4.38323E-6	0.0000110368	6.4003237E-6	0.0000917794	0.0000223749
dp2	-3.1046E-10	1.738268E-10	-1.77065E-10	8.7236284E-9	-3.815258E-9
dens	-0.00007824	0.0000299411	0.0001784136	-0.001774785	-0.000140709
dens2	3.4782653E-8	-1.298678E-7	-1.758114E-7	9.6571651E-7	-8.014584E-9
lf	3.223621E-10	-3.31619E-11	-6.93606E-11	2.517581E-9	1.800346E-10
lse	-3.31619E-11	7.581996E-10	8.334533E-11	2.2871311E-9	-1.49614E-10
lcv	-6.93606E-11	8.334533E-11	1.0160356E-9	2.8780162E-9	1.628904E-10
lspr	2.517581E-9	2.2871311E-9	2.8780162E-9	2.0663066E-7	-3.708667E-9
ldp	1.800346E-10	-1.49614E-10	1.628904E-10	-3.708667E-9	2.299621E-9
fse	1.902174E-11	-5.20523E-10	1.270102E-10	-1.586582E-9	1.390193E-10
fcv	-4.12603E-11	-5.10979E-11	-1.26295E-9	-5.841108E-9	2.909591E-11
fspr	-9.681043E-9	-1.518187E-9	-5.06941E-9	-2.795078E-7	4.8793986E-9
fdp	-5.57469E-10	9.774192E-11	3.738626E-10	7.9863167E-9	-2.149448E-9

scv	1.36839E-10	1.295783E-10	-4.25544E-10	-3.1514E-9	6.875641E-10
sspr	-5.36889E-10	-1.490303E-8	-7.584292E-9	-9.861517E-8	-3.689718E-9
sdp	-3.14337E-11	-1.184054E-9	2.437166E-10	-1.781916E-9	1.148651E-10
cspr	2.0321715E-9	-1.481862E-9	-2.461167E-8	-8.974883E-8	4.3001006E-9
cdp	1.436288E-10	3.839783E-10	-1.429431E-9	-2.22584E-9	-1.312952E-9
spdp	9.4398676E-9	-5.790842E-9	-1.635007E-8	-2.728102E-7	-1.660262E-9
ldns	1.2965908E-8	6.6045165E-9	-9.124469E-9	3.9271248E-7	-6.313344E-9
fdns	-8.648436E-9	-6.204731E-9	-2.111486E-9	-2.291943E-7	1.647899E-8
sdns	-3.529215E-9	1.0684534E-8	6.473568E-9	2.6770866E-8	-1.604102E-8
cdns	1.5824082E-9	2.6115819E-8	-3.94415E-9	-9.356902E-8	-1.251729E-9
spdns	3.0298861E-8	-2.393606E-7	-1.471023E-8	1.8957098E-6	8.4436977E-7
dpdns	-2.203745E-8	-5.730924E-9	1.4558065E-8	-8.807411E-7	7.7047879E-9

Consistent Covariance of Estimates

Variable	fse	fcv	fspr	fdp	scv
Intercept	0.0046180278	-0.004304311	-0.026248525	-0.002263897	0.0387530143
let	3.0636534E-6	5.2073625E-6	0.0000732821	0.0000111398	-4.798545E-6
let2	-1.07612E-11	2.720824E-11	2.6543219E-9	1.57975E-10	-3.36247E-11
cf	-8.138855E-6	-0.00001265	5.4836925E-6	-0.000022869	3.3860369E-7
cf2	-4.76138E-11	-1.533E-10	-4.044489E-9	-4.66792E-10	-6.56102E-11
seq	-0.000010633	-4.938907E-7	-0.0000374	-5.045162E-6	-0.000015579
seq2	2.423779E-11	-1.44106E-10	7.105544E-10	5.412471E-11	-6.04707E-10
cv	6.1895455E-7	-5.406001E-6	-0.000086125	0.0000118802	-0.000014732
cv2	1.859201E-11	1.348954E-10	1.1056918E-9	6.964069E-11	-3.5759E-10
spr	-9.107757E-6	-0.000210755	-0.004125021	0.0004002245	-0.000176447
spr2	-1.746057E-8	-8.918346E-8	-1.283634E-6	1.1016409E-7	-7.86372E-8
dp	-4.6264E-7	8.6681136E-6	-0.000022347	-0.000029146	0.0000256586

