

# longMI: Internal Tests

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## Tests

```
#> test
#> Call:
#> Comparison(configural = configural_fit, weak = weak_fit, strong = strong_fit,
#>   strict = strict_fit)
#>
#>           chisq df pvalue    cfi    tli  rmsea  srmr      aic      bic
#> configural  25.9682 19 0.1311 0.9915 0.9875 0.0424 0.0306 11252.23 11335.18
#> weak        41.8973 22 0.0064 0.9757 0.9691 0.0666 0.0763 11262.16 11335.16
#> strong      53.7228 25 0.0007 0.9650 0.9608 0.0750 0.0872 11267.98 11331.03
#> strict     134.5591 29 0.0000 0.8712 0.8757 0.1336 0.1690 11340.82 11390.59
#> Call:
#> Comparison(configural = configural_fit, weak = weak_fit, strong = strong_fit,
#>   strict = strict_fit)
#>
#>
#> CONFIGURAL INVARIANCE MODEL
#>
#> lavaan 0.6.16 ended normally after 75 iterations
#>
#> Estimator ML
#> Optimization method NLMINB
#> Number of model parameters 27
#> Number of equality constraints 2
#>
#> Number of observations 204
#> Number of missing patterns 1
#>
#> Model Test User Model:
#>
#> Test statistic 25.968
#> Degrees of freedom 19
#> P-value (Chi-square) 0.131
#>
#> Parameter Estimates:
```

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#>
#> Standard errors
#> Information
#> Observed information based on
#> Standard
#> Observed
#> Hessian
#>
#> Latent Variables:
#> Estimate Std.Err z-value P(>|z|)
#> f1t1 =~
#> y1_1 (111) 4.451 0.400 11.137 0.000
#> y1_2 6.850 0.637 10.745 0.000
#> y1_3 4.590 0.520 8.821 0.000
#> y1_4 5.039 0.396 12.728 0.000
#> f1t6 =~
#> y6_1 (111) 4.451 0.400 11.137 0.000
#> y6_2 4.006 0.489 8.194 0.000
#> y6_3 4.551 0.545 8.346 0.000
#> y6_4 4.102 0.453 9.057 0.000
#>
#> Covariances:
#> Estimate Std.Err z-value P(>|z|)
#> f1t1 ~~
#> f1t6 1.837 0.215 8.558 0.000
#>
#> Intercepts:
#> Estimate Std.Err z-value P(>|z|)
#> .y1_1 (i1) 19.776 0.427 46.273 0.000
#> .y1_2 21.797 0.680 32.036 0.000
#> .y1_3 14.903 0.528 28.223 0.000
#> .y1_4 20.396 0.439 46.416 0.000
#> .y6_1 (i1) 19.776 0.427 46.273 0.000
#> .y6_2 19.317 2.299 8.404 0.000
#> .y6_3 11.922 2.516 4.738 0.000
#> .y6_4 17.970 1.844 9.747 0.000
#> f1t1 0.000
#> f1t6 6.455 0.606 10.649 0.000
#>
#> Variances:
#> Estimate Std.Err z-value P(>|z|)
#> .y1_1 17.448 2.240 7.789 0.000
#> .y1_2 47.511 5.754 8.257 0.000
#> .y1_3 35.810 4.031 8.884 0.000
#> .y1_4 13.999 2.133 6.563 0.000
#> .y6_1 47.096 6.432 7.322 0.000
#> .y6_2 73.850 8.388 8.805 0.000
#> .y6_3 88.920 10.354 8.588 0.000
#> .y6_4 23.267 4.182 5.564 0.000

