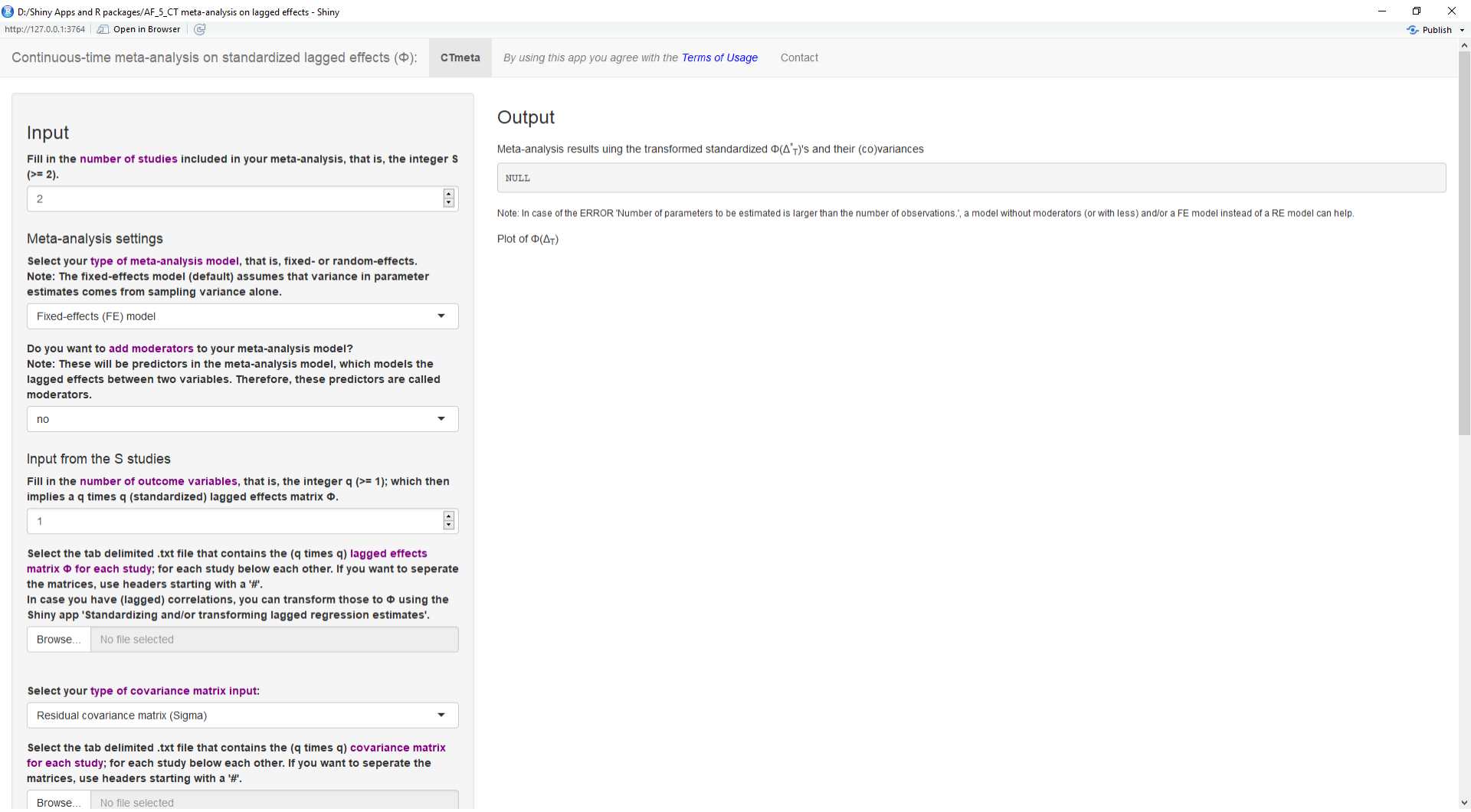
Tutorial

Shiny app ‘CT meta-analysis on lagged effects’

