

Genstat 64-bit Release 24.2 (PC/Windows 11) 04 October 2025 14:38:59
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Genstat Twenty-fourth Edition
Genstat Procedure Library Release PL33

```
1  SET  [WORKINGDIRECTORY='C:/Varie/GenStat'; DIAGNOSTIC=messages]
2  JOB
```

End of job.

```
6936
6937  "filter the dataset to CIK and LD recipients"
6938  RESTRICT eGFR_EPI2021, pz_categoria, mese, don_quality_score, don_eta,
ric_CIT, C[1], C[2], \
6939  ric_eta, ric_sesso, ric_PRA; CONDITION=pz_categoria.IN.!T('CIK
recipient','LD recipient')
6940
6941  "generate continuous variable time"
6942  DELETE [REDEFINE=yes] cmese2
6943  CALCULATE cmese2 = !(#mese)
6944
6945  "Random Coefficient Regression"
6946  DELETE [REDEFINE=yes] _vcs, _vcst, _cst, _effs, _effst, _sigma2, _cinit
6947  "Calculating the Initial Values"
6948  VCOMPONENTS [FIXED=pz_categoria * cmese2 + don_quality_score + don_eta
+ ric_CIT + C[2]\
6949  + ric_eta + ric_sesso + ric_PRA; SPLINE=pz_categoria.cmese2;
FACTORIAL=9] id/cmese2; CONSTRAINTS=positive
6950  REML [PRINT=*; MAXCYCLE=30; FMETHOD=automatic;
PTERMS=pz_categoria.cmese2; PSE=differences;\
6951  METHOD=AI] eGFR_EPI2021
6952  VKEEP [SIGMA2 = _sigma2] id/cmese2; COMPONENT = _vcs, _vcst;
EFFECTS=_tes, _test
6953  CALC _vcs, _vcst = _vcs, _vcst / _sigma2
6954  VARIATE _effs, _effst; VALUE=_tes, _test
6955  CALC _cst = CORR(_effs, _effst)*SQRT(_vcs*_vcst)
6956  VARIATE [VALUE=_vcs, _cst, _vcst] _cinit
6957  "Fit the model and check it"
6958  VCOMPONENTS [FIXED=pz_categoria * cmese2 + don_quality_score + don_eta
+ ric_CIT + C[2]\
6959  + ric_eta + ric_sesso + ric_PRA; SPLINE=pz_categoria.cmese2;
FACTORIAL=9] RANDOM=id/cmese2
6960  VSTRUCTURE [TERMS=id/cmese2; CORRELATE=unrest; FORM=whole;
CINITIAL=_cinit]
6961  REML [PRINT=model, components, deviance; MAXCYCLE=30;
FMETHOD=automatic;\
6962  PTERMS=pz_categoria.cmese2; PSE=differences; METHOD=AI] eGFR_EPI2021;
SAVE=wsave
```

REML variance components analysis

Response variate: eGFR_EPI2021
Fixed model: Constant + cmese2 + pz_categoria + cmese2.pz_categoria + don_quality_score + don_eta + ric_CIT + C['volume_attivitàDEC_centrotx'] + ric_eta + ric_sesso + ric_PRA
Random model: id + id.cmese2
Spline model: Spline(cmese2).pz_categoria
Number of units: 244 (260 units excluded due to zero weights or missing values)

Residual term has been added to model

Sparse algorithm with AI optimisation

All covariates centred

Analysis is subject to the restriction on eGFR_EPI2021

Covariance structures defined for random model

Correlated terms:

Set Correlation across terms
1 Unstructured

Set Terms
1 id
1 id.cmese2

Covariance model within term
Identity
Identity

Estimated variance components

Random term	component	s.e.
Spline(cmese2).pz_categoria	0.69	1.76

Estimated parameters for covariance models

Random term(s)	Factor	Model(order)	Parameter	Estimate	s.e.
id + id.cmese2	Across terms	Unstructured	v_11	4.200	1.110
			v_21	-0.03919	0.02537
			v_22	0.003364	0.001217
	Within terms	Identity	-	-	-

Note: the covariance matrix for each term is calculated as G or R where $\text{var}(y) = \text{Sigma2}(ZGZ' + R)$, i.e. relative to the residual variance, Sigma2 .

