

AV1

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```
#Definindo qual moeda e qual intervalo de datas eu quero puxar
```

```
currency_pair <- "USDBRL"  
start_date <- "2010-01-01"  
end_date <- Sys.Date()  
  
options(dplyr.summarise.inform = FALSE)
```

```
#pacotes que eu vou usar no meu codigo
```

```
library(quantmod) #puxar os dados  
library(ggplot2) #plots  
library(dplyr) #tibble  
library(gridExtra) #aesthetic plot grid  
library(tidyverse) #universal kkk
```

```
#maneira espertinha de puxar os dados usando o quantmod
```

```
tryCatch({  
  usd_brl <- getSymbols(paste0(currency_pair, "=X"), src = "yahoo",  
                        from = start_date, to = end_date, auto.assign = FALSE)  
}, error = function(e) {  
  stop("Failed to fetch data: ", e$message)  
})
```

```
#Extraindo os dados e transformando em tibble
```

```
usd_brl_data <- tibble(Date = index(usd_brl),  
                      Close = as.numeric(Cl(usd_brl)))
```

```
#Calculando os retornos
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```
usd_brl_data <- usd_brl_data %>%  
  mutate>Returns = c(NA, diff(log(Close)))
```

```
#Calculando a vol realizada
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```
usd_brl_data$RealizedVol <- rollapply(usd_brl_data>Returns,  
                                     width = 20,  
                                     FUN = function(x) sqrt(252) * sd(x, na.rm = TRUE),  
                                     fill = NA, align = "right")
```

```
# Calculando uma boa proxy para a VIX
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```
usd_brl_data$VIX <- rollapply(usd_brl_data>Returns,
```

```

width = 30,
FUN = function(x) sqrt(252) * sd(x, na.rm = TRUE),
fill = NA, align = "left")

#Como estamos olhando para uma realizada de 1 mes, precisamos shiftar a VIX um mes para frente
usd_brl_data$VIX_shifted <- lag(usd_brl_data$VIX, 30)

#Spread da realizada para a VIX
usd_brl_data$Spread <- usd_brl_data$VIX_shifted - usd_brl_data$RealizedVol

#Removendo os NAs
usd_brl_data <- na.omit(usd_brl_data)

#Plot 1: Realizada x Vix
plot1 <- ggplot(usd_brl_data, aes(x = Date)) +
  geom_line(aes(y = VIX_shifted, color = "VIX-like measure")) +
  geom_line(aes(y = RealizedVol, color = "Realized Volatility")) +
  labs(title = "USD/BRL",
       x = "Date",
       y = "Volatility") +
  theme_minimal() +
  theme(legend.position = "bottom",
        legend.title = element_blank())

# Plot 2: Spread
plot2 <- ggplot(usd_brl_data, aes(x = Date, y = Spread)) +
  geom_line(color = "blue") +
  labs(title = "Spread",
       x = "Date",
       y = "Spread") +
  theme_minimal()

# Plot 3: Histograma dos retornos caso tivessemos comprado USDBRL
plot3 <- ggplot(usd_brl_data, aes(x = Returns)) +
  geom_histogram(bins = 50, fill = "skyblue", color = "black") +
  labs(title = "Histogram of USD/BRL Returns",
       x = "Returns",
       y = "Frequency") +
  theme_minimal()

# Plot 4: Gráfico sazonal para o VIX (últimos 4 anos)
# Extrair mês e ano da coluna Date
usd_brl_data <- usd_brl_data %>%
  mutate(Month = factor(format(Date, "%b"), levels = month.abb),
         Year = as.numeric(format(Date, "%Y")))