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```

#>      fit1      1.000
#>      fit6      5.834      1.167      4.997      0.000
#>
#>
#> WEAK INVARIANCE MODEL
#>
#> lavaan 0.6.16 ended normally after 54 iterations
#>
#>      Estimator      ML
#>      Optimization method      NLMINB
#>      Number of model parameters      27
#>      Number of equality constraints      5
#>
#>      Number of observations      204
#>      Number of missing patterns      1
#>
#> Model Test User Model:
#>
#>      Test statistic      41.897
#>      Degrees of freedom      22
#>      P-value (Chi-square)      0.006
#>
#> Parameter Estimates:
#>
#>      Standard errors      Standard
#>      Information      Observed
#>      Observed information based on      Hessian
#>
#> Latent Variables:
#>
#>      Estimate Std.Err z-value P(>|z|)
#>      fit1 =~
#>      y1_1      (111)      4.933      0.339      14.562      0.000
#>      y1_2      (112)      5.172      0.429      12.052      0.000
#>      y1_3      (113)      5.072      0.397      12.762      0.000
#>      y1_4      (114)      4.865      0.336      14.492      0.000
#>      fit6 =~
#>      y6_1      (111)      4.933      0.339      14.562      0.000
#>      y6_2      (112)      5.172      0.429      12.052      0.000
#>      y6_3      (113)      5.072      0.397      12.762      0.000
#>      y6_4      (114)      4.865      0.336      14.492      0.000
#>
#> Covariances:
#>
#>      Estimate Std.Err z-value P(>|z|)
#>      fit1 ~~
#>      fit6      1.558      0.136      11.439      0.000

```

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#>
#> Intercepts:
#>           Estimate Std.Err z-value P(>|z|)
#>   .y1_1      (i1)  19.776   0.445  44.430   0.000
#>   .y1_2              21.797   0.629  34.633   0.000
#>   .y1_3              14.903   0.544  27.411   0.000
#>   .y1_4              20.396   0.436  46.803   0.000
#>   .y6_1      (i1)  19.776   0.445  44.430   0.000
#>   .y6_2              15.049   2.299   6.547   0.000
#>   .y6_3              11.756   2.212   5.315   0.000
#>   .y6_4              16.111   1.765   9.130   0.000
#>   f1t1              0.000
#>   f1t6              5.824   0.429  13.591   0.000
#>
#> Variances:
#>           Estimate Std.Err z-value P(>|z|)
#>   .y1_1          16.079   2.188   7.349   0.000
#>   .y1_2          54.055   6.012   8.992   0.000
#>   .y1_3          34.578   3.941   8.775   0.000
#>   .y1_4          15.075   2.109   7.149   0.000
#>   .y6_1          49.748   6.494   7.661   0.000
#>   .y6_2          72.254   8.353   8.650   0.000
#>   .y6_3          91.610  10.487   8.736   0.000
#>   .y6_4          22.022   4.032   5.462   0.000
#>   f1t1           1.000
#>   f1t6           4.240   0.546   7.759   0.000
#>
#>
#> STRONG INVARIANCE MODEL
#>
#> lavaan 0.6.16 ended normally after 52 iterations
#>
#> Estimator ML
#> Optimization method NLMINB
#> Number of model parameters 27
#> Number of equality constraints 8
#>
#> Number of observations 204
#> Number of missing patterns 1
#>
#> Model Test User Model:
#>
#> Test statistic 53.723
#> Degrees of freedom 25
#> P-value (Chi-square) 0.001

