Simulation

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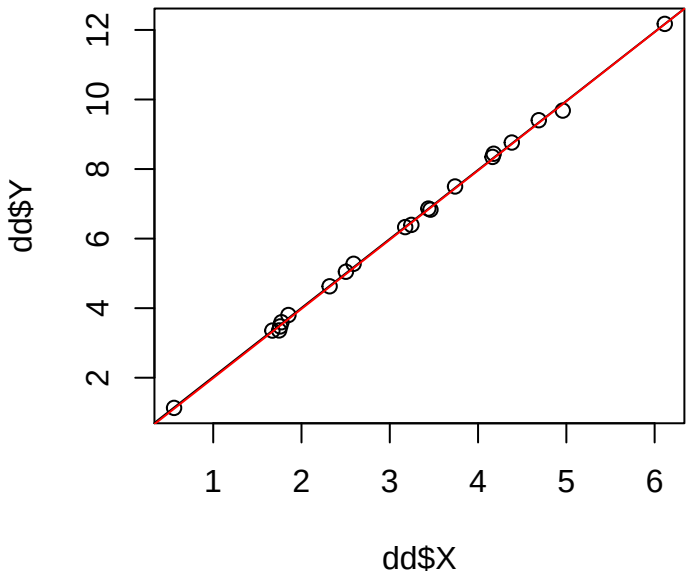
```
avg.slope <- function(n1, m1, s1, b01,
                      n2, m2, s2, b02){

## group 1
X1 <- rnorm(n1, mean = m1, sd = s1)
Y1 <- 2*X1 + b01 + rnorm(10, sd = 0.1)

## group 2
X2 <- rnorm(n2, mean = m2, sd = s2)
Y2 <- 2*X2 + b02 + rnorm(10, sd = 0.1)

## model
f1 <- lm(Y1~X1);  f1
f2 <- lm(Y2~X2);  f2

## pooled data
dd <- data.frame(X = c(X1, X2), Y = c(Y1, Y2))
fit <- lm(Y~X, data = dd);  fit

stargazer::stargazer(f1, f2, fit, no.space=TRUE)
## weighted average slope
b <- ((n1-1)*var(X1)*f1$coefficients[2]
      + (n2-1)*var(X2)*f2$coefficients[2])/((n1-1)*var(X1)
                                            + (n2-1)*var(X2))
b0<- (sum((X1-mean(X1))^2)*f1$coefficients[2]
      + sum((X2-mean(X2))^2)*f2$coefficients[2])/(sum((X1-mean(X1))^2)
                                                  + sum((X2-mean(X2))^2))

b1 <- (sum((X1-mean(X1))*(Y1-mean(Y1)))
      + sum((X2-mean(X2))*(Y2-mean(Y2))))/(sum((X1-mean(X1))^2)
                                           + sum((X2-mean(X2))^2))
## coefficients
com <- list(b = b, b0 = b0, b1 = b1, coef = fit$coefficients[2])

## plot
plot(dd$X, dd$Y)
abline(fit)           ## black line
abline(0, b, col = 2) ## red line

return(com)
}
```

```
avg.slope(10, 2, 1, 0,
          10, 4, 1, 0)
```

% Table created by stargazer v.5.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvard.edu
% Date and time: Thu, Apr 28, 2016 - 9:46:09 AM

Table 1:

	Dependent variable:		
	Y1	Y2	Y
	(1)	(2)	(3)
X1	2.002***		
	(0.029)		
X2		1.983***	
		(0.027)	
X			1.984***
			(0.013)
Constant	0.004	0.038	0.038
	(0.068)	(0.114)	(0.046)
Observations	10	10	20
R^2	0.998	0.999	0.999
Adjusted R^2	0.998	0.998	0.999
Residual Std. Error	0.073 (df = 8)	0.095 (df = 8)	0.081 (df = 18)
F Statistic	4,625.320*** (df = 1; 8)	5,354.838*** (df = 1; 8)	21,878.070*** (df = 1; 18)
Note:			*p<0.1; **p<0.05; ***p<0.01



