

Host

Host

Host

Host

Cooks Distance

Cooks Distance
Import data

Cooks distance regression diagnostics

Cooks distance regression diagnostics
G3 model

Regression

[CooksDistanceData] D:\DATA ANALYSIS\B Normality and Assumption Tests\Cooks Distance\SPSS_Output\sav\Cooks-Distance-data.sav

Variables Entered/Removed^a

| Model | Variables Entered | Variables Removed | Method |
|-------|---|-------------------|--------|
| 1 | age, studytime, absences, G2, failures, G1 ^b | . | Enter |

a. Dependent Variable: G3

b. All requested variables entered.

Model Summary^b

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .922 ^a | .851 | .849 | 1.254 |

a. Predictors: (Constant), age, studytime, absences, G2, failures, G1

b. Dependent Variable: G3

ANOVA^a

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|-------|------------|----------------|-----|-------------|---------|-------------------|
| 1 | Regression | 5753.053 | 6 | 958.842 | 609.353 | .000 ^b |
| | Residual | 1010.214 | 642 | 1.574 | | |
| | Total | 6763.267 | 648 | | | |

a. Dependent Variable: G3

b. Predictors: (Constant), age, studytime, absences, G2, failures, G1

Cooks distance regression diagnostics
G3 model

Coefficients^a

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|-------|------------|-----------------------------|------------|---------------------------|--------|------|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | -.545 | .763 | | -.715 | .475 |
| | G1 | .142 | .037 | .121 | 3.886 | .000 |
| | G2 | .883 | .034 | .797 | 25.823 | .000 |
| | studytime | .095 | .062 | .024 | 1.526 | .127 |
| | failures | -.233 | .095 | -.043 | -2.456 | .014 |
| | absences | .023 | .011 | .033 | 2.086 | .037 |
| | age | .024 | .043 | .009 | .544 | .587 |

a. Dependent Variable: G3

Collinearity Diagnostics^a

| Model | Dimension | Eigenvalue | Condition Index | Variance Proportions | | | |
|-------|-----------|------------|-----------------|----------------------|-----|-----|-----------|
| | | | | (Constant) | G1 | G2 | studytime |
| 1 | 1 | 5.344 | 1.000 | .00 | .00 | .00 | .00 |
| | 2 | .921 | 2.409 | .00 | .00 | .00 | .00 |
| | 3 | .567 | 3.071 | .00 | .00 | .00 | .01 |
| | 4 | .116 | 6.798 | .00 | .01 | .01 | .97 |
| | 5 | .043 | 11.188 | .02 | .06 | .08 | .01 |
| | 6 | .008 | 26.235 | .00 | .87 | .89 | .00 |
| | 7 | .002 | 49.066 | .97 | .06 | .02 | .00 |

Collinearity Diagnostics^a

| Model | Dimension | Variance Proportions | | |
|-------|-----------|----------------------|----------|-----|
| | | failures | absences | age |
| 1 | 1 | .00 | .01 | .00 |
| | 2 | .64 | .03 | .00 |
| | 3 | .10 | .88 | .00 |
| | 4 | .00 | .02 | .00 |
| | 5 | .21 | .05 | .03 |
| | 6 | .00 | .00 | .00 |
| | 7 | .04 | .00 | .96 |

Cooks distance regression diagnostics
G3 model

a. Dependent Variable: G3

Residuals Statistics^a

| | Minimum | Maximum | Mean | Std. Deviation | N |
|-----------------------------------|---------|---------|-------|----------------|-----|
| Predicted Value | .31 | 19.58 | 11.91 | 2.980 | 649 |
| Std. Predicted Value | -3.892 | 2.575 | .000 | 1.000 | 649 |
| Standard Error of Predicted Value | .059 | .403 | .122 | .045 | 649 |
| Adjusted Predicted Value | .32 | 19.59 | 11.91 | 2.979 | 649 |
| Residual | -9.045 | 5.817 | .000 | 1.249 | 649 |
| Std. Residual | -7.210 | 4.637 | .000 | .995 | 649 |
| Stud. Residual | -7.277 | 4.651 | .000 | 1.002 | 649 |
| Deleted Residual | -9.234 | 5.851 | -.001 | 1.265 | 649 |
| Stud. Deleted Residual | -7.591 | 4.727 | -.003 | 1.019 | 649 |
| Mahal. Distance | .414 | 65.945 | 5.991 | 6.491 | 649 |
| Cook's Distance | .000 | .177 | .002 | .010 | 649 |
| Centered Leverage Value | .001 | .102 | .009 | .010 | 649 |

a. Dependent Variable: G3

Cook distance thresholds

Cook distance thresholds
Rules of thumb

List

[CooksDistanceData] D:\DATA ANALYSIS\B Normality and Assumption Tests\Cooks Distance\SPSS_Output\sav\Cooks-Distance-with-diagnostics.sav

