

# Correlation\_tests.R

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```
library(Hmisc)

## Loading required package: lattice
## Loading required package: survival
## Loading required package: Formula
## Loading required package: ggplot2

##
## Attaching package: 'Hmisc'

## The following objects are masked from 'package:base':
##
##      format.pval, round.POSIXt, trunc.POSIXt, units

##Correlation tests, save as tables
##SampleFile <-"D:\\Downloads\\Korea May 2019\\Proportion vs. gender
bias\\Regression data 6 countries 96 and 12 -var3.txt" #regression data 6
countries.txt"
##SampleFile <-"D:\\Downloads\\Korea May 2019\\Proportion vs. gender
bias\\regression data 6 countries 50 96 and 12 - var3.txt"
SampleFile <-"D:\\Downloads\\Korea May 2019\\Proportion vs. gender
bias\\regression data 6 countries 100 96 and 12 -var3.txt"
options(digits=4)
options(scipen=10) #allow width of up to 10 digits before going into
scientific notation

AllData <-read.table(file=SampleFile, head=TRUE, sep = "\\t", na.strings="-
999")

#####
#####
## RQ1: Do large English-speaking countries have similar shares of female
first authors across fields?
#####
#####

#Compare female proportions between countries overall
FemaleProportionCols <-
c("auFem1All", "caFem1All", "ieFem1All", "nzFem1All", "ukFem1All", "usFem1All")
FemaleProportions <- AllData[FemaleProportionCols]
```

```
#round(corr(FemaleProportions,method="spearman", use =
"pairwise.complete.obs"), digits=4) #check if most appropriate is Spearman'
delete pairwise not casewise
rc <- rcorr(as.matrix(FemaleProportions),type="spearman")
```

```
## Warning in sqrt(npair - 2): NaNs produced
```

```
print(rc$r, digits = 4)
```

```
##          auFem1All caFem1All ieFem1All nzFem1All ukFem1All usFem1All
## auFem1All    1.0000    0.9484         NA         NA    0.9480    0.9431
## caFem1All    0.9484    1.0000         NA         NA    0.9710    0.9721
## ieFem1All         NA         NA          1         NA         NA         NA
## nzFem1All         NA         NA         NA          1         NA         NA
## ukFem1All    0.9480    0.9710         NA         NA    1.0000    0.9559
## usFem1All    0.9431    0.9721         NA         NA    0.9559    1.0000
```

```
print(rc$n, digits = 4)
```

```
##          auFem1All caFem1All ieFem1All nzFem1All ukFem1All usFem1All
## auFem1All        31        30          0          0        31        31
## caFem1All        30        72          0          0        69        72
## ieFem1All         0         0          0          0         0         0
## nzFem1All         0         0          0          0         0         0
## ukFem1All        31        69          0          0       137       137
## usFem1All        31        72          0          0       137       263
```

```
print(rc$P, digits = 4)
```

```
##          auFem1All caFem1All ieFem1All nzFem1All ukFem1All usFem1All
## auFem1All         NA 1.776e-15         NA         NA 4.441e-16 2.22e-15
## caFem1All 1.776e-15         NA         NA         NA 0.000e+00 0.00e+00
## ieFem1All         NA         NA         NA         NA         NA         NA
## nzFem1All         NA         NA         NA         NA         NA         NA
## ukFem1All 4.441e-16 0.000e+00         NA         NA         NA 0.00e+00
## usFem1All 2.220e-15 0.000e+00         NA         NA 0.000e+00         NA
```

```
#Compare female proportions between countries 96
```

```
FemaleProportionCols <-
```

```
c("auFem1.96","caFem1.96","ieFem1.96","nzFem1.96","ukFem1.96","usFem1.96")
```

```
FemaleProportions <- AllData[FemaleProportionCols]
```

```
rc <- rcorr(as.matrix(FemaleProportions),type="spearman")
```

```
## Warning in sqrt(npair - 2): NaNs produced
```

```
print(rc$r, digits = 4)
```

```
##          auFem1.96 caFem1.96 ieFem1.96 nzFem1.96 ukFem1.96 usFem1.96
## auFem1.96    1.0000    0.8514         NA         NA    0.8419    0.8690
## caFem1.96    0.8514    1.0000         NA         NA    0.8470    0.9125
## ieFem1.96         NA         NA          1         NA         NA         NA
## nzFem1.96         NA         NA         NA          1         NA         NA
```

```
## ukFem1.96      0.8419      0.8470      NA      NA      1.0000      0.8668
## usFem1.96      0.8690      0.9125      NA      NA      0.8668      1.0000
```

```
print(rc$n, digits = 4)
```

```
##          auFem1.96 caFem1.96 ieFem1.96 nzFem1.96 ukFem1.96 usFem1.96
## auFem1.96      31      30          0          0      31      31
## caFem1.96      30      72          0          0      69      72
## ieFem1.96       0       0          0          0       0       0
## nzFem1.96       0       0          0          0       0       0
## ukFem1.96      31      69          0          0     137     137
## usFem1.96      31      72          0          0     137     263
```

```
print(rc$P, digits = 4)
```

```
##          auFem1.96      caFem1.96 ieFem1.96 nzFem1.96      ukFem1.96
## auFem1.96          NA 0.00000000247          NA          NA 0.000000002922
## caFem1.96 0.0000000024697          NA          NA          NA 0.000000000000
## ieFem1.96          NA          NA          NA          NA          NA
## nzFem1.96          NA          NA          NA          NA          NA
## ukFem1.96 0.0000000029222 0.00000000000          NA          NA          NA
## usFem1.96 0.000000002315 0.00000000000          NA          NA 0.000000000000
##          usFem1.96
## auFem1.96 0.000000002315
## caFem1.96 0.000000000000
## ieFem1.96          NA
## nzFem1.96          NA
## ukFem1.96 0.000000000000
## usFem1.96          NA
```

*#Compare female proportions between countries 12*

```
FemaleProportionCols <-
```

```
c("auFem1.14","caFem1.14","ieFem1.14","nzFem1.14","ukFem1.14","usFem1.14")
```

```
FemaleProportions <- AllData[FemaleProportionCols]
```

```
rc <- rcorr(as.matrix(FemaleProportions),type="spearman")
```

```
## Warning in sqrt(npair - 2): NaNs produced
```

```
print(rc$r, digits = 4)
```

```
##          auFem1.14 caFem1.14 ieFem1.14 nzFem1.14 ukFem1.14 usFem1.14
## auFem1.14      1.0000      0.8982      NA      NA      0.8363      0.9194
## caFem1.14      0.8982      1.0000      NA      NA      0.9334      0.9529
## ieFem1.14       NA       NA          1      NA       NA          NA
## nzFem1.14       NA       NA          NA      1      NA          NA
## ukFem1.14      0.8363      0.9334      NA      NA      1.0000      0.9135
## usFem1.14      0.9194      0.9529      NA      NA      0.9135      1.0000
```

```
print(rc$n, digits = 4)
```

```
##          auFem1.14 caFem1.14 ieFem1.14 nzFem1.14 ukFem1.14 usFem1.14
## auFem1.14      31      30          0          0      31      31
```

```
## caFem1.14      30      72      0      0      69      72
## ieFem1.14      0      0      0      0      0      0
## nzFem1.14      0      0      0      0      0      0
## ukFem1.14     31     69      0      0     137     137
## usFem1.14     31     72      0      0     137     263
```

```
print(rc$P, digits = 4)
```

```
##          auFem1.14      caFem1.14 ieFem1.14 nzFem1.14
## auFem1.14      NA 0.00000000001669      NA      NA
## caFem1.14 0.0000000000166898      NA      NA      NA
## ieFem1.14      NA      NA      NA      NA
## nzFem1.14      NA      NA      NA      NA
## ukFem1.14 0.0000000046776780 0.00000000000000      NA      NA
## usFem1.14 0.000000000002833 0.00000000000000      NA      NA
##          ukFem1.14      usFem1.14
## auFem1.14 0.000000004678 0.0000000000002833
## caFem1.14 0.000000000000 0.0000000000000000
## ieFem1.14      NA      NA
## nzFem1.14      NA      NA
## ukFem1.14      NA 0.0000000000000000
## usFem1.14 0.000000000000      NA
```

*#Compare female proportions between countries change*

```
FemaleProportionCols <-
```

```
c("auChg1", "caChg1", "ieChg1", "nzChg1", "ukChg1", "usChg1")
```

```
FemaleProportions <- AllData[FemaleProportionCols]
```

```
rc <- rcorr(as.matrix(FemaleProportions), type="spearman")
```

```
## Warning in sqrt(npair - 2): NaNs produced
```

```
print(rc$r, digits = 4)
```

```
##          auChg1 caChg1 ieChg1 nzChg1 ukChg1 usChg1
## auChg1 1.0000 0.2792      NA      NA 0.2145 0.3927
## caChg1 0.2792 1.0000      NA      NA 0.3110 0.6390
## ieChg1      NA      NA      1      NA      NA      NA
## nzChg1      NA      NA      NA      1      NA      NA
## ukChg1 0.2145 0.3110      NA      NA 1.0000 0.3378
## usChg1 0.3927 0.6390      NA      NA 0.3378 1.0000
```