# Calcular o ano atual
current_year <- as.numeric(format(Sys.Date(), "%Y"))

# Filtrar para os últimos 4 anos e calcular médias mensais
monthly_avg <- usd_brl_data %>%
  filter(Year >= (current_year - 3)) %>%
  group_by(Year, Month) %>%

```

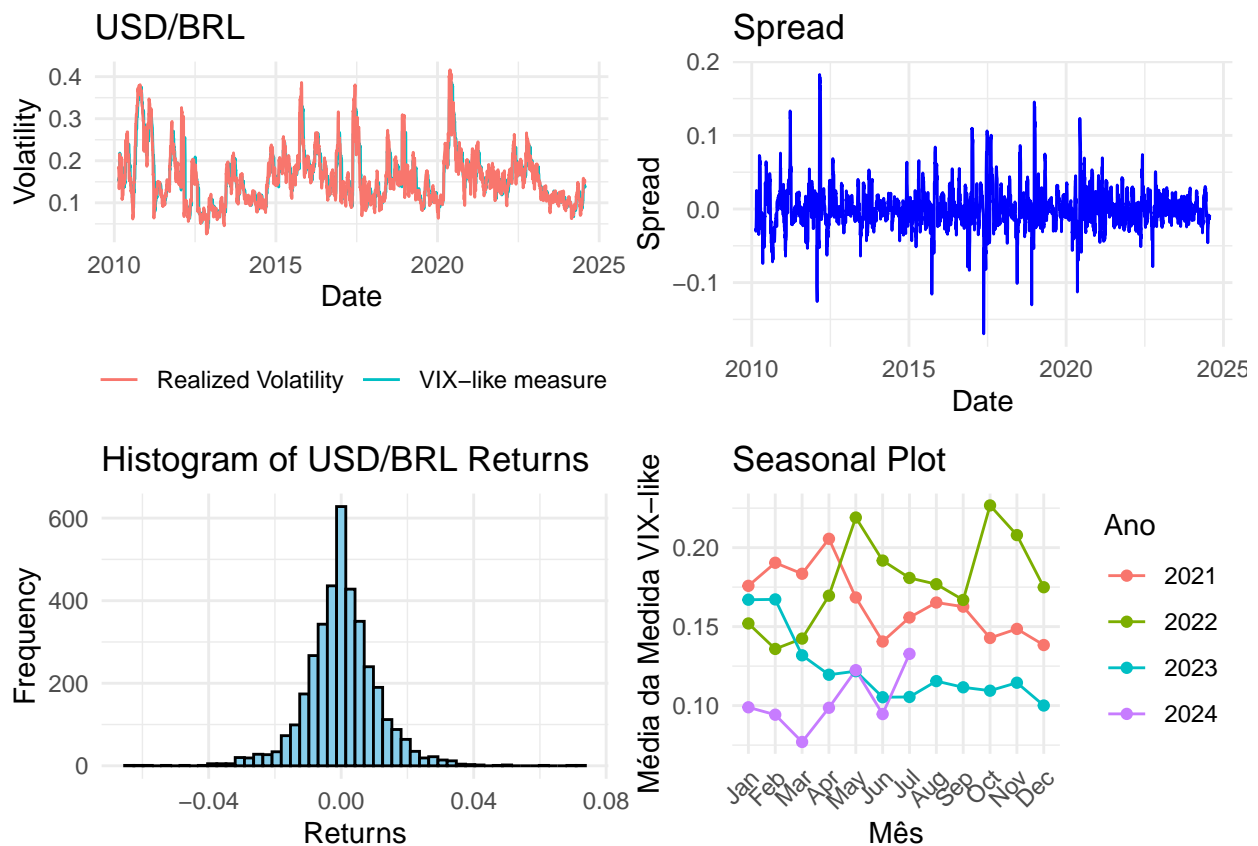
```

summarize(Avg_VIX = mean(VIX_shifted, na.rm = TRUE)) %>%
ungroup()

# Criar gráfico sazonal para VIX
plot4 <- ggplot(monthly_avg, aes(x = Month, y = Avg_VIX, group = Year, color = factor(Year))) +
  geom_line() +
  geom_point() +
  labs(title = "Seasonal Plot",
       x = "Mês",
       y = "Média da Medida VIX-like",
       color = "Ano") +
  theme_minimal() +
  theme(legend.position = "right",
       axis.text.x = element_text(angle = 45, hjust = 1))

# Organizar e exibir todos os gráficos
grid.arrange(plot1, plot2, plot3, plot4, ncol = 2)

```



Referencias: Cursor AI, R for Data Science e Yahoo Finance