

# Exploratory Analysis of Stock Price

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## 1 Introduction

This work is based on extract data from closing and opening day stock prices. The aim is to understand how to set the time range to perform the right evaluation of macroeconomic parameters role in stock prices. I'm going to study by field. Once the exploratory analysis is done, the next step is to write the conclusion in a text and start the section of simulation. This exploratory analysis is pointed to data analysts.

Daniel de Jesus

## 2 Extraction of data

The data were extracted form yahoo finance through the python library Pandas DataReader.

## 3 First round of analysis

The following plots show the price of three different enterprises stock of same field, in three different sets of time, before, during and after pandemic period.



Figure 1: The evolution of stock prices of three different companies in Brazil, Magazine Luiza, Via Varejo and Lojas Americanas, from 2016 to 2020. Normalized values.

The first graph, figure 1, shows more consistent growth to MGLU3, beside all of then showed the same pattern the fluctuation is more slight in MGLU. In this range of time, the AMER price scale to  $10^2$  while the MGLU ana VIIA to 10.

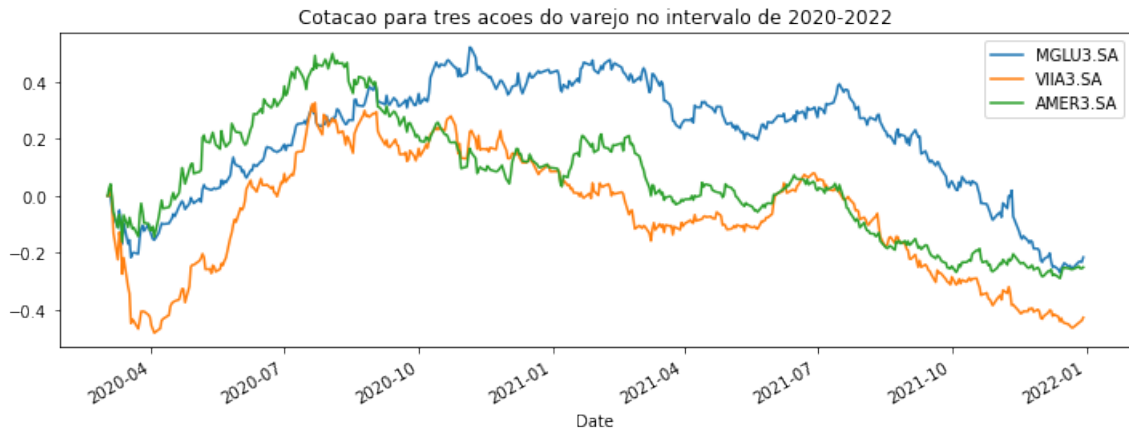


Figure 2: The evolution of stock prices of three different companies in Brazil, Magazine Luiza, Via Varejo and Lojas Americanas, from 2020 to 2022. Normalized values.

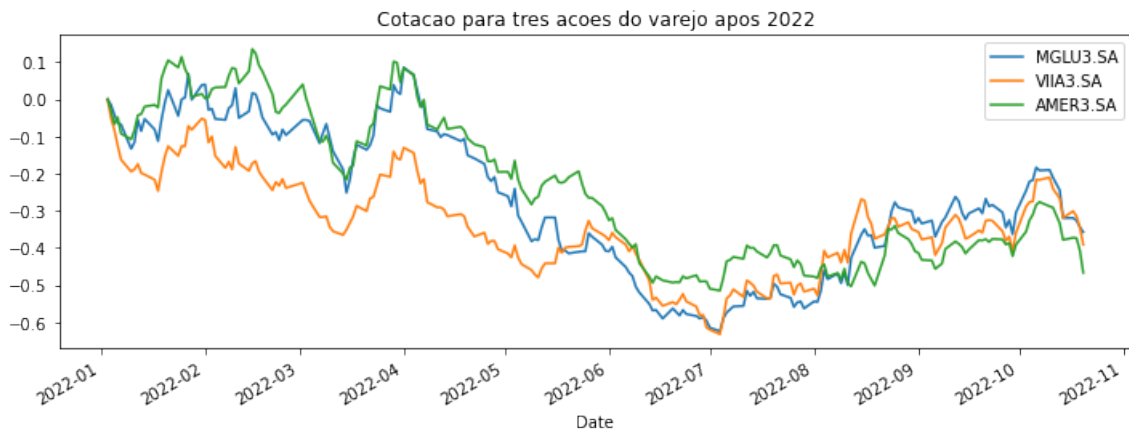


Figure 3: The evolution of stock prices of three different companies in Brazil, Magazine Luiza, Via Varejo and Lojas Americanas, during 2022. Normalized values.

## 4 Distribution of fluctuations

With those raw data I build the fluctuation of the stock price and depicted in distribution graph. To compare them, and study as a field, first I've got the distribution of all three stocks.

## 4.1 Before Pandemic

### 4.1.1 Entire group

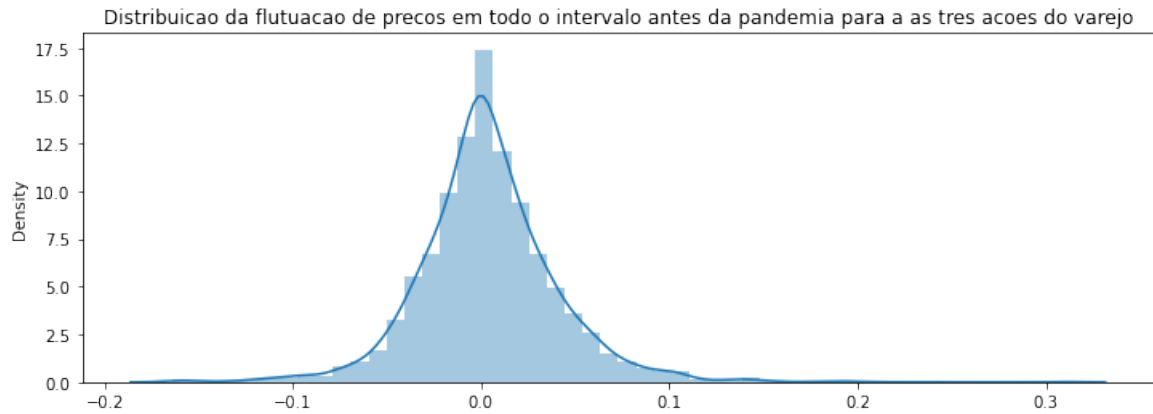


Figure 4: Stock price Fluctuation distribution to group of three enterprises before pandemic (2016-2020).

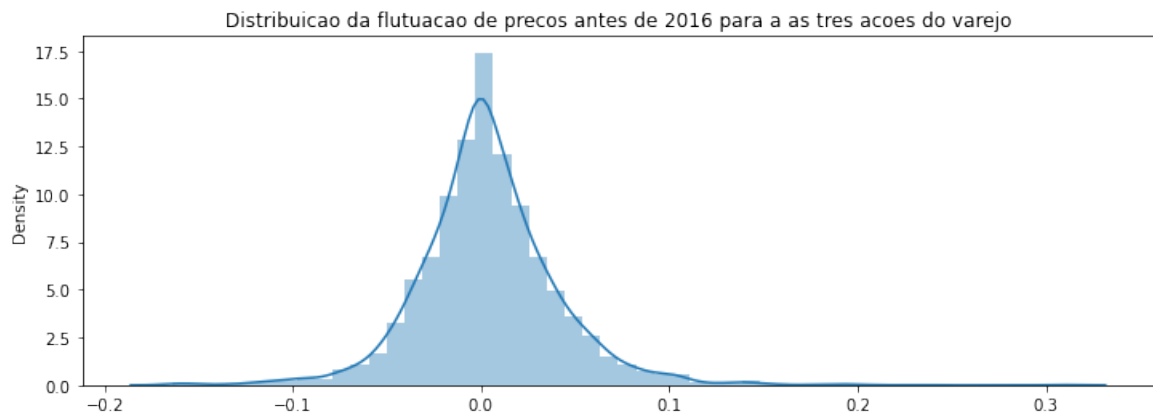


Figure 5: Stock price Fluctuation distribution to group of three enterprises in 2016

