

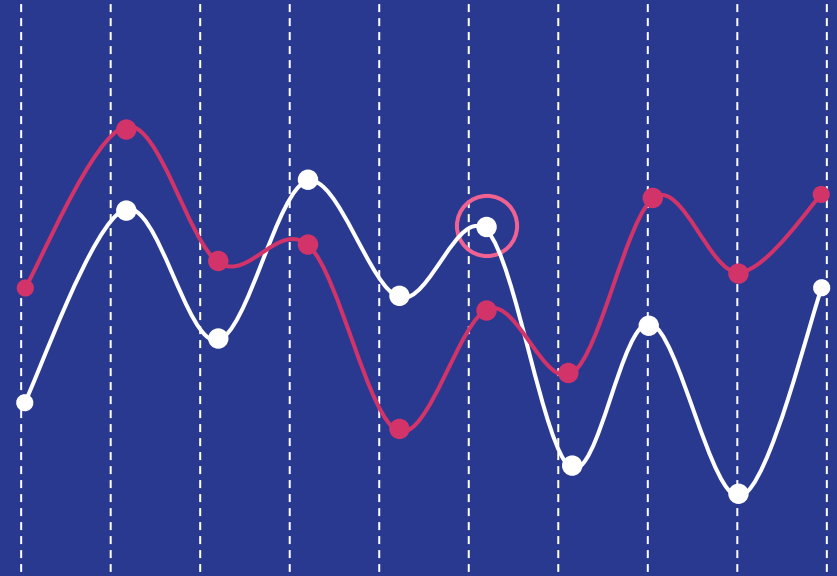
PROGETTO DI BUSINESS INTELLIGENCE 2018/2019

ZHOU JIA LIANG - 816019

1. Data Summary

Titoli selezionati

TENCENT
NETFLIX
TESLA
BYD
USD/EUR
USD/CNY



Tencent Holdings Limited (0700.HK) *Tencent* 腾讯

- WeChat
- PUBG
- Market capitalisation of US\$540 billion
- Bought a 40 percent stake in Epic (Fortnite)

N.B.

Per comodità 0700.HK -> TENC



Netflix, Inc. (NFLX)

NETFLIX

- Episodi interattivi (Black Mirror Bandernach)
- Serie di successo come Narcos, Tredici, Stranger Things...



THE SHOWS THAT

GOT US CHEATING

IN 2017

- 1 NARCOS
- 2 13 REASONS WHY
- 3 STRANGER THINGS
- 4 ORANGE IS THE NEW BLACK
- 5 SENSE8
- 6 BLACK MIRROR
- 7 MARVEL'S THE DEFENDERS
- 8 MARVEL'S IRON FIST
- 9 OZARK
- 10 MINDHUNTER

Shows so good we
watched ahead of
our significant others



Shows so good
they're a family affair

NETFLIX



THE SHOWS THAT BROUGHT US

TOGETHER

IN 2017

- 1 STRANGER THINGS
- 2 13 REASONS WHY
- 3 A SERIES OF UNFORTUNATE EVENTS
- 4 STAR TREK DISCOVERY
- 5 GILMORE GIRLS: A YEAR IN THE LIFE
- 6 RIVERDALE
- 7 FULLER HOUSE
- 8 CHEF'S TABLE
- 9 ATYPICAL
- 10 ANNE WITH AN E



2017 BINGE FACTS

BIGGEST
STREAMING DAY
OF THE YEAR

JAN
01

MEXICO

HAD THE MOST MEMBERS
WATCHING NETFLIX
EVERY-SINGLE-DAY

140 MILLION
HOURS
WATCHED PER DAY

=
1 BILLION
HOURS
PER WEEK

THE AVERAGE MEMBER WATCHED
60 MOVIES ON



THIS YEAR

ONE MEMBER WATCHED



PIRATES OF THE
CARIBBEAN:
THE CURSE OF THE BLACK PEARL
365 DAYS IN A ROW

A USER IN
ANTARCTICA



BINGED THROUGH
SHAMELESS

Tesla, Inc. (TSLA)



