calculate bias in each scenario, stratified by N

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# Write functions

# Bias

## Get results for correlated data

### Get quantiles  
S.by.quantiles <- lapply(quantiles.list, function(x) {get\_quantiles\_by\_N(x[1],x[2])})  
S.all <- get\_quantiles\_by\_N(0,1)  
  
### Put into a table  
S.by.quantiles <- lapply(S.by.quantiles, function(x) {  
 out <- rbind(x[[1]], x[[2]])  
 rownames(out) <- c("S\_VH", "S\_boot")  
 return(out)  
})  
S.all <- rbind(S.all[[1]], S.all[[2]])  
  
  
### Print S\_pop by quantiles  
knitr::kable(S.all)

|  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- |
| NA | NA | NA | NA | NA | NaN (NA) |
| NA | NA | NA | NA | NA | NaN (NA) |

knitr::kable(S.by.quantiles[[1]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | -0.390 | -0.013 | 0.121 | 0.229 | 0.449 | 0.097 (0.205) |
| S\_boot | -0.186 | -0.077 | 0.007 | 0.043 | 0.125 | -0.016 (0.086) |

knitr::kable(S.by.quantiles[[2]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | -0.304 | -0.014 | 0.049 | 0.099 | 0.180 | 0.026 (0.126) |
| S\_boot | -0.035 | 0.003 | 0.014 | 0.026 | 0.072 | 0.014 (0.040) |

knitr::kable(S.by.quantiles[[3]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | -0.211 | -0.009 | 0.021 | 0.045 | 0.083 | 0.003 (0.090) |
| S\_boot | -0.015 | 0.000 | 0.005 | 0.011 | 0.032 | 0.004 (0.077) |

knitr::kable(S.by.quantiles[[4]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | -0.118 | -0.006 | 0.009 | 0.020 | 0.040 | -0.003 (0.064) |
| S\_boot | -0.012 | -0.002 | 0.001 | 0.005 | 0.016 | -0.039 (2.346) |

knitr::kable(S.by.quantiles[[5]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | -0.061 | -0.003 | 0.004 | 0.010 | 0.019 | -0.003 (0.042) |
| S\_boot | -0.010 | -0.002 | 0.000 | 0.003 | 0.011 | -0.036 (1.862) |

### Get N values  
get\_N(0,1)

## [1] "N= 0"

lapply(quantiles.list, function(x) {get\_N(x[1],x[2])})

## [[1]]  
## [1] "N= 3213"  
##   
## [[2]]  
## [1] "N= 2757"  
##   
## [[3]]  
## [1] "N= 2421"  
##   
## [[4]]  
## [1] "N= 3338"  
##   
## [[5]]  
## [1] "N= 2432"

# Get results for uncorrelated data

### Get quantiles  
S.by.quantiles <- lapply(quantiles.list, function(x) {get\_quantiles\_by\_N(x[1],x[2], correlated = FALSE)})  
S.all <- get\_quantiles\_by\_N(0,1, correlated = FALSE)  
  
### Put into a table  
S.by.quantiles <- lapply(S.by.quantiles, function(x) {  
 out <- rbind(x[[1]], x[[2]])  
 rownames(out) <- c("S\_VH", "S\_boot")  
 return(out)  
})  
S.all <- rbind(S.all[[1]], S.all[[2]])  
  
  
### Print S\_pop by quantiles  
knitr::kable(S.all)

|  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- |
| NA | NA | NA | NA | NA | NaN (NA) |
| NA | NA | NA | NA | NA | NaN (NA) |

knitr::kable(S.by.quantiles[[1]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | -0.377 | -0.032 | 0.089 | 0.185 | 0.364 | 0.061 (0.186) |
| S\_boot | -0.146 | -0.026 | 0.047 | 0.088 | 0.170 | 0.030 (0.085) |

knitr::kable(S.by.quantiles[[2]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | -0.387 | -0.042 | 0.027 | 0.074 | 0.151 | -0.008 (0.143) |
| S\_boot | -0.022 | 0.018 | 0.031 | 0.048 | 0.100 | 0.038 (0.218) |

knitr::kable(S.by.quantiles[[3]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | -0.274 | -0.024 | 0.011 | 0.035 | 0.068 | -0.015 (0.098) |
| S\_boot | -0.016 | 0.004 | 0.011 | 0.019 | 0.044 | 0.012 (0.036) |

knitr::kable(S.by.quantiles[[4]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | -0.137 | -0.015 | 0.004 | 0.016 | 0.035 | -0.011 (0.071) |
| S\_boot | -0.013 | -0.001 | 0.003 | 0.008 | 0.021 | 0.001 (0.134) |

knitr::kable(S.by.quantiles[[5]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | -0.080 | -0.007 | 0.002 | 0.008 | 0.016 | -0.007 (0.046) |
| S\_boot | -0.012 | -0.002 | 0.001 | 0.004 | 0.012 | 0.001 (0.015) |

### Get N values  
get\_N(0,1, correlated = FALSE)

## [1] "N= 0"

lapply(quantiles.list, function(x) {get\_N(x[1],x[2], correlated = FALSE)})

## [[1]]  
## [1] "N= 3114"  
##   
## [[2]]  
## [1] "N= 2630"  
##   
## [[3]]  
## [1] "N= 2286"  
##   
## [[4]]  
## [1] "N= 3334"  
##   
## [[5]]  
## [1] "N= 2539"