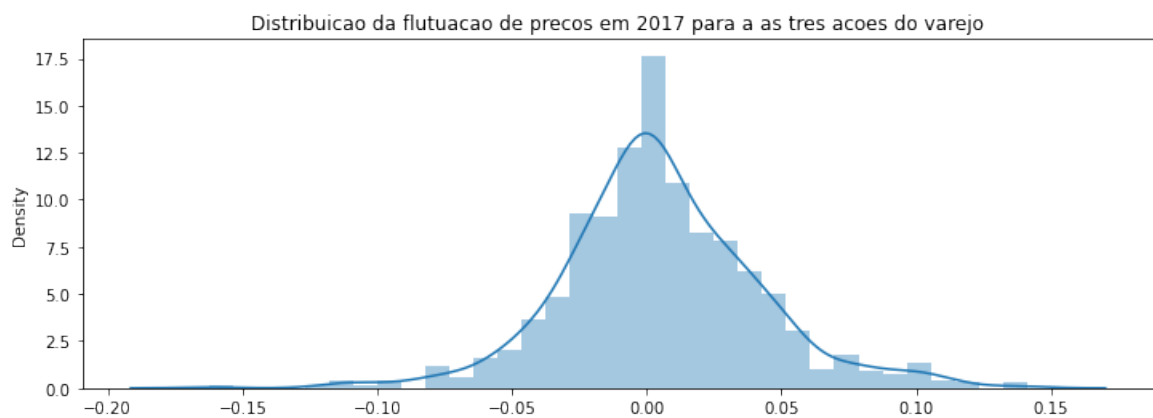


Figure 6: Stock price Fluctuation distribution to group of three enterprises in 2017

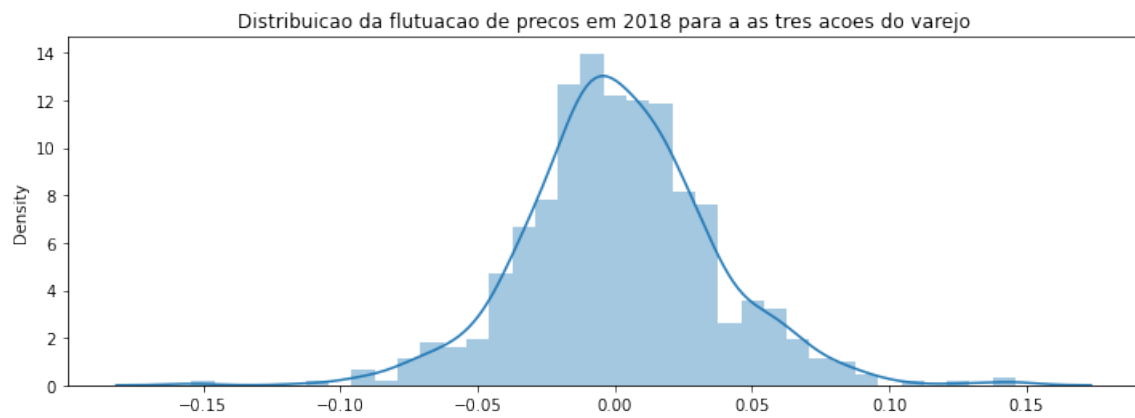


Figure 7: Stock price Fluctuation distribution to group of three enterprises in 2018

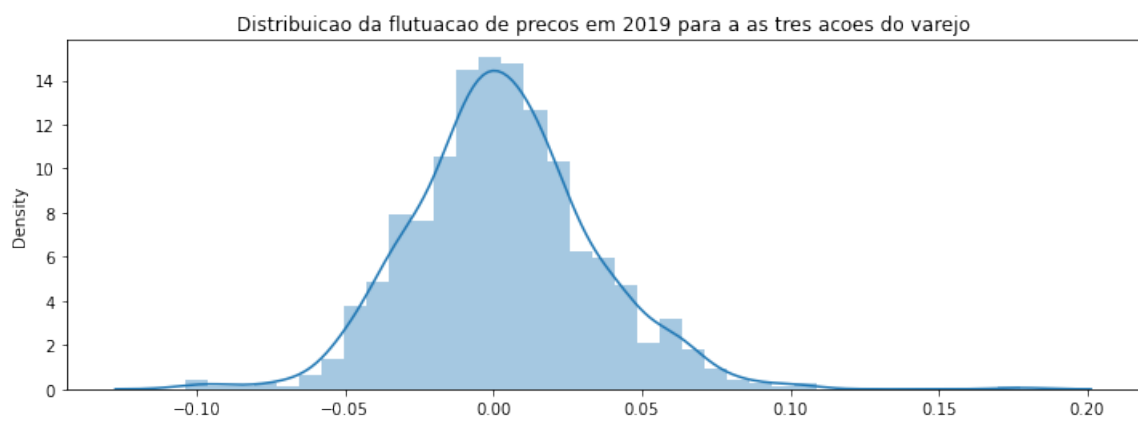


Figure 8: Stock price Fluctuation distribution to group of three enterprises in 2019

From figures 4 to 8, we can see the...

#### 4.1.2 Magazine Luiza

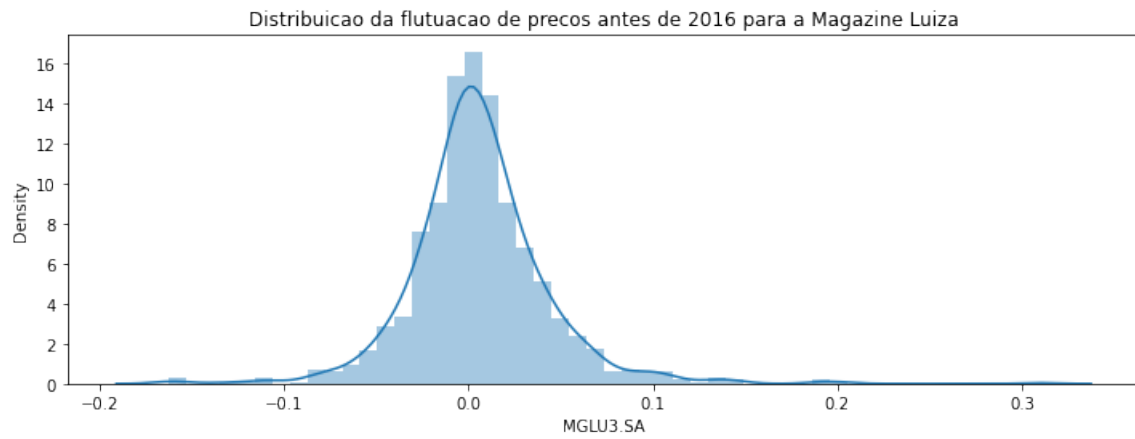


Figure 9: Stock price Fluctuation distribution to Magazine Luiza enterprise before 2016

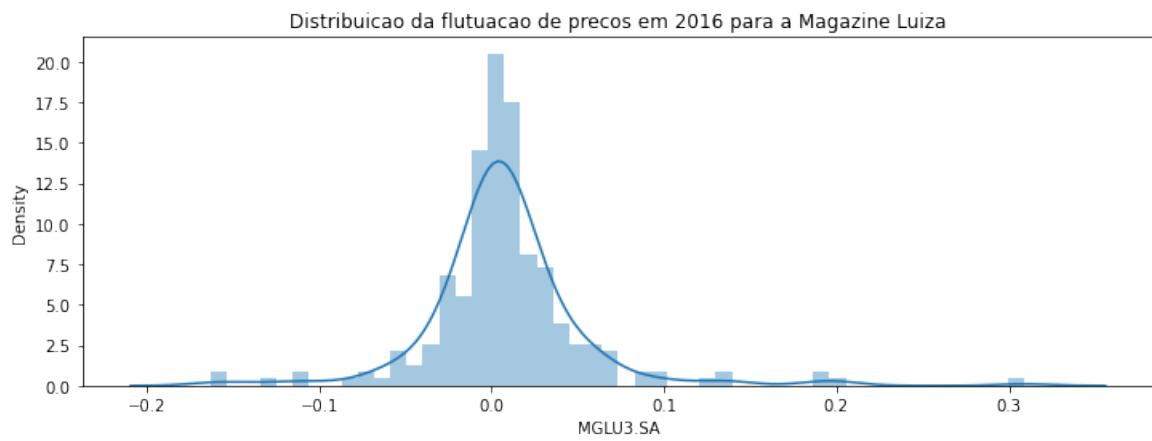


Figure 10: Stock price Fluctuation distribution to Magazine Luiza enterprise in 2016

