Code for Supplementary Figure 2

August 2, 2016

1 Create datasets

Load the necessary libraries, source the file with the R functions:

```
library(ggplot2)

source("functions.R")
```

These results are for the $I = 2, p = 2$ case, so the parameters we vary are: $r_1, r_2, \rho_{12,1}, \rho_{12,2}$. We save the relative efficiencies for both coefficients. For Panel a), we take $\rho_{12,1} = 0, r_1 = r_2 = r$:

```
bigMat.a <- expand.grid(r=c(0.1, 0.5, 0.9),
                        rho121=0, rho122=(-19:19)/20)
bigMat.a <- cbind(bigMat.a, RelEff1=NA, RelEff2=NA)
bigMat.a <- as.matrix(bigMat.a)
for(i in 1:nrow(bigMat.a))
{
  rho121 <- bigMat.a[i,"rho121"]
  rho122 <- bigMat.a[i,"rho122"]
  r <- bigMat.a[i, "r"]

  bigMat.a[i,c(4,5)] <- effCalc2(rho112=rho121, rho212=rho122, r1=r, r2=r)
}
##turn it back into data frame (need it as data frame for ggplot)
bigMat.a <- as.data.frame(bigMat.a)
##check that relative efficiencies are identical for the two coefficients
identical(bigMat.a$RelEff1, bigMat.a$RelEff2)

## [1] TRUE

##rename RelEff1 as RelEff
names(bigMat.a)[names(bigMat.a) == "RelEff1"] <- "RelEff"
##make r into a factor (needed for ggplot)
bigMat.a$r <- paste("r=", bigMat.a$r, sep="")##as.factor(bigMat.a$r)
```

For Panel b), we take $r_1 = 0.5, \rho_{12,1} = 0.5$:

```
bigMat.b <- expand.grid(r1=1/2, r2=c(0.1, 0.5, 0.9),
                        rho121=0.5, rho122=(-19:19)/20)
bigMat.b <- cbind(bigMat.b, RelEff1=0, RelEff2=0)
bigMat.b <- as.matrix(bigMat.b)
for(i in 1:nrow(bigMat.b))
{
```

```
  rho121 <- bigMat.b[i,"rho121"]
  rho122 <- bigMat.b[i,"rho122"]
  r1 <- bigMat.b[i, "r1"]
  r2 <- bigMat.b[i, "r2"]

  bigMat.b[i,c(5,6)] <- effCalc2(rho112=rho121, rho212=rho122, r1=r1, r2=r2)
}
##turn it back into data frame (need it as data frame for ggplot)
bigMat.b <- as.data.frame(bigMat.b)
identical(bigMat.b$RelEff1, bigMat.b$RelEff2)

## [1] FALSE

##rename RelEff1 as RelEff
names(bigMat.b)[names(bigMat.b) == "RelEff1"] <- "RelEff"
##make r2 into a factor (needed for ggplot)
bigMat.b$r2 <- as.factor(bigMat.b$r2)
```

2 Create plots

Panel a):

```
panelA <- ggplot(bigMat.a,
                 aes(x=rho122, y=RelEff)) +
  geom_line(size=1.3, aes(linetype=r, color=r)) +
  theme_bw(base_size = 20)+
  xlab(expression(paste(rho[2]))) +
  scale_color_discrete(name = "",
                       labels =
                         c(expression(paste(r[2], "=",
                                            0.1)),
                           expression(paste(r[2], "=",
                                            0.5)),
                           expression(paste(r[2], "=",
                                            0.9)))) +
  scale_linetype_discrete(name = "",
                          labels =
                            c(expression(paste(r[2], "=",
                                               0.1)),
                              expression(paste(r[2], "=",
                                               0.5)),
                              expression(paste(r[2], "=",
                                               0.9)))) +
  theme(axis.line = element_line(colour = "black"),
        plot.title = element_text(size = 16, hjust = 0.5),
        panel.grid.major = element_blank(),
        panel.grid.minor = element_blank(),
        panel.border = element_blank(),
        panel.background = element_blank(),
        legend.key = element_blank(),
        axis.line.x = element_line(color="black", size = 0.5), ##this is to show axes - bug in this vers
        axis.line.y = element_line(color="black", size = 0.5)) +
```

```
  labs(title=expression(atop("(a)", paste("Fixed effects: I = 2, ",
                                          rho[1], " = ", 0, ", ",
                                          r[1], " = ", r[2]))))
```