The REG Procedure
Model: MODEL1
Dependent Variable: delt

Consistent Covariance of Estimates

Variable	fse	fcv	fspr	fdp	scv
dp2	-2.73402E-10	-8.9741E-10	1.1725621E-8	1.198817E-9	-2.487773E-9
dens	0.0000860905	-0.000037469	-0.00250701	0.0004808008	-0.00003813
dens2	-8.363663E-8	-1.693284E-7	3.4304442E-6	-1.751855E-7	-1.888056E-7
lf	1.902174E-11	-4.12603E-11	-9.681043E-9	-5.57469E-10	1.36839E-10
lse	-5.20523E-10	-5.10979E-11	-1.518187E-9	9.774192E-11	1.295783E-10
lcv	1.270102E-10	-1.26295E-9	-5.06941E-9	3.738626E-10	-4.25544E-10
lspr	-1.586582E-9	-5.841108E-9	-2.795078E-7	7.9863167E-9	-3.1514E-9
ldp	1.390193E-10	2.909591E-11	4.8793986E-9	-2.149448E-9	6.875641E-10
fse	1.7122983E-9	-1.69394E-10	4.0652779E-9	-1.36443E-10	1.240084E-11
fcv	-1.69394E-10	3.1320603E-9	1.5817239E-8	-1.68974E-10	1.0542739E-9
fspr	4.0652779E-9	1.5817239E-8	1.3851661E-6	-2.444607E-8	-6.143355E-9
fdp	-1.36443E-10	-1.68974E-10	-2.444607E-8	7.7997809E-9	-2.59028E-10
scv	1.240084E-11	1.0542739E-9	-6.143355E-9	-2.59028E-10	4.1382021E-9
sspr	8.4864524E-9	3.429143E-10	6.0578376E-8	7.924108E-10	-9.27253E-10
sdp	2.654769E-10	2.308864E-10	3.0903264E-9	1.987584E-10	-3.21506E-10
cspr	-3.831006E-9	3.5829572E-8	1.6311311E-7	-1.195435E-8	4.681203E-8
cdp	-2.12364E-10	-8.54065E-10	6.3820536E-9	-1.784648E-9	-2.219566E-9
spdp	3.4228349E-9	2.7611208E-8	-4.860055E-7	-3.669801E-8	3.5081666E-8

ldns	-9.285568E-9	1.124644E-8	-6.856359E-7	4.2299971E-9	2.061788E-9
fdns	1.7848103E-8	1.6736748E-8	1.2362355E-6	-8.259844E-8	-1.91744E-8
sdns	7.092123E-9	-1.320626E-8	-2.83744E-8	7.2296085E-9	1.0570063E-8
cdns	-6.619574E-9	-8.379142E-9	-4.867994E-8	-4.688266E-8	1.0086731E-7
spdns	1.1112591E-9	-5.727092E-7	0.0000230798	-1.189224E-6	-1.78451E-7
dpdns	6.4361767E-9	-9.478888E-9	1.4532965E-7	6.4518354E-8	2.2962288E-8

Consistent Covariance of Estimates

Variable	sspr	sdp	cspr	cdp	spdp
Intercept	0.0703746861	-0.045676708	0.4219742437	0.0718432326	0.5261891177
let	0.0001521212	8.9336006E-6	0.0000619145	0.0000133664	0.0001649962
let2	7.974195E-10	-2.66027E-11	-9.66861E-11	7.842404E-11	-3.96252E-10
cf	-0.000036431	-7.788185E-6	-0.000135251	3.3102072E-6	0.0001316734
cf2	-4.83653E-11	1.371854E-11	-4.50845E-10	2.772265E-10	-3.367363E-9
seq	0.0000992938	-0.000013512	0.0000102006	0.0000163095	0.0000920893
seq2	-1.034384E-8	2.304578E-10	-7.8666E-9	1.112167E-10	-3.996739E-9
cv	0.0000138694	0.0000223662	-0.000051294	-0.000063582	0.0000712391
cv2	-1.064033E-9	1.56949E-10	-7.019738E-9	2.565771E-11	-2.369054E-9
spr	-0.012655466	0.0002915217	-0.011623026	0.000067401	-0.042431186
spr2	4.5207806E-6	8.8926009E-9	-3.729418E-6	2.639947E-7	-0.000019524
dp	-0.000100268	-0.000020636	0.0002830246	-0.000058426	0.0006418816
dp2	8.864877E-9	-7.97986E-10	-2.822488E-8	4.6258965E-9	-1.36913E-7
dens	-0.000758098	0.0000288397	-0.005100092	-0.000772367	0.0004903673
dens2	4.9405391E-6	-1.4723E-7	1.8261605E-6	1.2213526E-6	-0.000013651