Open app: Top


D:/Shiny Apps and R packages/AF_5_CT meta-analysis on lagged effects - Shiny
http://127.0.0.1:3764
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Continuous-time meta-analysis on standardized lagged effects (Φ):
CTmeta
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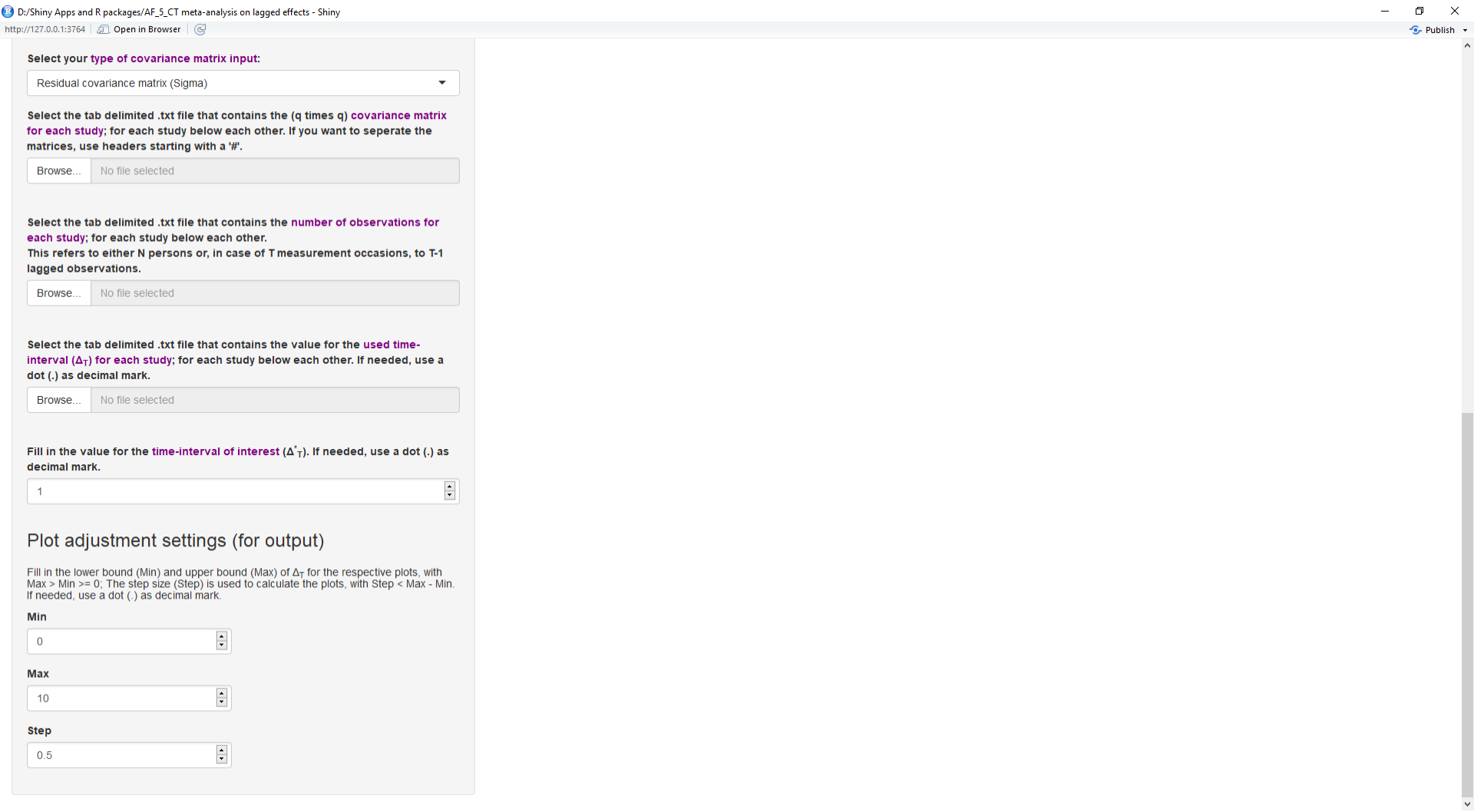
Input
Fill in the number of studies included in your meta-analysis, that is, the integer S (>= 2).
2
Meta-analysis settings
Select your type of meta-analysis model, that is, fixed- or random-effects.
Note: The fixed-effects model (default) assumes that variance in parameter estimates comes from sampling variance alone.
Fixed-effects (FE) model
Do you want to add moderators to your meta-analysis model?
Note: These will be predictors in the meta-analysis model, which models the lagged effects between two variables. Therefore, these predictors are called moderators.
no
Input from the S studies
Fill in the number of outcome variables, that is, the integer q (>= 1); which then implies a q times q (standardized) lagged effects matrix Φ.
1
Select the tab delimited .txt file that contains the (q times q) lagged effects matrix Φ for each study; for each study below each other. If you want to seperate the matrices, use headers starting with a '#'.
In case you have (lagged) correlations, you can transform those to Φ using the Shiny app 'Standardizing and/or transforming lagged regression estimates'.
Browse...
No file selected
Select your type of covariance matrix input:
Residual covariance matrix (Sigma)
Select the tab delimited .txt file that contains the (q times q) covariance matrix for each study; for each study below each other. If you want to seperate the matrices, use headers starting with a '#'.
Browse...
No file selected
Output
Meta-analysis results uing the transformed standardized Φ(Δ*T)'s and their (co)variances
NULL
Note: In case of the ERROR 'Number of parameters to be estimated is larger than the number of observations.', a model without moderators (or with less) and/or a FE model instead of a RE model can help.
Plot of Φ(ΔT)

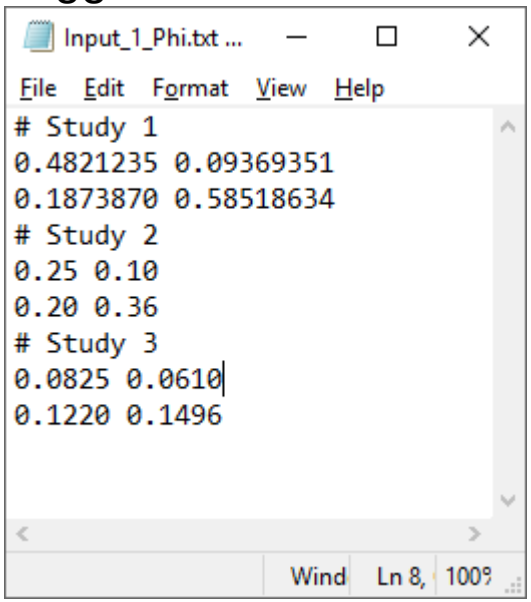
Open app: Bottom



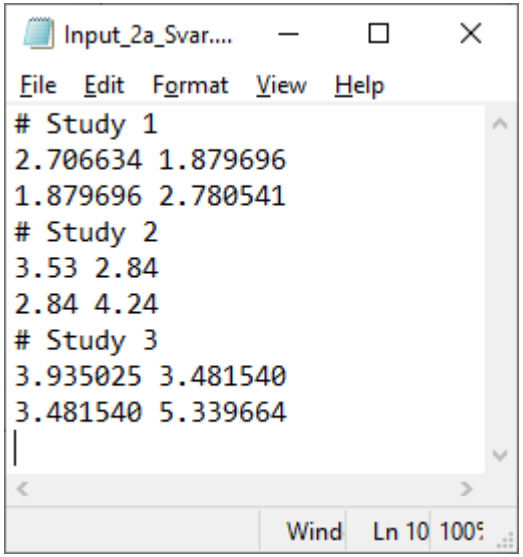
Input: Simple example

Combine S=3 studies
In each, we have q=2 outcome variables; and thus the following 2x2 matrices:

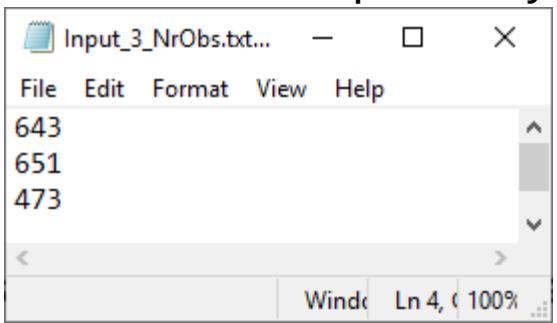
Lagged effects matrix:



