X2 Missing, No Interaction, Correlated Simulation Complete Case, MICE

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April 20, 2016

Overview

Assuming X_1 quantitative, X_2 dichotomous $X_1|X_2$ normally distributed with mean X_2 and $\sigma = 1$.

Setting up the simulation

```
#set the number of numeration & sample size
numsim <- 250
n <- 200

#true coefficients, mse, set proportion of data missing
#probabilities for x3: .5, .3, .1, .1
beta0 <- 0.5; beta1 <- 1.5; beta2 <- -1
mse <- 2
propmiss <- .3
probx1 <- .4
```

Creating results vectors

```
#parameters for original non-missing data
trueint <- rep(NA, numsim)
truex1 <- rep(NA,numsim)
truex2 <- rep(NA, numsim)

msetrueint <- rep(NA, numsim)
relbiastrueint <- rep(NA, numsim)
msetruex1 <- rep(NA, numsim)
relbiastruex1 <- rep(NA, numsim)
msetruex2 <- rep(NA, numsim)
relbiastruex2 <- rep(NA, numsim)

#parameters for complete case
ccint <- rep(NA, numsim)
ccx1 <- rep(NA,numsim)
ccx2 <- rep(NA, numsim)

mseccint <- rep(NA, numsim)
relbiasccint <- rep(NA, numsim)
mseccx1 <- rep(NA, numsim)
relbiasccx1 <- rep(NA, numsim)
mseccx2 <- rep(NA, numsim)
relbiasccx2 <- rep(NA, numsim)
```

```
#parameters for mice1 (default)
mice1int <- rep(NA, numsim)
mice1x1 <- rep(NA,numsim)
mice1x2 <- rep(NA, numsim)

msemice1int <- rep(NA, numsim)
relbiasmice1int <- rep(NA, numsim)
msemice1x1 <- rep(NA, numsim)
relbiasmice1x1 <- rep(NA, numsim)
msemice1x2 <- rep(NA, numsim)
relbiasmice1x2 <- rep(NA, numsim)
```

Storing coefficients

These results are not included in PDF, but shown in Rmd file.

Calculating MSE

```
msetrueint <- var(trueint) + relbiastrueint^2
msetruex1 <- var(truex1) + relbiastruex1^2
msetruex2 <- var(truex2) + relbiastruex2^2

mseccint <- var(ccint) + relbiasccint^2
mseccx1 <- var(ccx1) + relbiasccx1^2
mseccx2 <- var(ccx2) + relbiasccx2^2

msemice1int <- var(mice1int) + relbiasmice1int^2
msemice1x1 <- var(mice1x1) + relbiasmice1x1^2
msemice1x2 <- var(mice1x2) + relbiasmice1x2^2
```

Saving Coefficients

Not included in PDF, but shown in Rmd file.

Bias and MSE

```
mtrue
```

```
##                 Mean Standard Deviation
## Intercept  0.4803328          0.1858626
## x1         1.5135831          0.1349394
## x2        -1.0178428          0.3139822
```

```
mcc
```

```
##                 Mean Standard Deviation
## Intercept  0.5019269          0.4747474
## x1         1.4896595          0.2829057
## x2        -0.9961823          0.6670326
```

```
mmice1
```

```
##                 Mean Standard Deviation
## Intercept  0.411916          0.3290441
## x1         1.450820          0.2627002
## x2        -0.866663          0.5034068
```

```
mintbias
```

```
##      Relative Bias        MSE
## True  -0.019667193 0.06933846
## CC     0.001926917 0.44987231
## MICE  -0.088084022 0.22386582
```

```
mx1bias
```

```
##      Relative Bias        MSE
## True    0.01358306 0.03652894
## CC     -0.01034050 0.15985801
## MICE   -0.04918009 0.14016539
```

```
mx2bias
```

```
##      Relative Bias       MSE
## True  -0.017842839 0.1970937
## CC     0.003817676 0.8880999
## MICE   0.133337035 0.5236018
```

Simulation study results for one iteration

```
xmod <- xtable(mod, caption = "Truth (no missingness)", digits=3)
xmod
```

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.635	0.191	3.318	0.001
x1	1.726	0.146	11.823	0.000
x2	-1.851	0.351	-5.279	0.000

Table 1: Truth (no missingness)

```
xcc <- xtable(cc, caption = "CC", digits=3)
xcc
```

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.072	0.517	0.138	0.891
x1miss	2.061	0.369	5.578	0.000
x2	-2.034	0.677	-3.007	0.004

Table 2: CC

```
xmice1 <- xtable(mice1results, caption = "Default MICE", digits=3)
xmice1
```

	est	se	t	df	Pr(>|t|)	lo 95	hi 95	nmis	fmi	lambda
(Intercept)	-0.127	0.325	-0.392	24.963	0.698	-0.796	0.542		0.640	0.613
x1miss	2.282	0.237	9.643	92.388	0.000	1.812	2.752	153.000	0.255	0.239
x2	-1.569	0.512	-3.062	32.489	0.004	-2.612	-0.526	0.000	0.555	0.528

Table 3: Default MICE