Residual variance model

Term	Model(order)	Parameter	Estimate	s.e.
Residual	Identity	Sigma2	70.04	8.07

Deviance: -2*Log-Likelihood

Deviance	d.f.
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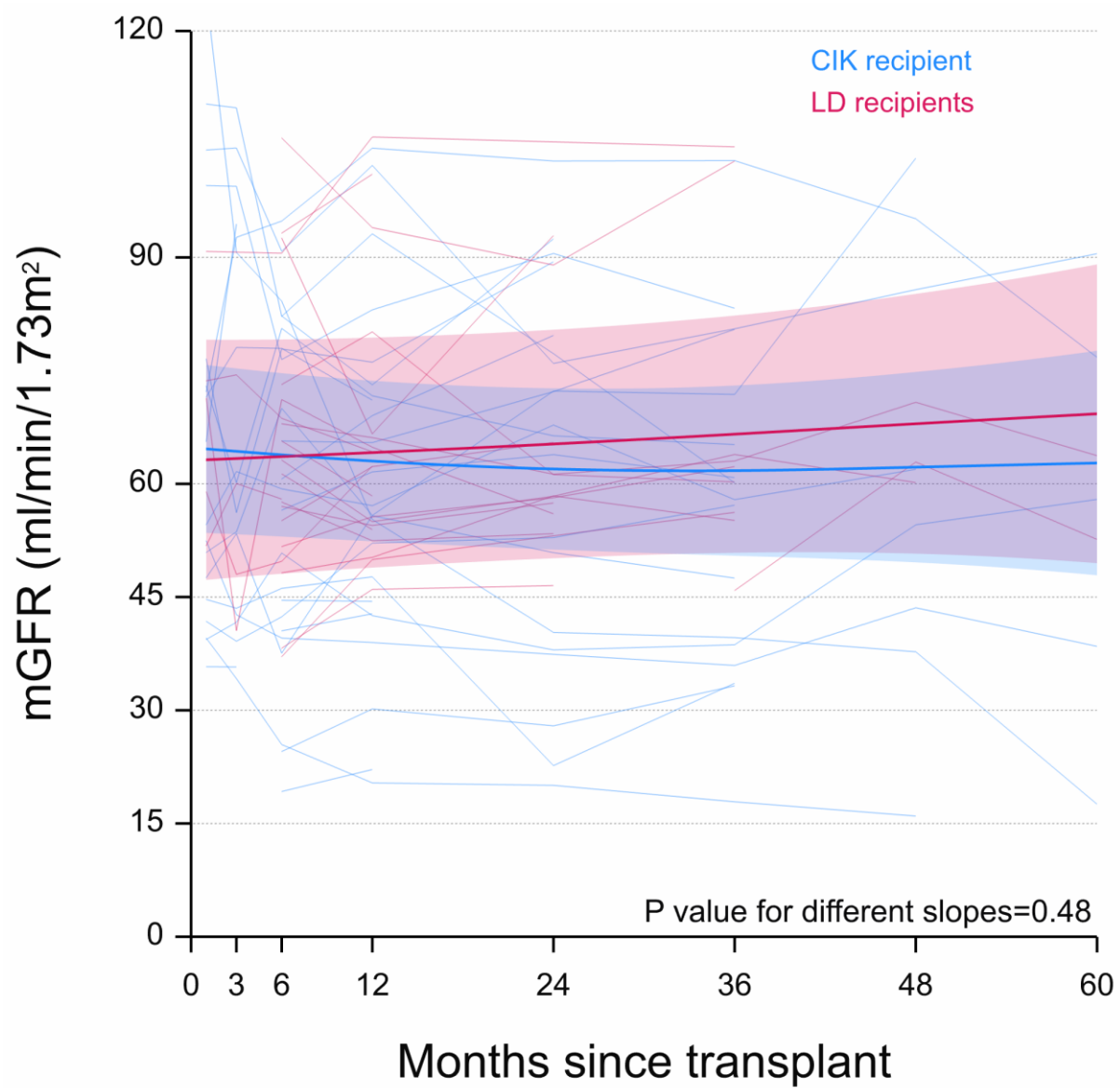
Note: deviance omits constants which depend on fixed model fitted.

```
6963  VPLOT
6964
6965
6966  "calculate and save P value and text for the plot (The P value includes
non linear spline component)"
6967  SCALAR [MODIFY = yes] IDENTIFIER = rdf
6968  VKEEP [DF= rdf] pz_categoria.cmese2; EFFECTS=beta; SEDEFFECTS=se;
NDF=ndf; DDF = ddf; FSTATISTIC = f; WALD = w
6969  CALC _Pval_f = CUF(f;ndf;ddf;0)
6970  TXCONSTRUCT [TEXT=text_Plin_diff] 'P value for different slopes=',
#_Pval_f; DECIMALS = 2
6971
6972
6973  "Get the mean population curve via VPREDICT for the plot"
6974  VPREDICT [PREDICTIONS = mgfr; SE = semgfr] pz_categoria,cmese2;
LEVELS=!T('CIK recipient','LD recipient'),!(1,2...60)
```

```

6975 VTABLE TABLE= mgfr, semgfr; VARIATE = MGFR, SEMGFR; CLASSIFICATION = CAT
6976
6977 "Graph setting for the plot (colours, pattern of mean trajectories lines,
axes settings"
6978 CALC red = RGB(212; 17; 89)
6979 & blue = RGB(26; 133; 255)
6980 PEN [RESET=yes] 1,2; METHOD=line; COLOUR=#blue,#red; CFILL='match';
SYMBOLS='none'; THICK=2
6981 YAXIS [RESET=yes] WINDOW=1; TITLE='mGFR (ml/min/1.73m2)'; LOWER=0;
UPPER=120; MARKS=(0,15,30,45,60,90,120 )
6982 XAXIS [RESET=yes] WINDOW=1; TITLE='Months since transplant'; LOWER=0;
UPPER=60; MARKS=(0,3,6,12,24,36,48,60)
6983 FRAME [GRID=yx; RESET=yes] WINDOW=1; BOX=omit
6984
6985 "Calculations to plot Individual trajectories for recipients only"