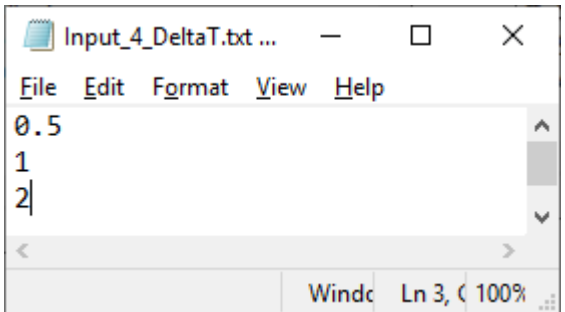
Residual covariance matrix:



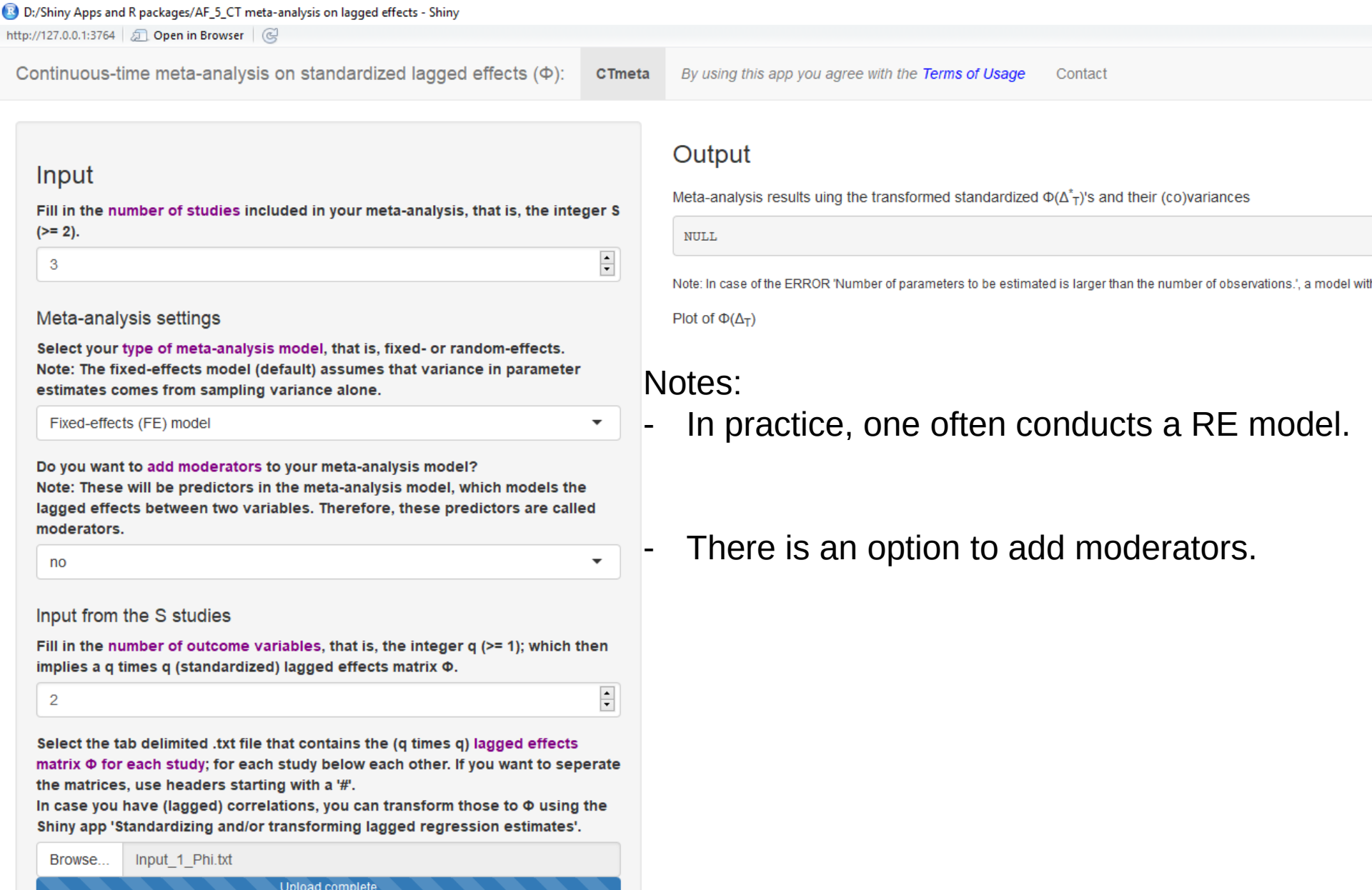
Furthermore, N per study:



and TI per study:



Example input: Top (zoomed in)

