

Sampling distribution of parameter estimates, an empirical approach.

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Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for a HTML browser interface to help.
Type 'q()' to quit R.

[Previously saved workspace restored]

```
> n <- 15

# Fix the x's

> x <- runif(n,0,10)

# Fix sigma

> sigma <- 3

# Generate errors

> error <- rnorm(n,mean = 0, sd = sigma)

# Construct observations

> y <- -1 + 2*x + error

# Plot Data

> plot(x,y)

# Fit Least Squares

> fm <- lm(y ~ x)
> fm

Call:
lm(formula = y ~ x)
```

```

Coefficients:
(Intercept)          x
      -0.9387      2.0347

> fm$coefficients
(Intercept)          x
      -0.938692      2.034697

# Sampling distribution of intercept and slope
# Construct 1000 datasets from the same model

> beta <- NULL
> B <- 1000
> for (i in 1:B)
+ {
+ error <- rnorm(n,mean = 0, sd = sigma)
+ y <- -1 + 2*x + error
+ fm <- lm(y ~ x)
+ beta <- rbind(beta,fm$coefficients)
+ }

> beta0 <- beta[,1]
> beta1 <- beta[,2]

# Construct histograms

> postscript("hist.eps")
> breaks <- seq(-8,5,by = .5)
> hist(beta0,breaks,plot = T)
> breaks <- seq(.8,3.2,by = .1)
> hist(beta1,breaks,plot = T)
> dev.off()

# Calculate Statistics

> mean(beta0)
[1] -0.8526184
> mean(beta1)
[1] 1.980757
> sd(beta0)
[1] 1.810449
> sd(beta1)
[1] 0.3243954

# Compare with true values

```

```
> sx <- sqrt(sum((x - mean(x))^2))
> sigma*sqrt(1/n + mean(x)^2/sx^2)
[1] 1.765777
> sigma/sx
[1] 0.3197968

> q()
Save workspace image? [y/n/c]: n
```

Process R finished at Fri Oct 11 08:38:38 2002

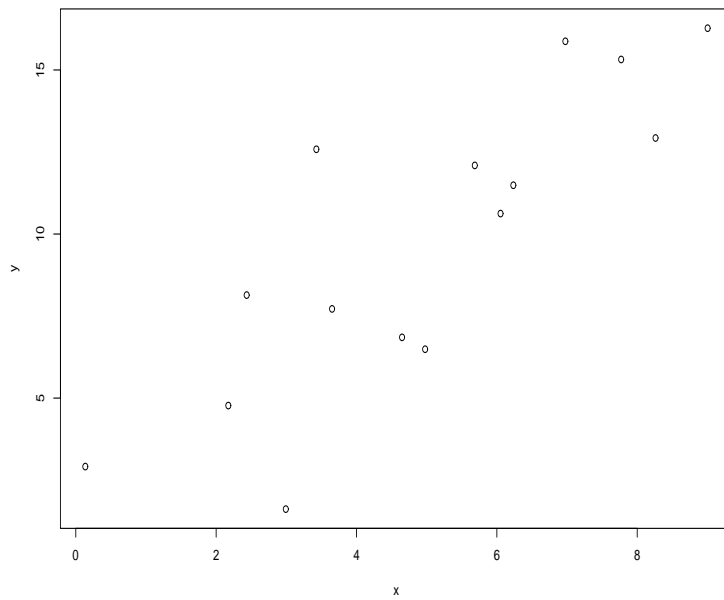


Figure 1: Plot of x versus y

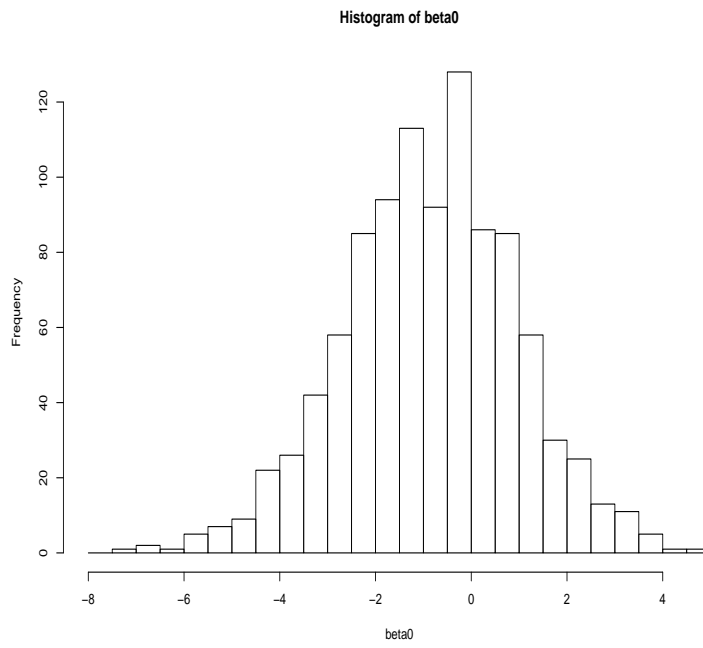


Figure 2: Histogram of the estimates $\hat{\beta}_0$

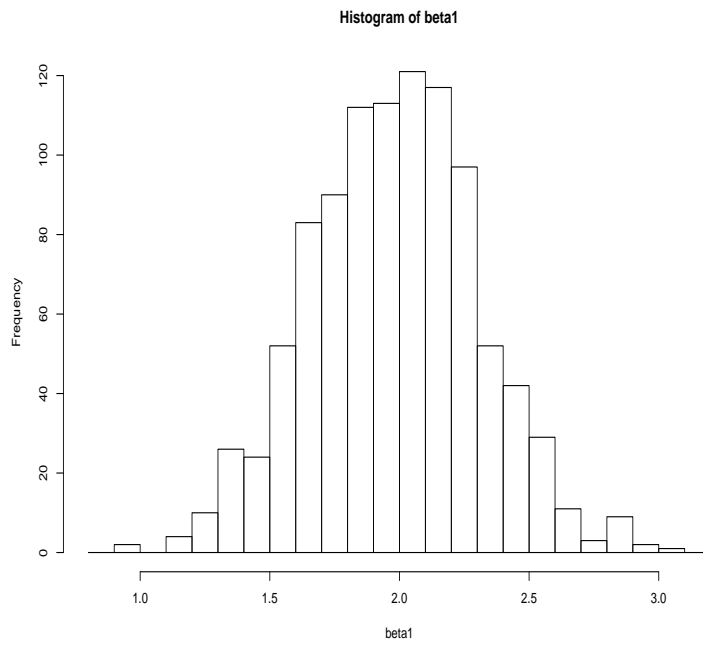


Figure 3: Histogram of the estimates $\hat{\beta}_1$