

Model without custom starting values

```
library(lavaan)

## This is lavaan 0.5-20
## lavaan is BETA software! Please report any bugs.
HS.model <- ' visual  =~ x1 + lam2*x2 + x3
             textual =~ x4 + x5 + x6
             speed   =~ x7 + x8 + x9
             x1  =~ x1 + psi1*x1
             x2  =~ x2 + psi2*x2
             x3  =~ x3 + psi3*x3
             x4  =~ x4 + psi4*x4
             x5  =~ x5 + psi5*x5
             x6  =~ x6 + psi6*x6
             x7  =~ x7 + psi7*x7
             x8  =~ x8 + psi8*x8
             x9  =~ x9 + psi9*x9
             stdlam2 := lam2/sqrt(lam2^2 + psi2) '
fit <- lavaan(HS.model, data=HolzingerSwineford1939,
             auto.var=TRUE, auto.fix.first=FALSE, std.lv=TRUE,
             auto.cov.lv.x=TRUE, estimator="MLM",
             meanstructure=TRUE, int.ov.free=TRUE)

const<-"stdlam2 == -0.8"
fit.const <- lavaan(HS.model, data=HolzingerSwineford1939,constraints=const,
             auto.var=TRUE, auto.fix.first=FALSE, std.lv=TRUE,
             auto.cov.lv.x=TRUE, estimator="MLM",
             meanstructure=TRUE, int.ov.free=TRUE)

lavTestLRT(fit,fit.const,method="satorra.bentler.2001") # positive

## Scaled Chi Square Difference Test (method = "satorra.bentler.2001")
##
##           Df    AIC    BIC   Chisq Chisq diff Df diff Pr(>Chisq)
## fit           24 7535.5 7646.7  85.305
## fit.const     25 7586.8 7694.3 138.607    31.536      1 1.957e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

lavTestLRT(fit,fit.const,method="satorra.bentler.2010") # positive

## Scaled Chi Square Difference Test (method = "satorra.bentler.2010")
##
##           Df    AIC    BIC   Chisq Chisq diff Df diff Pr(>Chisq)
## fit           24 7535.5 7646.7  85.305
## fit.const     25 7586.8 7694.3 138.607    29.904      1 4.54e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Model with custom start values: satorra.bentler.2010 goes negative

```
HS.model <- ' visual  =~ x1 + start(0.7)*lam2*x2 + x3
             textual =~ x4 + x5 + x6
             speed   =~ x7 + x8 + x9
             x1  =~ start(0.5)*x1 + psi1*x1
```

```

x2 ~~ x2 + psi2*x2
x3 ~~ x3 + psi3*x3
x4 ~~ x4 + psi4*x4
x5 ~~ x5 + psi5*x5
x6 ~~ x6 + psi6*x6
x7 ~~ x7 + psi7*x7
x8 ~~ x8 + psi8*x8
x9 ~~ x9 + psi9*x9
stdlam2 := lam2/sqrt(lam2^2 + psi2)'
fit <- lavaan(HS.model, data=HolzingerSwineford1939,
  auto.var=TRUE, auto.fix.first=FALSE, std.lv=TRUE,
  auto.cov.lv.x=TRUE, estimator="MLM",
  meanstructure=TRUE, int.ov.free=TRUE)

const<-"stdlam2 == -0.8"
fit.const <- lavaan(HS.model, data=HolzingerSwineford1939,constraints=const,
  auto.var=TRUE, auto.fix.first=FALSE, std.lv=TRUE,
  auto.cov.lv.x=TRUE, estimator="MLM",
  meanstructure=TRUE, int.ov.free=TRUE)

lavTestLRT(fit,fit.const,method="satorra.bentler.2001") # positive, and matches above

```

```

## Scaled Chi Square Difference Test (method = "satorra.bentler.2001")
##
##           Df      AIC      BIC   Chisq Chisq diff Df diff Pr(>Chisq)
## fit           24 7535.5 7646.7  85.305
## fit.const    25 7586.8 7694.3 138.607      31.536      1 1.958e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

lavTestLRT(fit,fit.const,method="satorra.bentler.2010") # ? negative

```

```

## Scaled Chi Square Difference Test (method = "satorra.bentler.2010")
##
##           Df      AIC      BIC   Chisq Chisq diff Df diff Pr(>Chisq)
## fit           24 7535.5 7646.7  85.305
## fit.const    25 7586.8 7694.3 138.607     -19.535      1      1

```

If I recall correctly, this might have something to do with the starting value for the error variance, which might be rarely used. It goes away if the starting value is not on the error variance.

```

HS.model <- ' visual  =~ x1 + start(0.7)*lam2*x2 + x3
             textual =~ x4 + x5 + x6
             speed   =~ x7 + x8 + x9
             x1  =~ x1 + psi1*x1
             x2  =~ x2 + psi2*x2
             x3  =~ x3 + psi3*x3
             x4  =~ x4 + psi4*x4
             x5  =~ x5 + psi5*x5
             x6  =~ x6 + psi6*x6
             x7  =~ x7 + psi7*x7
             x8  =~ x8 + psi8*x8
             x9  =~ x9 + psi9*x9
             stdlam2 := lam2/sqrt(lam2^2 + psi2)'
fit <- lavaan(HS.model, data=HolzingerSwineford1939,

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```

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fit.const <- lavaan(HS.model, data=HolzingerSwineford1939,constraints=const,
auto.var=TRUE, auto.fix.first=FALSE, std.lv=TRUE,
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## fit           24 7535.5 7646.7  85.305
## fit.const     25 7586.8 7694.3 138.607    29.904      1 4.54e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```