Cook distance thresholds
Rules of thumb

| n_model | p_parameters | cooks_threshold_4_over_n | high_leverage_threshold |
|---------|--------------|--------------------------|-------------------------|
| 649 | 7.00 | .00616 | .02157 |

Number of cases read: 1 Number of cases listed: 1

Top Cook distance cases

Top Cook distance cases
Sorted descending

List

Top Cook distance cases
Sorted descending

| case_id | cook_flag G3 | cook_flag pred_G3 | high_leve resid_G3 | large_resi G3 | std_resid_ cook_G3 | lev_G3 | df fi |
|---------|-----------------|----------------------|-----------------------|------------------|-----------------------|--------|-------|
| ts_G3 | _4_over_n | _above_1 | rage_flag | dual_flag | | | |
| 164.00 | 0 | 9.02294 | -9.02294 | -7.27663 | .17695 | .02132 | -. . |
| 21108 | 1.00 | .00 | .00 | 1.00 | | | |
| 640.00 | 0 | 7.54332 | -7.54332 | -6.07521 | .10887 | .01869 | -. . |
| 15576 | 1.00 | .00 | .00 | 1.00 | | | |
| 638.00 | 0 | 7.15378 | -7.15378 | -5.74028 | .06191 | .01144 | -. . |
| 09408 | 1.00 | .00 | .00 | 1.00 | | | |
| 173.00 | 1 | 10.04462 | -9.04462 | -7.23659 | .05473 | .00572 | -. . |
| 06617 | 1.00 | .00 | .00 | 1.00 | | | |
| 627.00 | 0 | 5.48156 | -5.48156 | -4.40859 | .04947 | .01596 | -. . |
| 09766 | 1.00 | .00 | .00 | 1.00 | | | |
| 584.00 | 0 | 6.17939 | -6.17939 | -4.95898 | .04700 | .01166 | -. . |
| 08268 | 1.00 | .00 | .00 | 1.00 | | | |
| 641.00 | 0 | 6.92062 | -6.92062 | -5.54546 | .04539 | .00868 | -. . |
| 07150 | 1.00 | .00 | .00 | 1.00 | | | |
| 587.00 | 0 | 8.25028 | -8.25028 | -6.60070 | .04489 | .00562 | -. . |
| 05951 | 1.00 | .00 | .00 | 1.00 | | | |
| 520.00 | 0 | 7.34324 | -7.34324 | -5.87976 | .04366 | .00722 | -. . |
| 06491 | 1.00 | .00 | .00 | 1.00 | | | |
| 280.00 | 5 | 7.70442 | -2.70442 | -2.21365 | .03798 | .04993 | -. . |
| 14674 | 1.00 | .00 | 1.00 | 1.00 | | | |
| 170.00 | 10 | 7.91591 | 2.08409 | 1.70078 | .01982 | .04422 | . . |
| 09995 | 1.00 | .00 | 1.00 | .00 | | | |
| 62.00 | 16 | 10.18320 | 5.81680 | 4.65072 | .01820 | .00431 | . . |
| 03426 | 1.00 | .00 | .00 | 1.00 | | | |
| 1.00 | 11 | 9.87749 | 1.12251 | .94500 | .01470 | .10177 | . . |
| 12933 | 1.00 | .00 | 1.00 | .00 | | | |
| 559.00 | 10 | 12.57270 | -2.57270 | -2.07430 | .01409 | .02088 | -. . |
| 05899 | 1.00 | .00 | .00 | 1.00 | | | |
| 558.00 | 10 | 8.33740 | 1.66260 | 1.35593 | .01224 | .04298 | . . |
| 07747 | 1.00 | .00 | 1.00 | .00 | | | |

Top Cook distance cases
Sorted descending

| | | | | | | | |
|--------|------|---------|----------|----------|--------|--------|----|
| 156.00 | 6 | 7.91342 | -1.91342 | -1.55110 | .01170 | .03139 | -. |
| 06515 | 1.00 | .00 | 1.00 | .00 | | | |
| 573.00 | 7 | 4.86506 | 2.13494 | 1.72338 | .01075 | .02318 | . |
| 05411 | 1.00 | .00 | 1.00 | .00 | | | |
| 479.00 | 8 | 6.50160 | 1.49840 | 1.22308 | .01035 | .04465 | . |
| 07256 | 1.00 | .00 | 1.00 | .00 | | | |
| 174.00 | 10 | 7.80792 | 2.19208 | 1.76730 | .01017 | .02074 | . |
| 04996 | 1.00 | .00 | .00 | .00 | | | |
| 79.00 | 10 | 8.48180 | 1.51820 | 1.23696 | .00974 | .04111 | . |
| 06764 | 1.00 | .00 | 1.00 | .00 | | | |