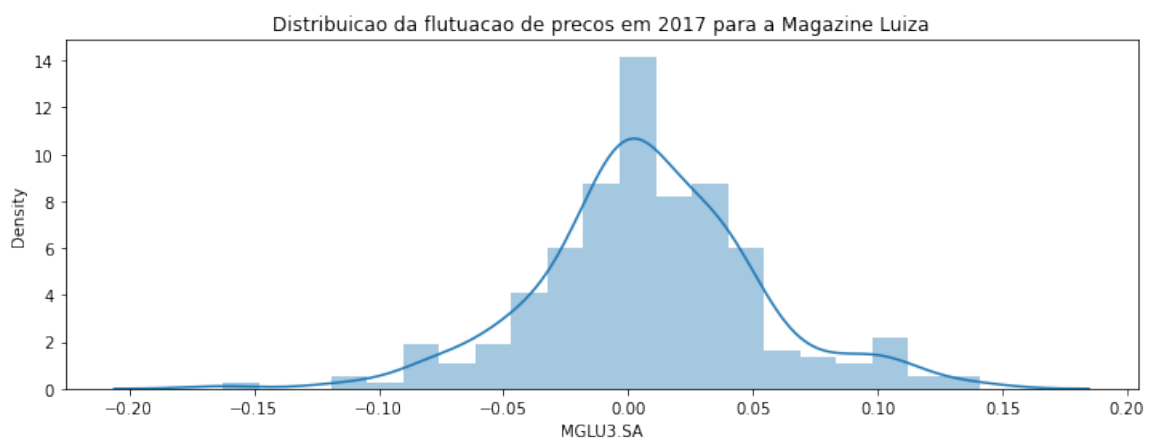


Figure 11: Stock price Fluctuation distribution to Magazine Luiza enterprise in 2017

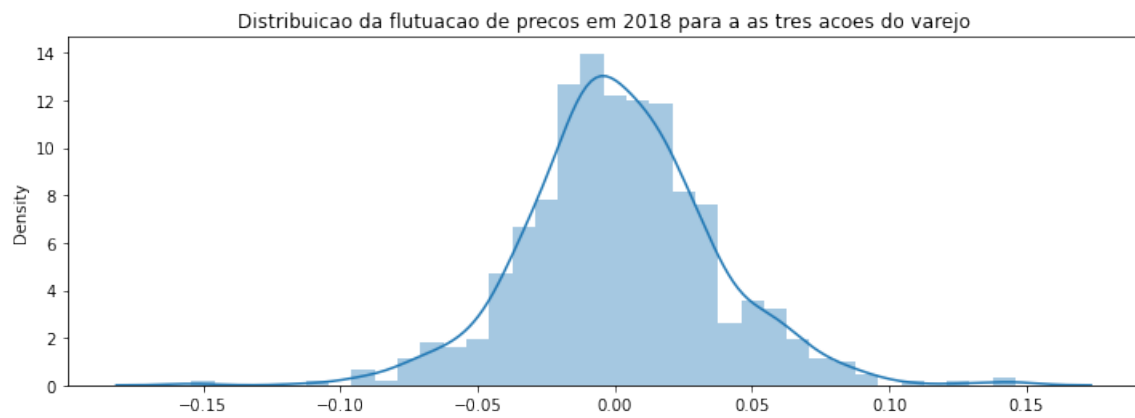


Figure 12: Stock price Fluctuation distribution to Magazine Luiza enterprise in 2018

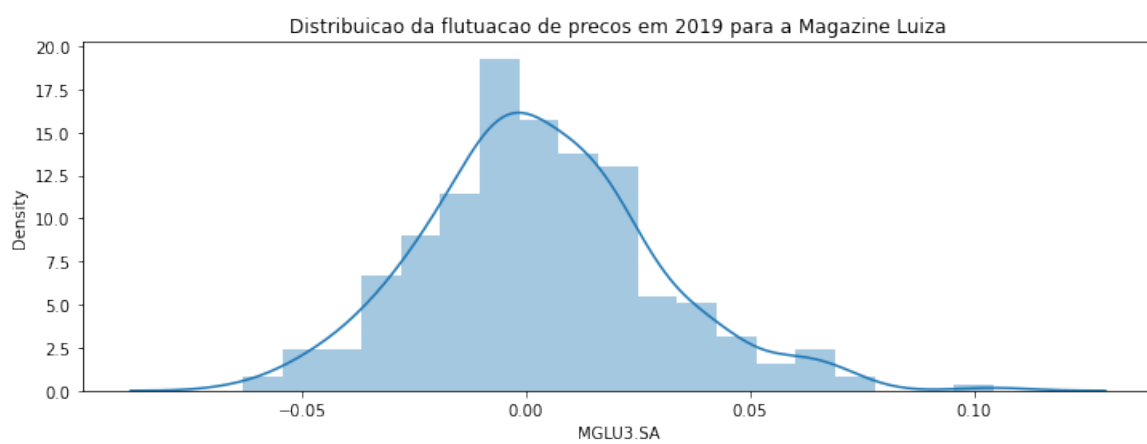


Figure 13: Stock price Fluctuation distribution to Magazine Luiza enterprise in 2019

### 4.1.3 Via Varejo

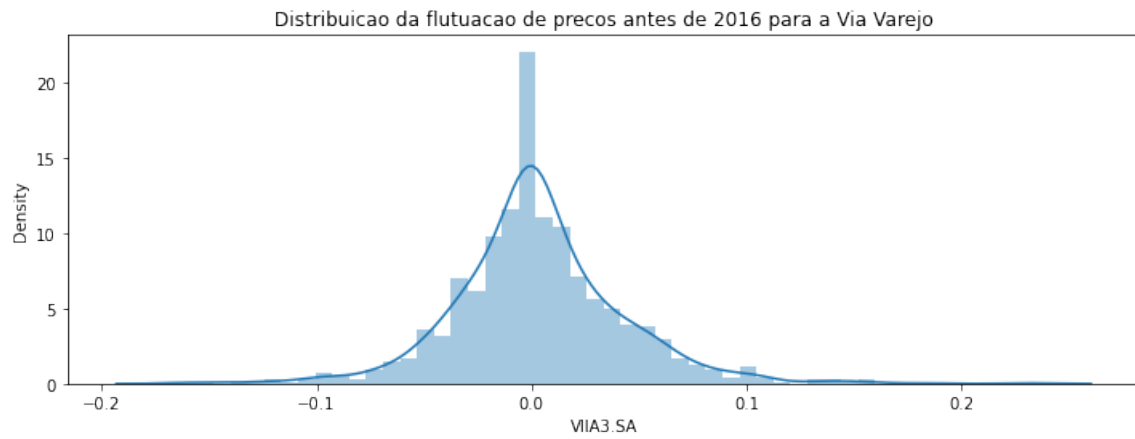


Figure 14: Stock price Fluctuation distribution to Via Varejo enterprise before 2016