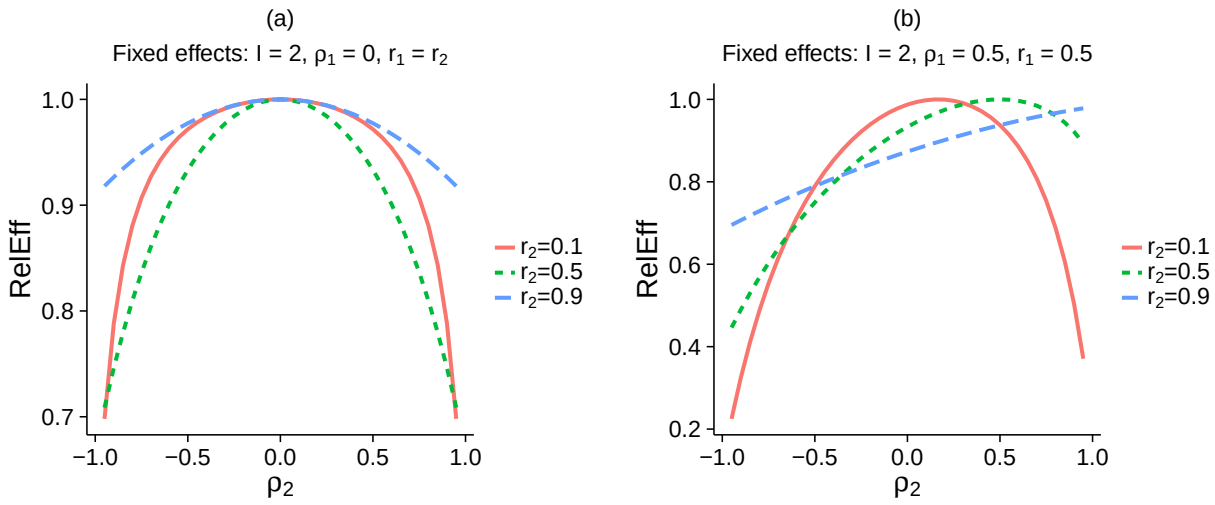
Panel b):

```
panelB <- ggplot(bigMat.b,
                 aes(x=rho122, y=RelEff)) +
  geom_line(size=1.3, aes(linetype=r2, color=r2)) +
  theme_bw(base_size = 20) +
  xlab(expression(paste(rho[2]))) +
  scale_color_discrete(name = "",
                       labels =
                         c(expression(paste(r[2], "=",
                                            0.1)),
                           expression(paste(r[2], "=",
                                            0.5)),
                           expression(paste(r[2], "=",
                                            0.9)))) +
  scale_linetype_discrete(name = "",
                          labels =
                            c(expression(paste(r[2], "=",
                                               0.1)),
                              expression(paste(r[2], "=",
                                               0.5)),
                              expression(paste(r[2], "=",
                                               0.9)))) +
  theme(axis.line = element_line(colour = "black"),
        plot.title = element_text(size = 16, hjust = 0.5),
        panel.grid.major = element_blank(),
        panel.grid.minor = element_blank(),
        panel.border = element_blank(),
        panel.background = element_blank(),
        legend.key = element_blank(),
        axis.line.x = element_line(color="black", size = 0.5), ##this is to show axes - bug in this vers
        axis.line.y = element_line(color="black", size = 0.5)) +
  labs(title=expression(atop("(b)", paste("Fixed effects: I = 2, ",
                                          rho[1], " = ", 0.5, ", ",
                                          r[1], " = ", 0.5))))
```

3 Put both panels together

```
multiplot(panelA, panelB, cols=2)

## Loading required package:  grid
```


(a)
Fixed effects: I = 2, ρ1 = 0, r1 = r2
RelEff
1.0
0.9
0.8
0.7
−1.0
−0.5
0.0
0.5
1.0
ρ2
r2=0.1
r2=0.5
r2=0.9
(b)
Fixed effects: I = 2, ρ1 = 0.5, r1 = 0.5
RelEff
1.0
0.8
0.6
0.4
0.2
−1.0
−0.5
0.0
0.5
1.0
ρ2
r2=0.1
r2=0.5
r2=0.9