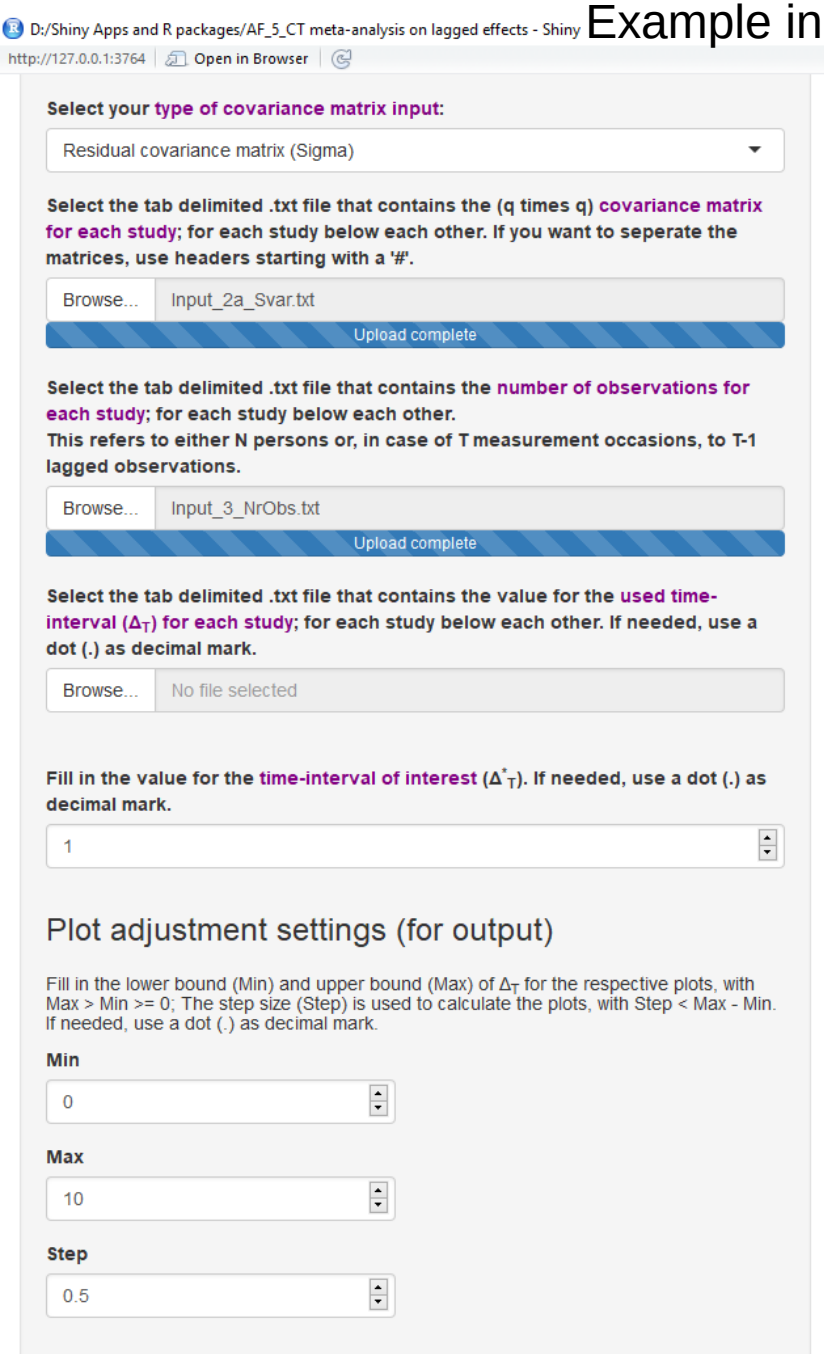


Notes:

- In practice, one often conducts a RE model.

- There is an option to add moderators.

Example input: Bottom (zoomed in)

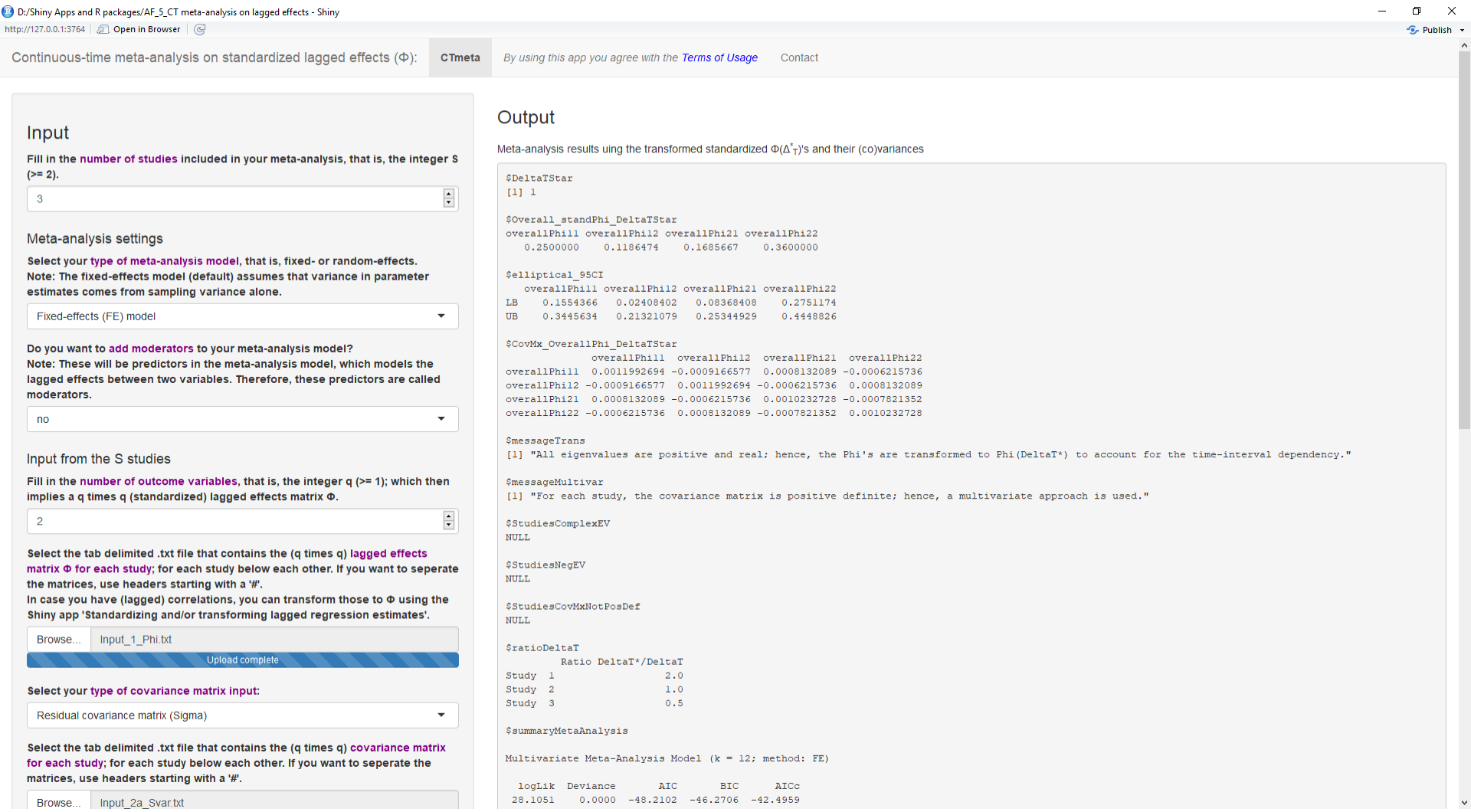


If you upload the file with time intervals (TIs), then the output will be generated.
Scroll up to see it from the start.