The SAS System

The REG Procedure
Model: MODEL1
Dependent Variable: delt

Consistent Covariance of Estimates

Variable	sspr	sdp	cspr	cdp	spdp
lf	-5.36889E-10	-3.14337E-11	2.0321715E-9	1.436288E-10	9.4398676E-9
lse	-1.490303E-8	-1.184054E-9	-1.481862E-9	3.839783E-10	-5.790842E-9
lcv	-7.584292E-9	2.437166E-10	-2.461167E-8	-1.429431E-9	-1.635007E-8
lspr	-9.861517E-8	-1.781916E-9	-8.974883E-8	-2.22584E-9	-2.728102E-7
ldp	-3.689718E-9	1.148651E-10	4.3001006E-9	-1.312952E-9	-1.660262E-9
fse	8.4864524E-9	2.654769E-10	-3.831006E-9	-2.12364E-10	3.4228349E-9
fcv	3.429143E-10	2.308864E-10	3.5829572E-8	-8.54065E-10	2.7611208E-8
fspr	6.0578376E-8	3.0903264E-9	1.6311311E-7	6.3820536E-9	-4.860055E-7
fdp	7.924108E-10	1.987584E-10	-1.195435E-8	-1.784648E-9	-3.669801E-8
scv	-9.27253E-10	-3.21506E-10	4.681203E-8	-2.219566E-9	3.5081666E-8
sspr	2.2486542E-6	-3.440448E-8	1.7756189E-7	2.8771792E-8	4.7514032E-8
sdp	-3.440448E-8	7.0825747E-9	-6.309809E-9	-3.09584E-9	-2.681328E-9
cspr	1.7756189E-7	-6.309809E-9	1.2679683E-6	-1.049805E-8	9.8574151E-7
cdp	2.8771792E-8	-3.09584E-9	-1.049805E-8	1.3765565E-8	-3.102622E-8
spdp	4.7514032E-8	-2.681328E-9	9.8574151E-7	-3.102622E-8	6.9217888E-6
ldns	-3.2742E-7	-6.83803E-9	2.2144331E-7	-2.318243E-8	1.1328865E-7
fdns	7.5994066E-9	4.6923142E-9	-2.389223E-8	2.044544E-8	-1.441478E-7
sdns	-2.291356E-7	-3.867613E-8	-1.75919E-7	8.4057709E-9	-3.752917E-7
cdns	1.2653987E-7	-8.680376E-8	1.2610246E-6	1.8669457E-7	3.2582389E-7
spdns	0.0000142796	-7.808035E-7	6.9401201E-6	5.2033893E-8	-0.00003818

dpdns	2.41958E-7	7.5551363E-8	-3.851232E-7	4.414323E-8	2.2860528E-6

Consistent Covariance of Estimates

Variable	ldns	fdns	sdns	cdns	spdns
Intercept	-0.057630996	-0.266342101	1.3943704375	3.7450733814	79.637536465
let	-0.00018653	0.0002972548	0.0000488005	-0.000088824	-0.002120818
let2	-3.507161E-9	6.526529E-10	1.4468628E-9	9.85161E-10	-5.841759E-8
cf	0.0000704626	-0.001326206	0.0003161185	0.0004864929	-0.001928035
cf2	-5.585617E-9	2.2488625E-8	-3.330112E-9	5.0293757E-9	1.1198478E-7
seq	0.0001177329	-0.000023705	-0.001882956	-0.000446744	0.0207680031
seq2	-2.80306E-10	2.9890587E-9	1.4824743E-8	-1.916998E-8	-6.994641E-9
cv	0.0004256757	-0.000212082	-0.000192165	-0.003731923	0.0229207651
cv2	1.9336142E-9	1.3898469E-9	-8.26898E-10	-2.165271E-8	-2.414243E-7
spr	-0.001009078	-0.005534267	0.0099731643	0.0001958434	-1.12868543
spr2	-6.673925E-6	-1.512455E-6	-4.005767E-7	2.4276832E-6	0.0000246092
dp	0.0004267593	0.0005621837	-0.000544548	0.0004353677	0.0212813999
dp2	1.1962731E-8	6.4506129E-9	6.4643022E-8	-8.817021E-9	2.9163948E-7
dens	-0.00572825	-0.008053814	-0.044143648	-0.03072549	-1.706511509
dens2	3.8212634E-6	-0.000043475	0.0000659804	0.0000328219	0.0023744282
lf	1.2965908E-8	-8.648436E-9	-3.529215E-9	1.5824082E-9	3.0298861E-8
lse	6.6045165E-9	-6.204731E-9	1.0684534E-8	2.6115819E-8	-2.393606E-7
lcv	-9.124469E-9	-2.111486E-9	6.473568E-9	-3.94415E-9	-1.471023E-8

