betaDelta: Staging

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Staging...

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
```

```
BetaDelta(object, type = "mvn")

#> Call:
#> BetaDelta(object = object, type = "mvn")
#>
#> Standardized regression slopes with MVN standard errors:
#>            est     se      t     p   0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.4951 0.0759 6.5272 0.000  0.2268 0.2905 0.3421 0.6482 0.6998 0.7635
#> PCTGRT  0.3915 0.0770 5.0824 0.000  0.1190 0.1837 0.2360 0.5469 0.5993 0.6640
#> PCTSUPP 0.2632 0.0747 3.5224 0.001 -0.0011 0.0616 0.1124 0.4141 0.4649 0.5276

BetaDelta(object, type = "adf")

#> Call:
#> BetaDelta(object = object, type = "adf")
#>
#> Standardized regression slopes with ADF standard errors:
#>            est     se      t      p   0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.4951 0.0674 7.3490 0.0000  0.2568 0.3134 0.3592 0.6311 0.6769 0.7335
#> PCTGRT  0.3915 0.0710 5.5164 0.0000  0.1404 0.2000 0.2483 0.5347 0.5830 0.6426
#> PCTSUPP 0.2632 0.0769 3.4231 0.0014 -0.0088 0.0558 0.1081 0.4184 0.4707 0.5353

out <- BetaDelta(object, type = "mvn")
print(out)

#> Call:
#> BetaDelta(object = object, type = "mvn")
#>
#> Standardized regression slopes with MVN standard errors:
#>            est     se      t     p   0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.4951 0.0759 6.5272 0.000  0.2268 0.2905 0.3421 0.6482 0.6998 0.7635
#> PCTGRT  0.3915 0.0770 5.0824 0.000  0.1190 0.1837 0.2360 0.5469 0.5993 0.6640
#> PCTSUPP 0.2632 0.0747 3.5224 0.001 -0.0011 0.0616 0.1124 0.4141 0.4649 0.5276
```

```r
summary(out)

#> Call:
#> BetaDelta(object = object, type = "mvn")
#>
#> Standardized regression slopes with MVN standard errors:
#>            est     se      t     p   0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.4951 0.0759 6.5272 0.000  0.2268 0.2905 0.3421 0.6482 0.6998 0.7635
#> PCTGRT  0.3915 0.0770 5.0824 0.000  0.1190 0.1837 0.2360 0.5469 0.5993 0.6640
#> PCTSUPP 0.2632 0.0747 3.5224 0.001 -0.0011 0.0616 0.1124 0.4141 0.4649 0.5276

coef(out)

#>    NARTIC    PCTGRT   PCTSUPP
#> 0.4951451 0.3914887 0.2632477

vcov(out)

#>               NARTIC       PCTGRT      PCTSUPP
#> NARTIC   0.005754524 -0.003360334 -0.002166127
#> PCTGRT  -0.003360334  0.005933462 -0.001769723
#> PCTSUPP -0.002166127 -0.001769723  0.005585256

confint(out)

#>              2.5%     97.5%
#> NARTIC  0.3420563 0.6482339
#> PCTGRT  0.2360380 0.5469395
#> PCTSUPP 0.1124272 0.4140682

out <- BetaDelta(object, type = "adf")
print(out)

#> Call:
#> BetaDelta(object = object, type = "adf")
#>
#> Standardized regression slopes with ADF standard errors:
#>            est     se      t      p   0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.4951 0.0674 7.3490 0.0000  0.2568 0.3134 0.3592 0.6311 0.6769 0.7335
#> PCTGRT  0.3915 0.0710 5.5164 0.0000  0.1404 0.2000 0.2483 0.5347 0.5830 0.6426
#> PCTSUPP 0.2632 0.0769 3.4231 0.0014 -0.0088 0.0558 0.1081 0.4184 0.4707 0.5353

summary(out)

#> Call:
#> BetaDelta(object = object, type = "adf")
#>
#> Standardized regression slopes with ADF standard errors:
```

```
#>            est     se      t      p   0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.4951 0.0674 7.3490 0.0000  0.2568 0.3134 0.3592 0.6311 0.6769 0.7335
#> PCTGRT  0.3915 0.0710 5.5164 0.0000  0.1404 0.2000 0.2483 0.5347 0.5830 0.6426
#> PCTSUPP 0.2632 0.0769 3.4231 0.0014 -0.0088 0.0558 0.1081 0.4184 0.4707 0.5353

coef(out)

#>    NARTIC    PCTGRT   PCTSUPP
#> 0.4951451 0.3914887 0.2632477

vcov(out)

#>                NARTIC       PCTGRT      PCTSUPP
#> NARTIC   0.004539472 -0.002552698 -0.001742698
#> PCTGRT  -0.002552698  0.005036538 -0.001906216
#> PCTSUPP -0.001742698 -0.001906216  0.005914088

confint(out)

#>              2.5%     97.5%
#> NARTIC  0.3591757 0.6311146
#> PCTGRT  0.2482683 0.5347091
#> PCTSUPP 0.1080509 0.4184444
```

```
BetaDelta(object, type = "mvn")