```

```

#>
#> Parameter Estimates:
#>
#> Standard errors          Standard
#> Information              Observed
#> Observed information based on Hessian
#>
#> Latent Variables:
#>      Estimate Std.Err z-value P(>|z|)
#> f1t1 =~
#>   y1_1      (l11)   5.270   0.331  15.917   0.000
#>   y1_2      (l12)   4.525   0.312  14.487   0.000
#>   y1_3      (l13)   4.960   0.328  15.112   0.000
#>   y1_4      (l14)   4.547   0.291  15.634   0.000
#> f1t6 =~
#>   y6_1      (l11)   5.270   0.331  15.917   0.000
#>   y6_2      (l12)   4.525   0.312  14.487   0.000
#>   y6_3      (l13)   4.960   0.328  15.112   0.000
#>   y6_4      (l14)   4.547   0.291  15.634   0.000
#>
#> Covariances:
#>      Estimate Std.Err z-value P(>|z|)
#> f1t1 ~~
#>   f1t6      1.608   0.142  11.316   0.000
#>
#> Intercepts:
#>      Estimate Std.Err z-value P(>|z|)
#>   .y1_1      (i1)  19.929   0.457  43.623   0.000
#>   .y1_2      (i2)  21.459   0.598  35.901   0.000
#>   .y1_3      (i3)  14.882   0.529  28.146   0.000
#>   .y1_4      (i4)  20.311   0.421  48.252   0.000
#>   .y6_1      (i1)  19.929   0.457  43.623   0.000
#>   .y6_2      (i2)  21.459   0.598  35.901   0.000
#>   .y6_3      (i3)  14.882   0.529  28.146   0.000
#>   .y6_4      (i4)  20.311   0.421  48.252   0.000
#>   f1t1        0.000
#>   f1t6      5.337   0.354  15.077   0.000
#>
#> Variances:
#>      Estimate Std.Err z-value P(>|z|)
#>   .y1_1      15.124   2.238   6.757   0.000
#>   .y1_2      57.819   6.150   9.402   0.000
#>   .y1_3      34.209   3.869   8.841   0.000
#>   .y1_4      16.339   2.114   7.729   0.000
#>   .y6_1      45.360   6.338   7.157   0.000
#>   .y6_2      74.229   8.352   8.887   0.000

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#>   .y6_3      89.572   10.110    8.860    0.000
#>   .y6_4      24.586    3.951    6.223    0.000
#>   f1t1        1.000
#>   f1t6        4.557    0.585    7.791    0.000
#>
#>
#>
#> STRICT INVARIANCE MODEL
#>
#> lavaan 0.6.16 ended normally after 57 iterations
#>
#> Estimator                      ML
#> Optimization method            NLMINB
#> Number of model parameters      27
#> Number of equality constraints   12
#>
#> Number of observations          204
#> Number of missing patterns      1
#>
#> Model Test User Model:
#>
#> Test statistic                  134.559
#> Degrees of freedom              29
#> P-value (Chi-square)            0.000
#>
#> Parameter Estimates:
#>
#> Standard errors                  Standard
#> Information                      Observed
#> Observed information based on    Hessian
#>
#> Latent Variables:
#>           Estimate Std.Err z-value P(>|z|)
#> f1t1 =~
#>   y1_1   (111)    5.083   0.364  13.978   0.000
#>   y1_2   (112)    4.309   0.333  12.944   0.000
#>   y1_3   (113)    4.785   0.356  13.447   0.000
#>   y1_4   (114)    4.358   0.317  13.765   0.000
#> f1t6 =~
#>   y6_1   (111)    5.083   0.364  13.978   0.000
#>   y6_2   (112)    4.309   0.333  12.944   0.000
#>   y6_3   (113)    4.785   0.356  13.447   0.000
#>   y6_4   (114)    4.358   0.317  13.765   0.000
#>
#> Covariances:
#>           Estimate Std.Err z-value P(>|z|)

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#> f1t1 ~~
#> f1t6          1.812    0.168   10.812    0.000
#>
#> Intercepts:
#>           Estimate Std.Err z-value P(>|z|)
#> .y1_1 (i1)  20.019    0.509   39.339    0.000
#> .y1_2 (i2)  21.513    0.621   34.648    0.000
#> .y1_3 (i3)  14.805    0.617   23.988    0.000
#> .y1_4 (i4)  20.313    0.433   46.915    0.000
#> .y6_1 (i1)  20.019    0.509   39.339    0.000
#> .y6_2 (i2)  21.513    0.621   34.648    0.000
#> .y6_3 (i3)  14.805    0.617   23.988    0.000
#> .y6_4 (i4)  20.313    0.433   46.915    0.000
#> f1t1          0.000
#> f1t6          5.557    0.415   13.396    0.000
#>
#> Variances:
#>           Estimate Std.Err z-value P(>|z|)
#> .y1_1 (u1)  28.657    2.958    9.689    0.000
#> .y1_2 (u2)  68.013    5.253   12.946    0.000
#> .y1_3 (u3)  61.387    4.897   12.535    0.000
#> .y1_4 (u4)  20.878    2.142    9.746    0.000
#> .y6_1 (u1)  28.657    2.958    9.689    0.000
#> .y6_2 (u2)  68.013    5.253   12.946    0.000
#> .y6_3 (u3)  61.387    4.897   12.535    0.000
#> .y6_4 (u4)  20.878    2.142    9.746    0.000
#> f1t1          1.000
#> f1t6          5.056    0.692    7.304    0.000
#>
#> Call:
#> Comparison(configural = configural_fit, weak = weak_fit, strong = strong_fit,
#>   strict = strict_fit)
#>
#> Chi-Squared Difference Test
#>
#>           Df    AIC    BIC   Chisq Chisq diff   RMSEA Df diff Pr(>Chisq)
#> 1.configural 19 11252 11335  25.968
#> 1.weak       22 11262 11335  41.897    15.929 0.14535     3 0.0011726 **
#> 2.configural 19 11252 11335  25.968
#> 2.strong     25 11268 11331  53.723    27.755 0.13332     6 0.0001045 ***
#> 3.configural 19 11252 11335  25.968
#> 3.strict     29 11341 11391 134.559   108.591 0.21984    10 < 2.2e-16 ***
#> 4.weak       22 11262 11335  41.897
#> 4.strong     25 11268 11331  53.723    11.826 0.12009     3 0.0080053 **
#> 5.weak       22 11262 11335  41.897
#> 5.strict     29 11341 11391 134.559    92.662 0.24492     7 < 2.2e-16 ***

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#> 6.strong      25 11268 11331  53.723
#> 6.strict      29 11341 11391 134.559      80.836 0.30686      4 < 2.2e-16 ***
#> ---
#> Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
#> Call:
#> Invariance(data = osbornesudick1972, time_points = time_points,
#>   factor_loadings = factor_loadings)
#>
#>           chisq df pvalue    cfi    tli rmsea  srmr      aic      bic
#> configural  25.9682 19 0.1311 0.9915 0.9875 0.0424 0.0306 11252.23 11335.18
#> weak       41.8973 22 0.0064 0.9757 0.9691 0.0666 0.0720 11262.16 11335.16
#> strong     53.7228 25 0.0007 0.9650 0.9608 0.0750 0.0859 11267.98 11331.03
#> strict    134.5591 29 0.0000 0.8712 0.8757 0.1336 0.1328 11340.82 11390.59
#> Call:
#> Invariance(data = osbornesudick1972, time_points = time_points,
#>   factor_loadings = factor_loadings)
#>
#>
#> CONFIGURAL INVARIANCE MODEL
#>
#> lavaan 0.6.16 ended normally after 75 iterations
#>
#> Estimator                      ML
#> Optimization method            NLMINB
#> Number of model parameters      27
#> Number of equality constraints   2
#>
#> Number of observations          204
#>
#> Model Test User Model:
#>
#> Test statistic                  25.968
#> Degrees of freedom              19
#> P-value (Chi-square)            0.131
#>
#> Parameter Estimates:
#>
#> Standard errors                  Standard
#> Information                      Expected
#> Information saturated (h1) model Structured
#>
#> Latent Variables:
#>           Estimate Std.Err z-value P(>|z|)
#> f1t1 =~
#>   y1_1    (111)    4.451   0.396  11.244   0.000
#>   y1_2          6.850   0.637  10.750   0.000