The SAS System

The REG Procedure

Model: MODEL1
Dependent Variable: delt

Consistent Covariance of Estimates

Variable	ldns	fdns	sdns	cdns	spdns
lspr	3.9271248E-7	-2.291943E-7	2.6770866E-8	-9.356902E-8	1.8957098E-6
ldp	-6.313344E-9	1.647899E-8	-1.604102E-8	-1.251729E-9	8.4436977E-7
fse	-9.285568E-9	1.7848103E-8	7.092123E-9	-6.619574E-9	1.1112591E-9
fcv	1.124644E-8	1.6736748E-8	-1.320626E-8	-8.379142E-9	-5.727092E-7
fspr	-6.856359E-7	1.2362355E-6	-2.83744E-8	-4.867994E-8	0.0000230798
fdp	4.2299971E-9	-8.259844E-8	7.2296085E-9	-4.688266E-8	-1.189224E-6
scv	2.061788E-9	-1.91744E-8	1.0570063E-8	1.0086731E-7	-1.78451E-7
sspr	-3.2742E-7	7.5994066E-9	-2.291356E-7	1.2653987E-7	0.0000142796
sdp	-6.83803E-9	4.6923142E-9	-3.867613E-8	-8.680376E-8	-7.808035E-7
cspr	2.2144331E-7	-2.389223E-8	-1.75919E-7	1.2610246E-6	6.9401201E-6
cdp	-2.318243E-8	2.044544E-8	8.4057709E-9	1.8669457E-7	5.2033893E-8
spdp	1.1328865E-7	-1.441478E-7	-3.752917E-7	3.2582389E-7	-0.00003818
ldns	2.1081478E-6	-1.83888E-6	-1.7029E-7	-1.637631E-6	8.5822862E-6
fdns	-1.83888E-6	0.0000142311	7.1349823E-7	-5.405158E-9	-0.000035434
sdns	-1.7029E-7	7.1349823E-7	0.0000225248	1.1955257E-6	-0.000127712
cdns	-1.637631E-6	-5.405158E-9	1.1955257E-6	0.000015322	-0.00003586
spdns	8.5822862E-6	-0.000035434	-0.000127712	-0.00003586	0.0132334035
dpdns	-4.206114E-6	-3.749394E-6	1.424002E-6	4.9468463E-6	-0.00031853

Consistent Covariance of Estimates

Variable	dpdns

Intercept	1.214577758
let	0.0002860801
let2	7.2538309E-9
cf	0.0006744778
cf2	-3.411181E-9
seq	-0.000897818
seq2	-5.338347E-9
cv	-0.001245467
cv2	-2.27613E-9
spr	0.0262612057
spr2	0.0000128267
dp	-0.001803042
dp2	-1.726157E-7
dens	0.0160967112
dens2	-0.000013301
lf	-2.203745E-8
lse	-5.730924E-9
lcv	1.4558065E-8
lspr	-8.807411E-7
ldp	7.7047879E-9
fse	6.4361767E-9

The REG Procedure
Model: MODEL1
Dependent Variable: delt

Consistent Covariance of Estimates

Variable	dpdns
fcv	-9.478888E-9
fspr	1.4532965E-7
fdp	6.4518354E-8
scv	2.2962288E-8
sspr	2.41958E-7
sdp	7.5551363E-8
cspr	-3.851232E-7
cdp	4.414323E-8
spdp	2.2860528E-6
ldns	-4.206114E-6
fdns	-3.749394E-6
sdns	1.424002E-6
cdns	4.9468463E-6
spdns	-0.00031853
dpdns	0.0000262714

The REG Procedure
Model: MODEL1
Dependent Variable: delt

Analysis of Variance

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

Model	14	3.036778E13	2.169127E12	492.32	<.0001
Error	1530	6.741038E12	4405907466		
Corrected Total	1544	3.710882E13			

Root MSE	66377	R-Square	0.8183
Dependent Mean	222595	Adj R-Sq	0.8167
Coeff Var	29.81959		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Tolerance
Intercept	1	-10445	5105.13388	-2.05	0.0409	.
let	1	1.41912	0.29338	4.84	<.0001	0.04663
let2	1	-3.62119E-7	0.00000171	-0.21	0.8325	0.07638
cf	1	0.70196	0.67445	1.04	0.2981	0.06292
cf2	1	0.00002786	0.00001333	2.09	0.0368	0.08345
seq	1	0.97724	0.51267	1.91	0.0568	0.27070
seq2	1	-0.00002167	0.00001573	-1.38	0.1685	0.28567
cv	1	4.53889	0.51221	8.86	<.0001	0.22352
cv2	1	-0.00005472	0.00000880	-6.22	<.0001	0.24542
spr	1	8.79140	14.60461	0.60	0.5473	0.12559

Parameter Estimates

Variable	DF	Variance Inflation
Intercept	1	0
let	1	21.44755
let2	1	13.09305
cf	1	15.89282
cf2	1	11.98392
seq	1	3.69412
seq2	1	3.50059
cv	1	4.47381
cv2	1	4.07473
spr	1	7.96211

The REG Procedure
Model: MODEL1
Dependent Variable: delt

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Tolerance
spr2	1	0.00102	0.00717	0.14	0.8864	0.16561
dp	1	19.04347	1.20011	15.87	<.0001	0.05855
dp2	1	-0.00016488	0.00003708	-4.45	<.0001	0.08296
dens	1	-308.62263	42.79224	-7.21	<.0001	0.13869

dens2	1	0.33992	0.08024	4.24	<.0001	0.14313

Parameter Estimates

Variable	DF	Variance Inflation
spr2	1	6.03820
dp	1	17.08067
dp2	1	12.05469
dens	1	7.21022
dens2	1	6.98690

