Contents

```
library(tidyverse)
```

```
## Warning: package 'tidyverse' was built under R version 4.0.3
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.0 --
```

```
## v ggplot2 3.3.5     v purrr   0.3.4
## v tibble  3.1.0     v dplyr   1.0.5
## v tidyr   1.1.3     v stringr 1.4.0
## v readr   1.4.0     v forcats 0.5.1
```

```
## Warning: package 'ggplot2' was built under R version 4.0.5
```

```
## Warning: package 'tibble' was built under R version 4.0.4
```

```
## Warning: package 'tidyr' was built under R version 4.0.4
```

```
## Warning: package 'readr' was built under R version 4.0.3
```

```
## Warning: package 'dplyr' was built under R version 4.0.4
```

```
## Warning: package 'forcats' was built under R version 4.0.4
```

```
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
knitr::opts_chunk$set(echo = FALSE)
library(knitr)
```

```
## Warning: package 'knitr' was built under R version 4.0.4
```

```
library(kableExtra)
```

```
## Warning: package 'kableExtra' was built under R version 4.0.4
```

```
##
## Attaching package: 'kableExtra'
```

```
## The following object is masked from 'package:dplyr':
##
##     group_rows
```

Table 1: Linear Effect Coverage

Test	Variable	Beta	LLT	O	S	OS
Y1	X1	4	0.964	0.965	0.969	0.963
Y1	X2	2	0.965	0.964	0.958	0.957
Y1	X3	1	0.953	0.953	0.955	0.954
Y2	X1	-3	0.940	0.948	0.945	0.943
Y2	X2	0	0.955	0.954	0.952	0.962
Y2	X3	1	0.937	0.932	0.942	0.938
Y3	X1	0	0.957	0.950	0.954	0.952
Y3	X2	0	0.948	0.949	0.950	0.956
Y3	X3	0	0.950	0.950	0.949	0.947

Table 2: Observation Covariance Estimates

param	true	LLT	O	S	OS
1,1	15.0	14.909	14.919	14.688	14.950
1,2	2.4	-	2.371	-	2.425
2,2	15.0	14.892	14.903	14.668	14.927
1,3	1.0	-	0.990	-	1.027
2,3	1.0	-	0.988	-	1.008
3,3	10.0	10.056	10.063	10.021	10.093

```
path = "FJCoTESTfullchain10"

sigeps <- c(15, 15, 10)
SIGeps <- diag(sigeps)
SIGeps[1,2] <- SIGeps[2, 1] <- 2.4
SIGeps[1,3] <- SIGeps[3, 1] <- 1
SIGeps[2,3] <- SIGeps[3, 2] <- 1

Sigma <- c(5, 3.714281, 0, 3.714281, 5, 0, 0, 0, 2) %>%
  matrix(3, 3)
Sigma <- diag(diag(Sigma))
```

\begin{table}

Table 3: Observation Covariance Coverage

param	LLT	O	S	OS
1,1	0.95	0.951	0.928	0.948
1,2	-	0.953	-	0.941
2,2	0.944	0.949	0.934	0.946
1,3	-	0.956	-	0.956
2,3	-	0.952	-	0.947
3,3	0.951	0.945	0.947	0.951