Number of cases read: 20 Number of cases listed: 20

Cook distance descriptives

Cook distance descriptives
Influence diagnostics

Descriptives

Descriptive Statistics

| | N | Minimum | Maximum | Mean | Std. Deviation |
|--------------------|-----|----------|----------|------------|----------------|
| cook_G3 | 649 | .00000 | .17695 | .0018629 | .00984723 |
| lev_G3 | 649 | .00064 | .10177 | .0092450 | .01001647 |
| dffits_G3 | 649 | -.21108 | .12933 | -.0009017 | .02027820 |
| std_resid_G3 | 649 | -7.27663 | 4.65072 | -.0003575 | 1.00176810 |
| resid_G3 | 649 | -9.04462 | 5.81680 | .0000000 | 1.24858805 |
| pred_G3 | 649 | .31032 | 19.57851 | 11.9060092 | 2.97962542 |
| Valid N (listwise) | 649 | | | | |

Explore

Case Processing Summary

| | Valid | | Cases Missing | | Total | |
|--------------|-------|---------|---------------|---------|-------|---------|
| | N | Percent | N | Percent | N | Percent |
| cook_G3 | 649 | 100.0% | 0 | 0.0% | 649 | 100.0% |
| lev_G3 | 649 | 100.0% | 0 | 0.0% | 649 | 100.0% |
| dffits_G3 | 649 | 100.0% | 0 | 0.0% | 649 | 100.0% |
| std_resid_G3 | 649 | 100.0% | 0 | 0.0% | 649 | 100.0% |

Cook distance descriptives
Influence diagnostics

Descriptives

| | | Statistic | Std. Error | |
|----------------------------------|----------------------------------|-------------|------------|-----------|
| cook_G3 | Mean | .0018629 | .00038654 | |
| | 95% Confidence Interval for Mean | Lower Bound | .0011039 | |
| | | Upper Bound | .0026219 | |
| | 5% Trimmed Mean | .0005517 | | |
| | Median | .0002064 | | |
| | Variance | .000 | | |
| | Std. Deviation | .00984723 | | |
| | Minimum | .00000 | | |
| | Maximum | .17695 | | |
| | Range | .17695 | | |
| | Interquartile Range | .00069 | | |
| | Skewness | 12.090 | .096 | |
| | Kurtosis | 181.367 | .192 | |
| | lev_G3 | Mean | .0092450 | .00039318 |
| 95% Confidence Interval for Mean | | Lower Bound | .0084729 | |
| | | Upper Bound | .0100171 | |
| 5% Trimmed Mean | | .0076968 | | |
| Median | | .0063325 | | |
| Variance | | .000 | | |
| Std. Deviation | | .01001647 | | |
| Minimum | | .00064 | | |
| Maximum | | .10177 | | |
| Range | | .10113 | | |
| Interquartile Range | | .00625 | | |
| Skewness | | 3.975 | .096 | |
| Kurtosis | | 22.251 | .192 | |
| dffits_G3 | | Mean | -.0009017 | .00079599 |
| | 95% Confidence Interval for Mean | Lower Bound | -.0024647 | |
| | | Upper Bound | .0006614 | |
| | 5% Trimmed Mean | .0000242 | | |
| | Median | -.0005725 | | |
| | Variance | .000 | | |

