

Van der Waerden Normal-Scores Test

Standalone verified Python analysis

Test: Van der Waerden Normal-Scores Test

Design: Normal-score comparison of final grades across maternal occupation groups.

Variables: G3, Mjob

Null hypothesis: All maternal-occupation groups share the same location distribution.

Formula: $A^2 = [\sum_j n_j \bar{z}_j^2] / [\sum_i z_i^2 / (N-1)]$, $z_i = \Phi^{-1}(R_i / (N+1))$

Source rows: 649

Calculated metrics:

statistic: 33.78199475162392

p_value: 8.259763222603105e-07

degrees_of_freedom: 4

normal_score_variance: 0.9511039610675783

Independent reference values:

statistic: 33.78199475162392

p_value: 8.259763222603105e-07

df: 4

normal_score_variance: 0.9511039610675783

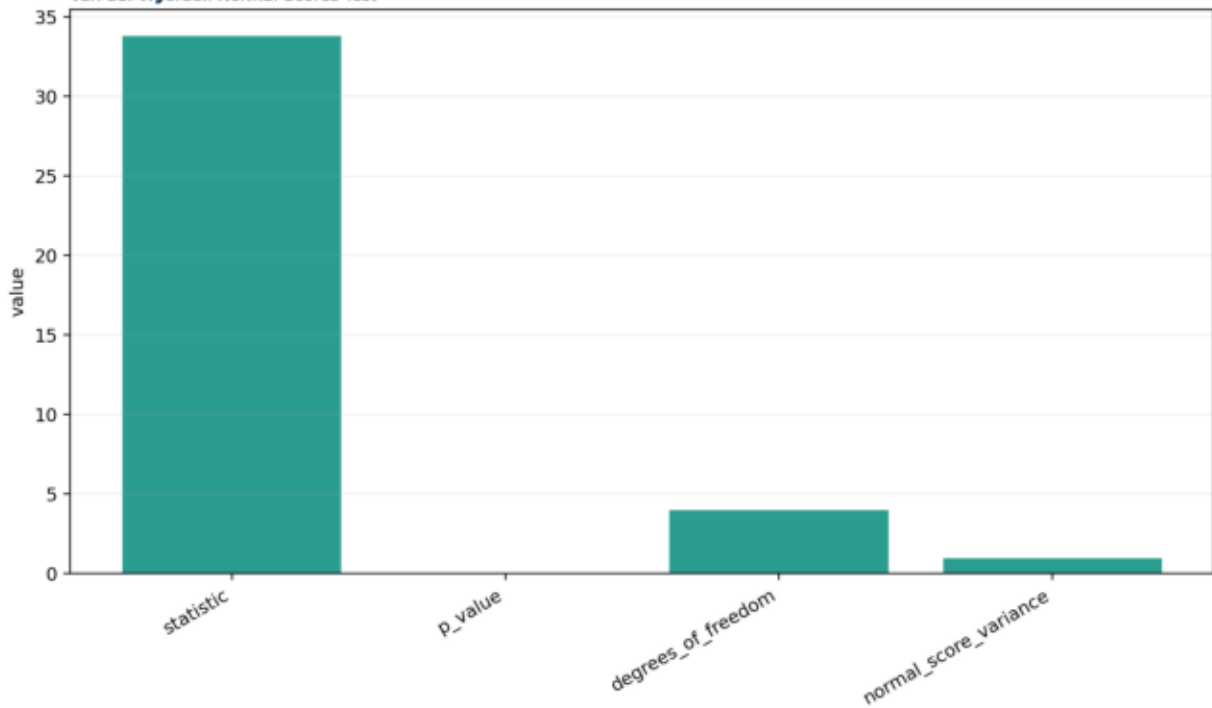
Interpretation:

Pooled midranks are transformed through the standard-normal quantile function before group comparison.