The REG Procedure
Model: MODEL1
Dependent Variable: delt

Consistent Covariance of Estimates

Variable	Intercept	let	let2	cf	cf2
Intercept	16405451.37	-88.23440099	0.0014998278	-139.3550202	0.0014605842
let	-88.23440099	0.1040914969	-5.367384E-7	-0.109749949	1.3896799E-6
let2	0.0014998278	-5.367384E-7	3.996699E-12	5.5432187E-7	-1.04585E-11
cf	-139.3550202	-0.109749949	5.5432187E-7	0.5994674702	-0.000011364
cf2	0.0014605842	1.3896799E-6	-1.04585E-11	-0.000011364	2.808452E-10
seq	53.675253049	-0.011131315	7.7331498E-8	-0.051718938	7.1040391E-7
seq2	0.0000847896	4.5200577E-8	-2.41022E-13	6.952099E-7	-8.6186E-12
cv	-435.2403052	-0.015669792	-3.252462E-8	-0.094888999	2.0151819E-6
cv2	0.0053163349	1.2904255E-7	8.187841E-13	1.4743395E-6	-2.85678E-11
spr	11269.655581	-0.528210803	5.3272017E-6	-0.345092587	-4.026129E-6
spr2	-8.587265425	0.0003218845	-4.841591E-9	0.0000372816	3.590638E-10
dp	-3881.218984	-0.166480706	5.8086953E-7	-0.156112691	5.2360585E-6
dp2	0.1639140471	2.5250735E-6	-1.10129E-11	6.9291813E-6	-2.14424E-10
dens	24473.953787	-1.853563497	0.0000105264	0.0250687553	0.0000611655
dens2	-49.43618832	0.0029805132	-1.860321E-8	-0.001598233	-4.961243E-8

Consistent Covariance of Estimates

Variable	seq	seq2	cv	cv2	spr
Intercept	53.675253049	0.0000847896	-435.2403052	0.0053163349	11269.655581
let	-0.011131315	4.5200577E-8	-0.015669792	1.2904255E-7	-0.528210803
let2	7.7331498E-8	-2.41022E-13	-3.252462E-8	8.187841E-13	5.3272017E-6
cf	-0.051718938	6.952099E-7	-0.094888999	1.4743395E-6	-0.345092587
cf2	7.1040391E-7	-8.6186E-12	2.0151819E-6	-2.85678E-11	-4.026129E-6
seq	0.294549754	-5.422337E-6	-0.008219162	-1.9918E-8	0.3200938793
seq2	-5.422337E-6	1.617841E-10	-5.825048E-7	1.089141E-11	-0.000012979
cv	-0.008219162	-5.825048E-7	0.4131946512	-6.564718E-6	-1.963677855
cv2	-1.9918E-8	1.089141E-11	-6.564718E-6	1.316775E-10	0.0000230309
spr	0.3200938793	-0.000012979	-1.963677855	0.0000230309	217.3780817
spr2	0.0000664828	-5.44825E-12	0.0009985939	-1.517079E-8	-0.071398183
dp	-0.033957316	1.5795816E-6	0.1259092225	-6.588734E-7	-8.235705735
dp2	7.2058754E-7	-5.40675E-11	-1.625962E-6	-5.8245E-12	0.0002109705
dens	0.0920951459	0.0000204641	-6.06587577	0.0000477618	15.188566953

dens2	0.0008370327	-4.649186E-8	0.0124126943	-1.216917E-7	-0.040235285

Consistent Covariance of Estimates

Variable	spr2	dp	dp2	dens	dens2
Intercept	-8.587265425	-3881.218984	0.1639140471	24473.953787	-49.43618832
let	0.0003218845	-0.166480706	2.5250735E-6	-1.853563497	0.0029805132
let2	-4.841591E-9	5.8086953E-7	-1.10129E-11	0.0000105264	-1.860321E-8
cf	0.0000372816	-0.156112691	6.9291813E-6	0.0250687553	-0.001598233

The REG Procedure
Model: MODEL1
Dependent Variable: delt

Consistent Covariance of Estimates

Variable	spr2	dp	dp2	dens	dens2
cf2	3.590638E-10	5.2360585E-6	-2.14424E-10	0.0000611655	-4.961243E-8
seq	0.0000664828	-0.033957316	7.2058754E-7	0.0920951459	0.0008370327
seq2	-5.44825E-12	1.5795816E-6	-5.40675E-11	0.0000204641	-4.649186E-8
cv	0.0009985939	0.1259092225	-1.625962E-6	-6.06587577	0.0124126943
cv2	-1.517079E-8	-6.588734E-7	-5.8245E-12	0.0000477618	-1.216917E-7
spr	-0.071398183	-8.235705735	0.0002109705	15.188566953	-0.040235285
spr2	0.0000441115	0.0033228266	-1.231223E-7	-0.003173098	0.0000294772
dp	0.0033228266	2.1340485365	-0.000073954	-7.645617446	0.0161221981
dp2	-1.231223E-7	-0.000073954	3.3224663E-9	0.0002604167	-7.234997E-7
dens	-0.003173098	-7.645617446	0.0002604167	1382.9919352	-2.363682329
dens2	0.0000294772	0.0161221981	-7.234997E-7	-2.363682329	0.0045382061