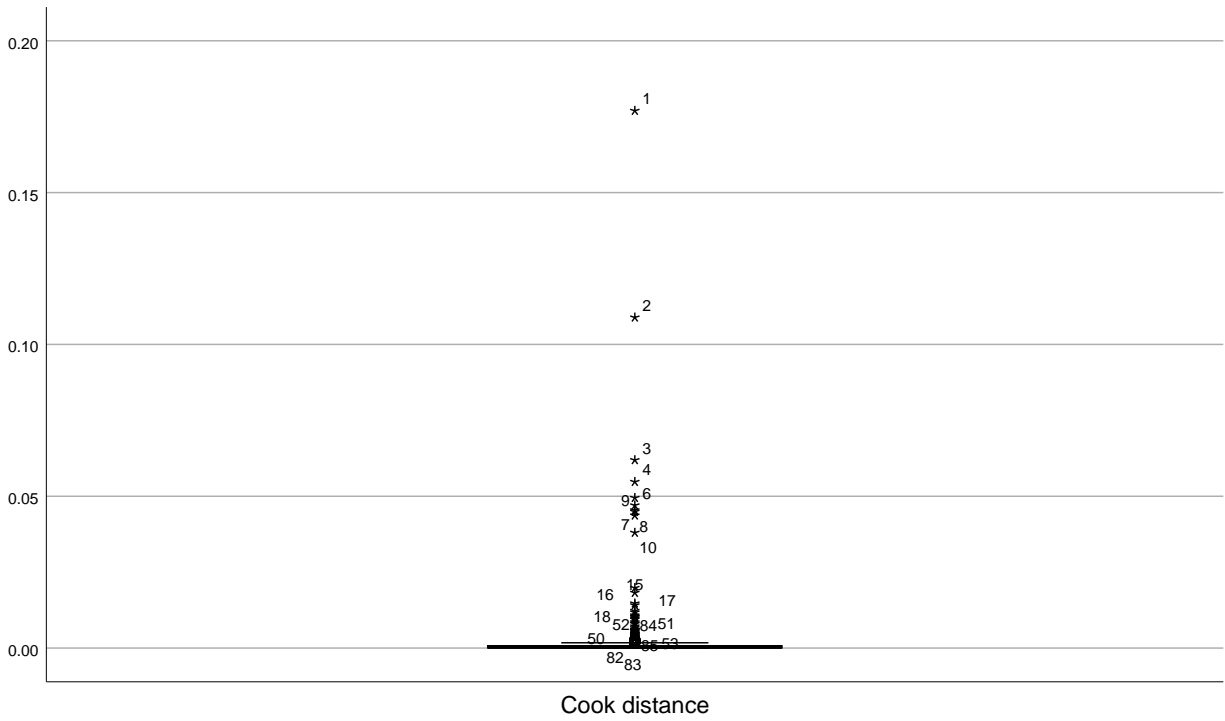
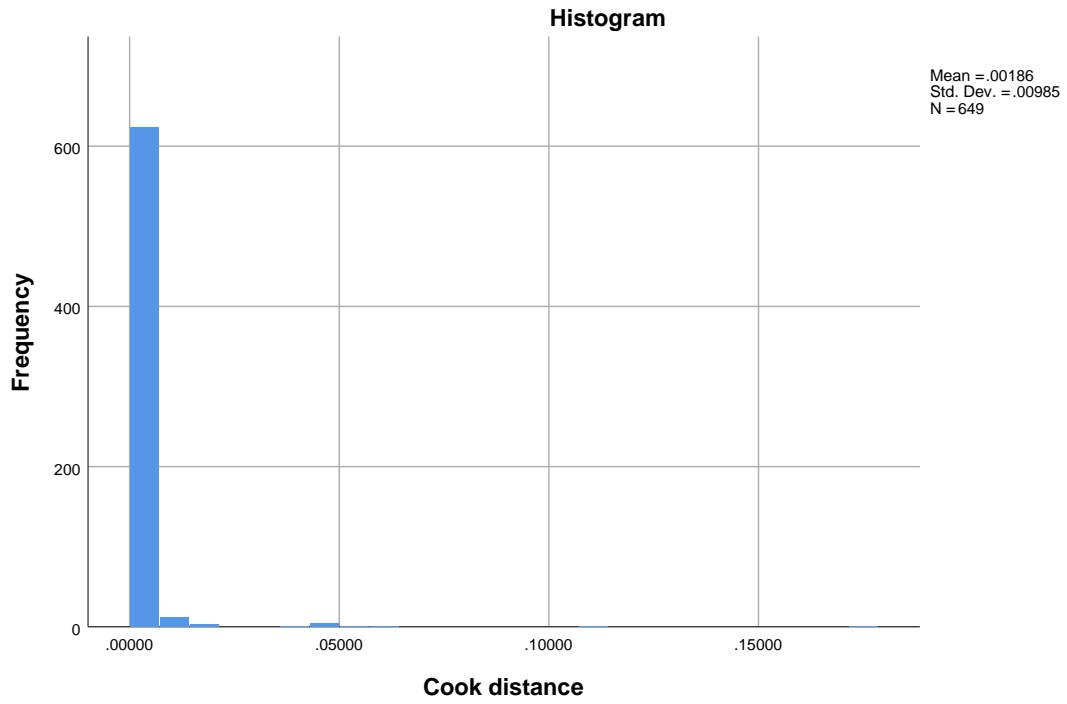
Cook distance descriptives
Influence diagnostics

Descriptives

| | | Statistic | Std. Error | |
|--------------|----------------------------------|-------------|------------|--|
| | Std. Deviation | .02027820 | | |
| | Minimum | -.21108 | | |
| | Maximum | .12933 | | |
| | Range | .34040 | | |
| | Interquartile Range | .00817 | | |
| | Skewness | -2.922 | .096 | |
| | Kurtosis | 33.041 | .192 | |
| std_resid_G3 | Mean | -.0003575 | .03932284 | |
| | 95% Confidence Interval for Mean | Lower Bound | -.0775730 | |
| | | Upper Bound | .0768581 | |
| | 5% Trimmed Mean | .0560408 | | |
| | Median | -.0545728 | | |
| | Variance | 1.004 | | |
| | Std. Deviation | 1.00176810 | | |
| | Minimum | -7.27663 | | |
| | Maximum | 4.65072 | | |
| | Range | 11.92735 | | |
| | Interquartile Range | .86567 | | |
| | Skewness | -2.869 | .096 | |
| | Kurtosis | 18.677 | .192 | |