```
print(rc$n, digits = 4)
```

```
##          auChg1 caChg1 ieChg1 nzChg1 ukChg1 usChg1
## auChg1      31      30      0      0      31      31
## caChg1      30      72      0      0      69      72
## ieChg1       0       0      0      0       0       0
## nzChg1       0       0      0      0       0       0
## ukChg1      31      69      0      0     137     137
## usChg1      31      72      0      0     137     263
```

```
print(rc$P, digits = 4)
```

```

##          auChg1          caChg1 ieChg1 nzChg1          ukChg1          usChg1
## auChg1      NA 0.135135717589      NA      NA 0.24651920 0.028852000529
## caChg1 0.13514          NA      NA      NA 0.00930429 0.000000001541
## ieChg1      NA          NA      NA      NA      NA      NA
## nzChg1      NA          NA      NA      NA      NA      NA
## ukChg1 0.24652 0.009304290144      NA      NA      NA 0.000054176081
## usChg1 0.02885 0.000000001541      NA      NA 0.00005418      NA

#####
#####
## RQ2/5: Are there gender differences in first author citation advantages
similar for fields in large English-speaking countries?
#####
#####

#RQ2 Compare female 1st author citation advantages between countries [model
*with* authors]
FemaleAdvCols <- c("auFFA1","caFFA1","ieFFA1","nzFFA1","ukFFA1","usFFA1")
FemaleAdv <- AllData[FemaleAdvCols]
#round(cor(FemaleAdv,method="spearman", use = "pairwise.complete.obs"),
digits=4) #check if most appropriate is Spearman' delete pairwise not
casewise
rc <- rcorr(as.matrix(FemaleAdv),type="spearman")

## Warning in sqrt(npair - 2): NaNs produced

print(rc$r, digits = 4)

##          auFFA1 caFFA1 ieFFA1 nzFFA1 ukFFA1 usFFA1
## auFFA1 1.0000 0.2405      NA      NA 0.4782 0.1282
## caFFA1 0.2405 1.0000      NA      NA 0.4701 0.5649
## ieFFA1      NA      NA      1      NA      NA      NA
## nzFFA1      NA      NA      NA      1      NA      NA
## ukFFA1 0.4782 0.4701      NA      NA 1.0000 0.3725
## usFFA1 0.1282 0.5649      NA      NA 0.3725 1.0000

print(rc$n, digits = 4)

##          auFFA1 caFFA1 ieFFA1 nzFFA1 ukFFA1 usFFA1
## auFFA1      31      30      0      0      31      31
## caFFA1      30      72      0      0      69      72
## ieFFA1       0       0      0      0       0       0
## nzFFA1       0       0      0      0       0       0
## ukFFA1      31      69      0      0     137     137
## usFFA1      31      72      0      0     137     263

print(rc$p, digits = 4)

##          auFFA1          caFFA1 ieFFA1 nzFFA1          ukFFA1          usFFA1
## auFFA1      NA 0.2004995327      NA      NA 0.006505154 0.4918062814
## caFFA1 0.200500          NA      NA      NA 0.000045798 0.0000002349
## ieFFA1      NA          NA      NA      NA      NA      NA

```

```
## nzFFA1      NA      NA      NA      NA      NA      NA
## ukFFA1 0.006505 0.0000457985      NA      NA      NA 0.0000073766
## usFFA1 0.491806 0.000002349      NA      NA 0.000007377      NA
```

*#RQ5 Compare female 1st author citation advantages between countries [model \*without\* authors]*

```
FemaleAdvCols <- c("auFFA2","caFFA2","ieFFA2","nzFFA2","ukFFA2","usFFA2")
FemaleAdv <- AllData[FemaleAdvCols]
rc <- rcorr(as.matrix(FemaleAdv),type="spearman")
```

```
## Warning in sqrt(npair - 2): NaNs produced
```

```
print(rc$r, digits = 4)
```

```
##      auFFA2 caFFA2 ieFFA2 nzFFA2 ukFFA2 usFFA2
## auFFA2 1.0000 0.4091      NA      NA 0.6105 0.3996
## caFFA2 0.4091 1.0000      NA      NA 0.5167 0.5549
## ieFFA2      NA      NA      1      NA      NA      NA
## nzFFA2      NA      NA      NA      1      NA      NA
## ukFFA2 0.6105 0.5167      NA      NA 1.0000 0.4384
## usFFA2 0.3996 0.5549      NA      NA 0.4384 1.0000
```

```
print(rc$n, digits = 4)
```

```
##      auFFA2 caFFA2 ieFFA2 nzFFA2 ukFFA2 usFFA2
## auFFA2      31      30      0      0      31      31
## caFFA2      30      72      0      0      69      72
## ieFFA2      0      0      0      0      0      0
## nzFFA2      0      0      0      0      0      0
## ukFFA2      31      69      0      0     137     137
## usFFA2      31      72      0      0     137     263
```

```
print(rc$p, digits = 4)
```

```
##      auFFA2      caFFA2 ieFFA2 nzFFA2      ukFFA2      usFFA2
## auFFA2      NA 0.0247738145      NA      NA 0.00026525580 0.02593785625
## caFFA2 0.0247738      NA      NA      NA 0.00000550071 0.00000042266
## ieFFA2      NA      NA      NA      NA      NA      NA
## nzFFA2      NA      NA      NA      NA      NA      NA
## ukFFA2 0.0002653 0.0000055007      NA      NA      NA 0.00000008409
## usFFA2 0.0259379 0.0000004227      NA      NA 0.00000008409      NA
```

*#Compare female last author citation advantages between countries [model with authors]*

```
#FemaleAdvCols <- c("auFLA1","caFLA1","ieFLA1","nzFLA1","ukFLA1","usFLA1")
#FemaleAdv <- AllData[FemaleAdvCols]
#round(cor(FemaleAdv,method="spearman", use = "pairwise.complete.obs"),
#digits=4) #check if most appropriate is Spearman' delete pairwise not
#casewise
```

*#Compare female last author citation advantages between countries [model without authors]*

```

#FemaleAdvCols <- c("auFLA2", "caFLA2", "ieFLA2", "nzFLA2", "ukFLA2", "usFLA2")
#FemaleAdv <- AllData[FemaleAdvCols]
#round(cor(FemaleAdv, method="spearman", use = "pairwise.complete.obs"),
digits=4) #check if most appropriate is Spearman' delete pairwise not
casewise
#Compare female 1st author citation advantages between countries [model
without authors]

#####
#####
## RQ3/5: Are female first author citation advantages higher in fields with a
greater proportion of females?
#####
#####

##RQ3
##All years proportion
FemaleProportionsAndFemale1AdvCols <-
c("au1CtyMFto14", "ca1CtyMFto14", "ie1CtyMFto14", "nz1CtyMFto14", "uk1CtyMFto14",
"us1CtyMFto14", "auFFA1", "caFFA1", "ieFFA1", "nzFFA1", "ukFFA1", "usFFA1")
FemaleProportionsAndFemale1Adv <- AllData[FemaleProportionsAndFemale1AdvCols]
#round(cor(FemaleProportionsAndFemale1Adv, method="spearman", use =
"pairwise.complete.obs"), digits=4) #check if most appropriate is Spearman'
delete pairwise not casewise
rc <- rcorr(as.matrix(FemaleProportionsAndFemale1Adv), type="spearman")

## Warning in sqrt(npair - 2): NaNs produced

print(rc$r, digits = 4)

##          au1CtyMFto14 ca1CtyMFto14 ie1CtyMFto14 nz1CtyMFto14
## au1CtyMFto14      1.000000      0.87960      NaN      NaN
## ca1CtyMFto14      0.879599      1.00000      NaN      NaN
## ie1CtyMFto14      NaN      NaN      1      NaN
## nz1CtyMFto14      NaN      NaN      NaN      1
## uk1CtyMFto14      0.738266      0.82701      NaN      NaN
## us1CtyMFto14      0.722978      0.93010      NaN      NaN
## auFFA1      -0.004435      -0.09277      NA      NA
## caFFA1      0.267631      0.20477      NA      NA
## ieFFA1      NA      NA      NA      NA
## nzFFA1      NA      NA      NA      NA
## ukFFA1      0.081048      0.20800      NA      NA
## usFFA1      0.257661      0.17657      NA      NA
##          uk1CtyMFto14 us1CtyMFto14      auFFA1 caFFA1 ieFFA1 nzFFA1
## au1CtyMFto14      0.7383      0.722978 -0.004435 0.2676      NA      NA
## ca1CtyMFto14      0.8270      0.930096 -0.092770 0.2048      NA      NA
## ie1CtyMFto14      NaN      NaN      NA      NA      NA      NA
## nz1CtyMFto14      NaN      NaN      NA      NA      NA      NA
## uk1CtyMFto14      1.0000      0.730498 0.100403 0.1503      NA      NA
## us1CtyMFto14      0.7305      1.000000 -0.038306 0.1960      NA      NA

```