Obs	_MODEL_	_TYPE_	_DEPVAR_	_RMSE_	Intercept	let	let2	cf
1	MODEL1	PARMS	delt	60326.96	-13415.80	1.65973	.000003322	1.77838

Obs	cf2	seq	seq2	cv	cv2	spr	spr2	dp
1	-.00007339	1.19988	.000030105	2.89920	.000017209	-19.9927	-0.032858	17.9262

Obs	dp2	dens	dens2	lf	lse	lcv	lspr
1	-.000556802	-22.4961	0.13666	-.000039915	.000024128	.000000439	-.000534428

Obs	ldp	fse	fcv	fspr	fdp	scv
1	.000034169	-.000045984	.000163629	.001147476	.000363502	-.000399978

Obs	sspr	sdp	cspr	cdp	spdp	ldns
1	.002039419	-.000042834	-.003342055	.000054356	.007074430	-.001461189

Obs	fdns	sdns	cdns	spdns	dpdns	delt
1	-0.012161	.004877152	-.009175071	-0.27399	.008473182	-1

Obs	mdelt	pdelt	elasl	elasf	elass
1	222595.34	229599.22	0.24069	0.11606	.007000313

Obs	elasc	elasp	elasd	elasdns
1	0.047970	-0.019978	0.67068	-0.077708

The SAS System

Obs	_MODEL_	_TYPE_	_DEPVAR_	_RMSE_	Intercept	let	let2
1	MODEL1	PARMS	delt	66377.01	-10445.32	1.41912	-.000000362

Obs	cf	cf2	seq	seq2	cv	cv2	spr
1	0.70196	.000027856	0.97724	-.000021667	4.53889	-.000054721	8.79140

Obs	spr2	dp	dp2	dens	dens2	delt
1	.001024983	19.0435	-.000164884	-308.623	0.33992	-1

The SAS System

Obs	mdelt	pdelt	elasl	elasf	elass
1	222595.34	225257.04	0.22268	0.071203	0.012912

Obs	elasc	elasp	elasd	elasdns
1	0.088135	0.015836	0.66888	-0.082530

The SAS System

The MEANS Procedure

Variable	N	Mean	Std Dev	Minimum	Maximum
padelt	1535	18352.66	15071.74	83.0000000	101197.00
pcl	1535	140.9718241	133.8627136	1.0000000	2044.00
act	1535	58.1087948	54.7023166	1.0000000	545.0000000
dp	1535	8179.28	5128.74	196.0000000	32926.00

The SAS System

The REG Procedure
Model: MODEL1
Dependent Variable: padelt

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	2.465968E11	27399646675	410.20	<.0001
Error	1525	1.018624E11	66795037		
Corrected Total	1534	3.484593E11			

Root MSE	8172.82309	R-Square	0.7077
Dependent Mean	18353	Adj R-Sq	0.7060
Coeff Var	44.53210		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Tolerance
Intercept	1	-629.78787	606.67576	-1.04	0.2994	.
pcl	1	35.57036	5.48701	6.48	<.0001	0.08071
pcl2	1	-0.00804	0.00354	-2.27	0.0234	0.21799
act	1	25.24529	12.54823	2.01	0.0444	0.09241
act2	1	-0.00431	0.03309	-0.13	0.8963	0.14321
dp	1	1.54560	0.14811	10.44	<.0001	0.07547
dp2	1	-0.00007300	0.00000737	-9.90	<.0001	0.05385
pact	1	-0.17276	0.04048	-4.27	<.0001	0.06120
padp	1	0.00178	0.00039687	4.48	<.0001	0.05457
acdp	1	0.00980	0.00110	8.89	<.0001	0.04571

Parameter Estimates

Variable	DF	Variance Inflation
Intercept	1	0
pcl	1	12.39002
pcl2	1	4.58727
act	1	10.82076
act2	1	6.98256
dp	1	13.25107
dp2	1	18.57061
pact	1	16.34061
padp	1	18.32532
acdp	1	21.87484

The REG Procedure
Model: MODEL1
Dependent Variable: padelt

Consistent Covariance of Estimates

Variable	Intercept	pcl	pcl2	act	act2
Intercept	176503.55468	39.583780979	0.0707848448	-169.9211793	-0.759265825
pcl	39.583780979	24.136847455	-0.00880578	-13.82880816	0.0106353533
pcl2	0.0707848448	-0.00880578	0.0000103958	0.0131598775	-0.000041743
act	-169.9211793	-13.82880816	0.0131598775	120.17512042	-0.24807765
act2	-0.759265825	0.0106353533	-0.000041743	-0.24807765	0.001091878
dp	-41.47932731	-0.268889971	0.0000155238	-0.544026496	0.0018027002
dp2	0.000409275	8.6858076E-6	-1.117251E-8	1.3495964E-6	6.9927963E-8
pact	-3.944198719	0.0051311056	-0.000120381	-0.180165303	0.0007111912
padp	0.0560525032	-0.001221058	8.9937459E-7	0.0018302959	-3.003302E-6
acdp	0.097955243	0.0015001905	1.8028364E-6	-0.00054502	-0.00002678