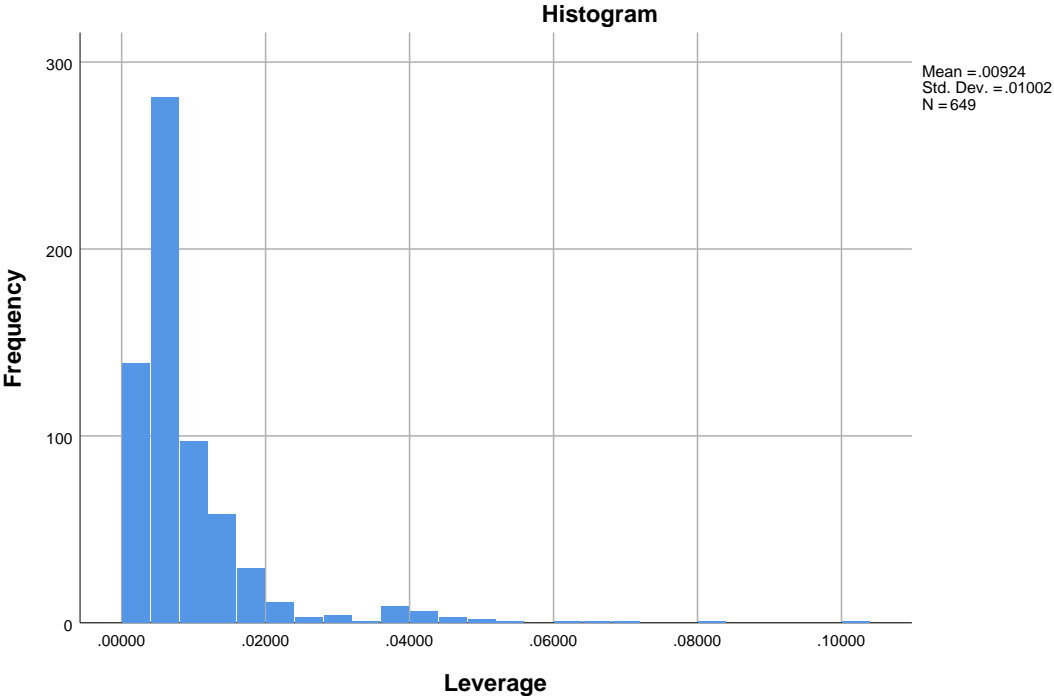
Cook distance

Cook distance descriptives
Influence diagnostics

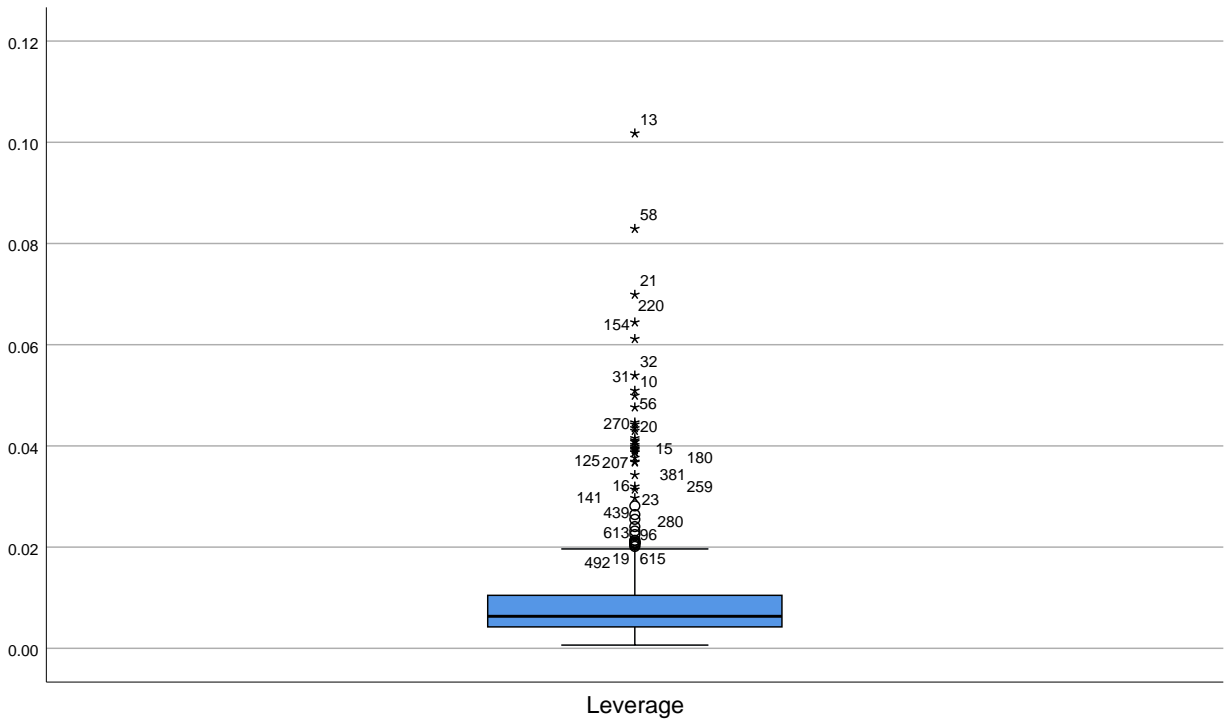