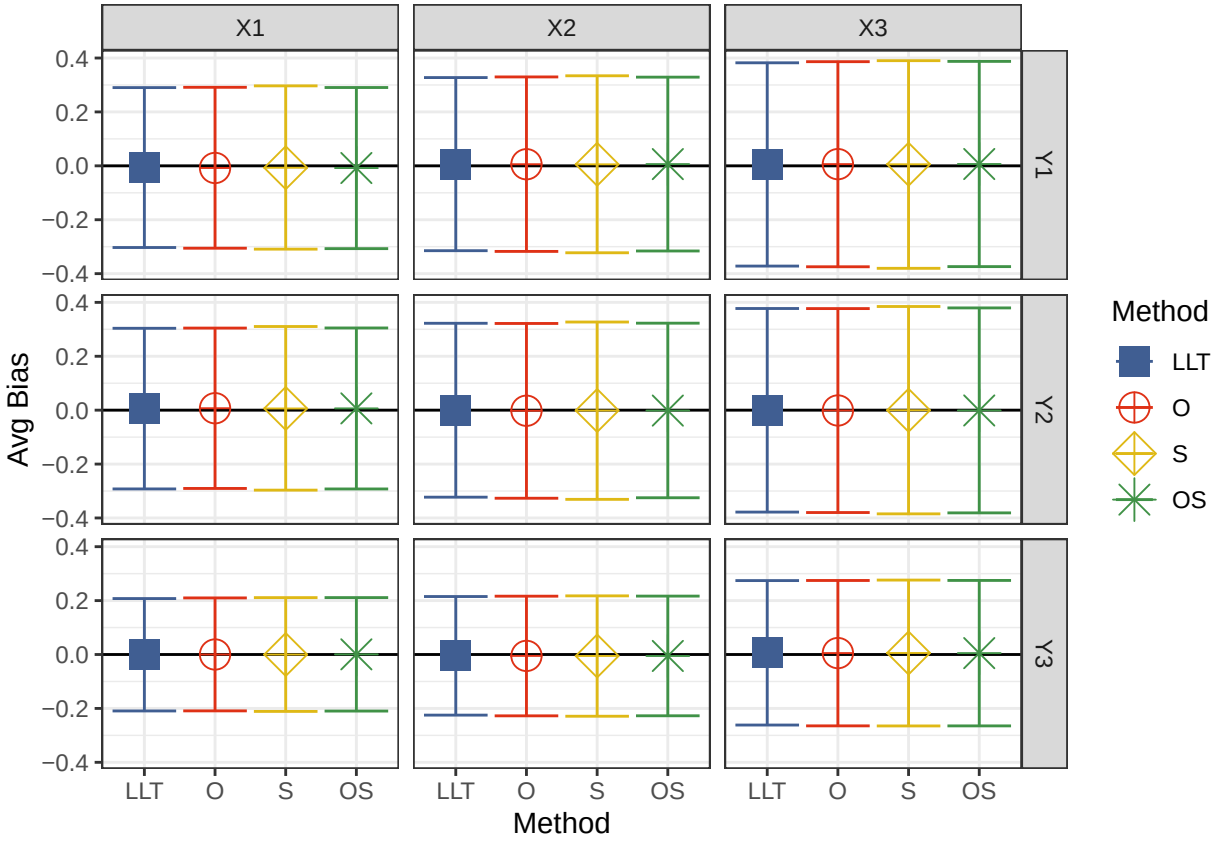

Figure 1: Bias and Estimate Variability

Table 4: State Covariance Estimates

param	true	LLT	O	S	OS
1,1	5	4.89	4.969	5.206	4.985
1,2	0	-	-	0.987	-0.071
2,2	5	4.887	4.964	5.205	4.988
1,3	0	-	-	0.373	-0.042
2,3	0	-	-	0.386	-0.021
3,3	2	1.893	1.932	1.973	1.932

Table 5: State Covariance Coverage

param	LLT	O	S	OS
1,1	0.935	0.948	0.938	0.945
1,2	-	-	0.500	0.939
2,2	0.948	0.952	0.955	0.951
1,3	-	-	0.815	0.942
2,3	-	-	0.783	0.933
3,3	0.92	0.936	0.930	0.934

Table 6: Observation Covariance Coverage

param	LLT	O	S	OS
1,1	14.909 (95%)	14.919 (95.1%)	14.688 (92.8%)	14.95 (94.8%)
1,2	-	2.371 (95.3%)	-	2.425 (94.1%)
2,2	14.892 (94.4%)	14.903 (94.9%)	14.668 (93.4%)	14.927 (94.6%)
1,3	-	0.99 (95.6%)	-	1.027 (95.6%)
2,3	-	0.988 (95.2%)	-	1.008 (94.7%)
3,3	10.056 (95.1%)	10.063 (94.5%)	10.021 (94.7%)	10.093 (95.1%)

\caption{Covariance estimate (coverage %)}

Parameter	LLT	O	S	OS
Observation Error				
1,1	14.909 (95%)	14.919 (95.1%)	14.688 (92.8%)	14.95 (94.8%)
1,2	-	2.371 (95.3%)	-	2.425 (94.1%)
2,2	14.892 (94.4%)	14.903 (94.9%)	14.668 (93.4%)	14.927 (94.6%)
1,3	-	0.99 (95.6%)	-	1.027 (95.6%)
2,3	-	0.988 (95.2%)	-	1.008 (94.7%)
3,3	10.056 (95.1%)	10.063 (94.5%)	10.021 (94.7%)	10.093 (95.1%)
State Process				
1,1	4.89 (93.5%)	4.969 (94.8%)	5.206 (93.8%)	4.985 (94.5%)
1,2	-	0 (100%)	-	-0.071 (93.9%)
2,2	4.887 (94.8%)	4.964 (95.2%)	5.205 (95.5%)	4.988 (95.1%)
1,3	-	0 (100%)	-	-0.042 (94.2%)
2,3	-	0 (100%)	-	-0.021 (93.3%)
3,3	1.893 (92%)	1.932 (93.6%)	1.973 (93%)	1.932 (93.4%)

\end{table}