- Tesla model 3
- Le auto elettriche stanno diventando sempre più accessibili
- Sempre più norme nuove per bloccare la circolazione delle auto diesel
- Tesla è leader mondiale nella guida autonoma, oltre che nella produzione delle veicoli stessi



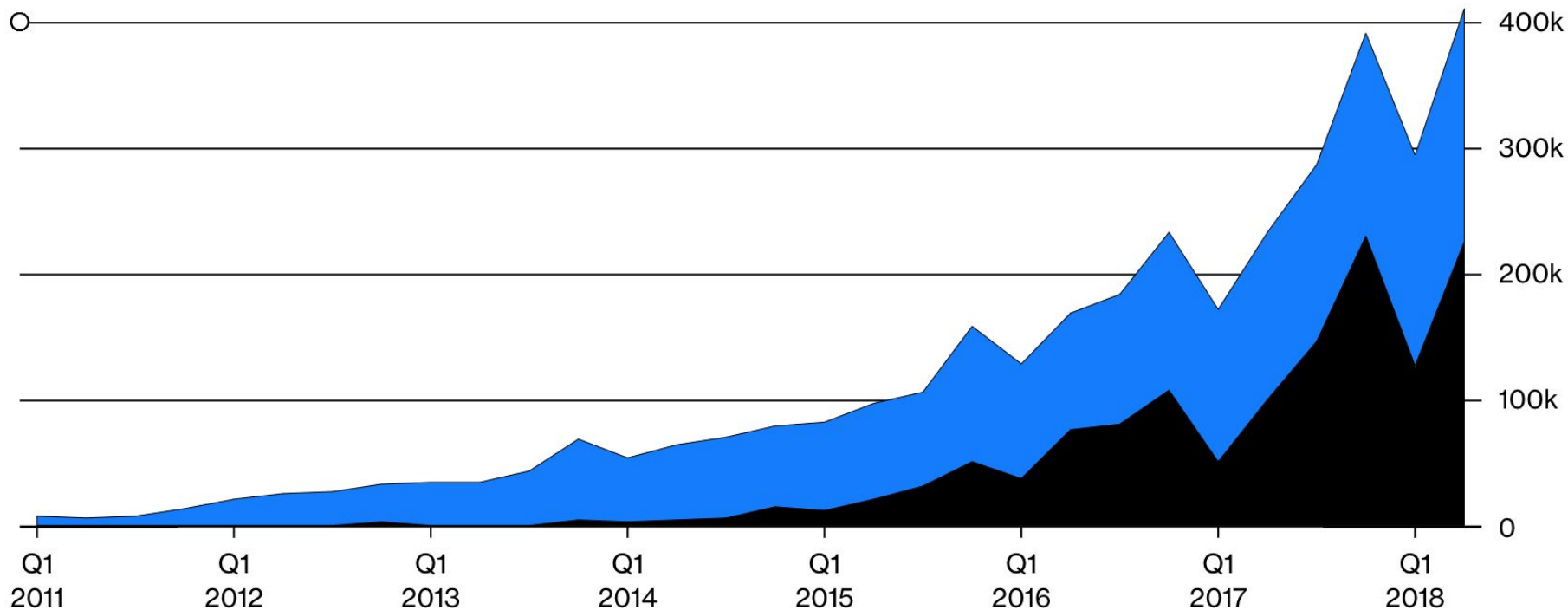
BYD Company Limited (1211.HK)

- BYD Co., Ltd. is the world's largest manufacturer of EVs (electric vehicles). It is also a major player in e-buses, e-trucks, solar panels, energy storage and batteries



Electric Vehicle Sales

■ China ■ Rest of the world



Data: Bloomberg Intelligence

USD/EUR (EUR=X) & USD/CNY (CNY=X)