Cook distance descriptives
Influence diagnostics

Leverage

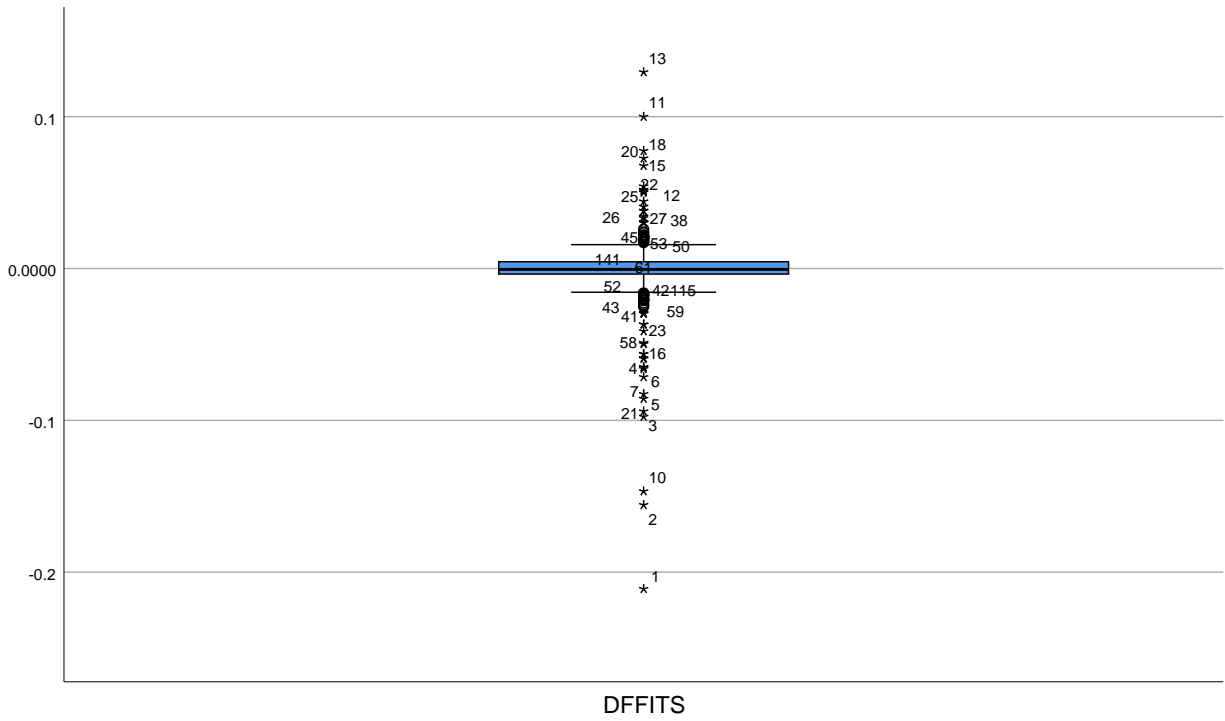
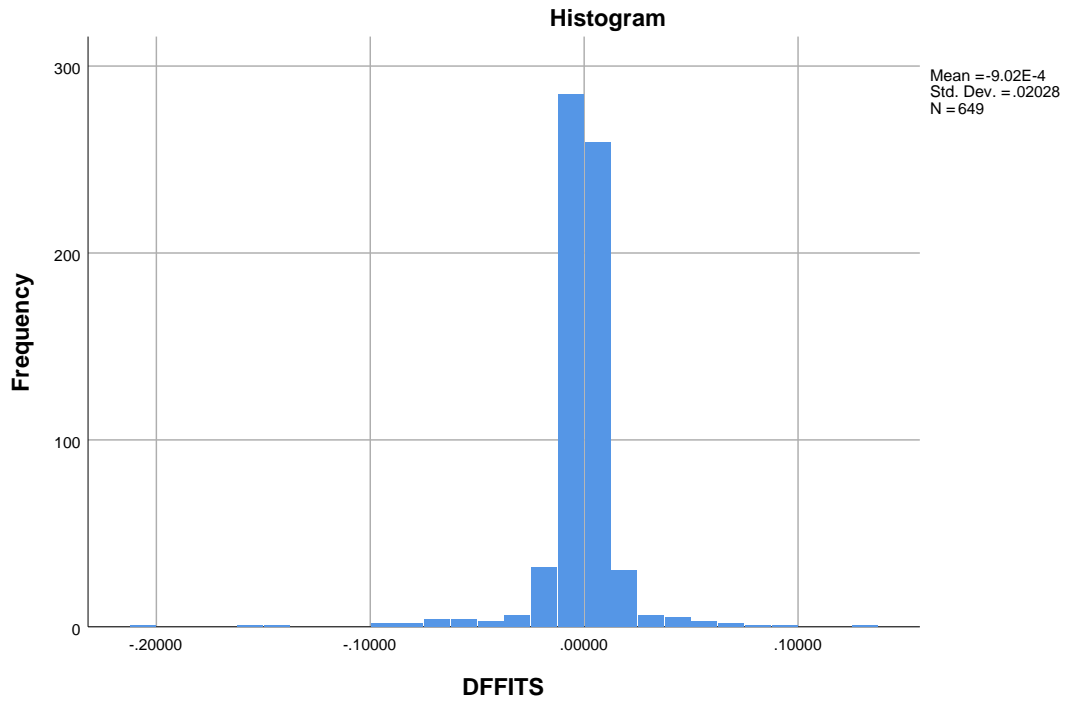