```



```

#>      y1_3      4.590    0.515    8.918    0.000
#>      y1_4      5.039    0.393   12.809    0.000
#>    f1t6 =~
#>      y6_1      (111)    4.451    0.396   11.244    0.000
#>      y6_2      4.006    0.485    8.261    0.000
#>      y6_3      4.551    0.546    8.342    0.000
#>      y6_4      4.102    0.448    9.150    0.000
#>
#> Covariances:
#>              Estimate Std.Err  z-value  P(>|z|)
#>    f1t1 ~~
#>      f1t6      1.837    0.211    8.703    0.000
#>
#> Intercepts:
#>              Estimate Std.Err  z-value  P(>|z|)
#>    .y1_1      (i1)   19.776    0.427   46.273    0.000
#>    .y1_2      21.797    0.680   32.036    0.000
#>    .y1_3      14.903    0.528   28.223    0.000
#>    .y1_4      20.396    0.439   46.416    0.000
#>    .y6_1      (i1)   19.776    0.427   46.273    0.000
#>    .y6_2      19.317    2.281    8.467    0.000
#>    .y6_3      11.922    2.538    4.697    0.000
#>    .y6_4      17.970    1.815    9.903    0.000
#>    f1t1        0.000
#>    f1t6        6.455    0.601   10.743    0.000
#>
#> Variances:
#>              Estimate Std.Err  z-value  P(>|z|)
#>    .y1_1      17.448    2.186    7.981    0.000
#>    .y1_2      47.511    5.748    8.266    0.000
#>    .y1_3      35.810    3.969    9.022    0.000
#>    .y1_4      13.999    2.085    6.712    0.000
#>    .y6_1      47.096    6.305    7.470    0.000
#>    .y6_2      73.850    8.395    8.797    0.000
#>    .y6_3      88.920   10.222    8.699    0.000
#>    .y6_4      23.267    4.076    5.709    0.000
#>    f1t1        1.000
#>    f1t6        5.834    1.159    5.035    0.000
#>
#>
#> WEAK INVARIANCE MODEL
#>
#> lavaan 0.6.16 ended normally after 54 iterations
#>
#>      Estimator                                          ML