```
## auFFA1          0.1004    -0.038306    1.000000  0.2405      NA      NA
## caFFA1          0.1503      0.196025    0.240489  1.0000      NA      NA
## ieFFA1          NA          NA          NA      NA      1      NA
## nzFFA1          NA          NA          NA      NA      NA      1
## ukFFA1          0.1196    -0.030504    0.478226  0.4701      NA      NA
## usFFA1          0.1821    -0.006348    0.128226  0.5649      NA      NA
##              ukFFA1      usFFA1
## au1CtyMFto14    0.08105    0.257661
## ca1CtyMFto14    0.20800    0.176571
## ie1CtyMFto14    NA          NA
## nz1CtyMFto14    NA          NA
## uk1CtyMFto14    0.11961    0.182079
## us1CtyMFto14    -0.03050    -0.006348
## auFFA1          0.47823    0.128226
## caFFA1          0.47015    0.564924
## ieFFA1          NA          NA
## nzFFA1          NA          NA
## ukFFA1          1.00000    0.372505
## usFFA1          0.37251    1.000000
```

```
print(rc$n, digits = 4)
```

```
##              au1CtyMFto14 ca1CtyMFto14 ie1CtyMFto14 nz1CtyMFto14
## au1CtyMFto14          34          33          3          3
## ca1CtyMFto14          33          75          3          3
## ie1CtyMFto14          3          3          5          5
## nz1CtyMFto14          3          3          5          7
## uk1CtyMFto14          34          72          4          4
## us1CtyMFto14          34          75          3          3
## auFFA1                31          30          0          0
## caFFA1                30          72          0          0
## ieFFA1                0          0          0          0
## nzFFA1                0          0          0          0
## ukFFA1                31          69          0          0
## usFFA1                31          72          0          0
##              uk1CtyMFto14 us1CtyMFto14 auFFA1 caFFA1 ieFFA1 nzFFA1 ukFFA1
## au1CtyMFto14          34          34          31          30          0          0          31
## ca1CtyMFto14          72          75          30          72          0          0          69
## ie1CtyMFto14          4          3          0          0          0          0          0
## nz1CtyMFto14          4          3          0          0          0          0          0
## uk1CtyMFto14          141         140          31          69          0          0          137
## us1CtyMFto14          140         266          31          72          0          0          137
## auFFA1                31          31          31          30          0          0          31
## caFFA1                69          72          30          72          0          0          69
## ieFFA1                0          0          0          0          0          0          0
## nzFFA1                0          0          0          0          0          0          0
## ukFFA1               137          137          31          69          0          0          137
## usFFA1               137          263          31          72          0          0          137
##              usFFA1
## au1CtyMFto14          31
```



```
## ca1CtyMFto14      72
## ie1CtyMFto14      0
## nz1CtyMFto14      0
## uk1CtyMFto14     137
## us1CtyMFto14     263
## auFFA1            31
## caFFA1            72
## ieFFA1            0
## nzFFA1            0
## ukFFA1           137
## usFFA1           263
```

```
print(rc$P, digits = 4)
```

```
##          au1CtyMFto14    ca1CtyMFto14 ie1CtyMFto14 nz1CtyMFto14
## au1CtyMFto14          NA 0.0000000001594          NaN          NaN
## ca1CtyMFto14 0.0000000001594          NA          NaN          NaN
## ie1CtyMFto14          NaN          NaN          NA          NaN
## nz1CtyMFto14          NaN          NaN          NaN          NA
## uk1CtyMFto14 0.00000062411558 0.000000000000000          NaN          NaN
## us1CtyMFto14 0.00000136943653 0.000000000000000          NaN          NaN
## auFFA1        0.98110710823397 0.62584474472569          NA          NA
## caFFA1        0.15276821511649 0.08444205848851          NA          NA
## ieFFA1          NA          NA          NA          NA
## nzFFA1          NA          NA          NA          NA
## ukFFA1        0.66470351964753 0.08633828656366          NA          NA
## usFFA1        0.16169233374747 0.13788409093540          NA          NA
##          uk1CtyMFto14 us1CtyMFto14    auFFA1    caFFA1 ieFFA1 nzFFA1
## au1CtyMFto14 0.0000006241 0.000001369 0.981107 0.1527682151          NA          NA
## ca1CtyMFto14 0.0000000000 0.000000000 0.625845 0.0844420585          NA          NA
## ie1CtyMFto14          NaN          NaN          NA          NA          NA          NA
## nz1CtyMFto14          NaN          NaN          NA          NA          NA          NA
## uk1CtyMFto14          NA 0.000000000 0.590984 0.2178228846          NA          NA
## us1CtyMFto14 0.0000000000          NA 0.837891 0.0988869262          NA          NA
## auFFA1        0.5909843528 0.837891278          NA 0.2004995327          NA          NA
## caFFA1        0.2178228846 0.098886926 0.200500          NA          NA          NA
## ieFFA1          NA          NA          NA          NA          NA          NA
## nzFFA1          NA          NA          NA          NA          NA          NA
## ukFFA1        0.1638612979 0.723451736 0.006505 0.0000457985          NA          NA
## usFFA1        0.0332142837 0.918398572 0.491806 0.0000002349          NA          NA
##          ukFFA1    usFFA1
## au1CtyMFto14 0.664703520 0.1616923337
## ca1CtyMFto14 0.086338287 0.1378840909
## ie1CtyMFto14          NA          NA
## nz1CtyMFto14          NA          NA
## uk1CtyMFto14 0.163861298 0.0332142837
## us1CtyMFto14 0.723451736 0.9183985718
## auFFA1        0.006505154 0.4918062814
## caFFA1        0.000045798 0.0000002349
## ieFFA1          NA          NA
```

```

## nzFFA1          NA          NA
## ukFFA1          NA 0.0000073766
## usFFA1          0.000007377    NA

##96 proportion
FemaleProportionsAndFemale1AdvCols <-
c("auFem1.96", "caFem1.96", "ieFem1.96", "nzFem1.96", "ukFem1.96", "usFem1.96",
  "auFFA1", "caFFA1", "ieFFA1", "nzFFA1", "ukFFA1", "usFFA1")
FemaleProportionsAndFemale1Adv <- AllData[FemaleProportionsAndFemale1AdvCols]
rc <- rcorr(as.matrix(FemaleProportionsAndFemale1Adv), type="spearman")

## Warning in sqrt(npair - 2): NaNs produced

print(rc$r, digits = 4)

##          auFem1.96 caFem1.96 ieFem1.96 nzFem1.96 ukFem1.96 usFem1.96
## auFem1.96  1.00000  0.8514      NA          NA      0.84194  0.8690
## caFem1.96  0.85139  1.0000      NA          NA      0.84700  0.9125
## ieFem1.96      NA      NA          1          NA      NA      NA
## nzFem1.96      NA      NA          NA          1      NA      NA
## ukFem1.96  0.84194  0.8470      NA          NA      1.00000  0.8668
## usFem1.96  0.86895  0.9125      NA          NA      0.86675  1.0000
## auFFA1      -0.27661 -0.2263      NA          NA     -0.28992 -0.2629
## caFFA1      -0.09588  0.2169      NA          NA      0.23544  0.1115
## ieFFA1      NA      NA          NA          NA      NA      NA
## nzFFA1      NA      NA          NA          NA      NA      NA
## ukFFA1      -0.04677  0.2312      NA          NA      0.17429  0.1210
## usFFA1      0.07379  0.3043      NA          NA      0.08873  0.1527
##          auFFA1  caFFA1 ieFFA1 nzFFA1  ukFFA1  usFFA1
## auFem1.96 -0.2766 -0.09588      NA      NA -0.04677 0.07379
## caFem1.96 -0.2263  0.21689      NA      NA  0.23120 0.30426
## ieFem1.96      NA      NA      NA      NA      NA      NA
## nzFem1.96      NA      NA      NA      NA      NA      NA
## ukFem1.96 -0.2899  0.23544      NA      NA  0.17429 0.08873
## usFem1.96 -0.2629  0.11149      NA      NA  0.12102 0.15266
## auFFA1      1.0000  0.24049      NA      NA  0.47823 0.12823
## caFFA1      0.2405  1.00000      NA      NA  0.47015 0.56492
## ieFFA1      NA      NA          1      NA      NA      NA
## nzFFA1      NA      NA          NA      1      NA      NA
## ukFFA1      0.4782  0.47015      NA      NA  1.00000 0.37251
## usFFA1      0.1282  0.56492      NA      NA  0.37251 1.00000

print(rc$n, digits = 4)

##          auFem1.96 caFem1.96 ieFem1.96 nzFem1.96 ukFem1.96 usFem1.96
## auFem1.96      31      30          0          0      31      31
## caFem1.96      30      72          0          0      69      72
## ieFem1.96       0       0          0          0       0       0
## nzFem1.96       0       0          0          0       0       0
## ukFem1.96      31      69          0          0     137     137
## usFem1.96      31      72          0          0     137     263

```