6986 SUBSET [pz_categoria .in. !T('CIK recipient','LD recipient');
SETLEVELS=yes] \
6987 id,pz_categoria,eGFR_EPI2021,cmese2; iid,icat,iY,iX
6988 TABULATE [CLASS=iid; PRINT=*] !(#icat); MEANS=tid "Get category for
individuals"
6989 VTABLE tid; idcat
6990 GROUPS [REDEFINE=yes] idcat
6991 CALC nidpen = NVALUES(idcat)
6992 CALC idcolour = NEWLEVELS(idcat;!(blue,red))
6993
6994 "Calculations to plot 95% confidence intervals as coloured regions by
reversin lower bound and appending
-6995 to the upper bounds to define a region to be shaded "
6996 SCALAR IDENTIFIER = t
6997 CALC t = ABS(EDT(0.025; rdf; 0))
6998 SORT [INDEX=CAT[1,2]] CAT[1,2],MGFR
6999 CALC LB = MGFR - t * SEMGFR
7000 CALC UB = MGFR + t * SEMGFR
7001 CALC RLB,RCAT[1,2] = REVERSE(LB,CAT[1,2])
7002 APPEND [AY] UB,RLB
7003 APPEND [AX] CAT[2],RCAT[2]
7004 APPEND [AP] CAT[1],RCAT[1]
7005
7006 "Make the plot"
7007 DSTART
7008 DGRAPH [WINDOW=1; KEYWINDOW=0] Y=MGFR; X=CAT[2]; PEN=CAT[1]; LAYER=3
"Mean lines"
7009 PEN 1,2; METHOD=fill; JOIN=given; TAREA = 200
7010 DGRAPH [WINDOW=1; KEYWINDOW=0; SCREEN=keep] Y=AY; X=AX; PEN=AP; LAYER=2
"95% Confidence region"
7011 PEN 1...nidpen; COLOUR=#idcolour; METHOD=line; SYMBOL='none';
THICK=0.9; LINESTYLE='solid'; TLINE = 150
7012 DGRAPH [WINDOW=1; KEYWINDOW=0; SCREEN=keep] Y=iY; X=iX; PEN=iid; LAYER=1
"Individuals lines"
7013 PEN 1,2; COLOUR=#blue,#red
7014 DKEY [WINDOW=6; NCOLUMNS=1; PENLABELS=(1,2); BORDER=none;
XOFFSET=-6] \
7015 !T('CIK recipient','LD recipients'); METHOD='none'
7016 PEN 2; COLOUR=1; SYMBOL=0; ROTATION=0; SIZE=1; LABELS= text_Plin_diff
7017 DGRAPH [WINDOW=1; KEYWINDOW=0; SCREEN=keep] 3; 30; PEN=2 "text"
7018 DFINISH