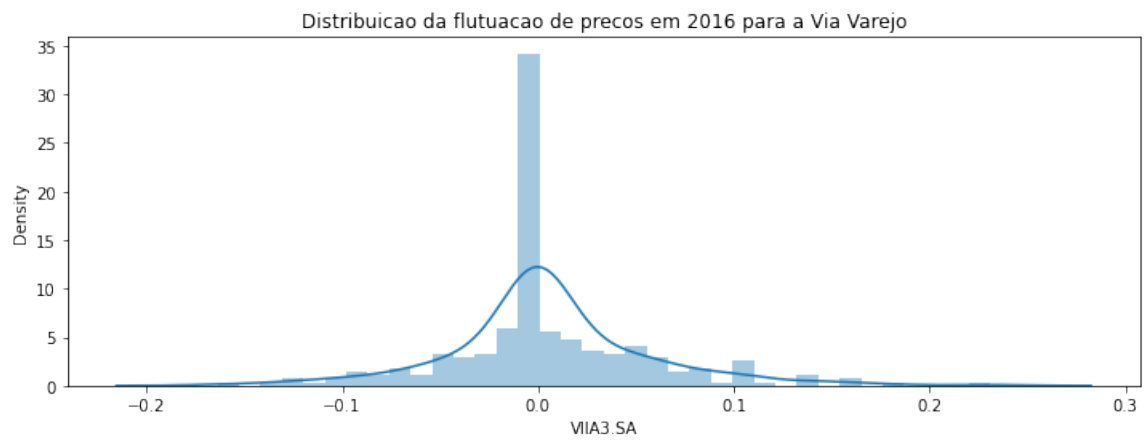


Figure 15: Stock price Fluctuation distribution to Via Varejo enterprise in 2016

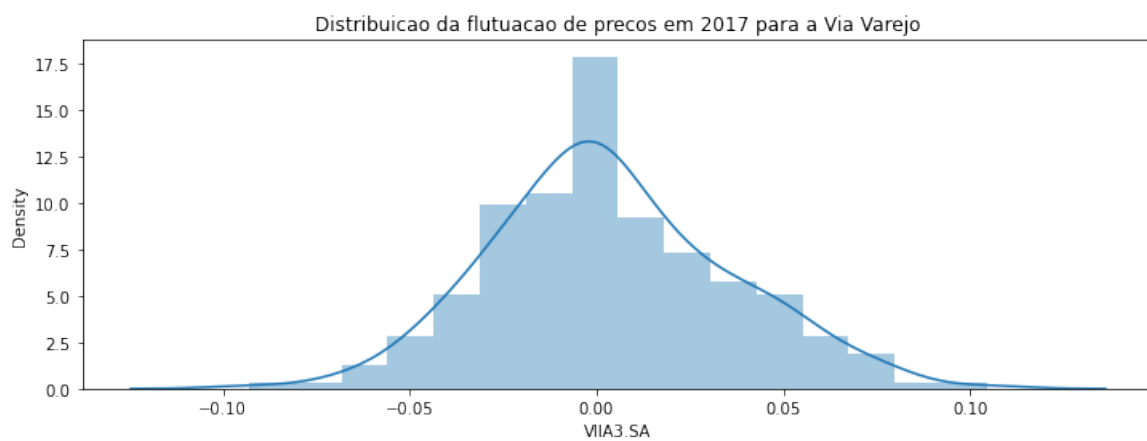


Figure 16: Stock price Fluctuation distribution to Via Varejo enterprise in 2017

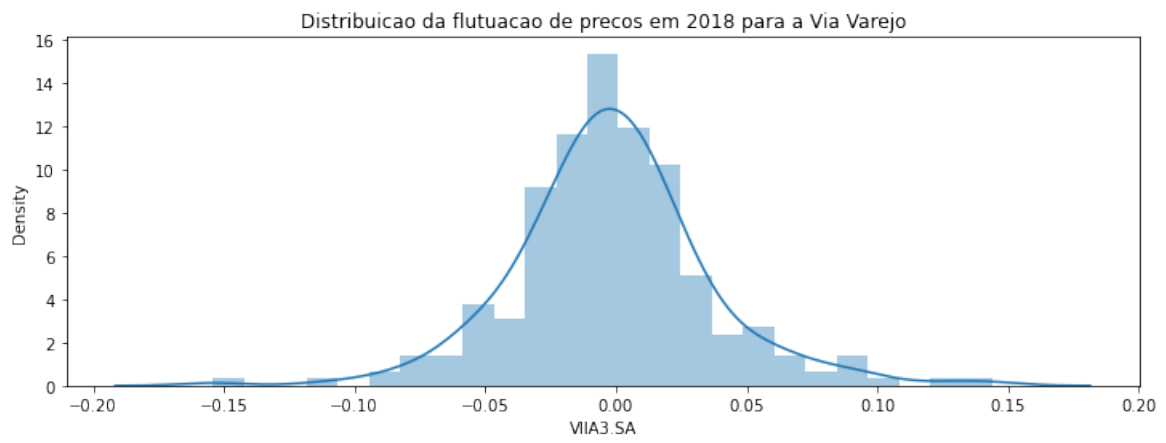


Figure 17: Stock price Fluctuation distribution to Via Varejo enterprise in 2018

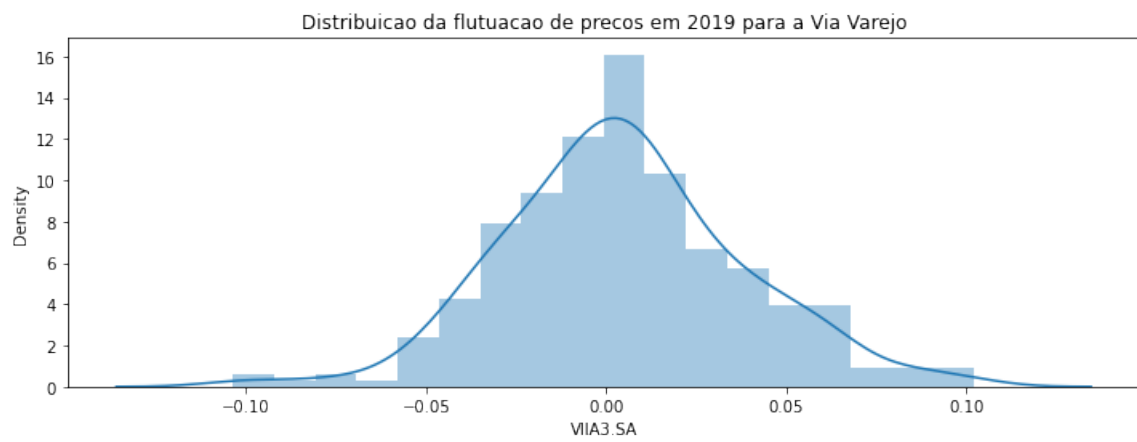


Figure 18: Stock price Fluctuation distribution to Via Varejo enterprise in 2019



#### 4.1.4 Lojas Americanas

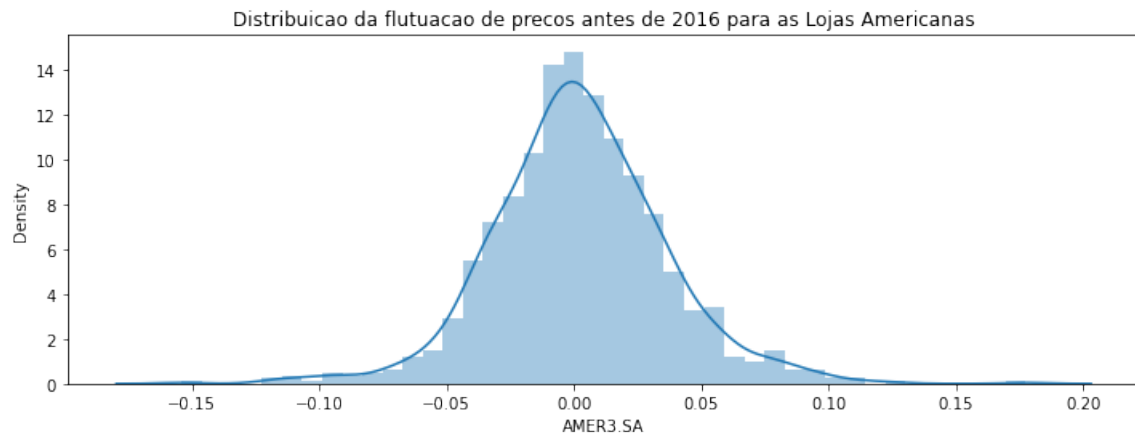


Figure 19: Stock price Fluctuation distribution to Lojas Americanas enterprise before 2016

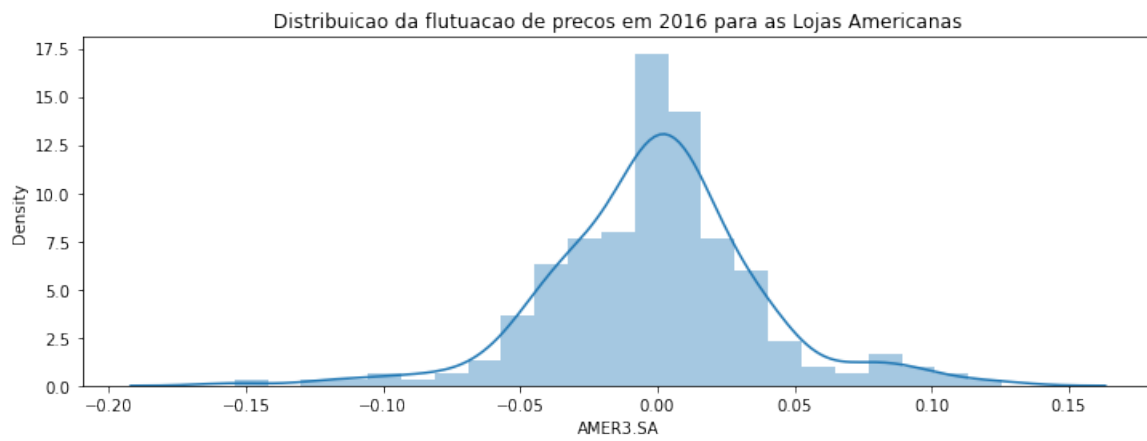


Figure 20: Stock price Fluctuation distribution to Lojas Americanas enterprise in 2016