You can change the TI of interest any time, output will change accordingly.

The same holds true for the plot settings.

Example output: Top



Example output: Top (zoomed in)

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CTmeta | *By using this app you agree with the Terms of Usage* | Contact

Output

Meta-analysis results uing the transformed standardized $\Phi(\Delta^*_T)$'s and their (co)variances

```
$DeltaTStar
[1] 1

$Overall_standPhi_DeltaTStar
overallPhi11 overallPhi12 overallPhi21 overallPhi22
   0.2500000    0.1186474    0.1685667    0.3600000

$elliptical_95CI
   overallPhi11 overallPhi12 overallPhi21 overallPhi22
LB    0.1554366   0.02408402   0.08368408    0.2751174
UB    0.3445634   0.21321079   0.25344929    0.4448826

$CovMx_OverallPhi_DeltaTStar
              overallPhi11  overallPhi12  overallPhi21  overallPhi22
overallPhi11  0.0011992694 -0.0009166577  0.0008132089 -0.0006215736
overallPhi12 -0.0009166577  0.0011992694 -0.0006215736  0.0008132089
overallPhi21  0.0008132089 -0.0006215736  0.0010232728 -0.0007821352
overallPhi22 -0.0006215736  0.0008132089 -0.0007821352  0.0010232728

$messageTrans
[1] "All eigenvalues are positive and real; hence, the Phi's are transformed to Phi(DeltaT*) to account for the time-interval dependency."

$messageMultivar
[1] "For each study, the covariance matrix is positive definite; hence, a multivariate approach is used."

$StudiesComplexEV
NULL

$StudiesNegEV
NULL

$StudiesCovMxNotPosDef
NULL

$ratioDeltaT
         Ratio DeltaT*/DeltaT
Study  1                  2.0
Study  2                  1.0
Study  3                  0.5
```

Targeted time-interval (TI).

Overall standardized(!) estimates for that TI.

Corresponding multivariate 95%CI

Covariance matrix of overall estimates

Wrt Messages:

- Sometimes estimates cannot be transformed, then dummy method is used. Now, by default, Ctmeta.
- Sometimes, multivariate (GLS) analysis cannot be performed, then univariate (WLS) analysis.
- Plus some additional information.

Example output: Bottom

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Residual covariance matrix (Sigma)

Select the tab delimited .txt file that contains the (q times q) covariance matrix for each study; for each study below each other. If you want to seperate the matrices, use headers starting with a '#'.

Browse... Input_2a_Svar.txt

Upload complete

Select the tab delimited .txt file that contains the number of observations for each study; for each study below each other.
This refers to either N persons or, in case of T measurement occasions, to T-1 lagged observations.

Browse... Input_3_NrObs.txt

Upload complete

Select the tab delimited .txt file that contains the value for the used time-interval (Δ_T) for each study; for each study below each other. If needed, use a dot (.) as decimal mark.

Browse... Input_4_DeltaT.txt

Upload complete

Fill in the value for the time-interval of interest (Δ^*_T). If needed, use a dot (.) as decimal mark.

1

Plot adjustment settings (for output)

Fill in the lower bound (Min) and upper bound (Max) of Δ_T for the respective plots, with Max > Min >= 0; The step size (Step) is used to calculate the plots, with Step < Max - Min. If needed, use a dot (.) as decimal mark.