Consistent Covariance of Estimates

Variable	dp	dp2	pact	padp	acdp
Intercept	-41.47932731	0.000409275	-3.944198719	0.0560525032	0.097955243
pcl	-0.268889971	8.6858076E-6	0.0051311056	-0.001221058	0.0015001905
pcl2	0.0000155238	-1.117251E-8	-0.000120381	8.9937459E-7	1.8028364E-6
act	-0.544026496	1.3495964E-6	-0.180165303	0.0018302959	-0.00054502
act2	0.0018027002	6.9927963E-8	0.0007111912	-3.003302E-6	-0.00002678
dp	0.0194303353	-2.649335E-7	0.0023080178	-0.000010411	-0.000055679
dp2	-2.649335E-7	4.818816E-11	1.6728475E-7	-1.401091E-9	-6.391626E-9
pact	0.0023080178	1.6728475E-7	0.002271952	-0.000012949	-0.000041603
padp	-0.000010411	-1.401091E-9	-0.000012949	2.0021268E-7	4.9285211E-8
acdp	-0.000055679	-6.391626E-9	-0.000041603	4.9285211E-8	2.0884077E-6

The SAS System

Obs	_MODEL_	_TYPE_	_DEPVAR_	_RMSE_	Intercept	pcl	pcl2	act
1	MODEL1	PARMS	padelt	8172.82	-629.788	35.5704	-.008035563	25.2453

Obs	act2	dp	dp2	pact	padp	acdp	padelt
1	-.004311346	1.54560	-.000073002	-0.17276	.001776442	.009802002	-1

The SAS System

Obs	mpadelt	ppadelt	elasp	elasa	elasd
1	18352.66	18727.24	0.28451	0.24998	0.51162

RESPONSE OF POSTAL SERVICE WITNESS BRADLEY
TO POIR NO. 6, QUESTION 6

6. The response to Interrogatory OCA/USPS-T14-5 provides values and SAS code for the marginal delivery time for each shape for the "regular full and restricted quadratic delivery models." The response to interrogatory ADVO/USPS-T14-2, also provides a copy of the SAS Log for the program "Estimating Delivery Equations." Please provide the values of the marginal and average delivery times for each shape (including large parcels and accountables) for each of the alternate models requested in Interrogatory OCA/USPS-T14-11 and discussed in Section G of witness Bradley's testimony in USPS-T-14. Also, provide the SAS Logs showing the calculations of the reported marginal and average costs. For the Translog specification, please provide the values of the aggregate marginal delivery time and the SAS Log of those calculations. Please elaborate on the significance of marginal cost estimates for these models, especially in the cases where a negative marginal cost is calculated.

RESPONSE:

The regular delivery time and parcel/accountable delivery time equations are multi-product functions reflecting the fact that city carrier delivery involves the simultaneous delivery of several classes of mail. In a multi-product firm, the concept of an individual product's average cost is not defined. Similarly, in a multi-product time function the concept of an individual products average time is not defined. For example, the natural approach to calculating an average time would be to find the volume variable time for an individual class or subclass and divide by its volume. However, substitution of the definition of volume variable cost shows that this ratio produces marginal cost, not average cost:

$$\frac{VVC_i}{V_i} = \frac{C\varepsilon_i}{V_i} = \frac{C_i \frac{\partial C}{\partial V_i}\frac{V_i}{C}}{V_i} = \frac{\partial C}{\partial V_i}.$$

Consequently, it is not possible to provide the requested average times. The marginal times are well defined, however and are provided in the following table. For purposes of comparison, I also include the marginal times for the recommended models provided in the responses to OCA/USPS-T14-5 and OCA/USPS-T14-6.

Marginal Times Alternative Regular Delivery Time Specifications

	Letters	Flats	Sequenced	Collection	Small Parcels	DPS
Recommended Model	1.39	1.36	0.82	4.00	9.56	
Fixed Effects	0.27	0.65	0.74	0.71	3.66	
Route Level	0.19	-0.68	1.07	0.11	20.47	
Alternative Volume	1.26	1.25	0.76	3.84	2.01	1.935616
Including DOW Effects	1.47	1.27	0.64	3.93	10.52	
Cross Section	2.04	0.63	-0.18	4.26	26.00	
Weighted: # of Routes	1.61	1.22	0.50	4.65	10.84	
Weighted:1/ # of Routes	1.20	1.95	0.66	3.05	6.39	
Including Prob. Zips	1.44	1.51	0.79	3.90	11.34	
Translog (Agg. Volume)	1.23					

Marginal Times Alternative P/A Delivery Time Specifications

	Large Parcel	Accountables
Recommended Model	37.80	80.56
Fixed Effects	51.12	94.45
Cross Section	38.50	89.10
Weighted: # of Routes	31.36	95.59
Weighted:1/ # of Routes	38.71	76.86