#> Call:
#> BetaDelta(object = object, type = "mvn")
#>
#> Standardized regression slopes with MVN standard errors:
#>            est     se      t     p   0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.4951 0.0759 6.5272 0.000  0.2268 0.2905 0.3421 0.6482 0.6998 0.7635
#> PCTGRT  0.3915 0.0770 5.0824 0.000  0.1190 0.1837 0.2360 0.5469 0.5993 0.6640
#> PCTSUPP 0.2632 0.0747 3.5224 0.001 -0.0011 0.0616 0.1124 0.4141 0.4649 0.5276

BetaDelta(object, type = "adf")

#> Call:
#> BetaDelta(object = object, type = "adf")
#>
#> Standardized regression slopes with ADF standard errors:
#>            est     se      t      p   0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.4951 0.0674 7.3490 0.0000  0.2568 0.3134 0.3592 0.6311 0.6769 0.7335
#> PCTGRT  0.3915 0.0710 5.5164 0.0000  0.1404 0.2000 0.2483 0.5347 0.5830 0.6426
#> PCTSUPP 0.2632 0.0769 3.4231 0.0014 -0.0088 0.0558 0.1081 0.4184 0.4707 0.5353

out <- rsq(BetaDelta(object, type = "mvn"))
print(out)
```

```
#> R-squared with MVN standard errors:
#>              est     se       t p  0.05%   0.5%   2.5%  97.5% 99.5% 99.95%
#> R-squared 0.8045 0.0517 15.5608 0 0.6216 0.6650 0.7002 0.9089 0.944 0.9874
#> Adjusted  0.7906 0.0554 14.2713 0 0.5946 0.6411 0.6788 0.9024 0.940 0.9865
```

```
summary(out)
```

```
#> R-squared with MVN standard errors:
#>              est     se       t p  0.05%   0.5%   2.5%  97.5% 99.5% 99.95%
#> R-squared 0.8045 0.0517 15.5608 0 0.6216 0.6650 0.7002 0.9089 0.944 0.9874
#> Adjusted  0.7906 0.0554 14.2713 0 0.5946 0.6411 0.6788 0.9024 0.940 0.9865
```

```
coef(out)
```

```
#> R-squared  Adjusted
#> 0.8045263 0.7905638
```

```
vcov(out)
```

```
#>             R-squared    Adjusted
#> R-squared 0.002673125 0.002864062
#> Adjusted  0.002864062 0.003068638
```

```
confint(out)
```

```
#>                2.5%     97.5%
#> R-squared 0.7001868 0.9088657
#> Adjusted  0.6787716 0.9023561
```

```
out <- rsq(BetaDelta(object, type = "adf"))
print(out)
```

```
#> R-squared with ADF standard errors:
#>              est     se       t p  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> R-squared 0.8045 0.0519 15.4910 0 0.6208 0.6644 0.6997 0.9093 0.9447 0.9883
#> Adjusted  0.7906 0.0556 14.2073 0 0.5937 0.6404 0.6783 0.9029 0.9407 0.9874
```

```
summary(out)
```

```
#> R-squared with ADF standard errors:
#>              est     se       t p  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> R-squared 0.8045 0.0519 15.4910 0 0.6208 0.6644 0.6997 0.9093 0.9447 0.9883
#> Adjusted  0.7906 0.0556 14.2073 0 0.5937 0.6404 0.6783 0.9029 0.9407 0.9874
```

```
coef(out)
```

```
#> R-squared  Adjusted
#> 0.8045263 0.7905638
```

```r
vcov(out)

#>             R-squared    Adjusted
#> R-squared 0.002697266 0.002889927
#> Adjusted  0.002889927 0.003096351

confint(out)

#>                2.5%     97.5%
#> R-squared 0.6997168 0.9093357
#> Adjusted  0.6782680 0.9028597
```

```r
BetaDelta(object, type = "mvn")

#> Call:
#> BetaDelta(object = object, type = "mvn")
#>
#> Standardized regression slopes with MVN standard errors:
#>            est     se      t     p   0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.4951 0.0759 6.5272 0.000  0.2268 0.2905 0.3421 0.6482 0.6998 0.7635
#> PCTGRT  0.3915 0.0770 5.0824 0.000  0.1190 0.1837 0.2360 0.5469 0.5993 0.6640
#> PCTSUPP 0.2632 0.0747 3.5224 0.001 -0.0011 0.0616 0.1124 0.4141 0.4649 0.5276

BetaDelta(object, type = "adf")

#> Call:
#> BetaDelta(object = object, type = "adf")
#>
#> Standardized regression slopes with ADF standard errors:
#>            est     se      t      p   0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.4951 0.0674 7.3490 0.0000  0.2568 0.3134 0.3592 0.6311 0.6769 0.7335
#> PCTGRT  0.3915 0.0710 5.5164 0.0000  0.1404 0.2000 0.2483 0.5347 0.5830 0.6426
#> PCTSUPP 0.2632 0.0769 3.4231 0.0014 -0.0088 0.0558 0.1081 0.4184 0.4707 0.5353

out <- dif(BetaDelta(object, type = "mvn"))
print(out)