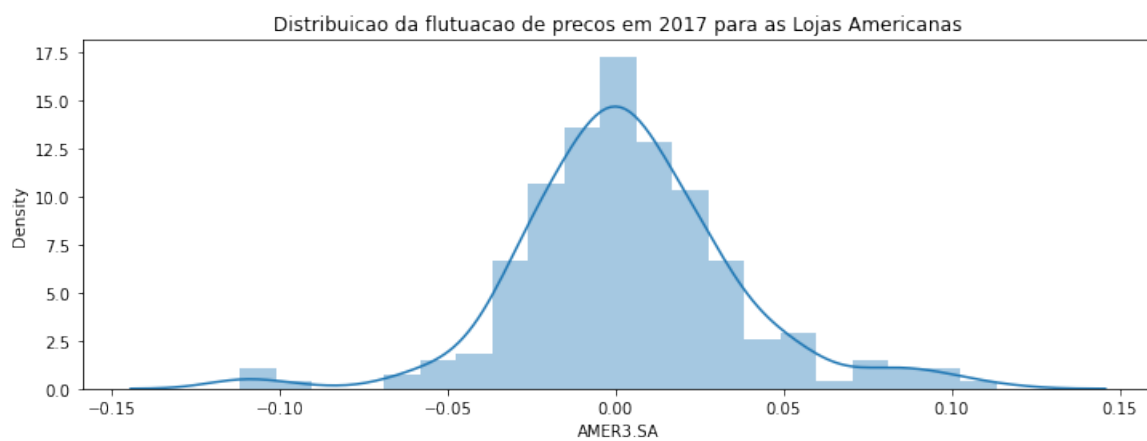


Figure 21: Stock price Fluctuation distribution to Lojas Americanas enterprise in 2017

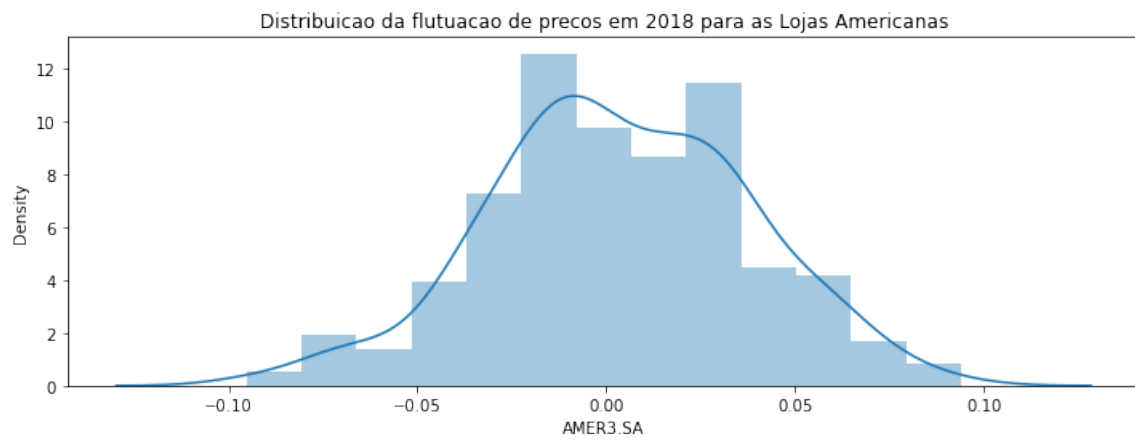


Figure 22: Stock price Fluctuation distribution to Lojas Americanas enterprise in 2018

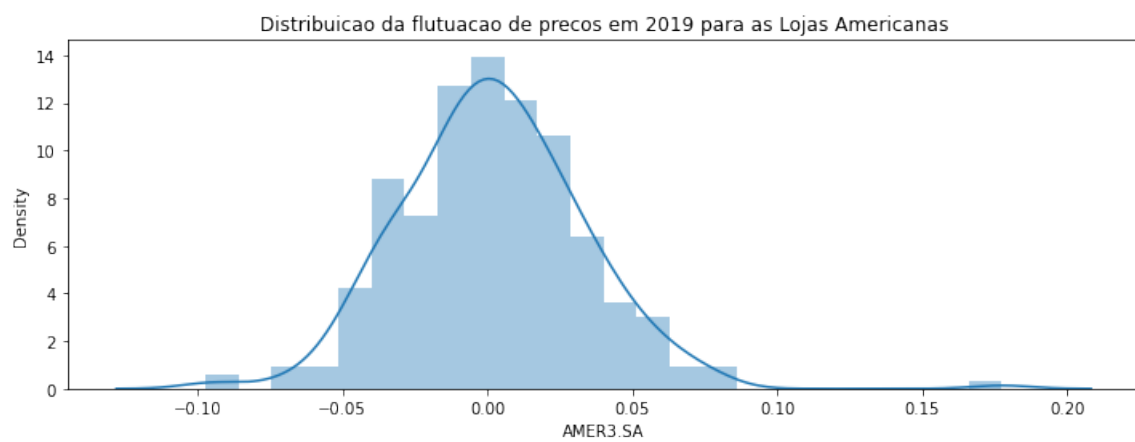


Figure 23: Stock price Fluctuation distribution to Lojas Americanas enterprise in 2019

#### 4.1.5 Relative frequencies

- Frequency of down movements:
  - MGLU3.SA: 0.443787
  - VILA3.SA: 0.485278
  - AMER3.SA: 0.484283
- Frequency of up movements:
  - MGLU3.SA: 0.556213
  - VILA3.SA: 0.514722
  - AMER3.SA: 0.515717

