

```

@=====
@
@      PROGRAM NOTES      -----
@
@  THIS PROGRAM IS LCMTV GAUSSPRG DPR4.PRG
@
@  THIS PROGRAM PRODUCES GENERALIZED LEAST-SQUARES ESTIMATES
@  OF THE MODEL WITH RAILROAD EFFECTS AND TIME EFFECTS.  IT THEN
@  COMPUTES RAILROAD-SPECIFIC VARIABLE COST RATIOS.
@
@  IT PRODUCES THE FOLLOWING TABLES:
@
@      TABLE 1:  SUMMARY STATISTICS FOR THE DATA
@
@      TABLE 2:  SUMMARY OF GLS ESTIMATION
@
@      TABLE 3:  RATIOS
@
@=====

```

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@=====
@
@      DATA      -----
@
@=====

```

```

OUTPUT FILE = LPT1 ON;
FORMAT /M1 /RD 10,4;

```

```

@  NUMBER OF RAILROADS  @  N = 15;
@  NUMBER OF YEARS      @  T = 9;

```

```

NT      =  N*T;

```

```

NAMES    =  GETNAME("C:\\LCMTV\\DATA\\NDPR.DAT");
OPEN D1  =  C:\\LCMTV\\DATA\\NDPR.DAT  VARINDXI;
D        =  READR(D1,135);
F1       =  CLOSE(D1);

```

```

YI       =  IGENADMN;
X1I      =  ITRK;
X2I      =  IGTM;
RRI      =  IRRID;
YEARI    =  IYEAR;

```

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YEAR     =  D[.,YEARI];

```

```

R        =  D[.,RRI];
RR       =  R[SEQA(1,T,N),.];

```

```

Y        =  D[.,YI];
X1       =  D[.,X1I];
X2       =  D[.,X2I];
YEAR     =  D[.,YEARI];

```

```

SEL1     =  (YEAR .EQ 1979);
SEL2     =  (YEAR .EQ YEAR[NT,.]);

```



```

FORMAT 40,8;    "    ";; $UNITS1;

FORMAT /RD 8,8;
"                ";; $NAMES{X1I,.J};;
FORMAT 40,8;    "    ";; $UNITS2;

FORMAT /RD 8,8;
"                ";; $NAMES{X2I,.J};;
FORMAT 40,8;    "    ";; $UNITS3;

FORMAT /M1 /RD 12,4;
"
"
"
"
"
"                RAILROAD SPECIFIC MEANS OF THE DATA
"
"
FORMAT 12,8;
"                RAILROAD ";;    $NAMES{YI X1I X2I,.J}';
"

                LET MASK[1,4] = 1 1 1 1;

                LET FMT[4,3] =  "%.*1f" 20 0
                                "%.*1f" 16 4
                                "%.*1f" 14 4
                                "%.*1f" 14 4;

                PR = PRINTFM(XM,MASK,FMT);

"
"
"                XM = MEANC(XM)';

"
"                OVERALL MEANS OF THE DATA
"
"                ";;    FORMAT /M1 /RD 17,4; XM[.,2];;
"                FORMAT /M1 /RD 13,4; XM[.,3];;
"                FORMAT /M1 /RD 13,4; XM[.,4];

"\f";

CLEAR A, YM, PR, MASK, FMT;

@=====
@
@  -----  CREATION OF DUMMY VARIABLES  -----  @
@
@=====

DUMR    =    DUMMY(R,RR);
DUMR    =    DUMR[.,1:N];
DUMT    =    DUMMY(YEAR,SEQA(1979,1,T));
DUMT    =    DUMT[.,2:T];

@=====
@

```

```
@ ----- OLS: STEP ONE IN GLS -----@
@
@=====
```

```
Y0      = Y;
X0      = X1 ~ X2;
X       = X0 ~ DUMR ~ DUMT;

K       = COLS(X);

B       = INV(X'X)*X'Y;
E       = Y - X*B;

E1      = DELIF(E,SEL1);
E2      = DELIF(E,SEL2);

RHO     = INV(E2'E2)*E1'E2;
```

```
@=====
@
@ ----- STEP TWO OF GLS -----@
@ PRAIS-WINSTEN TRANSFORMATION@
@ DUMMIES NOT TRANSFORMED@
@=====
```

```
P11     = SQRT(1 - RHO*RHO);
P1      = ONES(1,1) ~ ZEROS(1,T-1) ~ -RHO;

P       = RESHAPE(P1,T,T);
P[1,1]  = P11;

P       = EYE(N) .* P;
X       = X[.,1:2];

Y       = P*Y;
X       = P*X;

CLEAR P;

X       = X ~ DUMR ~ DUMT;

B       = INV(X'X)*X'Y;
E       = Y - X*B;

E       = RESHAPE(E,N,T);
RS      = E*E';
RS      = INV(T)*DIAG(RS);
```

```
@=====
@
@ ----- STEP THREE OF GLS -----@
@ WEIGHTED LEAST-SQUARES TRANSFORMATION@
@ DUMMIES NOT TRANSFORMED@
@=====
```

I = 1;

```
DO WHILE I <= N;
PRT = RR[I,.] ~ B[I+2,.] ~ TSTAT[I+2,.];

LET MASK[1,3] = 1 1 1;

LET FMT[3,3] = ".*1f" 26 0
               ".*1f" 14 4
               ".*1f" 13 4;

PR = PRINTFM(PRT,MASK,FMT); "      ";

I = I + 1;

ENDO;

" ";
" ";

"                1978 IS THE BASE YEAR";
```

```
I = 1;

DO WHILE I <= T - 1;

PRT = YEAR[I,.] ~ B[17+I,.] ~ TSTAT[17+I,.];

PR = PRINTFM(PRT,MASK,FMT); "      ";
```

```
I = I + 1;

ENDO;
" ";
" ";

"                ERROR VARIANCE ";; S;
"                RSQ ";; RSQ;
"                MODIFIED DW ";; DW;
"                MODIFIED RHO ";; RHO;

"\f";
```

```
@=====
@
@  -----  CALCULATION OF RATIOS  -----  @
@                AND THEIR STANDARD ERRORS                @
@
@=====
```

```
V      = COV[1:2,1:2];

DEN     = (B[1,.]*X1M + B[2,.]*X2M);
G1      = -(B[2,.]*X2M .* X1M) ./ (DEN^2);
G2      = -(B[1,.] ./ B[2,.])*G1;

G       = G1 ~ G2;
```