Min

0

Max

10

Step

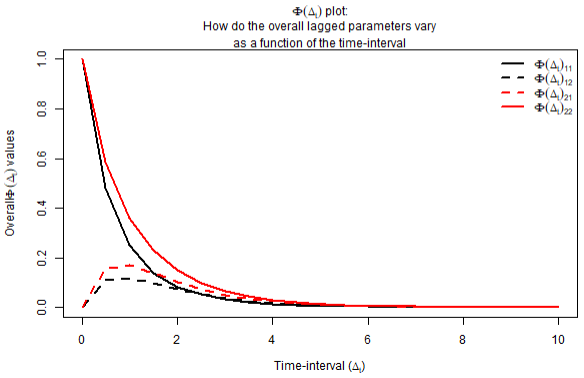
0.5

```
Study  3                 0.5

$summaryMetaAnalysis

Multivariate Meta-Analysis Model (k = 12; method: FE)

  logLik  Deviance       AIC       BIC      AICc
 28.1051    0.0000  -48.2102  -46.2706  -42.4959

Variance Components: none

Test for Residual Heterogeneity:
QE(df = 8) = 0.0000, p-val = 1.0000

Test of Moderators (coefficients 1:4):
QM(df = 4) = 640.7759, p-val < .0001

Model Results:

              estimate      se     zval    pval   ci.lb   ci.ub
overallPhi11    0.2500  0.0346   7.2191  <.0001  0.1821  0.3179  ***
overallPhi12    0.1186  0.0346   3.4261  0.0006  0.0508  0.1865  ***
overallPhi21    0.1686  0.0320   5.2696  <.0001  0.1059  0.2313  ***
overallPhi22    0.3600  0.0320  11.2540  <.0001  0.2973  0.4227  ***

---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Note: In case of the ERROR 'Number of parameters to be estimated is larger than the number of observations.', a model without moderators (or with less) and/or a FE model instead of a RE model can help.

Plot of $\Phi(\Delta_T)$

Download Phi-plot as pdf



Example output: Bottom (zoomed in)

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```
Study  3                0.5

$summaryMetaAnalysis

Multivariate Meta-Analysis Model (k = 12; method: FE)

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 28.1051    0.0000  -48.2102  -46.2706  -42.4959

Variance Components: none

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overallPhi11   0.2500  0.0346   7.2191  <.0001  0.1821  0.3179  ***
overallPhi12   0.1186  0.0346   3.4261  0.0006  0.0508  0.1865  ***
overallPhi21   0.1686  0.0320   5.2696  <.0001  0.1059  0.2313  ***
overallPhi22   0.3600  0.0320  11.2540  <.0001  0.2973  0.4227  ***

---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Output of meta-analysis

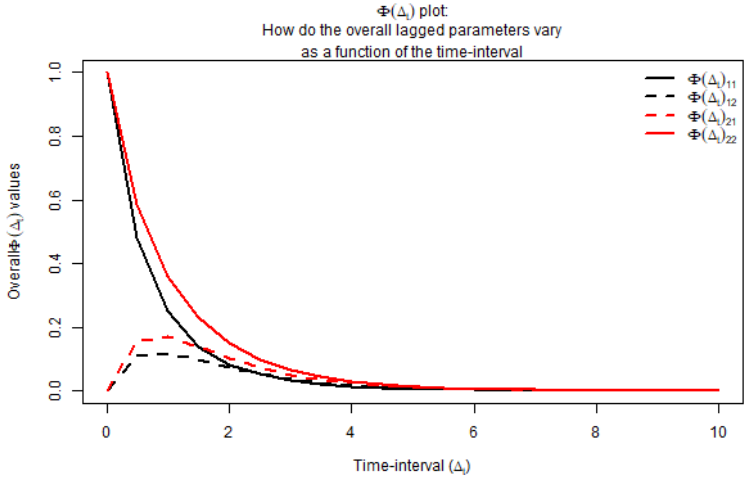
Overall standardized estimates for targeted TI.

Note: In case of the ERROR 'Number of parameters to be estimated is larger than the number of observations.', a model without moderators (or with less) and/or a FE model instead of a RE model can help.

Plot of $\Phi(\Delta_T)$

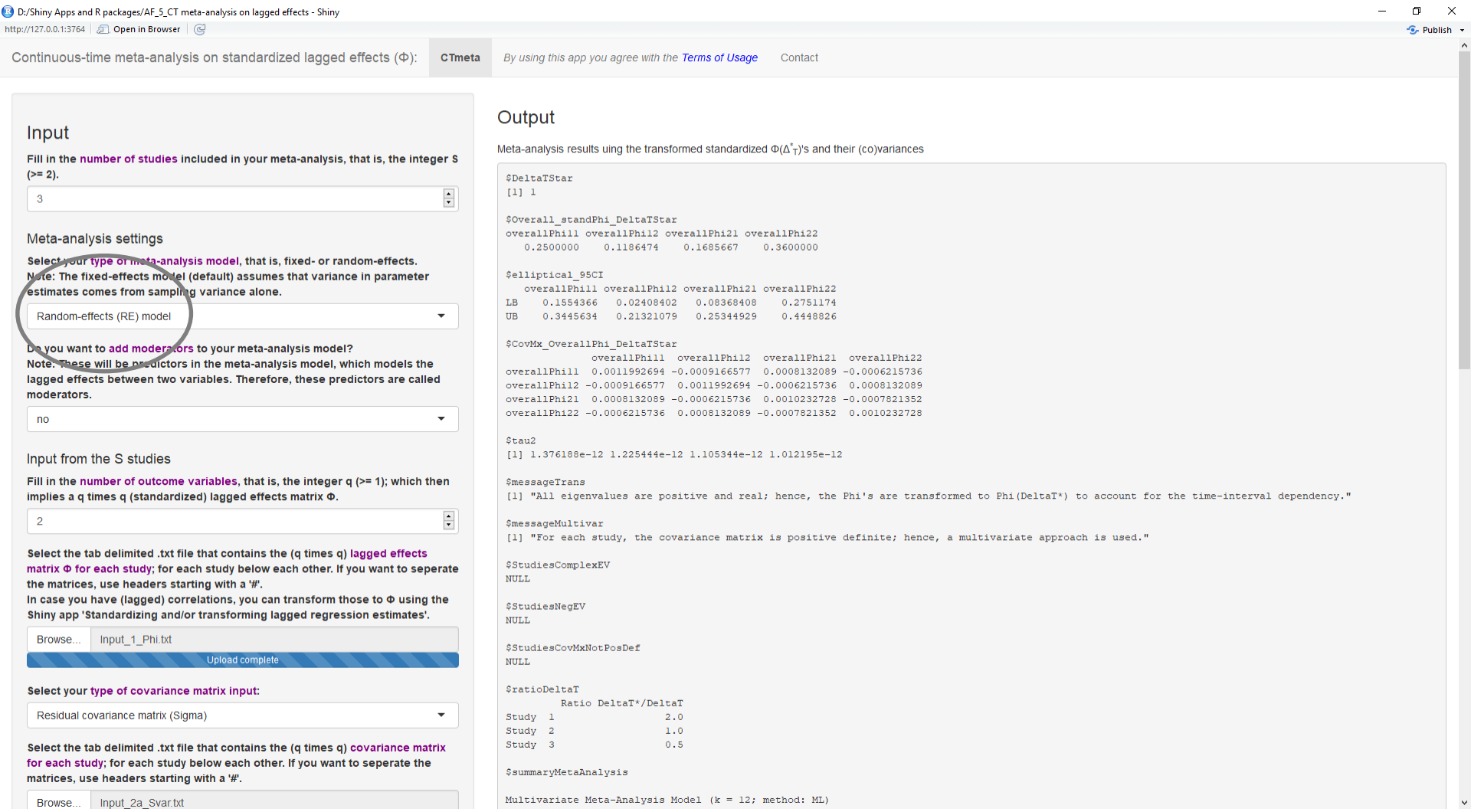
Download Phi-plot as pdf

Phi-plot of overall standardized lagged effects matrix



Random effects model

Example input RE



Example output RE

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for each study; for each study below each other. If you want to seperate the matrices, use headers starting with a '#'.

Browse... Input_2a_Svar.txt

Upload complete

Select the tab delimited .txt file that contains the number of observations for each study; for each study below each other.
This refers to either N persons or, in case of T measurement occasions, to T-1 lagged observations.

Browse... Input_3_NrObs.txt

Upload complete

Select the tab delimited .txt file that contains the value for the used time-interval (Δ_T) for each study; for each study below each other. If needed, use a dot (.) as decimal mark.

Browse... Input_4_DeltaT.txt

Upload complete

Fill in the value for the time-interval of interest (Δ^*_T). If needed, use a dot (.) as decimal mark.

1

Plot adjustment settings (for output)

Fill in the lower bound (Min) and upper bound (Max) of Δ_T for the respective plots, with Max > Min >= 0; The step size (Step) is used to calculate the plots, with Step < Max - Min. If needed, use a dot (.) as decimal mark.

Min

0

Max

10

Step

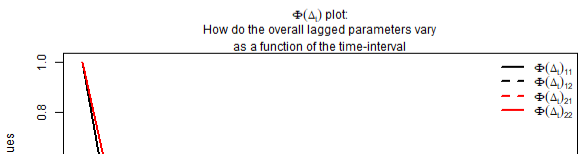
0.5