4.2 During Pandemic

4.2.1 Entire group

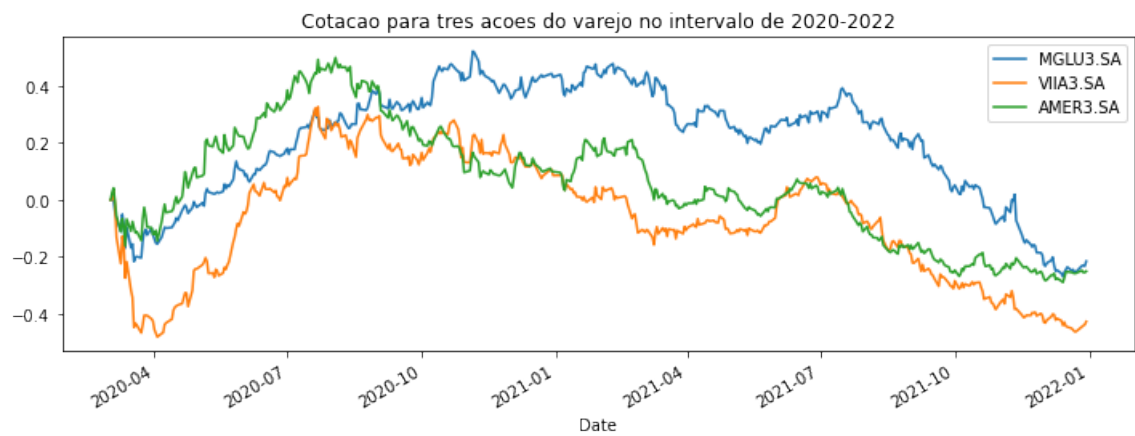


Figure 24: Caption

4.2.2 Magazine Luiza

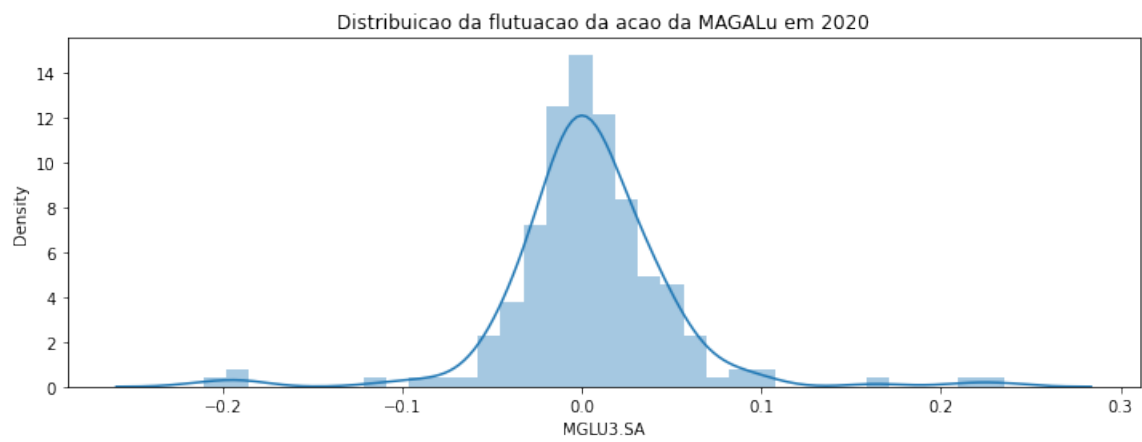


Figure 25: Caption

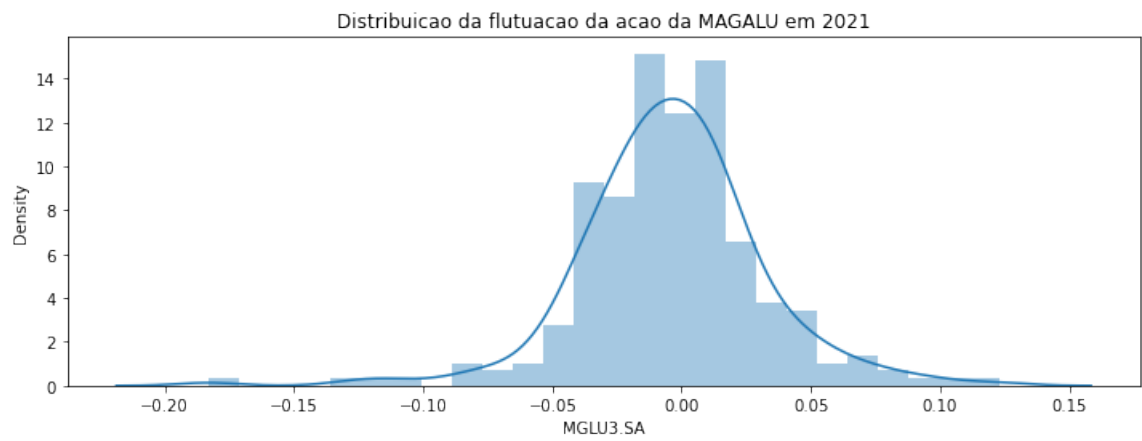


Figure 26: Caption

4.2.3 Via Varejo

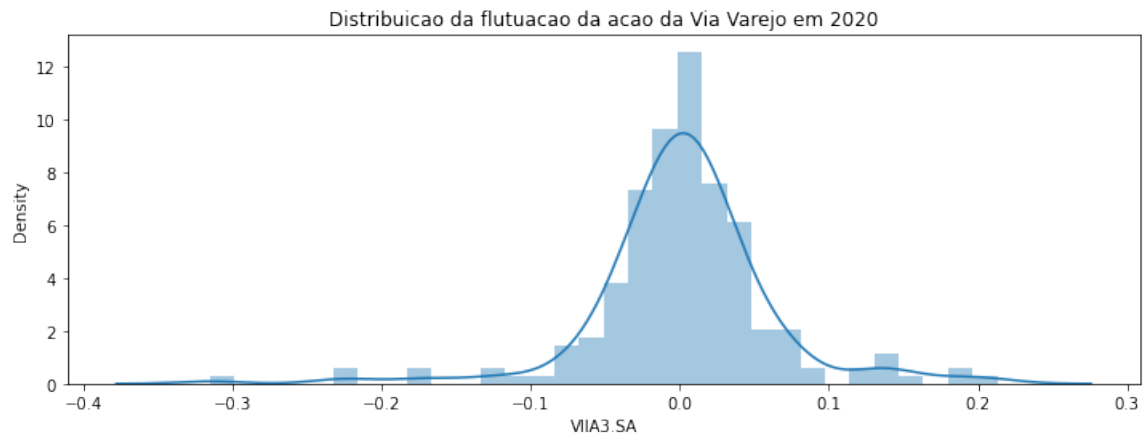


Figure 27: Caption

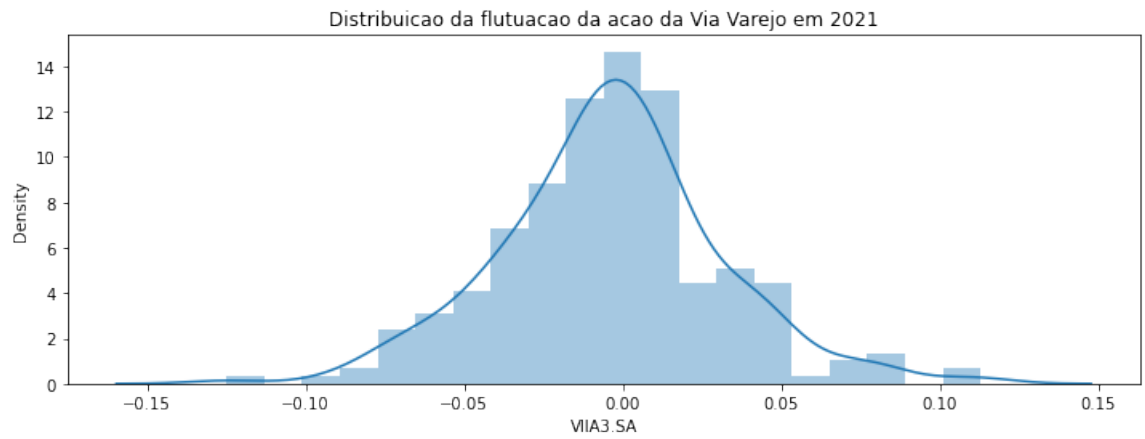


Figure 28: Caption

4.2.4 Lojas Americanas

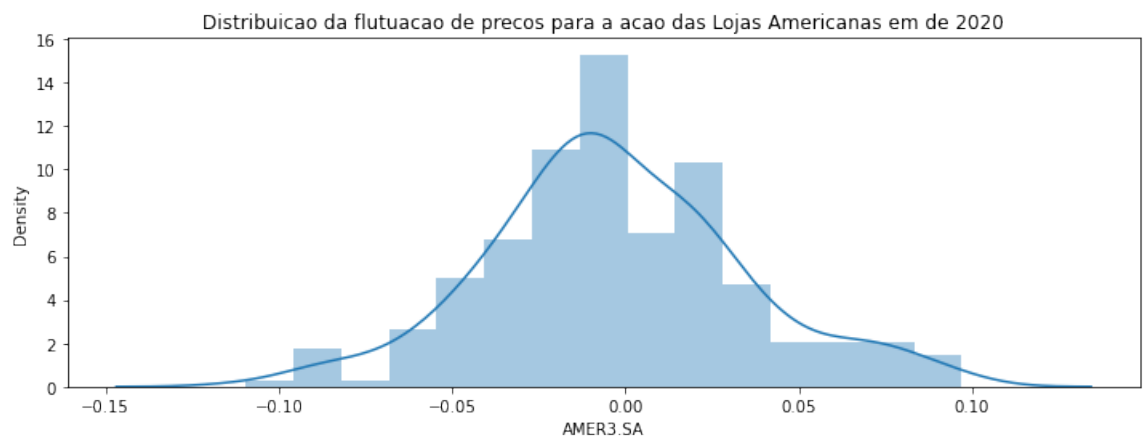


Figure 29: Caption

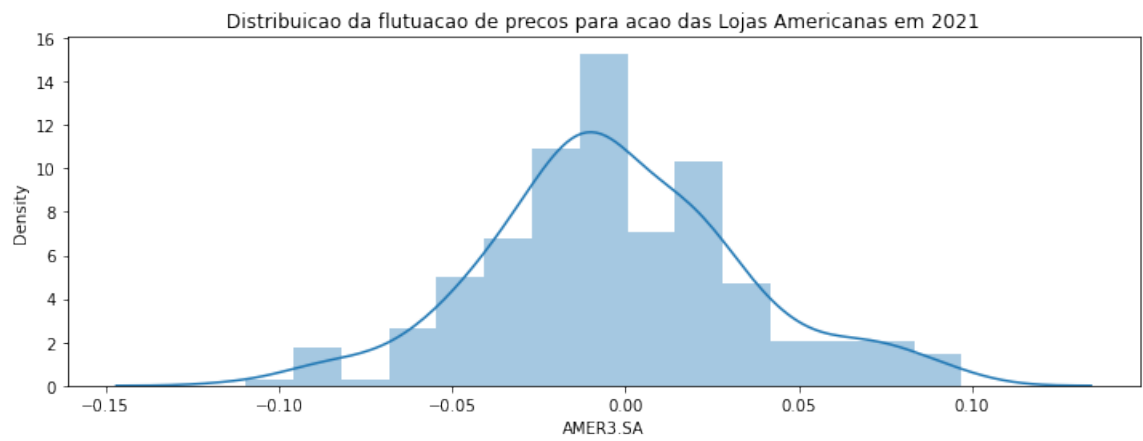


Figure 30: Caption

#### 4.2.5 Relative frequencies

- Frequency of down movements:
  - MGLU3.SA: 0.443787
  - VIIA3.SA: 0.485278
  - AMER3.SA: 0.484283
- Frequency of up movements:
  - MGLU3.SA: 0.556213
  - VIIA3.SA: 0.514722
  - AMER3.SA: 0.515717