```
## auFFA1      31      30      0      0      31      31
## caFFA1      30      72      0      0      69      72
## ieFFA1       0       0      0      0       0       0
## nzFFA1       0       0      0      0       0       0
## ukFFA1      31      69      0      0     137     137
## usFFA1      31      72      0      0     137     263
##           auFFA1 caFFA1 ieFFA1 nzFFA1 ukFFA1 usFFA1
## auFem1.96   31     30      0      0     31     31
## caFem1.96   30     72      0      0     69     72
## ieFem1.96    0      0      0      0      0      0
## nzFem1.96    0      0      0      0      0      0
## ukFem1.96   31     69      0      0    137    137
## usFem1.96   31     72      0      0    137    263
## auFFA1      31     30      0      0     31     31
## caFFA1      30     72      0      0     69     72
## ieFFA1       0      0      0      0      0      0
## nzFFA1       0      0      0      0      0      0
## ukFFA1      31     69      0      0    137    137
## usFFA1      31     72      0      0    137    263
```

```
print(rc$P, digits = 4)
```

```
##           auFem1.96   caFem1.96 ieFem1.96 nzFem1.96   ukFem1.96
## auFem1.96           NA 0.00000000247           NA           NA 0.000000002922
## caFem1.96 0.0000000024697           NA           NA           NA 0.000000000000
## ieFem1.96           NA           NA           NA           NA           NA
## nzFem1.96           NA           NA           NA           NA           NA
## ukFem1.96 0.0000000029222 0.00000000000           NA           NA           NA
## usFem1.96 0.0000000002315 0.00000000000           NA           NA 0.000000000000
## auFFA1      0.1319659620042 0.22927083304           NA           NA 0.113635361980
## caFFA1      0.6142415336684 0.06724147837           NA           NA 0.051475665546
## ieFFA1           NA           NA           NA           NA           NA
## nzFFA1           NA           NA           NA           NA           NA
## ukFFA1      0.8026939057875 0.05595215604           NA           NA 0.041651696957
## usFFA1      0.6932102736543 0.00936311297           NA           NA 0.302503376202
##           usFem1.96   auFFA1   caFFA1 ieFFA1 nzFFA1   ukFFA1
## auFem1.96 0.0000000002315 0.131966 0.6142415337           NA           NA 0.802693906
## caFem1.96 0.0000000000000 0.229271 0.0672414784           NA           NA 0.055952156
## ieFem1.96           NA           NA           NA           NA           NA           NA
## nzFem1.96           NA           NA           NA           NA           NA           NA
## ukFem1.96 0.0000000000000 0.113635 0.0514756655           NA           NA 0.041651697
## usFem1.96           NA 0.153031 0.3511572432           NA           NA 0.158933312
## auFFA1      0.1530305764121           NA 0.2004995327           NA           NA 0.006505154
## caFFA1      0.3511572431809 0.200500           NA           NA           NA 0.000045798
## ieFFA1           NA           NA           NA           NA           NA           NA
## nzFFA1           NA           NA           NA           NA           NA           NA
## ukFFA1      0.1589333123464 0.006505 0.0000457985           NA           NA           NA
## usFFA1      0.0131971803786 0.491806 0.0000002349           NA           NA 0.000007377
##           usFFA1
## auFem1.96 0.6932102737
```

```

## caFem1.96 0.0093631130
## ieFem1.96      NA
## nzFem1.96      NA
## ukFem1.96 0.3025033762
## usFem1.96 0.0131971804
## auFFA1      0.4918062814
## caFFA1      0.0000002349
## ieFFA1      NA
## nzFFA1      NA
## ukFFA1      0.0000073766
## usFFA1      NA

##12 proportion
FemaleProportionsAndFemale1AdvCols <-
c("auFem1.14","caFem1.14","ieFem1.14","nzFem1.14","ukFem1.14","usFem1.14",
"auFFA1","caFFA1","ieFFA1","nzFFA1","ukFFA1","usFFA1")
FemaleProportionsAndFemale1Adv <- AllData[FemaleProportionsAndFemale1AdvCols]
rc <- rcorr(as.matrix(FemaleProportionsAndFemale1Adv),type="spearman")

## Warning in sqrt(npair - 2): NaNs produced

print(rc$r, digits = 4)

##          auFem1.14 caFem1.14 ieFem1.14 nzFem1.14 ukFem1.14 usFem1.14
## auFem1.14  1.00000  0.89821      NA      NA      0.8363  0.9194
## caFem1.14  0.89821  1.00000      NA      NA      0.9334  0.9529
## ieFem1.14      NA      NA      1      NA      NA      NA
## nzFem1.14      NA      NA      NA      1      NA      NA
## ukFem1.14  0.83629  0.93341      NA      NA      1.0000  0.9135
## usFem1.14  0.91935  0.95292      NA      NA      0.9135  1.0000
## auFFA1     -0.14839 -0.04405      NA      NA     -0.1069 -0.1548
## caFFA1      0.04961  0.17600      NA      NA      0.1419  0.1659
## ieFFA1      NA      NA      NA      NA      NA      NA
## nzFFA1      NA      NA      NA      NA      NA      NA
## ukFFA1     -0.04476  0.26173      NA      NA      0.1416  0.1630
## usFFA1      0.10363  0.26388      NA      NA      0.1808  0.1781
##          auFFA1  caFFA1 ieFFA1 nzFFA1  ukFFA1  usFFA1
## auFem1.14 -0.14839 0.04961      NA      NA -0.04476 0.1036
## caFem1.14 -0.04405 0.17600      NA      NA  0.26173 0.2639
## ieFem1.14      NA      NA      NA      NA      NA      NA
## nzFem1.14      NA      NA      NA      NA      NA      NA
## ukFem1.14 -0.10685 0.14195      NA      NA  0.14155 0.1808
## usFem1.14 -0.15484 0.16586      NA      NA  0.16296 0.1781
## auFFA1      1.00000 0.24049      NA      NA  0.47823 0.1282
## caFFA1      0.24049 1.00000      NA      NA  0.47015 0.5649
## ieFFA1      NA      NA      1      NA      NA      NA
## nzFFA1      NA      NA      NA      1      NA      NA
## ukFFA1      0.47823 0.47015      NA      NA  1.00000 0.3725
## usFFA1      0.12823 0.56492      NA      NA  0.37251 1.0000

print(rc$n, digits = 4)

```

```
##          auFem1.14 caFem1.14 ieFem1.14 nzFem1.14 ukFem1.14 usFem1.14
## auFem1.14      31      30          0          0      31      31
## caFem1.14      30      72          0          0      69      72
## ieFem1.14       0       0          0          0       0       0
## nzFem1.14       0       0          0          0       0       0
## ukFem1.14      31      69          0          0     137     137
## usFem1.14      31      72          0          0     137     263
## auFFA1         31      30          0          0      31      31
## caFFA1         30      72          0          0      69      72
## ieFFA1          0       0          0          0       0       0
## nzFFA1          0       0          0          0       0       0
## ukFFA1         31      69          0          0     137     137
## usFFA1         31      72          0          0     137     263
##          auFFA1 caFFA1 ieFFA1 nzFFA1 ukFFA1 usFFA1
## auFem1.14      31      30          0          0      31      31
## caFem1.14      30      72          0          0      69      72
## ieFem1.14       0       0          0          0       0       0
## nzFem1.14       0       0          0          0       0       0
## ukFem1.14      31      69          0          0     137     137
## usFem1.14      31      72          0          0     137     263
## auFFA1         31      30          0          0      31      31
## caFFA1         30      72          0          0      69      72
## ieFFA1          0       0          0          0       0       0
## nzFFA1          0       0          0          0       0       0
## ukFFA1         31      69          0          0     137     137
## usFFA1         31      72          0          0     137     263
```

```
print(rc$P, digits = 4)
```

```
##          auFem1.14      caFem1.14 ieFem1.14 nzFem1.14
## auFem1.14      NA 0.0000000001669      NA      NA
## caFem1.14 0.000000000166898      NA      NA      NA
## ieFem1.14      NA      NA      NA      NA
## nzFem1.14      NA      NA      NA      NA
## ukFem1.14 0.0000000046776780 0.00000000000000      NA      NA
## usFem1.14 0.0000000000002833 0.00000000000000      NA      NA
## auFFA1      0.4256497255818728 0.81719676120224      NA      NA
## caFFA1      0.7945993102841920 0.13918744130284      NA      NA
## ieFFA1      NA      NA      NA      NA
## nzFFA1      NA      NA      NA      NA
## ukFFA1      0.8110426201551530 0.02982539181939      NA      NA
## usFFA1      0.5790529209542434 0.02510367750924      NA      NA
##          ukFem1.14      usFem1.14 auFFA1      caFFA1 ieFFA1
## auFem1.14 0.000000004678 0.0000000000002833 0.425650 0.7945993103      NA
## caFem1.14 0.000000000000 0.0000000000000000 0.817197 0.1391874413      NA
## ieFem1.14      NA      NA      NA      NA      NA
## nzFem1.14      NA      NA      NA      NA      NA
## ukFem1.14      NA 0.0000000000000000 0.567230 0.2446487300      NA
## usFem1.14 0.000000000000      NA 0.405572 0.1637933155      NA
## auFFA1      0.567229823912 0.4055720239418472      NA 0.2004995327      NA
```