```
$summaryMetaAnalysis

Multivariate Meta-Analysis Model (k = 12; method: ML)

  logLik  Deviance       AIC       BIC      AICc
 28.1051    0.0000  -28.2102  -21.4215  391.7898

Variance Components:

outer factor: RandomPart (nlvls = 3)
inner factor: overallPhi (nlvls = 4)

            estim    sqrt  k.lvl  fixed  level
tau^2.1    0.0000  0.0000      3     no     11
tau^2.2    0.0000  0.0000      3     no     12
tau^2.3    0.0000  0.0000      3     no     21
tau^2.4    0.0000  0.0000      3     no     22

     rho.11   rho.12   rho.21   rho.22    11  12  21  22
11        1  -0.9936   0.9891  -0.9849     -  no  no  no
12  -0.9936        1  -0.9919   0.9920     3   -  no  no
21   0.9891  -0.9919        1  -0.9990     3   3   -  no
22  -0.9849   0.9920  -0.9990        1     3   3   3

Test for Residual Heterogeneity:
QE(df = 8) = 0.0000, p-val = 1.0000

Test of Moderators (coefficients 1:4):
QM(df = 4) = 640.7759, p-val < .0001

Model Results:

              estimate      se     zval    pval   ci.lb   ci.ub
overallPhi11    0.2500  0.0346   7.2191  <.0001  0.1821  0.3179  ***
overallPhi12    0.1186  0.0346   3.4261  0.0006  0.0508  0.1865  ***
overallPhi21    0.1686  0.0320   5.2696  <.0001  0.1059  0.2313  ***
overallPhi22    0.3600  0.0320  11.2540  <.0001  0.2973  0.4227  ***

---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

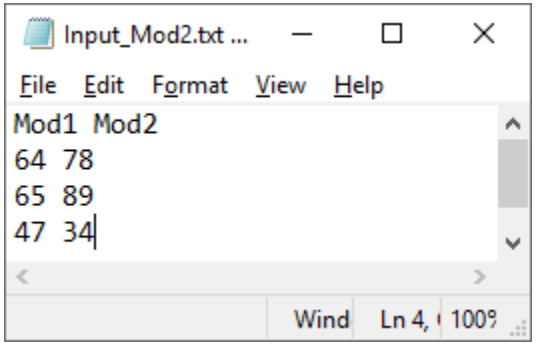
Note: In case of the ERROR 'Number of parameters to be estimated is larger than the number of observations.', a model without moderators (or with less) and/or a FE model instead of a RE model can help.