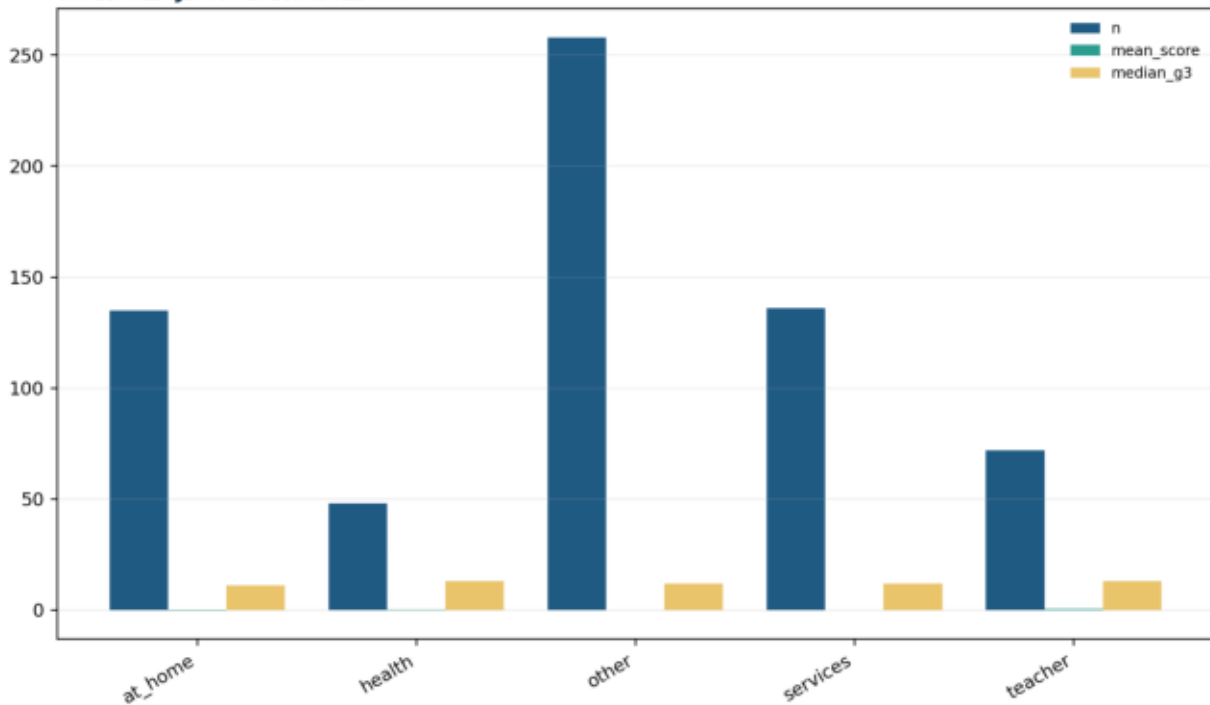
The normal-scores chi-square is 33.781995, $p=8.25976e-07$.