```

## caFFA1      0.244648729984 0.1637933154984919 0.200500      NA      NA
## ieFFA1      NA      NA      NA      NA      NA
## nzFFA1      NA      NA      NA      NA      NA
## ukFFA1      0.098945438939 0.0570785466828494 0.006505 0.0000457985      NA
## usFFA1      0.034534843746 0.0037661245399012 0.491806 0.0000002349      NA
##          nzFFA1      ukFFA1      usFFA1
## auFem1.14      NA 0.811042620 0.5790529210
## caFem1.14      NA 0.029825392 0.0251036775
## ieFem1.14      NA      NA      NA
## nzFem1.14      NA      NA      NA
## ukFem1.14      NA 0.098945439 0.0345348437
## usFem1.14      NA 0.057078547 0.0037661245
## auFFA1      NA 0.006505154 0.4918062814
## caFFA1      NA 0.000045798 0.0000002349
## ieFFA1      NA      NA      NA
## nzFFA1      NA      NA      NA
## ukFFA1      NA      NA 0.0000073766
## usFFA1      NA 0.000007377      NA

##RQ5
##All years proportion
FemaleProportionsAndFemale1AdvCols <-
c("au1CtyMFto14", "ca1CtyMFto14", "ie1CtyMFto14", "nz1CtyMFto14", "uk1CtyMFto14",
  "us1CtyMFto14", "auFFA2", "caFFA2", "ieFFA2", "nzFFA2", "ukFFA2", "usFFA2")
FemaleProportionsAndFemale1Adv <- AllData[FemaleProportionsAndFemale1AdvCols]
rc <- rcorr(as.matrix(FemaleProportionsAndFemale1Adv), type="spearman")

## Warning in sqrt(npair - 2): NaNs produced

print(rc$r, digits = 4)

##          au1CtyMFto14 ca1CtyMFto14 ie1CtyMFto14 nz1CtyMFto14
## au1CtyMFto14      1.0000      0.87960      NaN      NaN
## ca1CtyMFto14      0.8796      1.00000      NaN      NaN
## ie1CtyMFto14      NaN      NaN      1      NaN
## nz1CtyMFto14      NaN      NaN      NaN      1
## uk1CtyMFto14      0.7383      0.82701      NaN      NaN
## us1CtyMFto14      0.7230      0.93010      NaN      NaN
## auFFA2      0.0504     -0.05673      NA      NA
## caFFA2      0.2685      0.22571      NA      NA
## ieFFA2      NA      NA      NA      NA
## nzFFA2      NA      NA      NA      NA
## ukFFA2      0.1609      0.10530      NA      NA
## usFFA2      0.3105      0.18686      NA      NA
##          uk1CtyMFto14 us1CtyMFto14      auFFA2 caFFA2 ieFFA2 nzFFA2
## au1CtyMFto14      0.73827      0.7229781 0.0504032 0.2685      NA      NA
## ca1CtyMFto14      0.82701      0.9300956 -0.0567297 0.2257      NA      NA
## ie1CtyMFto14      NaN      NaN      NA      NA      NA      NA
## nz1CtyMFto14      NaN      NaN      NA      NA      NA      NA
## uk1CtyMFto14      1.00000      0.7304980 0.1193548 0.1940      NA      NA
## us1CtyMFto14      0.73050      1.0000000 -0.0008065 0.2356      NA      NA

```

```
## auFFA2          0.11935   -0.0008065   1.0000000  0.4091      NA      NA
## caFFA2          0.19401    0.2356422   0.4091212  1.0000      NA      NA
## ieFFA2          NA         NA         NA         NA         1      NA
## nzFFA2          NA         NA         NA         NA        NA       1
## ukFFA2          0.04665   -0.0074720   0.6104839  0.5167      NA      NA
## usFFA2          0.17292   -0.0072833   0.3995968  0.5549      NA      NA
##               ukFFA2    usFFA2
## au1CtyMFto14   0.160887  0.310484
## ca1CtyMFto14   0.105298  0.186861
## ie1CtyMFto14   NA        NA
## nz1CtyMFto14   NA        NA
## uk1CtyMFto14   0.046652  0.172920
## us1CtyMFto14  -0.007472 -0.007283
## auFFA2          0.610484  0.399597
## caFFA2          0.516661  0.554923
## ieFFA2          NA        NA
## nzFFA2          NA        NA
## ukFFA2          1.000000  0.438404
## usFFA2          0.438404  1.000000
```

```
print(rc$n, digits = 4)
```

```
##               au1CtyMFto14 ca1CtyMFto14 ie1CtyMFto14 nz1CtyMFto14
## au1CtyMFto14          34          33          3          3
## ca1CtyMFto14          33          75          3          3
## ie1CtyMFto14          3          3          5          5
## nz1CtyMFto14          3          3          5          7
## uk1CtyMFto14          34          72          4          4
## us1CtyMFto14          34          75          3          3
## auFFA2                31          30          0          0
## caFFA2                30          72          0          0
## ieFFA2                 0          0          0          0
## nzFFA2                 0          0          0          0
## ukFFA2                31          69          0          0
## usFFA2                31          72          0          0
##               uk1CtyMFto14 us1CtyMFto14 auFFA2 caFFA2 ieFFA2 nzFFA2 ukFFA2
## au1CtyMFto14          34          34          31          30          0          0          31
## ca1CtyMFto14          72          75          30          72          0          0          69
## ie1CtyMFto14          4          3          0          0          0          0          0
## nz1CtyMFto14          4          3          0          0          0          0          0
## uk1CtyMFto14         141         140          31          69          0          0         137
## us1CtyMFto14         140         266          31          72          0          0         137
## auFFA2                31          31          31          30          0          0          31
## caFFA2                69          72          30          72          0          0          69
## ieFFA2                 0          0          0          0          0          0          0
## nzFFA2                 0          0          0          0          0          0          0
## ukFFA2               137         137          31          69          0          0         137
## usFFA2               137         263          31          72          0          0         137
##               usFFA2
## au1CtyMFto14          31
```

```
## ca1CtyMFto14      72
## ie1CtyMFto14      0
## nz1CtyMFto14      0
## uk1CtyMFto14     137
## us1CtyMFto14     263
## auFFA2            31
## caFFA2            72
## ieFFA2            0
## nzFFA2            0
## ukFFA2           137
## usFFA2           263
```

```
print(rc$P, digits = 4)
```

```
##          au1CtyMFto14    ca1CtyMFto14 ie1CtyMFto14 nz1CtyMFto14
## au1CtyMFto14          NA 0.00000000001594          NaN          NaN
## ca1CtyMFto14 0.00000000001594          NA          NaN          NaN
## ie1CtyMFto14          NaN          NaN          NA          NaN
## nz1CtyMFto14          NaN          NaN          NaN          NA
## uk1CtyMFto14 0.00000062411558 0.00000000000000          NaN          NaN
## us1CtyMFto14 0.00000136943653 0.00000000000000          NaN          NaN
## auFFA2        0.78772042980962 0.76588776351340          NA          NA
## caFFA2        0.15135595168767 0.05660641955984          NA          NA
## ieFFA2          NA          NA          NA          NA
## nzFFA2          NA          NA          NA          NA
## ukFFA2        0.38724602730673 0.38919006701271          NA          NA
## usFFA2        0.08913747595980 0.11602114226233          NA          NA
##          uk1CtyMFto14 us1CtyMFto14    auFFA2    caFFA2 ieFFA2
## au1CtyMFto14 0.0000006241 0.000001369 0.7877204 0.1513559517    NA
## ca1CtyMFto14 0.0000000000 0.000000000 0.7658878 0.0566064196    NA
## ie1CtyMFto14          NaN          NaN          NA          NA    NA
## nz1CtyMFto14          NaN          NaN          NA          NA    NA
## uk1CtyMFto14          NA 0.000000000 0.5224826 0.1101893059    NA
## us1CtyMFto14 0.0000000000          NA 0.9965646 0.0462995101    NA
## auFFA2        0.5224825819 0.996564635          NA 0.0247738145    NA
## caFFA2        0.1101893059 0.046299510 0.0247738          NA    NA
## ieFFA2          NA          NA          NA          NA    NA
## nzFFA2          NA          NA          NA          NA    NA
## ukFFA2        0.5882735726 0.930944302 0.0002653 0.0000055007    NA
## usFFA2        0.0433134029 0.906420759 0.0259379 0.0000004227    NA
##          nzFFA2    ukFFA2    usFFA2
## au1CtyMFto14    NA 0.38724602731 0.08913747596
## ca1CtyMFto14    NA 0.38919006701 0.11602114226
## ie1CtyMFto14    NA          NA          NA
## nz1CtyMFto14    NA          NA          NA
## uk1CtyMFto14    NA 0.58827357260 0.04331340292
## us1CtyMFto14    NA 0.93094430204 0.90642075931
## auFFA2          NA 0.00026525580 0.02593785625
## caFFA2          NA 0.00000550071 0.00000042266
## ieFFA2          NA          NA          NA
```