Cook distance descriptives
Influence diagnostics



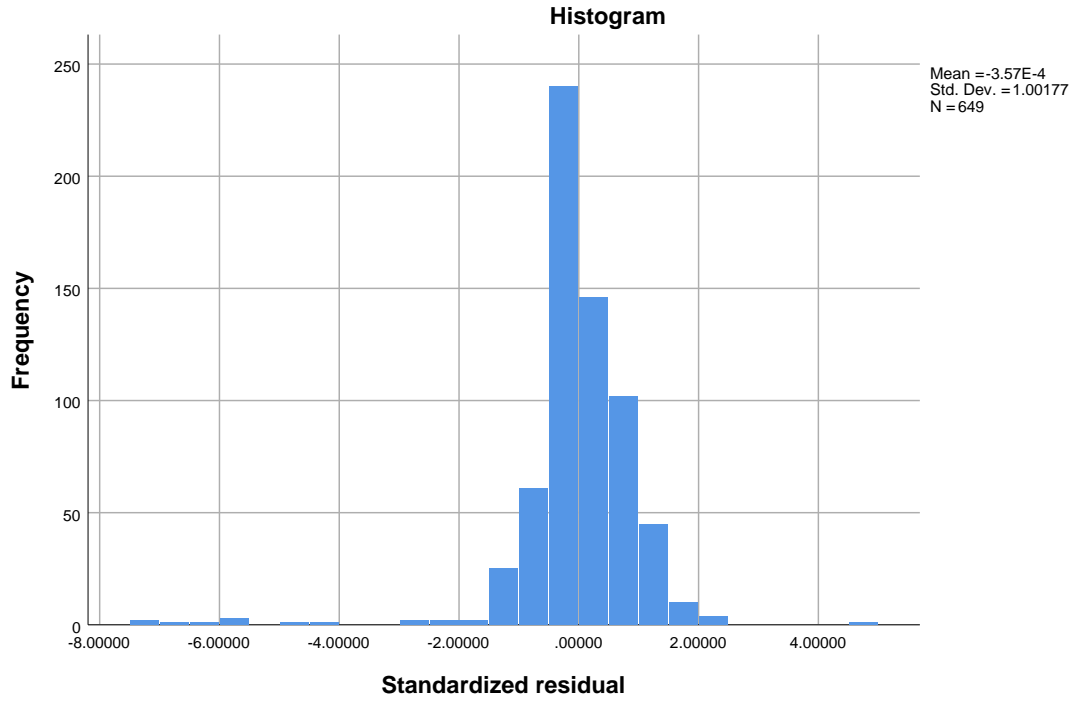
DFFITS

Cook distance descriptives
Influence diagnostics

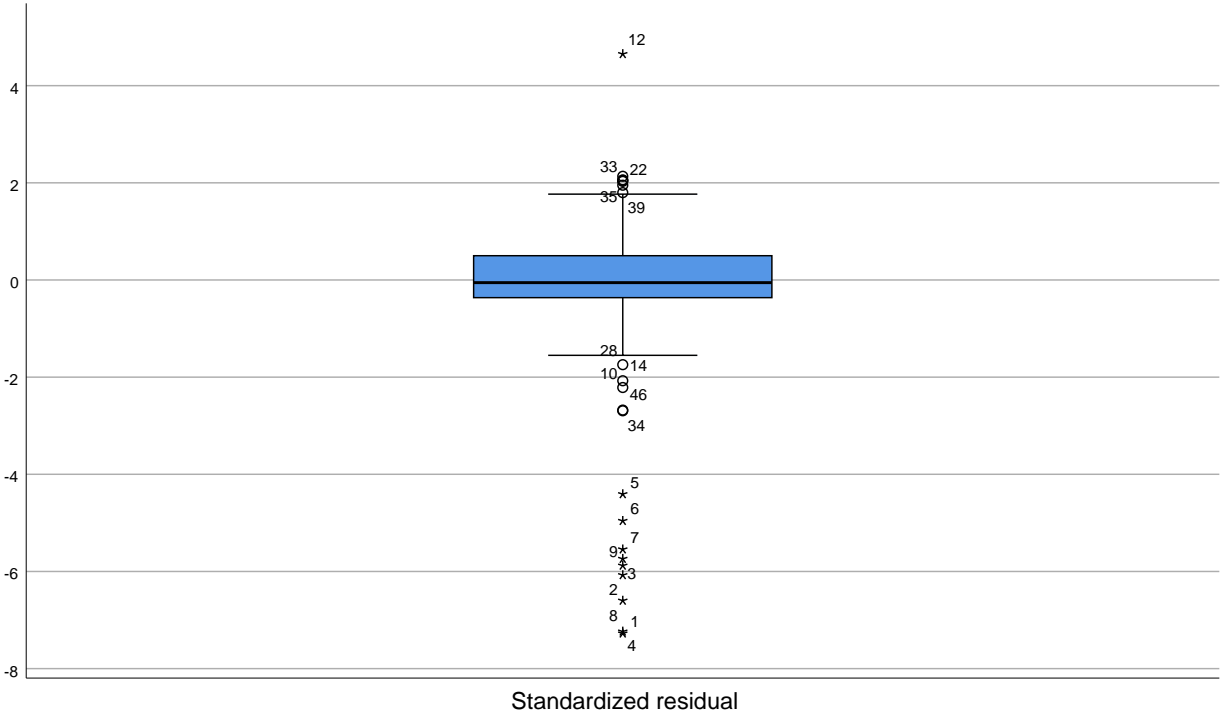


Cook distance descriptives
Influence diagnostics

Standardized residual



Cook distance descriptives
Influence diagnostics



Correlations

Cook distance descriptives
Influence diagnostics

Correlations

| | | cook_G3 | lev_G3 | dffits_G3 | std_resid_G3 | resid_G3 |
|--------------|---------------------|---------|---------|-----------|--------------|----------|
| cook_G3 | Pearson Correlation | 1 | .175** | -.612** | -.591** | -.590** |
| | Sig. (2-tailed) | | .000 | .000 | .000 | .000 |
| | N | 649 | 649 | 649 | 649 | 649 |
| lev_G3 | Pearson Correlation | .175** | 1 | -.048 | -.071 | -.071 |
| | Sig. (2-tailed) | .000 | | .218 | .072 | .072 |
| | N | 649 | 649 | 649 | 649 | 649 |
| dffits_G3 | Pearson Correlation | -.612** | -.048 | 1 | .798** | .795** |
| | Sig. (2-tailed) | .000 | .218 | | .000 | .000 |
| | N | 649 | 649 | 649 | 649 | 649 |
| std_resid_G3 | Pearson Correlation | -.591** | -.071 | .798** | 1 | 1.000** |