```



```
7019
7020
7021  "Print linear difference between CIK and LD eGFR slopes per year FROM
THE REGRESSION TABLE (NOT INCLUDING SPLINES) "
7022  VRSETUP [SAVE = wsave]
7023  VRFIT [PRINT=model] pz_categoria * cmese2 + don_quality_score + don_eta
+ ric_CIT + C[2]\
7024    + ric_eta + ric_sesso + ric_PRA
```

Regression analysis of REML fixed model

Response variate: eGFR_EPI2021
Weight matrix: REML weights
Fitted terms: Constant + pz_categoria + cmese2 + cmese2.pz_categoria +
don_quality_score + don_eta + ric_CIT + C['volume_attivitàDEC_centrotx'] + ric_eta + ric_sesso +
ric_PRA

```
7025 VRKEEP [RDF = rrdf] pz_categoria.cmese2; ESTIMATES = rb_lin_diff; SE =  
rse_lin_diff; DDF = ddf  
7026 CALC rt = ABS(EDT(0.025; rrdf; 0))  
7027 SCALAR [MODIFY=yes] zt  
7028 CALC zt = ABS(#rb_lin_diff$[2] / #rse_lin_diff$[2])  
7029 CALC _Pval_t = 2* CUT(zt;rrdf;0)  
7030 CALC _erb_lin_diff = #rb_lin_diff$[2] * 12 * -1 "Difference in slopes  
per ml/min/1.73m2/year CIK vs LD recipients"  
7031 CALC _erse_lin_diff = #rse_lin_diff$[2]* 12  
7032 CALC _erlb_lin_diff = _erb_lin_diff - rt * _erse_lin_diff  
7033 & _erub_lin_diff = _erb_lin_diff + rt * _erse_lin_diff  
7034 PRINT _erb_lin_diff, _erse_lin_diff, rt, _erlb_lin_diff, _erub_lin_diff;  
DECIMALS = 2
```

erb_lin_diff	erse_lin_diff	rt	erlb_lin_diff	erub_lin_diff
-2.02	2.21	1.97	-6.37	2.34

```
7035 TXCONSTRUCT [TEXT=ertext_lin_diff] 'Adjusted linear diff. between CIK  
and LD recipients:', #erb_lin_diff, \  
7036 ' (95%CI: ', #erlb_lin_diff, ' to ', #erub_lin_diff, '; P=', #_Pval_t,  
)'; DECIMALS = *,1,*,1,*,1,*,2,*  
7037 PRINT [IPRINT=*] ertext_lin_diff
```

Adjusted linear diff. between CIK and LD recipients:-2.0 (95%CI: -6.4 to 2.3; P=0.36)

```
7038  
7039
```