

Data and Sampling Distributions

Fabian Peri

October 6, 2018

```
# packages needed for chapter 2
library(boot)
library(ggplot2)

# Import the datasets needed for chapter 2
PSDS_PATH <- file.path('C:/Users/fabia/Desktop', 'psds_data')

loans_income <- read.csv(file.path(PSDS_PATH, 'data', 'loans_income.csv'))[,1]
sp500_px <- read.csv(file.path(PSDS_PATH, 'data', 'sp500_px.csv'))

x <- seq(from=-3, to=3, length=300)
gauss <- dnorm(x)

png(filename=file.path(PSDS_PATH, 'figures', 'normal_density.png'), width = 4, height=5, units='in', res=300)
par(mar=c(3, 3, 0, 0)+.1)
plot(x, gauss, type="l", col='blue', xlab='', ylab='', axes=FALSE)
polygon(x, gauss, col='blue')
dev.off()

## pdf
## 2

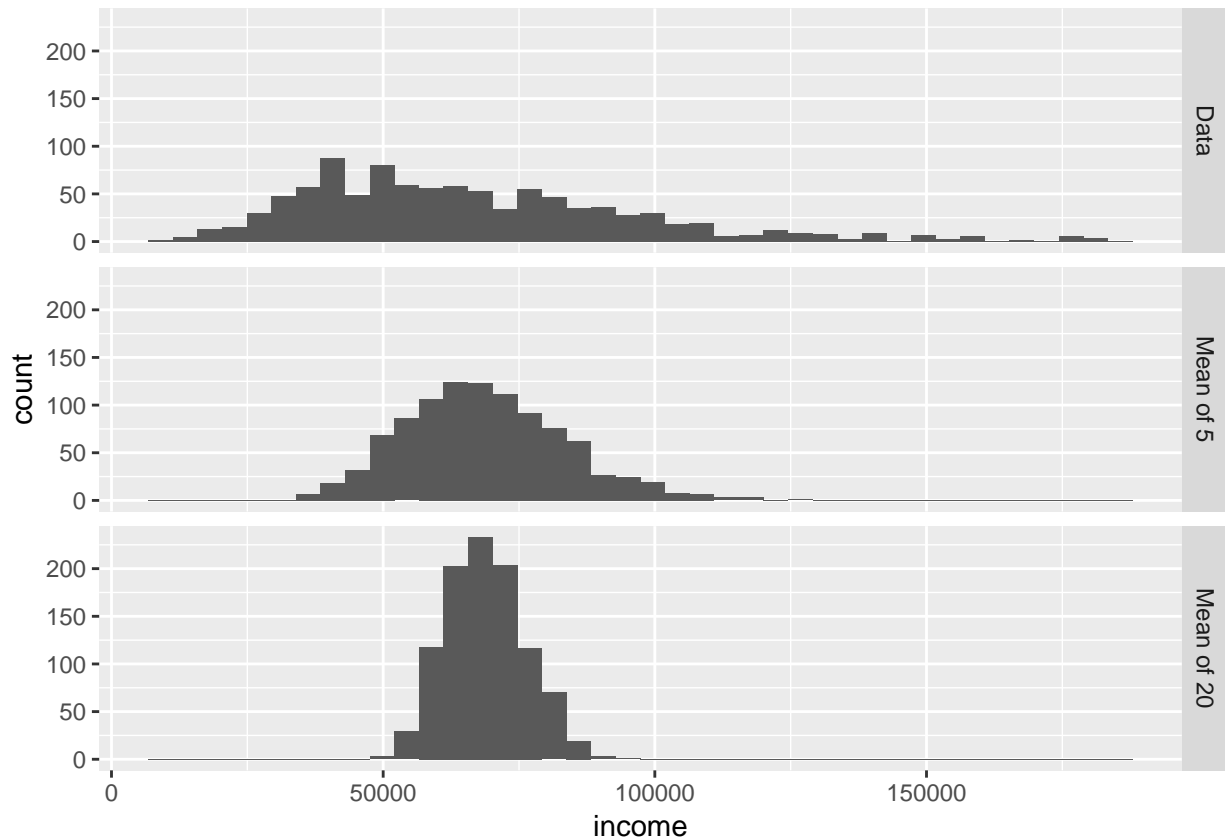
png(filename=file.path(PSDS_PATH, 'figures', 'samp_hist.png'), width = 200, height = 250)
norm_samp <- rnorm(100)
par(mar=c(3, 3, 0, 0)+.1)
hist(norm_samp, axes=FALSE, col='red', main='')
dev.off()

## pdf
## 2

## Code snippet 2.1
stat_fun <- function(x, idx) median(x[idx])
boot_obj <- boot(loans_income, R = 1000, statistic=stat_fun)

# take a simple random sample
samp_data <- data.frame(income=sample(loans_income, 1000),
                        type='data_dist')
# take a sample of means of 5 values
samp_mean_05 <- data.frame(
  income = tapply(sample(loans_income, 1000*5),
                  rep(1:1000, rep(5, 1000)), FUN=mean),
  type = 'mean_of_5')
# take a sample of means of 20 values
samp_mean_20 <- data.frame(
  income = tapply(sample(loans_income, 1000*20),
                  rep(1:1000, rep(20, 1000)), FUN=mean),
  type = 'mean_of_20')
# bind the data.frames and convert type to a factor
income <- rbind(samp_data, samp_mean_05, samp_mean_20)
```

```
income$type = factor(income$type,
                     levels=c('data_dist', 'mean_of_5', 'mean_of_20'),
                     labels=c('Data', 'Mean of 5', 'Mean of 20'))
# plot the histograms
ggplot(income, aes(x=income)) +
  geom_histogram(bins=40) +
  facet_grid(type ~ .)
```



```
## Code for Figure 6
png(filename=file.path(PSDS_PATH, 'figures', 'psds_0206.png'), width = 3, height=4, units='in', res=300)
ggplot(income, aes(x=income)) +
  geom_histogram(bins=40) +
  facet_grid(type ~ .) +
  theme_bw()
dev.off()
```

```
## pdf
## 2
```

```
## Code for Figure 11
png(filename=file.path(PSDS_PATH, 'figures', 'psds_0211.png'), width = 4, height=4, units='in', res=300)
norm_samp <- rnorm(100)
par(mar=c(3, 3, 0, 0)+.1)
qqnorm(norm_samp, main='', xlab='', ylab='')
abline(a=0, b=1, col='grey')
dev.off()
```

```
## pdf
## 2

## Code for Figure 12
png(filename=file.path(PSDS_PATH, 'figures', 'psds_0212.png'), width = 4, height=4, units='in', res=300)
par(mar=c(3, 3, 0, 0)+.1)
nflx <- sp500_px['NFLX']
nflx <- diff(log(nflx[nflx>0]))
qqnorm(nflx, main='', xlab='', ylab='')
abline(a=0, b=1, col='grey')
dev.off()

## pdf
## 2
```