### 4.3 After Pandemic

#### 4.3.1 Entire group

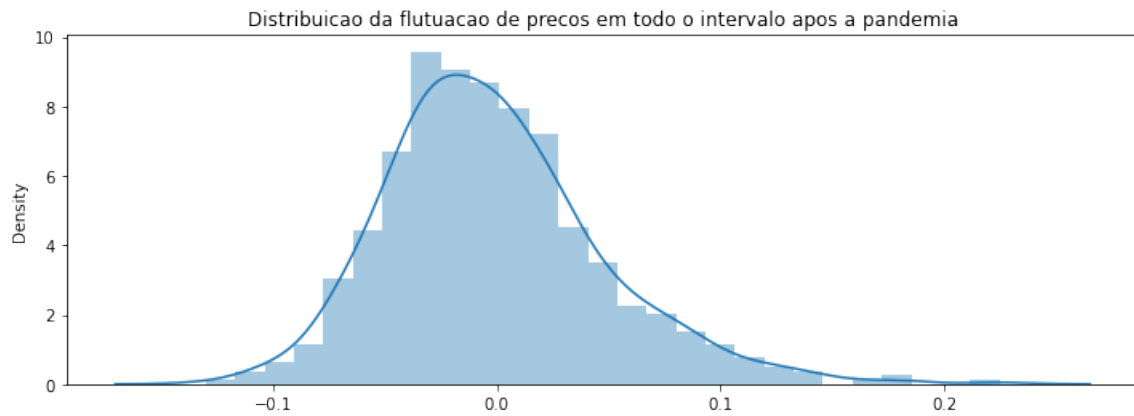


Figure 31: Caption

#### 4.3.2 Magazine Luiza

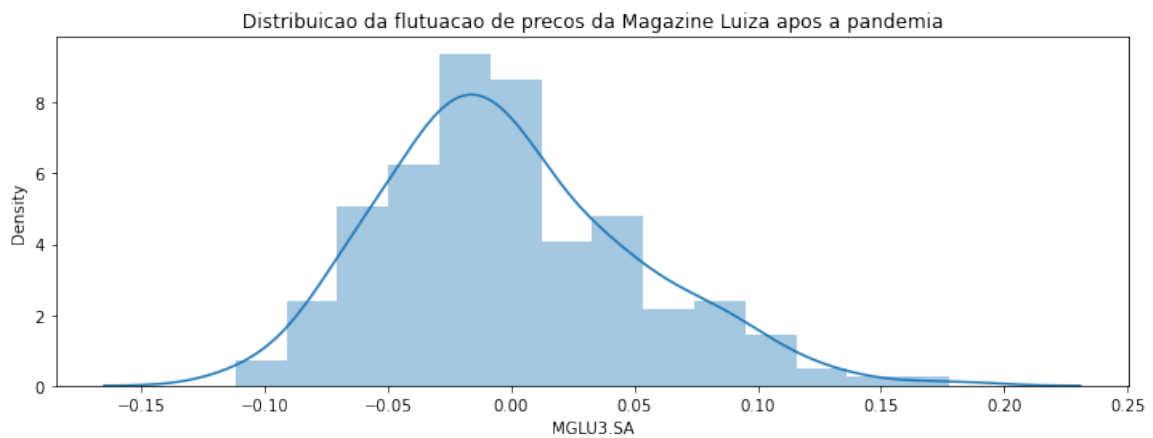


Figure 32: Caption

#### 4.3.3 Via Varejo

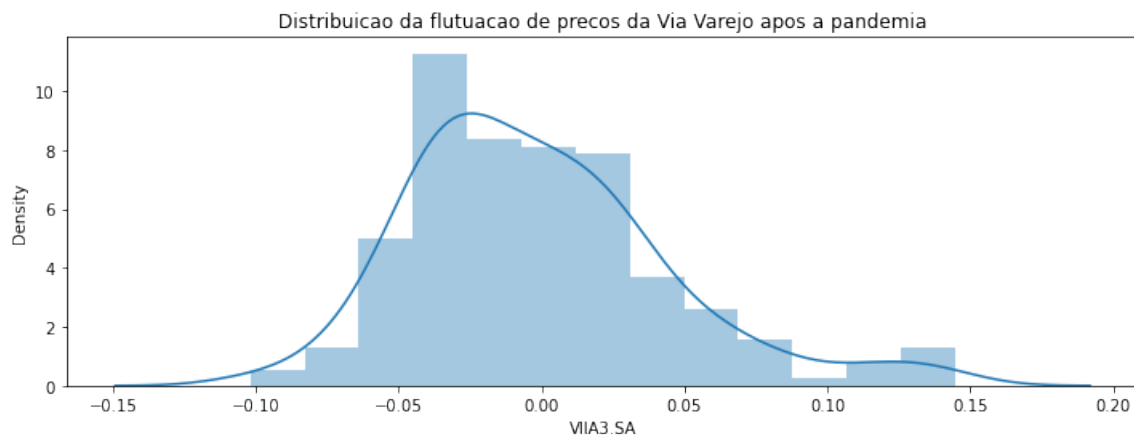


Figure 33: Caption



#### 4.3.4 Lojas Americanas

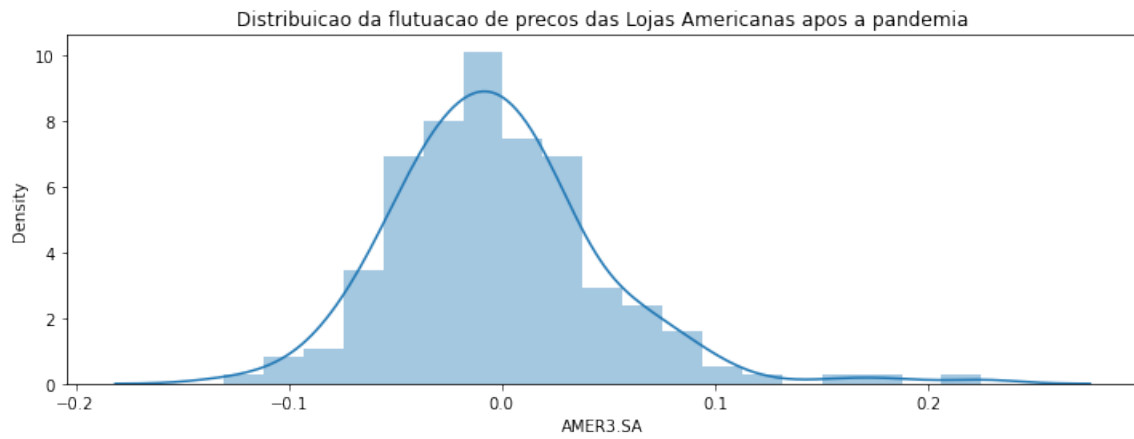


Figure 34: Caption

Of course, any distribution of price fluctuation is normal, otherwise the stock price would not change in the range of time evaluated.

Those distributions can not be used to a straight evaluation, but rather to some mathematical first step to a more complex calculus and assertion. Some of the distributions has a bimodal shape adding complexity to this hard visualization.

A more intuitive statistical parameter can be discussed in terms of the relative frequency for the up and down movement.

#### 4.3.5 Relative frequencies

- Frequency of down movements:
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- Frequency of up movements:
  - MGLU3.SA: 0.556213
  - VIIA3.SA: 0.514722
  - AMER3.SA: 0.515717