| | Sig. (2-tailed) | .000 | .072 | .000 | | .000 |
| | N | 649 | 649 | 649 | 649 | 649 |
| resid_G3 | Pearson Correlation | -.590** | -.071 | .795** | 1.000** | 1 |
| | Sig. (2-tailed) | .000 | .072 | .000 | .000 | |
| | N | 649 | 649 | 649 | 649 | 649 |
| pred_G3 | Pearson Correlation | -.192** | -.319** | .051 | .000 | .000 |
| | Sig. (2-tailed) | .000 | .000 | .191 | .992 | 1.000 |
| | N | 649 | 649 | 649 | 649 | 649 |

Cook distance descriptives
Influence diagnostics

Correlations

| | | pred_G3 |
|--------------|---------------------|---------|
| cook_G3 | Pearson Correlation | -.192** |
| | Sig. (2-tailed) | .000 |
| | N | 649 |
| lev_G3 | Pearson Correlation | -.319** |
| | Sig. (2-tailed) | .000 |
| | N | 649 |
| dffits_G3 | Pearson Correlation | .051 |
| | Sig. (2-tailed) | .191 |
| | N | 649 |
| std_resid_G3 | Pearson Correlation | .000 |
| | Sig. (2-tailed) | .992 |
| | N | 649 |
| resid_G3 | Pearson Correlation | .000 |
| | Sig. (2-tailed) | 1.000 |
| | N | 649 |
| pred_G3 | Pearson Correlation | 1 |
| | Sig. (2-tailed) | |
| | N | 649 |

** . Correlation is significant at the 0.01 level (2-tailed).