b b0 b1 coef X1 1.98938 1.98938 1.98938

1.984314

```
avg.slope(20, 2, 1, 1,
          20, 4, 1, 5)
```

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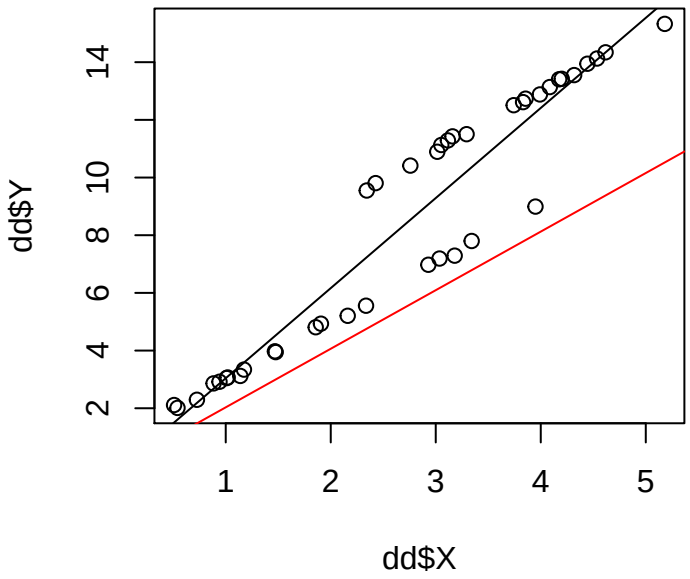
Table 2:

	Dependent variable:		
	Y1	Y2	Y
	(1)	(2)	(3)
X1	2.027***		
	(0.021)		
X2		2.039***	
		(0.022)	
X			3.124***
			(0.164)
Constant	0.967***	4.842***	−0.082
	(0.043)	(0.082)	(0.500)
Observations	20	20	40
R^2	0.998	0.998	0.905
Adjusted R^2	0.998	0.998	0.902
Residual Std. Error	0.095 (df = 18)	0.073 (df = 18)	1.366 (df = 38)
F Statistic	9,238.880*** (df = 1; 18)	8,933.695*** (df = 1; 18)	361.131*** (df = 1; 38)
Note:			*p<0.1; **p<0.05; ***p<0.01



b b0 b1 coef X1 2.031172 2.031172 2.031172 3.123843

```
avg.slope(100, 20, 1, 5,
          100, 40, 1, 5)
```

% Table created by stargazer v.5.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvard.edu
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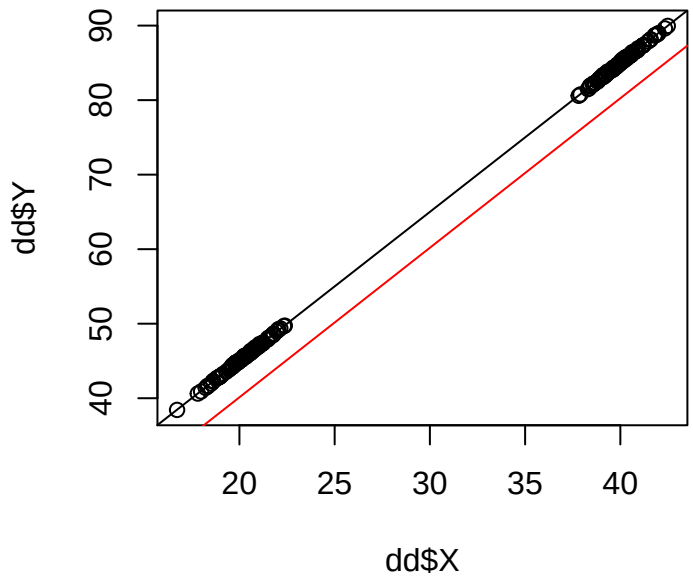
Table 3:

	Dependent variable:		
	Y1	Y2	Y
	(1)	(2)	(3)
X1	2.009***		
	(0.007)		
X2		2.002***	
		(0.009)	
X			2.000***
			(0.001)
Constant	4.818***	4.900***	5.014***
	(0.135)	(0.352)	(0.018)
Observations	100	100	200
R^2	0.999	0.998	1.000
Adjusted R^2	0.999	0.998	1.000
Residual Std. Error	0.073 (df = 98)	0.088 (df = 98)	0.081 (df = 198)
F Statistic	91,021.390*** (df = 1; 98)	51,774.640*** (df = 1; 98)	12,107,016.000*** (df = 1; 198)
Note:			*p<0.1; **p<0.05; ***p<0.01



b b0 b1 coef X1 2.006242 2.006242 2.006242 1.9996