#### 4.4 Second Round of evaluation

#### 4.5 Monthly mean

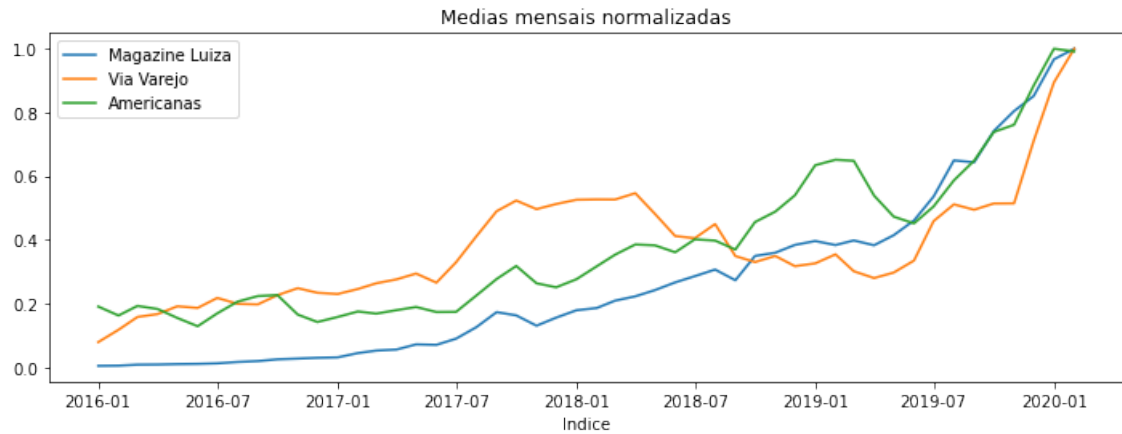


Figure 35: Medias mensais normalizadas antes da pandemia

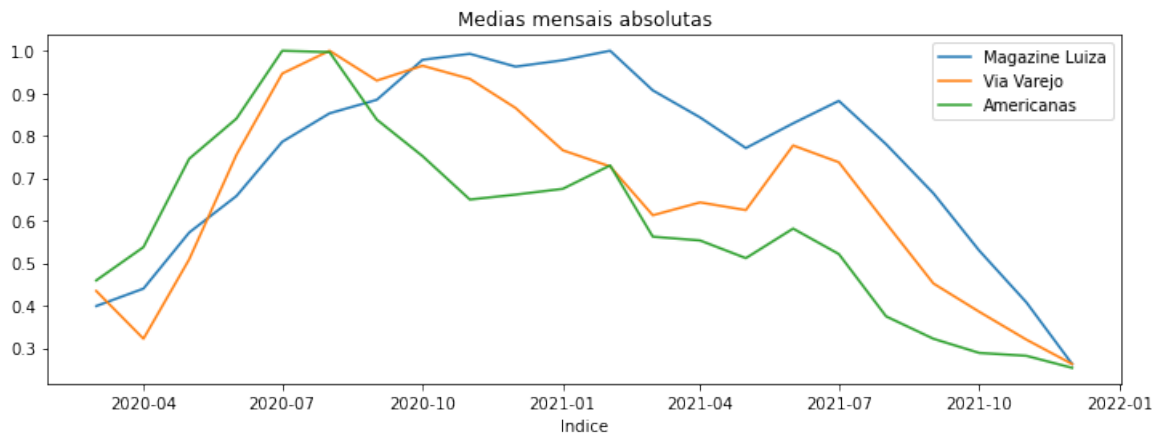


Figure 36: Medias mensais normalizadas durante a pandemia

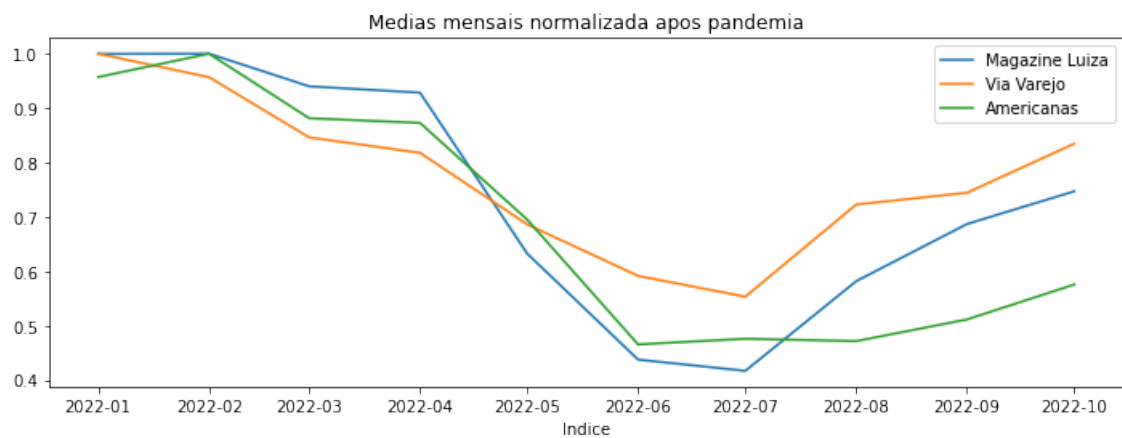


Figure 37: Medias mensais normalizadas depois da pandemia

As we can see in the fig 35, 36 e 37 the stock price of Margazine Luiza has some resistense in change his values emerging as a delay in comparison to the other two. So this kind of delay of variation gives us a hint to modeling the stock price with parameter similar to electric inductance.

## 5 Next steps

- Simulating the monthly stock price in terms of Dollar quotation and SELIC interest (Curve minimization).

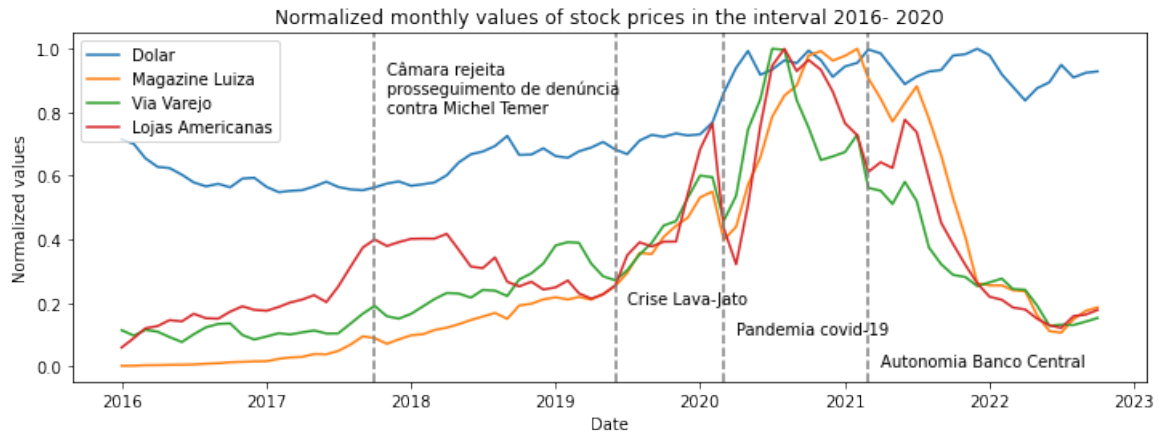


Figure 38: First pick of normalized monthly mean of stock prices

The figure 38 shows the possible relation between the dollar quotation and the stock prices.

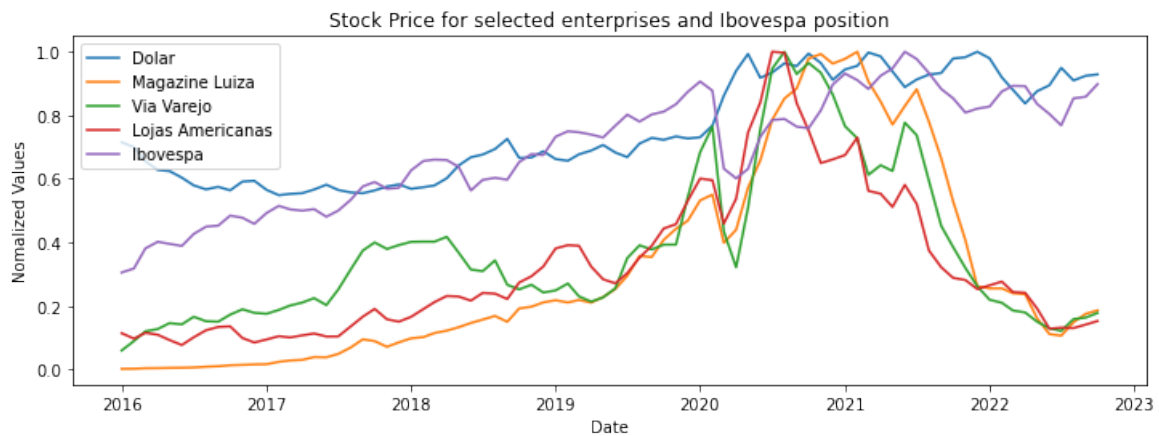


Figure 39: Ibovespa cotation rule the patern, while dolar quotation

1. What is the offset?
  2. What is the parameters?
  3. What function holds?
- Simulating the monthly stock price with the relative frequency obtained in this text to statistical analysis Integration of Binomial distribution (Generalized Bernoulli Distribution).
    - 1.
  - Search for the parameter to represent the 'inductance' for the system.
    - the stochastic equation
  - Calculate the time of range we have since the strong fluctuation occurs.

”  
É que eu, falo a língua dos manos,  
Não perco uma batalha,  
E, apesar dos danos,  
Sou história na minha área.  
”

Djonga

”  
Vi um pretinho,  
seu caderno era um fuzil.  
Fuzil.  
”

Nego Drama,  
Racionais MC's