Primary Metrics

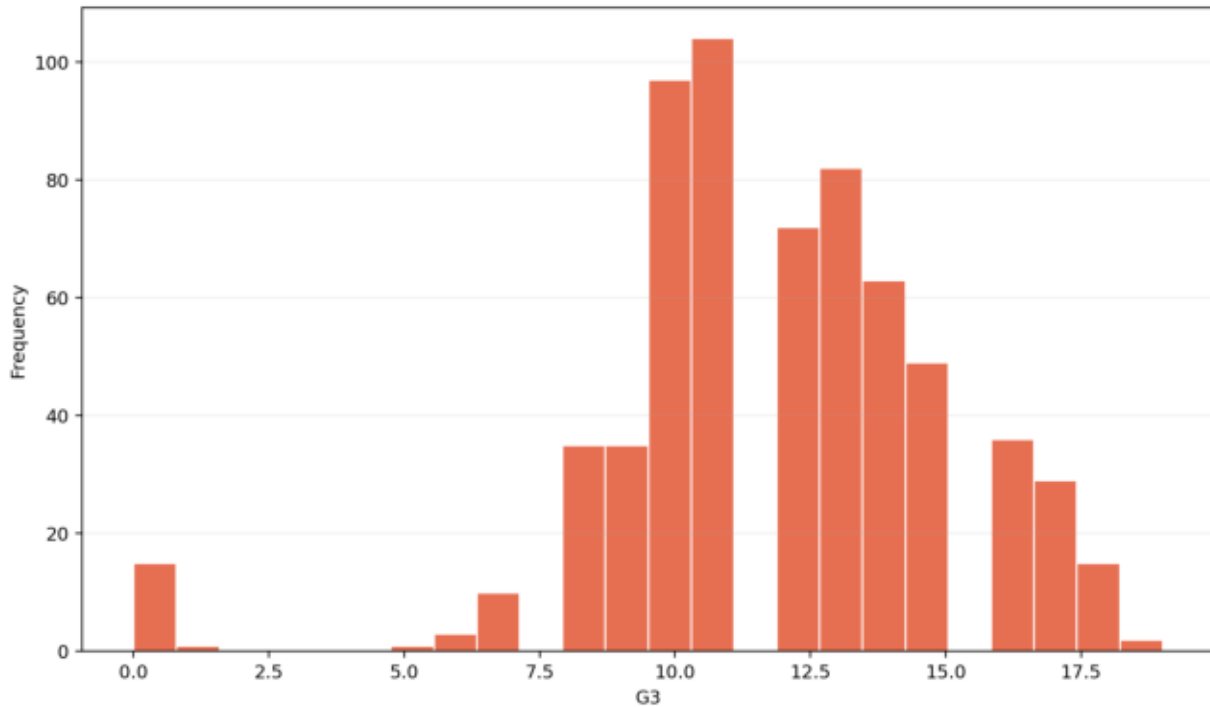
Paired Sample T-Test



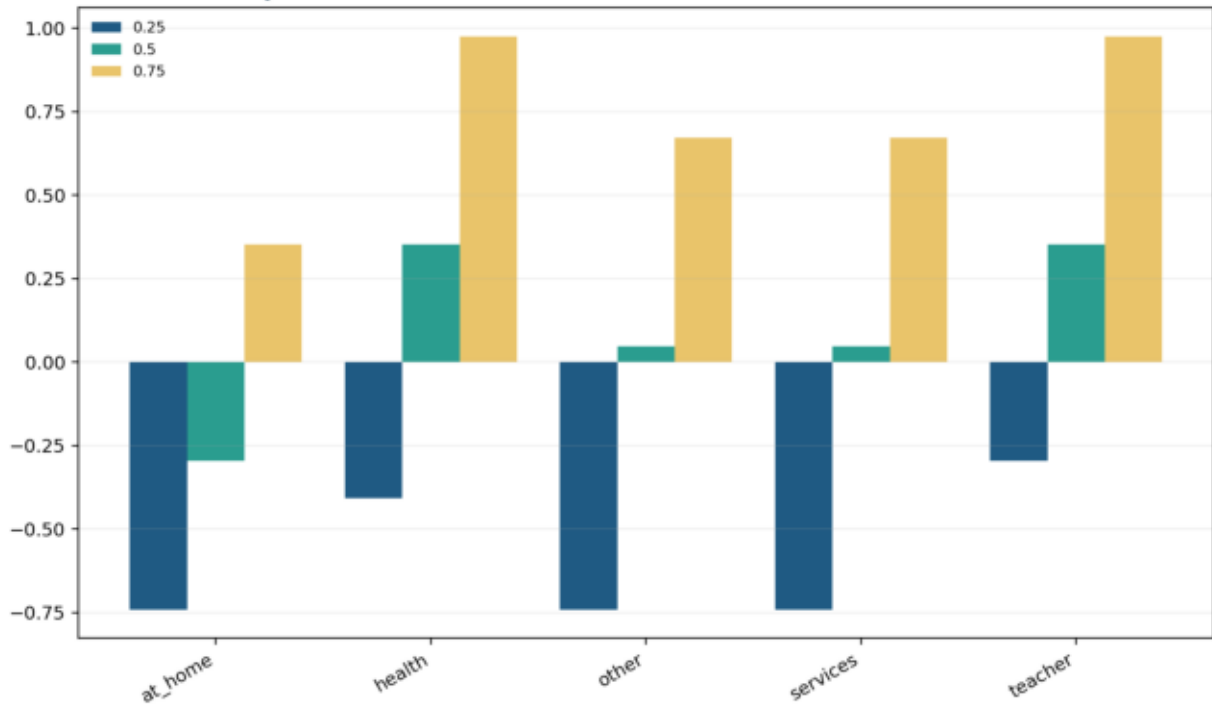
Maternal Job Normal Scores



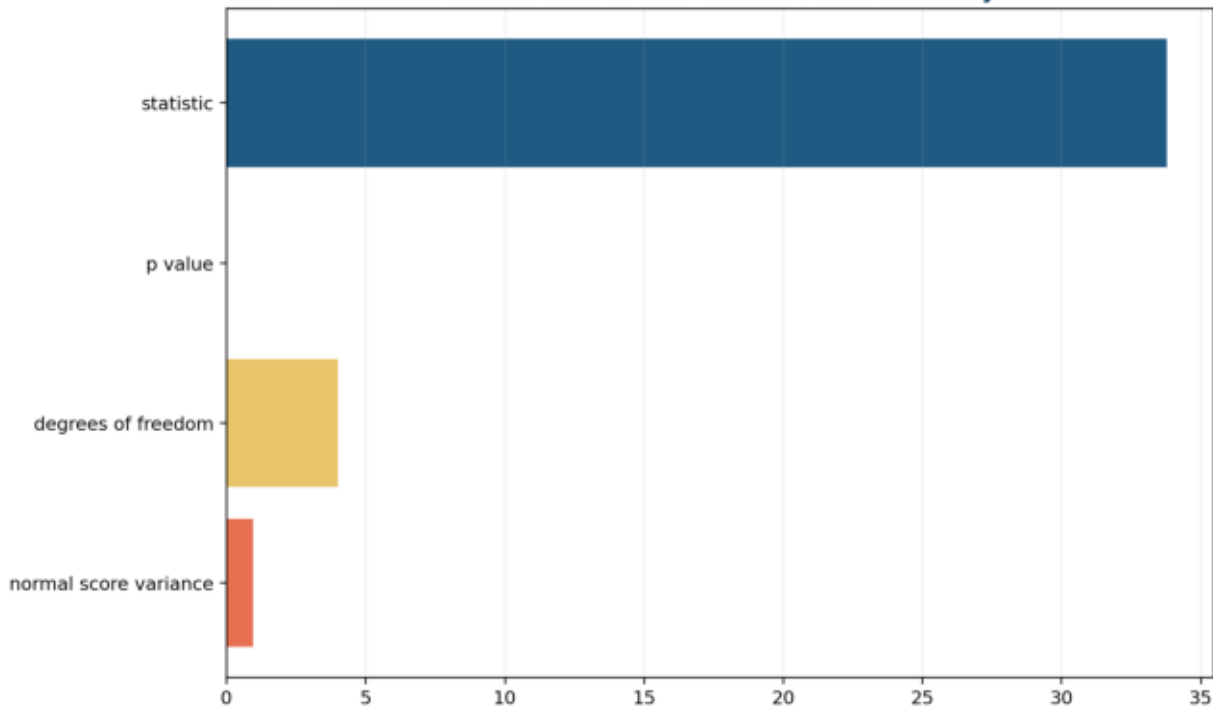
Scored Observations



Normal Score Quantiles



Van der Waerden Normal-Scores Test verified result summary



Primary Metrics

metric	value
statistic	33.782
p_value	8.25976e-07
degrees_of_freedom	4
normal_score_variance	0.951104

Maternal Job Normal Scores

Mjob	n	mean_score	median_g3
at_home	135	-0.285375	11
health	48	0.341221	13
other	258	-0.0630417	12
services	136	0.0536575	12
teacher	72	0.443005	13

Scored Observations

Mjob	G3	normal_score
at_home	11	-0.295395
at_home	11	-0.295395
at_home	12	0.0482231
health	14	0.672071
other	13	0.352297
services	13	0.352297
other	13	0.352297
other	13	0.352297
services	17	1.65236
other	13	0.352297
teacher	14	0.672071
services	13	0.352297
health	12	0.0482231
teacher	13	0.352297
other	15	0.975664
health	17	1.65236
services	14	0.672071
other	14	0.672071
services	7	-1.75968
health	12	0.0482231
teacher	14	0.672071
health	12	0.0482231
teacher	14	0.672071
other	10	-0.741383
services	10	-0.741383
services	12	0.0482231

Normal Score Quantiles

Mjob	0.25	0.5	0.75
at_home	-0.741383	-0.295395	0.352297
health	-0.406892	0.352297	0.975664
other	-0.741383	0.0482231	0.672071
services	-0.741383	0.0482231	0.672071
teacher	-0.295395	0.352297	0.975664