RESPONSE OF POSTAL SERVICE WITNESS BRADLEY
TO POIR NO. 6, QUESTION 6

Please note that the forming the response to the information request required calculating over 50 marginal times from 13 different econometric regressions. Consequently, it was far more efficient to calculate the marginal times in Excel that in SAS. The formula used to calculate the marginal time is embodied in the attached Excel program but is presented here for clarity:

$$MT_{ij} \quad = \quad \varepsilon_{ij} \frac{T_{ij}(\overline{V}, \overline{X})}{\overline{V}ij} \quad = \quad \frac{\partial T_{ij}}{\partial V_{ij}}.$$

Where MT_{ij} is the mean time for product "i" in specification "j," ε_{ij} is the variability for product "i" in specification "j," $\overline{V}ij$ is the average volume for product "i" in specification "j," and $T_{ij}(\overline{V}, \overline{X})$ is the delivery time for specification j evaluated at the mean values for volumes and non-volume variables (X). Please also note that in the case of the mean centered translog, $T_{ij}(\overline{V}, \overline{X}) \quad = \quad e^{\beta_0}$, where β_0 is the estimated intercept from the translog equation.

A review of the marginal times from the various specifications reveals that they support the proposed approach to measuring street time variabilities, in general, and specifically help justify the selection of the recommended variabilities. First, the existence of negative marginal costs in the route level analysis and the cross-sectional analysis helps emphasize that these econometric approaches are not appropriate for the estimation of street time variabilities on the CCSTS data set.

RESPONSE OF POSTAL SERVICE WITNESS BRADLEY
TO POIR NO. 6, QUESTION 6

The cross sectional approach dramatically reduces the data available to estimate the equation and may therefore exacerbate the multicollinearity problem inherent in the delivery volume data. The route level analysis not only has a negative marginal cost (which does not make intuitive sense) but also very low marginal times. This most likely reflects the fact that a route level analysis does not capture the full response of carrier street time to changes in volume. A comparison of the marginal times from the recommend model with the remaining specifications (save the translog which has only aggregate volume and will be discussed below) shows that the marginal times from the recommended model are bounded by the other marginal times. In addition, despite the fact that different specifications and econometric approaches were taken, the overall results are quite robust. For example, calculating the average for the marginal times across the alternative approaches (after first eliminating the approaches that produced negative marginal times) produces values that are close, although a little lower, than marginal times from the recommended model. For letters, the average alternative marginal time is 1.21 seconds as compared with 1.39 seconds for the recommended model. For flats the two marginal times are 1.31 and 1.36, respectively. The average alternative marginal time for sequenced mail is 0.68 seconds relative to the marginal time from the recommended model of 0.82 seconds. Finally, the average alternative marginal times for collected mail and small parcels are 3.34 seconds and 7.46 seconds, respectively, which compare with marginal times from the recommended model of 4.0 seconds and 9.53 seconds.

RESPONSE OF POSTAL SERVICE WITNESS BRADLEY
TO POIR NO. 6, QUESTION 6

The translog model has only a single aggregate volume term with an associated marginal time of 1.23 seconds. Because this volume measure is an aggregate of all shapes, it is difficult to provide an intuitive interpretation, but given that letters and flats dominate the volume vector, it is reassuring that the calculated marginal time is close to the letter and flat marginal times.

The results for the parcel/accountable delivery equation mirror those for the regular delivery equation in the sense that the recommended delivery time is in the middle of the distribution of marginal times across all specifications and that the averages marginal times from other specifications parallel the marginal times from the recommended model.

RESPONSE OF POSTAL SERVICE WITNESS BOZZO
TO POIR NO. 6, QUESTION 8

8. As noted on page 10 of USPS-LR-K-56, "The Postal Service provides the data on IBM 3480-compatible cartridge tapes. The [Installation Master File] IMF data were provided by AP for PFY 1999-2003, and on a monthly basis starting in PFY 2004." For the MODS Operation Groups, variables, and time period (FY 1999-2004) used in USPS-T-12:

(a) Please provide MODS data disaggregated by postal accounting period (AP) for PFY 1999-2003.

(b) Please provide MODS data disaggregated by month for the same MODS Operation Groups and variables used in USPS-T-12 for PFY 2004.

RESPONSE:

Please note that while the LR-K-56 datasets use source data of various frequencies, the MODS data frequency for the entire period employs postal quarters based on the "old" Postal Service fiscal calendar. See USPS-T-12 at 38-39. I was able to obtain monthly MODS data for FY 2004 (October 2003-September 2004) to fulfill the information request, but please note that the LR-K-56 MODS data for FY 2004 are consistent with the AP-frequency data provided in response to part (a) rather than the monthly data provided in response to part (b).

(a) Please see the spreadsheet file mods-ap9904.xls, to be filed with USPS-LR-K-135, for the requested data. The mods-ap9904.xls file provides AP frequency data through what would have been AP 13, FY 2004 by the "old" Postal Service fiscal calendar.

(b) Please see the spreadsheet file mods-mth04.xls, to be filed with USPS-LR-K-135, for the requested data.