Plot of $\Phi(\Delta_T)$

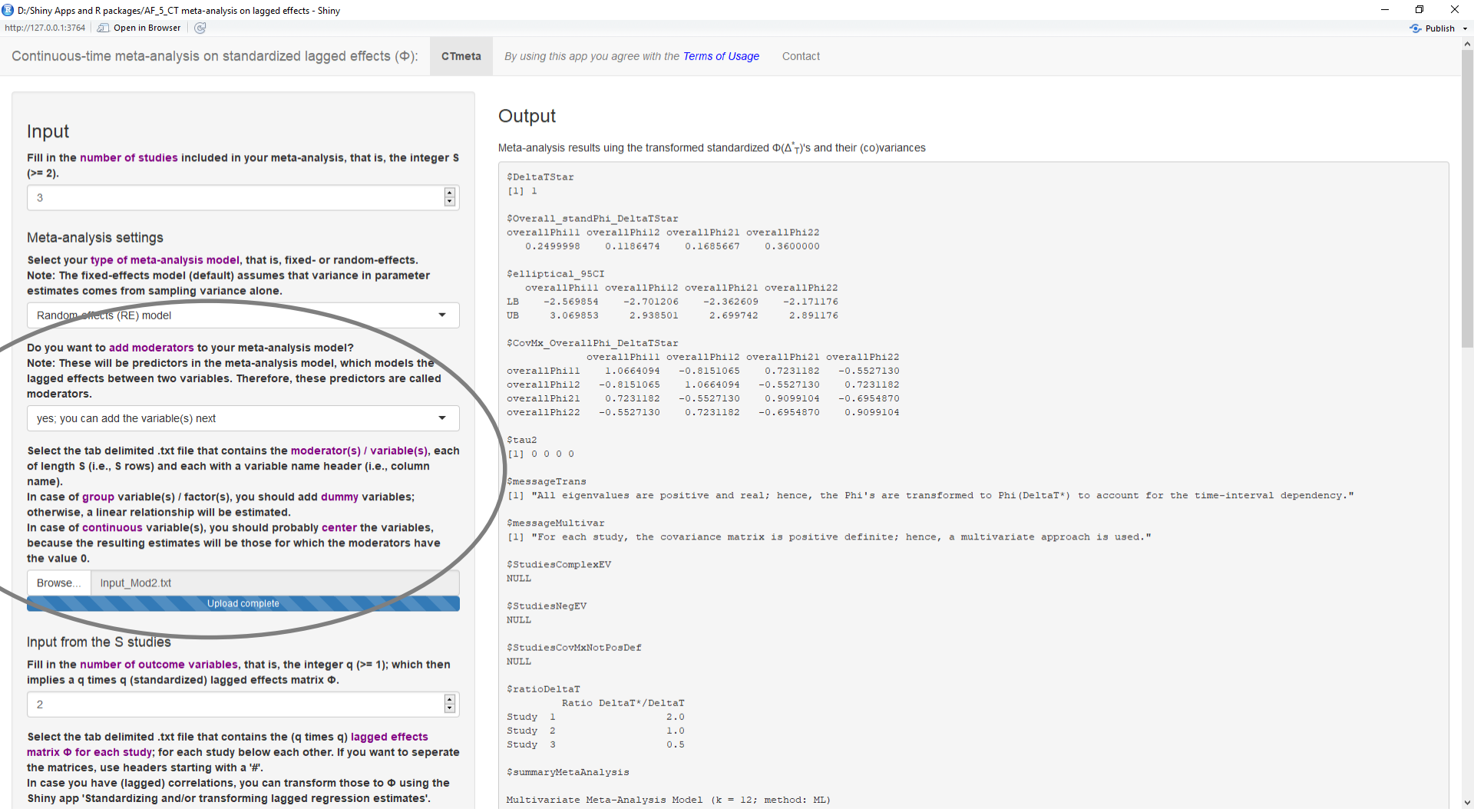
Download Phi-plot as pdf



Moderators


Input_Mod2.txt ...
File Edit Format View Help
Mod1 Mod2
64 78
65 89
47 34
Wind
Ln 4,
100%

Example input Moderator(s)



Example output Moderators

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Select the tab delimited .txt file that contains the (q times q) lagged effects matrix Φ for each study; for each study below each other. If you want to seperate the matrices, use headers starting with a '#'.
In case you have (lagged) correlations, you can transform those to Φ using the Shiny app 'Standardizing and/or transforming lagged regression estimates'.

Browse... Input_1_Phi.txt

Upload complete

Select your type of covariance matrix input:

Residual covariance matrix (Sigma)

Select the tab delimited .txt file that contains the (q times q) covariance matrix for each study; for each study below each other. If you want to seperate the matrices, use headers starting with a '#'.

Browse... Input_2a_Svar.txt

Upload complete

Select the tab delimited .txt file that contains the number of observations for each study; for each study below each other.
This refers to either N persons or, in case of T measurement occasions, to T-1 lagged observations.

Browse... Input_3_NrObs.txt

Upload complete

Select the tab delimited .txt file that contains the value for the used time-interval (Δ_T) for each study; for each study below each other. If needed, use a dot (.) as decimal mark.

Browse... Input_4_DeltaT.txt

Upload complete

Fill in the value for the time-interval of interest (Δ^*_T). If needed, use a dot (.) as decimal mark.

1

Plot adjustment settings (for output)

Fill in the lower bound (Min) and upper bound (Max) of Δ_T for the respective plots, with Max > Min >= 0; The step size (Step) is used to calculate the plots, with Step < Max - Min. If needed, use a dot (.) as decimal mark.

Min

0

Max

```
Study  2                  1.0
Study  3                  0.5

$summaryMetaAnalysis

Multivariate Meta-Analysis Model (k = 12; method: ML)

  logLik  Deviance       AIC       BIC      AICc
 28.1051   -0.0000  -12.2102   -1.5422  999.7898

Variance Components:

outer factor: RandomPart (nlvls = 3)
inner factor: overallPhi (nlvls = 4)

            estim    sqrt  k.lvl  fixed  level
tau^2.1    0.0000  0.0000      3     no     11
tau^2.2    0.0000  0.0000      3     no     12
tau^2.3    0.0000  0.0000      3     no     21
tau^2.4    0.0000  0.0000      3     no     22

    rho.11  rho.12  rho.21  rho.22    11  12  21  22
11       1  0.0000  0.0000  0.0000     -  no  no  no
12  0.0000       1  0.0000  0.0000     3   -  no  no
21  0.0000  0.0000       1  0.0000     3   3   -  no
22  0.0000  0.0000  0.0000       1     3   3   3   -

Test for Residual Heterogeneity:
QE(df = 0) = 0.0000, p-val = 1.0000

Test of Moderators (coefficients 1:12):
QM(df = 12) = 640.7759, p-val < .0001

Model Results:

                          estimate      se     zval    pval    ci.lb   ci.ub
overallPhi11                0.2500  1.0327   0.2421  0.8087  -1.7740  2.2740
overallPhi12                0.1186  1.0327   0.1149  0.9085  -1.9054  2.1426
overallPhi21                0.1686  0.9539   0.1767  0.8597  -1.7010  2.0382
overallPhi22                0.3600  0.9539   0.3774  0.7059  -1.5096  2.2296
overallPhi11:Mod.Mod1       0.0000  0.0287   0.0000  1.0000  -0.0562  0.0562
overallPhi12:Mod.Mod1      -0.0000  0.0287  -0.0000  1.0000  -0.0562  0.0562
overallPhi21:Mod.Mod1       0.0000  0.0265   0.0000  1.0000  -0.0519  0.0519
overallPhi22:Mod.Mod1      -0.0000  0.0265  -0.0000  1.0000  -0.0519  0.0519
overallPhi11:Mod.Mod2      -0.0000  0.0099  -0.0000  1.0000  -0.0194  0.0194
overallPhi12:Mod.Mod2       0.0000  0.0099   0.0000  1.0000  -0.0194  0.0194
overallPhi21:Mod.Mod2      -0.0000  0.0092  -0.0000  1.0000  -0.0180  0.0180
overallPhi22:Mod.Mod2       0.0000  0.0092   0.0000  1.0000  -0.0180  0.0180

Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Note: In case of the ERROR 'Number of parameters to be estimated is larger than the number of observations.', a model without moderators (or with less) and/or a FE model instead of a RE model can help.

Plot of $\Phi(\Delta_T)$