```

```

#> Optimization method NLMINB
#> Number of model parameters 27
#> Number of equality constraints 5
#>
#> Number of observations 204
#>
#> Model Test User Model:
#>
#> Test statistic 41.897
#> Degrees of freedom 22
#> P-value (Chi-square) 0.006
#>
#> Parameter Estimates:
#>
#> Standard errors Standard
#> Information Expected
#> Information saturated (h1) model Structured
#>
#> Latent Variables:
#> Estimate Std.Err z-value P(>|z|)
#> fit1 =~
#> y1_1 (l11) 4.933 0.342 14.420 0.000
#> y1_2 (l12) 5.172 0.413 12.534 0.000
#> y1_3 (l13) 5.072 0.398 12.733 0.000
#> y1_4 (l14) 4.865 0.330 14.733 0.000
#> fit6 =~
#> y6_1 (l11) 4.933 0.342 14.420 0.000
#> y6_2 (l12) 5.172 0.413 12.534 0.000
#> y6_3 (l13) 5.072 0.398 12.733 0.000
#> y6_4 (l14) 4.865 0.330 14.733 0.000
#>
#> Covariances:
#> Estimate Std.Err z-value P(>|z|)
#> fit1 ~~
#> fit6 1.558 0.136 11.482 0.000
#>
#> Intercepts:
#> Estimate Std.Err z-value P(>|z|)
#> .y1_1 (i1) 19.776 0.445 44.430 0.000
#> .y1_2 21.797 0.629 34.633 0.000
#> .y1_3 14.903 0.544 27.411 0.000
#> .y1_4 20.396 0.436 46.803 0.000
#> .y6_1 (i1) 19.776 0.445 44.430 0.000
#> .y6_2 15.049 2.223 6.770 0.000
#> .y6_3 11.756 2.238 5.253 0.000
#> .y6_4 16.111 1.699 9.484 0.000

```

```

#>      fit1      0.000
#>      fit6      5.824      0.432      13.476      0.000
#>
#> Variances:
#>           Estimate Std.Err z-value P(>|z|)
#>      .y1_1      16.079      2.165      7.427      0.000
#>      .y1_2      54.055      5.831      9.270      0.000
#>      .y1_3      34.578      3.922      8.817      0.000
#>      .y1_4      15.075      2.051      7.350      0.000
#>      .y6_1      49.748      6.242      7.970      0.000
#>      .y6_2      72.254      8.498      8.503      0.000
#>      .y6_3      91.610     10.272      8.919      0.000
#>      .y6_4      22.022      3.989      5.521      0.000
#>      fit1      1.000
#>      fit6      4.240      0.539      7.867      0.000
#>
#>
#> STRONG INVARIANCE MODEL
#>
#> lavaan 0.6.16 ended normally after 52 iterations
#>
#> Estimator ML
#> Optimization method NLMINB
#> Number of model parameters 27
#> Number of equality constraints 8
#>
#> Number of observations 204
#>
#> Model Test User Model:
#>
#> Test statistic 53.723
#> Degrees of freedom 25
#> P-value (Chi-square) 0.001
#>
#> Parameter Estimates:
#>
#> Standard errors Standard
#> Information Expected
#> Information saturated (h1) model Structured
#>
#> Latent Variables:
#>           Estimate Std.Err z-value P(>|z|)
#>      fit1 =~
#>      y1_1 (111)  5.270      0.333     15.813      0.000
#>      y1_2 (112)  4.525      0.308     14.681      0.000

