DDA Report

Variable Distribution

```
##
## DIRECTION DEPENDENCE ANALYSIS: Variable Distributions
##
## Skewness and kurtosis tests:
##           pb2       z-value   Pr(>|z|)  ac2       z-value   Pr(>|z|)
## Skewness  -0.5669  -7.6383    0.0000    -0.5232  -7.1128    0.0000
## Kurtosis  -0.5688  -5.7314    0.0000    -0.6125  -6.4071    0.0000
##
## 95% Percentile bootstrap CIs for higher moment differences:
##           diff     lower    upper
## Skewness  -0.0476  -0.1732   0.0970
## Kurtosis   0.0516  -0.3099   0.3501
##
## 95% Percentile bootstrap CIs for differences in higher-order correlations:
##                           estimate  lower    upper
## Cor^2[2,1] - Cor^2[1,2]  -0.0148   -0.0481   0.0257
## Cor^2[3,1] - Cor^2[1,3]   0.1399   -0.2418   0.5400
##
## 95% Percentile bootstrap CIs for Likelihood Ratio approximations:
##                                 estimate  lower    upper
## Hyvarinen-Smith (co-skewness)  -0.0161   -0.0451   0.0249
## Hyvarinen-Smith (tanh)          0.0024   -0.0023   0.0077
## Chen-Chan (co-kurtosis)         0.0397   -0.0889   0.1335
##
## Number of resamples: 100
## ---
## Note: (Cor^2[i,j] - Cor^2[j,i]) > 0 suggests the model ac2 -> pb2
```

Error Distribution

```
##
## DIRECTION DEPENDENCE ANALYSIS: Residual Distributions
##
## Skewness and kurtosis tests:
##           target   z-value  Pr(>|z|)  alternative  z-value  Pr(>|z|)
## Skewness  -0.4266  -5.9055   0.0000   -0.4731      -6.4945   0.0000
## Kurtosis   0.0017   0.1153   0.9082    0.0951       0.7597   0.4474
##
## Skewness and kurtosis difference tests and 95% Percentile bootstrap CIs:
##
##           diff     z-value  Pr(>|z|)  lower    upper
```

```
## Skewness   0.0419  -0.3789   0.7048   -0.1280   0.2186
## Kurtosis   0.0090   0.4867   0.6265   -0.0480   0.1964
##
## 95% Percentile bootstrap CIs for joint higher moment differences:
##                               estimate  lower    upper
## Co-Skewness                   -0.0151   -0.0569   0.0316
## Hyvarinen-Smith (Co-Skewness)  -0.0488   -0.1674   0.1016
## Co-Kurtosis                   -0.2757   -0.7545   1.0867
## Hyvarinen-Smith (Co-Kurtosis)  -0.0386   -0.1004   0.1483
## Chen-Chan (Co-Kurtosis)        -0.0433   -0.2493   0.0481
##
## Number of resamples: 100
## ---
## Note: Target is ac2 -> pb2
##       Alternative is pb2 -> ac2
##       Under prob.trans = TRUE, skewness and kurtosis differences < 0 and
##       co-skewness and co-kurtosis differences > 0 suggest ac2 -> pb2
```

Independenve Properties

```
params$rundda_ind
```

```
##
## DIRECTION DEPENDENCE ANALYSIS: Independence Properties
##
## Target Model: ac2 -> pb2
##
## Omnibus Independence Tests:
## HSIC = 8.3764, p-value = 0
## dCor = 0.1919, p-value = 0.0099
##
## Homoscedasticity Tests:
##                 X-squared  df     p-value
## BP-test         39.08       1.00   0.00
## Robust BP-test  39.04       1.00   0.00
##
## Non-linear Correlation Tests: input$NlFun_i_dda Transformation
##                                                          estimate   t-value
## Cor[input$NlFun_i_dda(r_pb2), ac2]                         -0.1779    -6.3447
## Cor[r_pb2, input$NlFun_i_dda(ac2)]                          0.0552     1.9414
## Cor[input$NlFun_i_dda(r_pb2), input$NlFun_i_dda(ac2)]       0.0074     0.2604
##                                                          df         Pr(>|t|)
## Cor[input$NlFun_i_dda(r_pb2), ac2]                       1231.0000     0.0000
## Cor[r_pb2, input$NlFun_i_dda(ac2)]                       1231.0000     0.0524
## Cor[input$NlFun_i_dda(r_pb2), input$NlFun_i_dda(ac2)]    1231.0000     0.7946
##
## Alternative Model: pb2 -> ac2
##
## Omnibus Independence Tests:
## HSIC = 6.9307, p-value = 0
## dCor = 0.1743, p-value = 0.0099
```

```
##
## Homoscedasticity Tests:
##                 X-squared  df     p-value
## BP-test         20.81       1.00   0.00
## Robust BP-test  19.87       1.00   0.00
##
## Non-linear Correlation Tests: input$NlFun_i_dda Transformation
##                                                                 estimate   t-value
## Cor[input$NlFun_i_dda(r_ac2), pb2]                               -0.1269    -4.4901
## Cor[r_ac2, input$NlFun_i_dda(pb2)]                                0.0531     1.8641
## Cor[input$NlFun_i_dda(r_ac2), input$NlFun_i_dda(pb2)]            -0.0324    -1.1388
##                                                                 df         Pr(>|t|)
## Cor[input$NlFun_i_dda(r_ac2), pb2]                              1231.0000     0.0000
## Cor[r_ac2, input$NlFun_i_dda(pb2)]                              1231.0000     0.0625
## Cor[input$NlFun_i_dda(r_ac2), input$NlFun_i_dda(pb2)]           1231.0000     0.2550
```