```

## nzFFA2          NA          NA          NA
## ukFFA2          NA          NA 0.00000008409
## usFFA2          NA 0.00000008409          NA

##96 proportion
FemaleProportionsAndFemale1AdvCols <-
c("auFem1.96", "caFem1.96", "ieFem1.96", "nzFem1.96", "ukFem1.96", "usFem1.96",
  "auFFA2", "caFFA2", "ieFFA2", "nzFFA2", "ukFFA2", "usFFA2")
FemaleProportionsAndFemale1Adv <- AllData[FemaleProportionsAndFemale1AdvCols]
rc <- rcorr(as.matrix(FemaleProportionsAndFemale1Adv), type="spearman")

## Warning in sqrt(npair - 2): NaNs produced

print(rc$r, digits = 4)

##          auFem1.96 caFem1.96 ieFem1.96 nzFem1.96 ukFem1.96 usFem1.96
## auFem1.96  1.000000  0.85139         NA         NA  0.84194  0.86895
## caFem1.96  0.851390  1.00000         NA         NA  0.84700  0.91250
## ieFem1.96          NA          NA          1         NA          NA          NA
## nzFem1.96          NA          NA          NA          1         NA          NA
## ukFem1.96  0.841935  0.84700         NA         NA  1.00000  0.86675
## usFem1.96  0.868952  0.91250         NA         NA  0.86675  1.00000
## auFFA2     -0.103629 -0.07631         NA         NA -0.15161 -0.10121
## caFFA2     -0.030923  0.24651         NA         NA  0.24898  0.15464
## ieFFA2          NA          NA          NA          NA          NA          NA
## nzFFA2          NA          NA          NA          NA          NA          NA
## ukFFA2      0.001613  0.26376         NA         NA  0.16244  0.14321
## usFFA2      0.115726  0.25760         NA         NA  0.03205  0.06207
##          auFFA2  caFFA2 ieFFA2 nzFFA2  ukFFA2  usFFA2
## auFem1.96 -0.10363 -0.03092         NA         NA 0.001613 0.11573
## caFem1.96 -0.07631  0.24651         NA         NA 0.263756 0.25760
## ieFem1.96          NA          NA          NA          NA          NA          NA
## nzFem1.96          NA          NA          NA          NA          NA          NA
## ukFem1.96 -0.15161  0.24898         NA         NA 0.162439 0.03205
## usFem1.96 -0.10121  0.15464         NA         NA 0.143209 0.06207
## auFFA2      1.00000  0.40912         NA         NA 0.610484 0.39960
## caFFA2      0.40912  1.00000         NA         NA 0.516661 0.55492
## ieFFA2          NA          NA          1         NA          NA          NA
## nzFFA2          NA          NA          NA          1         NA          NA
## ukFFA2      0.61048  0.51666         NA         NA 1.000000 0.43840
## usFFA2      0.39960  0.55492         NA         NA 0.438404 1.00000

print(rc$n, digits = 4)

##          auFem1.96 caFem1.96 ieFem1.96 nzFem1.96 ukFem1.96 usFem1.96
## auFem1.96      31      30          0          0      31      31
## caFem1.96      30      72          0          0      69      72
## ieFem1.96       0       0          0          0       0       0
## nzFem1.96       0       0          0          0       0       0
## ukFem1.96      31      69          0          0     137     137
## usFem1.96      31      72          0          0     137     263

```

```
## auFFA2      31      30      0      0      31      31
## caFFA2      30      72      0      0      69      72
## ieFFA2       0       0      0      0       0       0
## nzFFA2       0       0      0      0       0       0
## ukFFA2      31      69      0      0     137     137
## usFFA2      31      72      0      0     137     263
##           auFFA2 caFFA2 ieFFA2 nzFFA2 ukFFA2 usFFA2
## auFem1.96   31     30      0      0     31     31
## caFem1.96   30     72      0      0     69     72
## ieFem1.96    0      0      0      0      0      0
## nzFem1.96    0      0      0      0      0      0
## ukFem1.96   31     69      0      0    137    137
## usFem1.96   31     72      0      0    137    263
## auFFA2      31     30      0      0     31     31
## caFFA2      30     72      0      0     69     72
## ieFFA2       0      0      0      0      0      0
## nzFFA2       0      0      0      0      0      0
## ukFFA2      31     69      0      0    137    137
## usFFA2      31     72      0      0    137    263
```

```
print(rc$P, digits = 4)
```

```
##           auFem1.96   caFem1.96 ieFem1.96 nzFem1.96   ukFem1.96
## auFem1.96           NA 0.00000000247           NA           NA 0.000000002922
## caFem1.96 0.0000000024697           NA           NA           NA 0.000000000000
## ieFem1.96           NA           NA           NA           NA           NA
## nzFem1.96           NA           NA           NA           NA           NA
## ukFem1.96 0.0000000029222 0.00000000000           NA           NA           NA
## usFem1.96 0.0000000002315 0.00000000000           NA           NA 0.000000000000
## auFFA2      0.5790529209542 0.68858465959           NA           NA 0.415543012937
## caFFA2      0.8711364091743 0.03684850320           NA           NA 0.039110432576
## ieFFA2              NA           NA           NA           NA           NA
## nzFFA2              NA           NA           NA           NA           NA
## ukFFA2      0.9931293297884 0.02853644544           NA           NA 0.057893914532
## usFFA2      0.5352945554990 0.02891751885           NA           NA 0.710057289558
##           usFem1.96   auFFA2   caFFA2 ieFFA2 nzFFA2
## auFem1.96 0.0000000002315 0.5790529 0.8711364092           NA           NA
## caFem1.96 0.0000000000000 0.6885847 0.0368485032           NA           NA
## ieFem1.96           NA           NA           NA           NA           NA
## nzFem1.96           NA           NA           NA           NA           NA
## ukFem1.96 0.0000000000000 0.4155430 0.0391104326           NA           NA
## usFem1.96           NA 0.5879915 0.1946248774           NA           NA
## auFFA2      0.5879914711103           NA 0.0247738145           NA           NA
## caFFA2      0.1946248774371 0.0247738           NA           NA           NA
## ieFFA2              NA           NA           NA           NA           NA
## nzFFA2              NA           NA           NA           NA           NA
## ukFFA2      0.0950241257737 0.0002653 0.0000055007           NA           NA
## usFFA2      0.3159618905413 0.0259379 0.0000004227           NA           NA
##           ukFFA2   usFFA2
## auFem1.96 0.99312932979 0.53529455550
```

```

## caFem1.96 0.02853644544 0.02891751885
## ieFem1.96          NA          NA
## nzFem1.96          NA          NA
## ukFem1.96 0.05789391453 0.71005728956
## usFem1.96 0.09502412577 0.31596189054
## auFFA2      0.00026525580 0.02593785625
## caFFA2      0.00000550071 0.00000042266
## ieFFA2          NA          NA
## nzFFA2          NA          NA
## ukFFA2          NA 0.00000008409
## usFFA2      0.00000008409          NA

##12 proportion
FemaleProportionsAndFemale1AdvCols <-
c("auFem1.14", "caFem1.14", "ieFem1.14", "nzFem1.14", "ukFem1.14", "usFem1.14",
  "auFFA2", "caFFA2", "ieFFA2", "nzFFA2", "ukFFA2", "usFFA2")
FemaleProportionsAndFemale1Adv <- AllData[FemaleProportionsAndFemale1AdvCols]
rc <- rcorr(as.matrix(FemaleProportionsAndFemale1Adv), type="spearman")

## Warning in sqrt(npair - 2): NaNs produced

print(rc$r, digits = 4)

##          auFem1.14 caFem1.14 ieFem1.14 nzFem1.14 ukFem1.14 usFem1.14
## auFem1.14  1.000000  0.8982          NA          NA  0.83629  0.91935
## caFem1.14  0.898209  1.0000          NA          NA  0.93341  0.95292
## ieFem1.14          NA          NA          1          NA          NA          NA
## nzFem1.14          NA          NA          NA          1          NA          NA
## ukFem1.14  0.836290  0.9334          NA          NA  1.00000  0.91346
## usFem1.14  0.919355  0.9529          NA          NA  0.91346  1.00000
## auFFA2     -0.004435  0.1159          NA          NA  0.04315  0.03589
## caFFA2      0.058509  0.2093          NA          NA  0.17941  0.21339
## ieFFA2          NA          NA          NA          NA          NA          NA
## nzFFA2          NA          NA          NA          NA          NA          NA
## ukFFA2      0.061694  0.3785          NA          NA  0.18603  0.21578
## usFFA2      0.112500  0.2125          NA          NA  0.13948  0.09169
##          auFFA2  caFFA2  ieFFA2  nzFFA2  ukFFA2  usFFA2
## auFem1.14 -0.004435 0.05851    NA    NA  0.06169 0.11250
## caFem1.14  0.115919 0.20931    NA    NA  0.37852 0.21246
## ieFem1.14          NA    NA    NA    NA    NA    NA
## nzFem1.14          NA    NA    NA    NA    NA    NA
## ukFem1.14  0.043145 0.17941    NA    NA  0.18603 0.13948
## usFem1.14  0.035887 0.21339    NA    NA  0.21578 0.09169
## auFFA2      1.000000 0.40912    NA    NA  0.61048 0.39960
## caFFA2      0.409121 1.00000    NA    NA  0.51666 0.55492
## ieFFA2          NA    NA    1    NA    NA    NA
## nzFFA2          NA    NA    NA    1    NA    NA
## ukFFA2      0.610484 0.51666    NA    NA  1.00000 0.43840
## usFFA2      0.399597 0.55492    NA    NA  0.43840 1.00000