```

```

#>      y1_3      (113)      4.960      0.328      15.120      0.000
#>      y1_4      (114)      4.547      0.289      15.707      0.000
#>      f1t6 =~
#>      y6_1      (111)      5.270      0.333      15.813      0.000
#>      y6_2      (112)      4.525      0.308      14.681      0.000
#>      y6_3      (113)      4.960      0.328      15.120      0.000
#>      y6_4      (114)      4.547      0.289      15.707      0.000
#>
#> Covariances:
#>                                Estimate Std.Err  z-value  P(>|z|)
#>      f1t1 ~~
#>      f1t6                1.608      0.143    11.281    0.000
#>
#> Intercepts:
#>                                Estimate Std.Err  z-value  P(>|z|)
#>      .y1_1      (i1)    19.929      0.456    43.727    0.000
#>      .y1_2      (i2)    21.459      0.598    35.868    0.000
#>      .y1_3      (i3)    14.882      0.529    28.153    0.000
#>      .y1_4      (i4)    20.311      0.421    48.237    0.000
#>      .y6_1      (i1)    19.929      0.456    43.727    0.000
#>      .y6_2      (i2)    21.459      0.598    35.868    0.000
#>      .y6_3      (i3)    14.882      0.529    28.153    0.000
#>      .y6_4      (i4)    20.311      0.421    48.237    0.000
#>      f1t1                0.000
#>      f1t6                5.337      0.353    15.109    0.000
#>
#> Variances:
#>                                Estimate Std.Err  z-value  P(>|z|)
#>      .y1_1                15.124      2.193     6.895    0.000
#>      .y1_2                57.819      6.078     9.512    0.000
#>      .y1_3                34.209      3.850     8.885    0.000
#>      .y1_4                16.339      2.062     7.925    0.000
#>      .y6_1                45.360      6.182     7.337    0.000
#>      .y6_2                74.229      8.350     8.890    0.000
#>      .y6_3                89.572     10.064     8.900    0.000
#>      .y6_4                24.586      3.878     6.339    0.000
#>      f1t1                1.000
#>      f1t6                4.557      0.584     7.806    0.000
#>
#>
#>
#> STRICT INVARIANCE MODEL
#>
#> lavaan 0.6.16 ended normally after 57 iterations
#>

```

```

#> Estimator ML
#> Optimization method NLMINB
#> Number of model parameters 27
#> Number of equality constraints 12
#>
#> Number of observations 204
#>
#> Model Test User Model:
#>
#> Test statistic 134.559
#> Degrees of freedom 29
#> P-value (Chi-square) 0.000
#>
#> Parameter Estimates:
#>
#> Standard errors Standard
#> Information Expected
#> Information saturated (h1) model Structured
#>
#> Latent Variables:
#> Estimate Std.Err z-value P(>|z|)
#> f1t1 =~
#> y1_1 (l11) 5.083 0.364 13.968 0.000
#> y1_2 (l12) 4.309 0.325 13.248 0.000
#> y1_3 (l13) 4.785 0.354 13.521 0.000
#> y1_4 (l14) 4.358 0.312 13.971 0.000
#> f1t6 =~
#> y6_1 (l11) 5.083 0.364 13.968 0.000
#> y6_2 (l12) 4.309 0.325 13.248 0.000
#> y6_3 (l13) 4.785 0.354 13.521 0.000
#> y6_4 (l14) 4.358 0.312 13.971 0.000
#>
#> Covariances:
#> Estimate Std.Err z-value P(>|z|)
#> f1t1 ~~
#> f1t6 1.812 0.168 10.790 0.000
#>
#> Intercepts:
#> Estimate Std.Err z-value P(>|z|)
#> .y1_1 (i1) 20.019 0.506 39.547 0.000
#> .y1_2 (i2) 21.513 0.621 34.617 0.000
#> .y1_3 (i3) 14.805 0.617 24.001 0.000
#> .y1_4 (i4) 20.313 0.433 46.903 0.000
#> .y6_1 (i1) 20.019 0.506 39.547 0.000
#> .y6_2 (i2) 21.513 0.621 34.617 0.000
#> .y6_3 (i3) 14.805 0.617 24.001 0.000

