

Lista 1 - Extra

Profº Rodrigo Targino

Student Rafael Kovashikawa

- 1 Plot the volatility smile for an asset class:

Using the **TSLA option** for prices from day 10.03.2020 with expiration in 20.03.2020, treating the data and plotting the volatility data – in page 2. File and code available in: https://github.com/kovashikawa/Quant_Finances

```
library(readr)
library(dplyr)
data <- read_delim("tsla_options_march20_2020.csv", col_names =
  TRUE, delim=";")

data$day <- format(as.Date(data$date_time,format="%Y-%m-%d"),
  format = "%d")
data$month <- format(as.Date(data$date_time,format="%Y-%m-%d"),
  format = "%m")
data$year <- format(as.Date(data$date_time,format="%Y-%m-%d"),
  format = "%Y")

day_last_price <- data[data$day == '10',]
day_last_price <- day_last_price[day_last_price$month == '03',]
day_last_price <- day_last_price[day_last_price$year == '2020',]

puts <- day_last_price[day_last_price$contract_type == 'P',]
calls <- day_last_price[day_last_price$contract_type == 'C',]
calls$implied_volatility <-
  as.numeric(gsub('%','',calls$implied_volatility))
puts$implied_volatility <-
  as.numeric(gsub('%','',puts$implied_volatility))
calls$open_interest <-
  as.numeric(gsub('','',calls$open_interest))
puts$open_interest <- as.numeric(gsub('','',puts$open_interest))

plot(calls$strike, calls$implied_volatility, type="p", col="red",
  main=c("TSLA 20 March 2020 | Calls"), xlab="Strike",
  ylab="Implied Vol")
plot(puts$strike, puts$implied_volatility, type="p", col="blue",
  main=c("TSLA 20 March 2020 | Puts"), xlab="Strike",
  ylab="Implied Vol")
```

