

eAppendix

Example R code

```
set.seed(10000)
N <- 80000
n.subjs.list <- c(10000)
n.samps.list <- c(100,100)
z3.sd.list <- c(0.3,1.0)
for (i.scen in c(1:2)){
  n.samps <- n.samps.list[i.scen]
  z3.sd <- z3.sd.list[i.scen]
  fname <- paste("save.new2_",n.samps,"_",round(z3.sd,1),sep="")
  sd.eps <- 25
  sd.eta <- 4
  beta.est.list <- list()
  se.est.list <- list()
  r2.list <- list()
  exp.var.list <- list()
  alpha3.est.list <- list()
  alpha3.se.list <- list()
  alpha1 <- 4
  alpha2 <- 4
  alpha3 <- 4
  beta0 <- 1
  beta1 <- 2
  for (i.subjs.list in c(1:length(n.subjs.list))){
    n.subjs <- n.subjs.list[i.subjs.list]
    beta.est <- data.frame(matrix(rep(NA,N*3),ncol=3))
    se.est <- data.frame(matrix(rep(NA,N*3),ncol=3))
    r2 <- data.frame(matrix(rep(NA,N*3),ncol=3))
    exp.var <- data.frame(matrix(rep(NA,N*3),ncol=3))
    colnames(beta.est) <- c("true","modell","model2")
    colnames(se.est) <- c("true","modell","model2")
    colnames(r2) <- c("true","modell","model2")
    colnames(exp.var) <- c("true","modell","model2")
    alpha3.est <- rep(NA,N)
    alpha3.se <- rep(NA,N)
    for (i in 1:N){
      if (floor(i/1000)==i/1000) print(i)
      z1.subjs <- rnorm(n.subjs)
      z2.subjs <- rnorm(n.subjs)
      z3.subjs <- rnorm(n.subjs)
      z1.samps <- rnorm(n.samps)
      z2.samps <- rnorm(n.samps)
      z3.samps <- rnorm(n.samps,0,z3.sd)
      exp.subjs <- alpha1*z1.subjs + alpha2*z2.subjs + alpha3*z3.subjs +
        rnorm(n.subjs,0,sd.eta)
      exp.samps <- alpha1*z1.samps + alpha2*z2.samps + alpha3*z3.samps +
        rnorm(n.samps,0,sd.eta)
      y.subjs <- beta0 + beta1*exp.subjs+rnorm(n.subjs,0,sd.eps)
      # true exposure
      exp.subjs.est.true <- exp.subjs
      lm.fit <- lm(y.subjs~exp.subjs.est.true)
      beta.est[i,"true"] <- summary(lm.fit)$coef[2,1]
      se.est[i,"true"] <- summary(lm.fit)$coef[2,2]
      r2[i,"true"] <- summary(lm(exp.subjs.est.true~exp.subjs))$r.sq
      exp.var[i,"true"] <- var(exp.subjs.est.true)
```

```

# model 1 (Misspecified Model)
exp.lm.fit <- lm(exp.samps~z1.samps+z2.samps)
exp.subjs.est.m1 <-
exp.lm.fit$coef[1] + exp.lm.fit$coef[2]*z1.subjs +
exp.lm.fit$coef[3]*z2.subjs
lm.fit <- lm(y.subjs~exp.subjs.est.m1)
beta.est[i,"model1"] <- summary(lm.fit)$coef[2,1]
se.est[i,"model1"] <- summary(lm.fit)$coef[2,2]
r2[i,"model1"] <- summary(lm(exp.subjs.est.m1~exp.subjs))$r.sq
exp.var[i,"model1"] <- var(exp.subjs.est.m1)
# model 2 (Correctly Specified Model)
exp.lm.fit <- lm(exp.samps~z1.samps+z2.samps+z3.samps)
exp.subjs.est.m2 <-
exp.lm.fit$coef[1] + exp.lm.fit$coef[2]*z1.subjs +
exp.lm.fit$coef[3]*z2.subjs + exp.lm.fit$coef[4]*z3.subjs
lm.fit <- lm(y.subjs~exp.subjs.est.m2)
beta.est[i,"model2"] <- summary(lm.fit)$coef[2,1]
se.est[i,"model2"] <- summary(lm.fit)$coef[2,2]
r2[i,"model2"] <- summary(lm(exp.subjs.est.m2~exp.subjs))$r.sq
exp.var[i,"model2"] <- var(exp.subjs.est.m2)
alpha3.est[i] <- exp.lm.fit$coef[4]
alpha3.se[i] <- summary(exp.lm.fit)$coef[4,2]
}
print(n.subjs)
beta.est.list[[i.subjs.list]] <- beta.est
se.est.list[[i.subjs.list]] <- se.est
r2.list[[i.subjs.list]] <- r2
exp.var.list[[i.subjs.list]] <- exp.var
alpha3.est.list[[i.subjs.list]] <- alpha3.est
alpha3.se.list[[i.subjs.list]] <- alpha3.se
}
save.image(file=paste(fname, ".Rdata", sep=""))
}

```