#> Difference between standardized regression coefficients with MVN standard errors:
#>                    est     se      t      p   0.05%    0.5%    2.5%  97.5%
#> NARTIC-PCTGRT  0.1037 0.1357 0.7640 0.4491 -0.3763 -0.2624 -0.1702 0.3775
#> NARTIC-PCTSUPP 0.2319 0.1252 1.8524 0.0710 -0.2110 -0.1059 -0.0207 0.4845
#> PCTGRT-PCTSUPP 0.1282 0.1227 1.0451 0.3020 -0.3059 -0.2028 -0.1194 0.3759
#>                  99.5% 99.95%
#> NARTIC-PCTGRT  0.4697 0.5837
#> NARTIC-PCTSUPP 0.5697 0.6748
#> PCTGRT-PCTSUPP 0.4593 0.5624
```

```r
summary(out)

#> Difference between standardized regression coefficients with MVN standard errors:
#>                    est     se      t      p   0.05%    0.5%    2.5%  97.5%
#> NARTIC-PCTGRT  0.1037 0.1357 0.7640 0.4491 -0.3763 -0.2624 -0.1702 0.3775
#> NARTIC-PCTSUPP 0.2319 0.1252 1.8524 0.0710 -0.2110 -0.1059 -0.0207 0.4845
#> PCTGRT-PCTSUPP 0.1282 0.1227 1.0451 0.3020 -0.3059 -0.2028 -0.1194 0.3759
#>                  99.5% 99.95%
#> NARTIC-PCTGRT  0.4697 0.5837
#> NARTIC-PCTSUPP 0.5697 0.6748
#> PCTGRT-PCTSUPP 0.4593 0.5624

coef(out)

#>  NARTIC-PCTGRT NARTIC-PCTSUPP PCTGRT-PCTSUPP
#>      0.1036564      0.2318974      0.1282410

vcov(out)

#>                NARTIC-PCTGRT NARTIC-PCTSUPP PCTGRT-PCTSUPP
#> NARTIC-PCTGRT    0.018408653    0.009511262   -0.008897391
#> NARTIC-PCTSUPP   0.009511262    0.015672035    0.006160773
#> PCTGRT-PCTSUPP  -0.008897391    0.006160773    0.015058164

confint(out)

#>                        2.5%     97.5%
#> NARTIC-PCTGRT  -0.17015387 0.3774667
#> NARTIC-PCTSUPP -0.02074216 0.4845371
#> PCTGRT-PCTSUPP -0.11940123 0.3758833

out <- dif(BetaDelta(object, type = "adf"))
print(out)

#> Difference between standardized regression coefficients with ADF standard errors:
#>                    est     se      t      p   0.05%    0.5%    2.5%  97.5%
#> NARTIC-PCTGRT  0.1037 0.1212 0.8555 0.3971 -0.3250 -0.2233 -0.1409 0.3482
#> NARTIC-PCTSUPP 0.2319 0.1181 1.9642 0.0561 -0.1858 -0.0866 -0.0064 0.4702
#> PCTGRT-PCTSUPP 0.1282 0.1215 1.0555 0.2973 -0.3016 -0.1996 -0.1170 0.3734
#>                  99.5% 99.95%
#> NARTIC-PCTGRT  0.4306 0.5323
#> NARTIC-PCTSUPP 0.5504 0.6496
#> PCTGRT-PCTSUPP 0.4561 0.5581

summary(out)
```

```
#> Difference between standardized regression coefficients with ADF standard errors:
#>                    est     se      t      p   0.05%    0.5%    2.5%  97.5%
#> NARTIC-PCTGRT  0.1037 0.1212 0.8555 0.3971 -0.3250 -0.2233 -0.1409 0.3482
#> NARTIC-PCTSUPP 0.2319 0.1181 1.9642 0.0561 -0.1858 -0.0866 -0.0064 0.4702
#> PCTGRT-PCTSUPP 0.1282 0.1215 1.0555 0.2973 -0.3016 -0.1996 -0.1170 0.3734
#>                  99.5% 99.95%
#> NARTIC-PCTGRT  0.4306 0.5323
#> NARTIC-PCTSUPP 0.5504 0.6496
#> PCTGRT-PCTSUPP 0.4561 0.5581

coef(out)

#>  NARTIC-PCTGRT NARTIC-PCTSUPP PCTGRT-PCTSUPP
#>      0.1036564      0.2318974      0.1282410

vcov(out)

#>                 NARTIC-PCTGRT NARTIC-PCTSUPP PCTGRT-PCTSUPP
#> NARTIC-PCTGRT    0.014681407    0.006928651   -0.007752755
#> NARTIC-PCTSUPP   0.006928651    0.013938955    0.007010303
#> PCTGRT-PCTSUPP  -0.007752755    0.007010303    0.014763058

confint(out)

#>                         2.5%     97.5%
#> NARTIC-PCTGRT  -0.140868200 0.3481810
#> NARTIC-PCTSUPP -0.006364043 0.4701589
#> PCTGRT-PCTSUPP -0.116962608 0.3734447
```

References

R Core Team. (2022). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. Vienna, Austria. https://www.R-project.org/