Before we begin, introducing R and RStudio

Installing and installing R

Downloading and installing R

Example 1: Violent crime and disorder across Local Authorities

Example 2: Criminal Damage across London

IMPORTANT: It is easy to forget to correctly load packages, particularly if R restarts for some reason. Usually, the main cause of errors refers to this process as installing the package. Because our package is a work in progress, we also need to install

```
# Install the latest version of the rcme package from CRAN
install.packages("rcme")
```

```
# Install the latest version of the rcme package as a work in progress
install.packages("rcme", type = "source", repos = "https://osf.io/preprints/socarxiv/sbc8w/"
```

This package provides a range of functions for simulating and analyzing crime data with measurement error. The data included with the package is based on the work of Pina-Sanchez et al. (2022b)

We are interested in understanding the extent that the estimated relationship with recorded crime may be biased as a result of measurement errors.

```
# Load the package
library(rcme)
```

As before, we start by estimating our model of interest. And once again, we log the crime variable as this is expected to mitigate some of the more adverse impacts of the multiplicative measurement error form that a

```
# Simulate data
D <- c(-0.2, -0.1, 0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1)
me.2ex <- rcme_out(
  samples = 1000,
  D = D,
  method = "residual", 
  log_var = T)

# Perform the analysis
lm(formula = disorder ~ log(violent_crime) + white_british + median_age, data = crime_disorder)
```

```
## Multiple R-squared:  0.275,  Adjusted R-squared:  0.2632
## Residual standard error: 0.8584 on 245 degrees of freedom
```

```
# View the results
summary(me.2ex)
```

```
$naive

     naive
   value     se     ci     p
  1 -0.1925 0.0234 0.15 0.0001
  2 -0.1925 0.0234 0.15 0.0001
  3 -0.1925 0.0234 0.15 0.0001
  4 -0.1925 0.0234 0.15 0.0001
  5 -0.1925 0.0234 0.15 0.0001
  6 -0.1925 0.0234 0.15 0.0001

Example 3: Criminal Damage across London

```
# Load the data
data(crime_disorder)
```

```
summary(crime_disorder)
```

```
## Example of R output

      violent_crime  disorder  white_british median_age
  Min.   : 4.216   Min.   :-2.85200   Min.   :-2.21630   Min.   :-2.48795   Min.   :-3.1834   Min.   :1.4390
  1st Qu.: 1.174   1st Qu.: 0.69989   1st Qu.: 0.62289   1st Qu.: 0.72843   1st Qu.: 3.6483   1st Qu.: 1.2943
  Mean   : 2.215   Mean   : 1.07304   Mean   : 1.08873   Mean   : 1.20738   Mean   : 4.2919   Mean   : 2.1778
  3rd Qu.: 2.942   3rd Qu.: 1.39998   3rd Qu.: 1.56878   3rd Qu.: 1.59955   3rd Qu.: 5.1073   3rd Qu.: 2.8878
  Max.   : 8.533   Max.   : 3.07428   Max.   : 2.49459   Max.   : 2.51350   Max.   : 6.4906   Max.   : 3.6276

We can see that there is a significant and positive relationship between violent crime and disorder, with the coefficient being 0.31. This suggests that as violent crime increases, so does disorder.

**References**