```

```

#>      .y6_4      (i4)  20.313    0.433   46.903    0.000
#>      f1t1              0.000
#>      f1t6              5.557    0.411   13.526    0.000
#>
#> Variances:
#>              Estimate Std.Err  z-value  P(>|z|)
#>      .y1_1      (u1)  28.657    2.747   10.433    0.000
#>      .y1_2      (u2)  68.013    5.170   13.155    0.000
#>      .y1_3      (u3)  61.387    4.821   12.734    0.000
#>      .y1_4      (u4)  20.878    2.008   10.398    0.000
#>      .y6_1      (u1)  28.657    2.747   10.433    0.000
#>      .y6_2      (u2)  68.013    5.170   13.155    0.000
#>      .y6_3      (u3)  61.387    4.821   12.734    0.000
#>      .y6_4      (u4)  20.878    2.008   10.398    0.000
#>      f1t1              1.000
#>      f1t6              5.056    0.685    7.378    0.000
#>
#> Call:
#> Invariance(data = osbornesudick1972, time_points = time_points,
#>      factor_loadings = factor_loadings)
#>
#> Chi-Squared Difference Test
#>
#>              Df    AIC    BIC    Chisq Chisq diff    RMSEA Df diff Pr(>Chisq)
#> 1.configural  19 11252 11335  25.968
#> 1.weak        22 11262 11335  41.897      15.929 0.14535      3 0.0011726 **
#> 2.configural  19 11252 11335  25.968
#> 2.strong      25 11268 11331  53.723      27.755 0.13332      6 0.0001045 ***
#> 3.configural  19 11252 11335  25.968
#> 3.strict      29 11341 11391 134.559     108.591 0.21984     10 < 2.2e-16 ***
#> 4.weak        22 11262 11335  41.897
#> 4.strong      25 11268 11331  53.723      11.826 0.12009      3 0.0080053 **
#> 5.weak        22 11262 11335  41.897
#> 5.strict      29 11341 11391 134.559     92.662 0.24492      7 < 2.2e-16 ***
#> 6.strong      25 11268 11331  53.723
#> 6.strict      29 11341 11391 134.559     80.836 0.30686      4 < 2.2e-16 ***
#> ---
#> Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> [[1]]

```

```

#> [[1]][[1]]
#> [[1]][[1]]$value
#> [[1]][[1]]$value[[1]]
#> lavaan 0.6.16 ended normally after 90 iterations
#>
#>      Estimator                      ML
#>      Optimization method          NLMINB
#>      Number of model parameters          31
#>      Number of equality constraints        12
#>
#>      Number of observations          204
#>      Number of missing patterns        1
#>
#> Model Test User Model:
#>
#>      Test statistic          133.220
#>      Degrees of freedom          25
#>      P-value (Chi-square)          0.000
#>
#>
#> [[1]][[1]]$visible
#> [1] TRUE

```

## Environment

```
ls()
```

```
#> [1] "osbornesudick1972" "root"                "tex_file"
```



## Class

```
#> [[1]]  
#> [1] "data.frame"  
#>  
#> [[2]]  
#> [1] "root_criterion"  
#>  
#> [[3]]  
#> [1] "character"
```

## References

- Pesigan, I. J. A., Sun, R. W., & Cheung, S. F. (2023). betaDelta and betaSandwich: Confidence intervals for standardized regression coefficients in R. *Multivariate Behavioral Research*, 1–4. <https://doi.org/10.1080/00273171.2023.2201277>
- R Core Team. (2023). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. Vienna, Austria. <https://www.R-project.org/>