print(rc$n, digits = 4)

```

```
##          auFem1.14 caFem1.14 ieFem1.14 nzFem1.14 ukFem1.14 usFem1.14
## auFem1.14      31      30          0          0      31      31
## caFem1.14      30      72          0          0      69      72
## ieFem1.14       0       0          0          0       0       0
## nzFem1.14       0       0          0          0       0       0
## ukFem1.14      31      69          0          0     137     137
## usFem1.14      31      72          0          0     137     263
## auFFA2         31      30          0          0      31      31
## caFFA2         30      72          0          0      69      72
## ieFFA2          0       0          0          0       0       0
## nzFFA2          0       0          0          0       0       0
## ukFFA2         31      69          0          0     137     137
## usFFA2         31      72          0          0     137     263
##          auFFA2 caFFA2 ieFFA2 nzFFA2 ukFFA2 usFFA2
## auFem1.14      31      30          0          0      31      31
## caFem1.14      30      72          0          0      69      72
## ieFem1.14       0       0          0          0       0       0
## nzFem1.14       0       0          0          0       0       0
## ukFem1.14      31      69          0          0     137     137
## usFem1.14      31      72          0          0     137     263
## auFFA2         31      30          0          0      31      31
## caFFA2         30      72          0          0      69      72
## ieFFA2          0       0          0          0       0       0
## nzFFA2          0       0          0          0       0       0
## ukFFA2         31      69          0          0     137     137
## usFFA2         31      72          0          0     137     263
```

```
print(rc$P, digits = 4)
```

```
##          auFem1.14      caFem1.14 ieFem1.14 nzFem1.14
## auFem1.14      NA 0.00000000001669      NA      NA
## caFem1.14 0.0000000000166898      NA      NA      NA
## ieFem1.14      NA      NA      NA      NA
## nzFem1.14      NA      NA      NA      NA
## ukFem1.14 0.0000000046776780 0.00000000000000      NA      NA
## usFem1.14 0.0000000000002833 0.00000000000000      NA      NA
## auFFA2      0.9811071082339695 0.54186150117993      NA      NA
## caFFA2      0.7587555328491227 0.07763145383253      NA      NA
## ieFFA2      NA      NA      NA      NA
## nzFFA2      NA      NA      NA      NA
## ukFFA2      0.7416313933461449 0.00134121599842      NA      NA
## usFFA2      0.5468074270670069 0.07316751412548      NA      NA
##          ukFem1.14      usFem1.14      auFFA2      caFFA2 ieFFA2
## auFem1.14 0.000000004678 0.0000000000002833 0.9811071 0.7587555328      NA
## caFem1.14 0.000000000000 0.0000000000000000 0.5418615 0.0776314538      NA
## ieFem1.14      NA      NA      NA      NA      NA
## nzFem1.14      NA      NA      NA      NA      NA
## ukFem1.14      NA 0.000000000000000000 0.8177363 0.1401879079      NA
## usFem1.14 0.000000000000      NA 0.8480075 0.0718960577      NA
## auFFA2      0.817736314013 0.8480075137959360      NA 0.0247738145      NA
```

```
## caFFA2      0.140187907923 0.0718960576511858 0.0247738      NA      NA
## ieFFA2      NA      NA      NA      NA      NA
## nzFFA2      NA      NA      NA      NA      NA
## ukFFA2      0.029518067232 0.0113296493453245 0.0002653 0.0000055007      NA
## usFFA2      0.104047929767 0.1380555262162462 0.0259379 0.0000004227      NA
##          nzFFA2      ukFFA2      usFFA2
## auFem1.14      NA 0.74163139335 0.54680742707
## caFem1.14      NA 0.00134121600 0.07316751413
## ieFem1.14      NA      NA      NA
## nzFem1.14      NA      NA      NA
## ukFem1.14      NA 0.02951806723 0.10404792977
## usFem1.14      NA 0.01132964935 0.13805552622
## auFFA2      NA 0.00026525580 0.02593785625
## caFFA2      NA 0.00000550071 0.00000042266
## ieFFA2      NA      NA      NA
## nzFFA2      NA      NA      NA
## ukFFA2      NA      NA 0.00000008409
## usFFA2      NA 0.00000008409      NA
```

```
#####
#####
```

```
## RQ4/5: Are female first author citation advantages higher in fields with a
greater increase in the proportion of females?
```

```
#####
#####
```

```
##RQ4
```

```
FemaleProportionsAndFemale1AdvCols <-
```

```
c("auChg1", "caChg1", "ieChg1", "nzChg1", "ukChg1", "usChg1",
  "auFFA1", "caFFA1", "ieFFA1", "nzFFA1", "ukFFA1", "usFFA1")
```

```
FemaleProportionsAndFemale1Adv <- AllData[FemaleProportionsAndFemale1AdvCols]
```

```
rc <- rcorr(as.matrix(FemaleProportionsAndFemale1Adv), type="spearman")
```

```
## Warning in sqrt(npair - 2): NaNs produced
```

```
print(rc$r, digits = 4)
```

```
##          auChg1      caChg1 ieChg1 nzChg1      ukChg1 usChg1      auFFA1      caFFA1
## auChg1 1.00000 0.279199      NA      NA 0.21452 0.3927 0.047177 0.39221
## caChg1 0.27920 1.000000      NA      NA 0.31096 0.6390 -0.008676 0.03206
## ieChg1      NA      NA      1      NA      NA      NA      NA      NA
## nzChg1      NA      NA      NA      1      NA      NA      NA      NA
## ukChg1 0.21452 0.310961      NA      NA 1.00000 0.3378 0.150000 -0.06167
## usChg1 0.39274 0.638980      NA      NA 0.33779 1.0000 0.289113 0.20722
## auFFA1 0.04718 -0.008676      NA      NA 0.15000 0.2891 1.000000 0.24049
## caFFA1 0.39221 0.032060      NA      NA -0.06167 0.2072 0.240489 1.00000
## ieFFA1      NA      NA      NA      NA      NA      NA      NA      NA
## nzFFA1      NA      NA      NA      NA      NA      NA      NA      NA
## ukFFA1 0.05605 0.170223      NA      NA -0.03279 0.1447 0.478226 0.47015
## usFFA1 0.17258 0.165477      NA      NA 0.22519 0.1309 0.128226 0.56492
##          ieFFA1 nzFFA1      ukFFA1 usFFA1
```

```
## auChg1      NA      NA  0.05605 0.1726
## caChg1      NA      NA  0.17022 0.1655
## ieChg1      NA      NA      NA      NA
## nzChg1      NA      NA      NA      NA
## ukChg1      NA      NA -0.03279 0.2252
## usChg1      NA      NA  0.14471 0.1309
## auFFA1      NA      NA  0.47823 0.1282
## caFFA1      NA      NA  0.47015 0.5649
## ieFFA1       1      NA      NA      NA
## nzFFA1      NA      1      NA      NA
## ukFFA1      NA      NA  1.00000 0.3725
## usFFA1      NA      NA  0.37251 1.0000
```

```
print(rc$n, digits = 4)
```

```
##          auChg1 caChg1 ieChg1 nzChg1 ukChg1 usChg1 auFFA1 caFFA1 ieFFA1
## auChg1      31      30        0        0      31      31      31      30        0
## caChg1      30      72        0        0      69      72      30      72        0
## ieChg1       0        0        0        0        0        0        0        0        0
## nzChg1       0        0        0        0        0        0        0        0        0
## ukChg1      31      69        0        0     137     137      31      69        0
## usChg1      31      72        0        0     137     263      31      72        0
## auFFA1      31      30        0        0      31      31      31      30        0
## caFFA1      30      72        0        0      69      72      30      72        0
## ieFFA1       0        0        0        0        0        0        0        0        0
## nzFFA1       0        0        0        0        0        0        0        0        0
## ukFFA1      31      69        0        0     137     137      31      69        0
## usFFA1      31      72        0        0     137     263      31      72        0
##          nzFFA1 ukFFA1 usFFA1
## auChg1       0      31      31
## caChg1       0      69      72
## ieChg1       0        0        0
## nzChg1       0        0        0
## ukChg1       0     137     137
## usChg1       0     137     263
## auFFA1       0      31      31
## caFFA1       0      69      72
## ieFFA1       0        0        0
## nzFFA1       0        0        0
## ukFFA1       0     137     137
## usFFA1       0     137     263
```