# Magnatude of Bias

## Get results for correlated data

### Get quantiles  
S.by.quantiles <- lapply(quantiles.list, function(x) {get\_quantiles\_by\_N(x[1],x[2], magnitude = TRUE)})  
S.all <- get\_quantiles\_by\_N(0,1, magnitude = TRUE)  
  
### Put into a table  
S.by.quantiles <- lapply(S.by.quantiles, function(x) {  
 out <- rbind(x[[1]], x[[2]])  
 rownames(out) <- c("S\_VH", "S\_boot")  
 return(out)  
})  
S.all <- rbind(S.all[[1]], S.all[[2]])  
  
  
### Print S\_pop by quantiles  
knitr::kable(S.all)

|  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- |
| NA | NA | NA | NA | NA | NaN (NA) |
| NA | NA | NA | NA | NA | NaN (NA) |

knitr::kable(S.by.quantiles[[1]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | 0.009 | 0.078 | 0.161 | 0.263 | 0.484 | 0.184 (0.133) |
| S\_boot | 0.002 | 0.024 | 0.052 | 0.104 | 0.188 | 0.068 (0.055) |

knitr::kable(S.by.quantiles[[2]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | 0.004 | 0.037 | 0.075 | 0.119 | 0.304 | 0.092 (0.090) |
| S\_boot | 0.001 | 0.008 | 0.016 | 0.028 | 0.078 | 0.022 (0.036) |

knitr::kable(S.by.quantiles[[3]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | 0.002 | 0.017 | 0.036 | 0.057 | 0.211 | 0.050 (0.076) |
| S\_boot | 0.000 | 0.003 | 0.007 | 0.012 | 0.038 | 0.012 (0.076) |

knitr::kable(S.by.quantiles[[4]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | 0.001 | 0.008 | 0.017 | 0.028 | 0.118 | 0.027 (0.058) |
| S\_boot | 0.000 | 0.002 | 0.004 | 0.007 | 0.020 | 0.047 (2.346) |

knitr::kable(S.by.quantiles[[5]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | 0.000 | 0.004 | 0.008 | 0.013 | 0.061 | 0.014 (0.039) |
| S\_boot | 0.000 | 0.001 | 0.003 | 0.005 | 0.015 | 0.044 (1.861) |

### Get N values  
get\_N(0,1)

## [1] "N= 0"

lapply(quantiles.list, function(x) {get\_N(x[1],x[2])})

## [[1]]  
## [1] "N= 3213"  
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## [[3]]  
## [1] "N= 2421"  
##   
## [[4]]  
## [1] "N= 3338"  
##   
## [[5]]  
## [1] "N= 2432"

## Get results for uncorrelated data

### Get quantiles  
S.by.quantiles <- lapply(quantiles.list, function(x) {get\_quantiles\_by\_N(x[1],x[2], correlated = FALSE, magnitude = TRUE)})  
S.all <- get\_quantiles\_by\_N(0,1, correlated = FALSE, magnitude = TRUE)  
  
### Put into a table  
S.by.quantiles <- lapply(S.by.quantiles, function(x) {  
 out <- rbind(x[[1]], x[[2]])  
 rownames(out) <- c("S\_VH", "S\_boot")  
 return(out)  
})  
S.all <- rbind(S.all[[1]], S.all[[2]])  
  
  
### Print S\_pop by quantiles  
knitr::kable(S.all)

|  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- |
| NA | NA | NA | NA | NA | NaN (NA) |
| NA | NA | NA | NA | NA | NaN (NA) |

knitr::kable(S.by.quantiles[[1]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | 0.007 | 0.068 | 0.138 | 0.222 | 0.430 | 0.157 (0.116) |
| S\_boot | 0.006 | 0.041 | 0.073 | 0.107 | 0.173 | 0.077 (0.046) |

knitr::kable(S.by.quantiles[[2]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | 0.003 | 0.032 | 0.065 | 0.108 | 0.387 | 0.092 (0.110) |
| S\_boot | 0.003 | 0.019 | 0.032 | 0.049 | 0.102 | 0.042 (0.217) |

knitr::kable(S.by.quantiles[[3]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | 0.002 | 0.016 | 0.032 | 0.053 | 0.274 | 0.052 (0.085) |
| S\_boot | 0.001 | 0.006 | 0.012 | 0.020 | 0.047 | 0.016 (0.034) |

knitr::kable(S.by.quantiles[[4]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | 0.001 | 0.008 | 0.016 | 0.027 | 0.137 | 0.029 (0.066) |
| S\_boot | 0.000 | 0.002 | 0.005 | 0.009 | 0.024 | 0.010 (0.134) |

knitr::kable(S.by.quantiles[[5]])

|  |  |  |  |  |  | mean |
| --- | --- | --- | --- | --- | --- | --- |
| S\_VH | 0.000 | 0.004 | 0.007 | 0.012 | 0.080 | 0.015 (0.044) |
| S\_boot | 0.000 | 0.001 | 0.003 | 0.006 | 0.015 | 0.005 (0.014) |

### Get N values  
get\_N(0,1, correlated = FALSE)

## [1] "N= 0"

lapply(quantiles.list, function(x) {get\_N(x[1],x[2], correlated = FALSE)})

## [[1]]  
## [1] "N= 3114"  
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## [[4]]  
## [1] "N= 3334"  
##   
## [[5]]  
## [1] "N= 2539"