```
print(rc$P, digits = 4)
```

```
##          auChg1          caChg1 ieChg1 nzChg1          ukChg1          usChg1
## auChg1      NA 0.135135717589      NA      NA 0.24651920 0.028852000529
## caChg1 0.13514      NA      NA      NA 0.00930429 0.000000001541
## ieChg1      NA      NA      NA      NA      NA      NA
## nzChg1      NA      NA      NA      NA      NA      NA
## ukChg1 0.24652 0.009304290144      NA      NA      NA 0.000054176081
## usChg1 0.02885 0.000000001541      NA      NA 0.00005418      NA
```

```
## auFFA1 0.80103 0.963705940980 NA NA 0.42057946 0.114689063931
## caFFA1 0.03206 0.789203349269 NA NA 0.61467041 0.080720033487
## ieFFA1 NA NA NA NA NA NA
## nzFFA1 NA NA NA NA NA NA
## ukFFA1 0.76458 0.162000577433 NA NA 0.70365514 0.091569592577
## usFFA1 0.35320 0.164789753488 NA NA 0.00815215 0.033858345711
## auFFA1 caFFA1 ieFFA1 nzFFA1 ukFFA1 usFFA1
## auChg1 0.801027 0.0320572853 NA NA 0.764577182 0.3532034472
## caChg1 0.963706 0.7892033493 NA NA 0.162000577 0.1647897535
## ieChg1 NA NA NA NA NA NA
## nzChg1 NA NA NA NA NA NA
## ukChg1 0.420579 0.6146704076 NA NA 0.703655138 0.0081521512
## usChg1 0.114689 0.0807200335 NA NA 0.091569593 0.0338583457
## auFFA1 NA 0.2004995327 NA NA 0.006505154 0.4918062814
## caFFA1 0.200500 NA NA NA 0.000045798 0.0000002349
## ieFFA1 NA NA NA NA NA NA
## nzFFA1 NA NA NA NA NA NA
## ukFFA1 0.006505 0.0000457985 NA NA NA 0.0000073766
## usFFA1 0.491806 0.0000002349 NA NA 0.000007377 NA
```

```
##RQ5
```

```
FemaleProportionsAndFemale1AdvCols <-
```

```
c("auChg1", "caChg1", "ieChg1", "nzChg1", "ukChg1", "usChg1",
  "auFFA2", "caFFA2", "ieFFA2", "nzFFA2", "ukFFA2", "usFFA2")
```

```
FemaleProportionsAndFemale1Adv <- AllData[FemaleProportionsAndFemale1AdvCols]
```

```
rc <- rcorr(as.matrix(FemaleProportionsAndFemale1Adv), type="spearman")
```

```
## Warning in sqrt(npair - 2): NaNs produced
```

```
print(rc$r, digits = 4)
```

```
## auChg1 caChg1 ieChg1 nzChg1 ukChg1 usChg1 auFFA2 caFFA2
## auChg1 1.00000 0.27920 NA NA 0.21452 0.39274 0.05444 0.27786
## caChg1 0.27920 1.00000 NA NA 0.31096 0.63898 0.05451 0.04489
## ieChg1 NA NA 1 NA NA NA NA NA
## nzChg1 NA NA NA 1 NA NA NA NA
## ukChg1 0.21452 0.31096 NA NA 1.00000 0.33779 0.20242 -0.02126
## usChg1 0.39274 0.63898 NA NA 0.33779 1.00000 0.38992 0.22461
## auFFA2 0.05444 0.05451 NA NA 0.20242 0.38992 1.00000 0.40912
## caFFA2 0.27786 0.04489 NA NA -0.02126 0.22461 0.40912 1.00000
## ieFFA2 NA NA NA NA NA NA NA NA
## nzFFA2 NA NA NA NA NA NA NA NA
## ukFFA2 0.14113 0.32360 NA NA 0.04237 0.22643 0.61048 0.51666
## usFFA2 0.06573 0.09882 NA NA 0.21392 0.09882 0.39960 0.55492
## ieFFA2 nzFFA2 ukFFA2 usFFA2
## auChg1 NA NA 0.14113 0.06573
## caChg1 NA NA 0.32360 0.09882
## ieChg1 NA NA NA NA
## nzChg1 NA NA NA NA
## ukChg1 NA NA 0.04237 0.21392
## usChg1 NA NA 0.22643 0.09882
```

```
## auFFA2      NA      NA 0.61048 0.39960
## caFFA2      NA      NA 0.51666 0.55492
## ieFFA2       1      NA      NA      NA
## nzFFA2      NA      1      NA      NA
## ukFFA2      NA      NA 1.00000 0.43840
## usFFA2      NA      NA 0.43840 1.00000
```

```
print(rc$n, digits = 4)
```

```
##          auChg1 caChg1 ieChg1 nzChg1 ukChg1 usChg1 auFFA2 caFFA2 ieFFA2
## auChg1      31      30        0        0      31      31      31      30        0
## caChg1      30      72        0        0      69      72      30      72        0
## ieChg1       0        0        0        0        0        0        0        0        0
## nzChg1       0        0        0        0        0        0        0        0        0
## ukChg1      31      69        0        0     137     137      31      69        0
## usChg1      31      72        0        0     137     263      31      72        0
## auFFA2      31      30        0        0      31      31      31      30        0
## caFFA2      30      72        0        0      69      72      30      72        0
## ieFFA2       0        0        0        0        0        0        0        0        0
## nzFFA2       0        0        0        0        0        0        0        0        0
## ukFFA2      31      69        0        0     137     137      31      69        0
## usFFA2      31      72        0        0     137     263      31      72        0
```

```
##          nzFFA2 ukFFA2 usFFA2
## auChg1       0      31      31
## caChg1       0      69      72
## ieChg1       0        0        0
## nzChg1       0        0        0
## ukChg1       0     137     137
## usChg1       0     137     263
## auFFA2       0      31      31
## caFFA2       0      69      72
## ieFFA2       0        0        0
## nzFFA2       0        0        0
## ukFFA2       0     137     137
## usFFA2       0     137     263
```

```
print(rc$P, digits = 4)
```

```
##          auChg1          caChg1 ieChg1 nzChg1          ukChg1          usChg1
## auChg1      NA 0.135135717589      NA      NA 0.24651920 0.028852000529
## caChg1 0.13514          NA      NA      NA 0.00930429 0.000000001541
## ieChg1      NA          NA      NA      NA      NA      NA
## nzChg1      NA          NA      NA      NA      NA      NA
## ukChg1 0.24652 0.009304290144      NA      NA      NA 0.000054176081
## usChg1 0.02885 0.000000001541      NA      NA 0.00005418      NA
## auFFA2 0.77117 0.774829447663      NA      NA 0.27480546 0.030127034427
## caFFA2 0.13709 0.708084688464      NA      NA 0.86231655 0.057846520208
## ieFFA2      NA          NA      NA      NA      NA      NA
## nzFFA2      NA          NA      NA      NA      NA      NA
## ukFFA2 0.44888 0.006681109840      NA      NA 0.62298079 0.007799667183
## usFFA2 0.72537 0.408897017136      NA      NA 0.01207166 0.109859248607
```



```
##          auFFA2          caFFA2 ieFFA2 nzFFA2          ukFFA2          usFFA2
## auChg1 0.7711702 0.1370906801      NA      NA 0.44887926077 0.72537250560
## caChg1 0.7748294 0.7080846885      NA      NA 0.00668110984 0.40889701714
## ieChg1      NA      NA      NA      NA      NA      NA
## nzChg1      NA      NA      NA      NA      NA      NA
## ukChg1 0.2748055 0.8623165550      NA      NA 0.62298078674 0.01207166261
## usChg1 0.0301270 0.0578465202      NA      NA 0.00779966718 0.10985924861
## auFFA2      NA 0.0247738145      NA      NA 0.00026525580 0.02593785625
## caFFA2 0.0247738      NA      NA      NA 0.00000550071 0.00000042266
## ieFFA2      NA      NA      NA      NA      NA      NA
## nzFFA2      NA      NA      NA      NA      NA      NA
## ukFFA2 0.0002653 0.0000055007      NA      NA      NA 0.00000008409
## usFFA2 0.0259379 0.0000004227      NA      NA 0.00000008409      NA
```

### *#Basic stats*

```
SampleSizeCols <-
```

```
c("au1CtyMFto14", "ca1CtyMFto14", "ie1CtyMFto14", "nz1CtyMFto14", "uk1CtyMFto14",
  "us1CtyMFto14")
```

```
SampleSizes <- AllData[SampleSizeCols]
```

```
colSums(SampleSizes)
```

```
## au1CtyMFto14 ca1CtyMFto14 ie1CtyMFto14 nz1CtyMFto14 uk1CtyMFto14
##          NA          NA          NA          NA          NA
## us1CtyMFto14
##          NA
```

```
colSums(SampleSizes != 0)
```

```
## au1CtyMFto14 ca1CtyMFto14 ie1CtyMFto14 nz1CtyMFto14 uk1CtyMFto14
##          NA          NA          NA          NA          NA
## us1CtyMFto14
##          NA
```