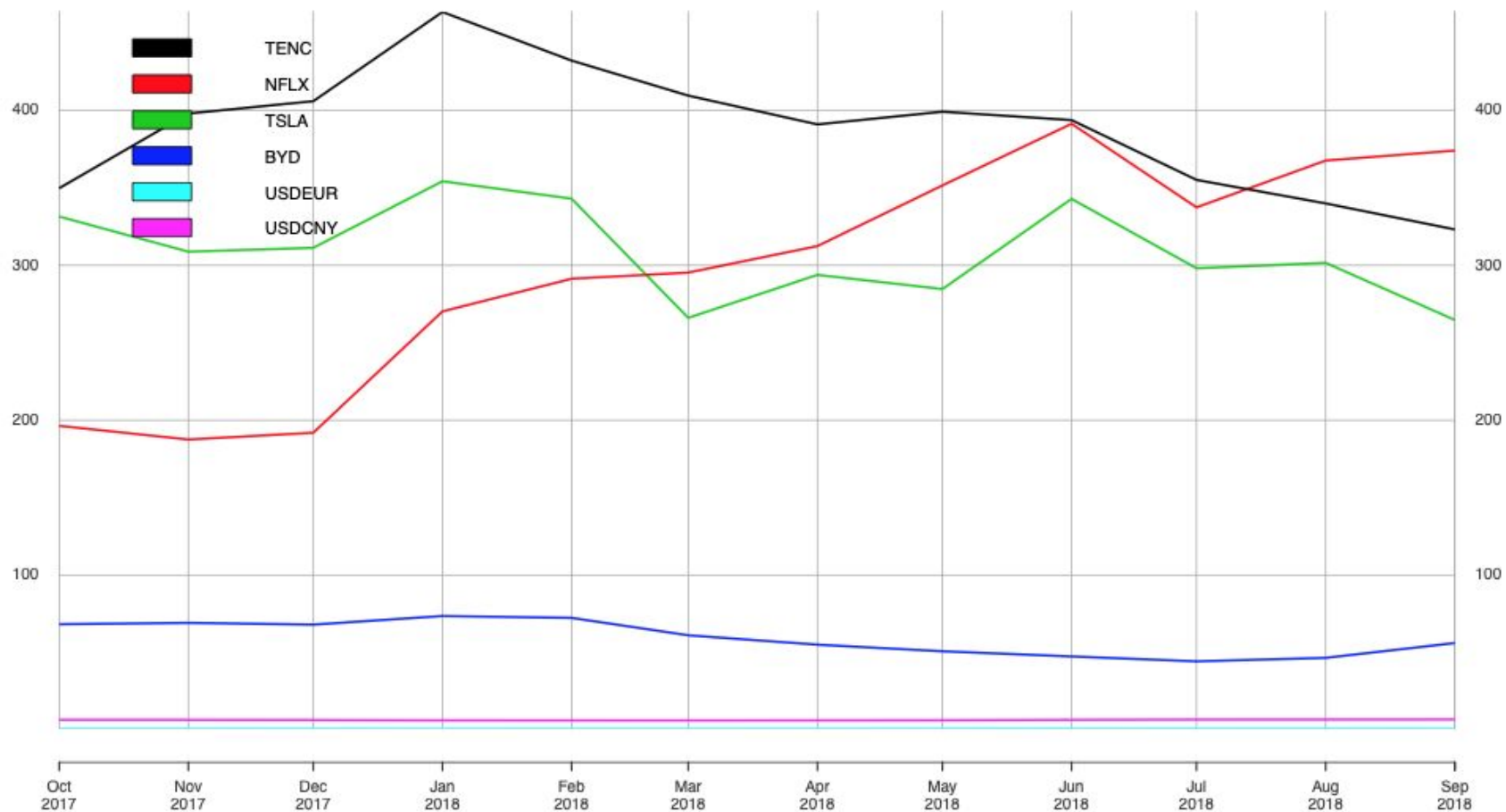
- Guerra dei dazi tra Cina e USA
- *“Other countries, particularly EU ones, will take more than \$200bn of China's exports after threatened US tariff hikes.”*
- Comprendere il rapporto tra gli andamenti delle diverse valute



2. Descriptive Analytics

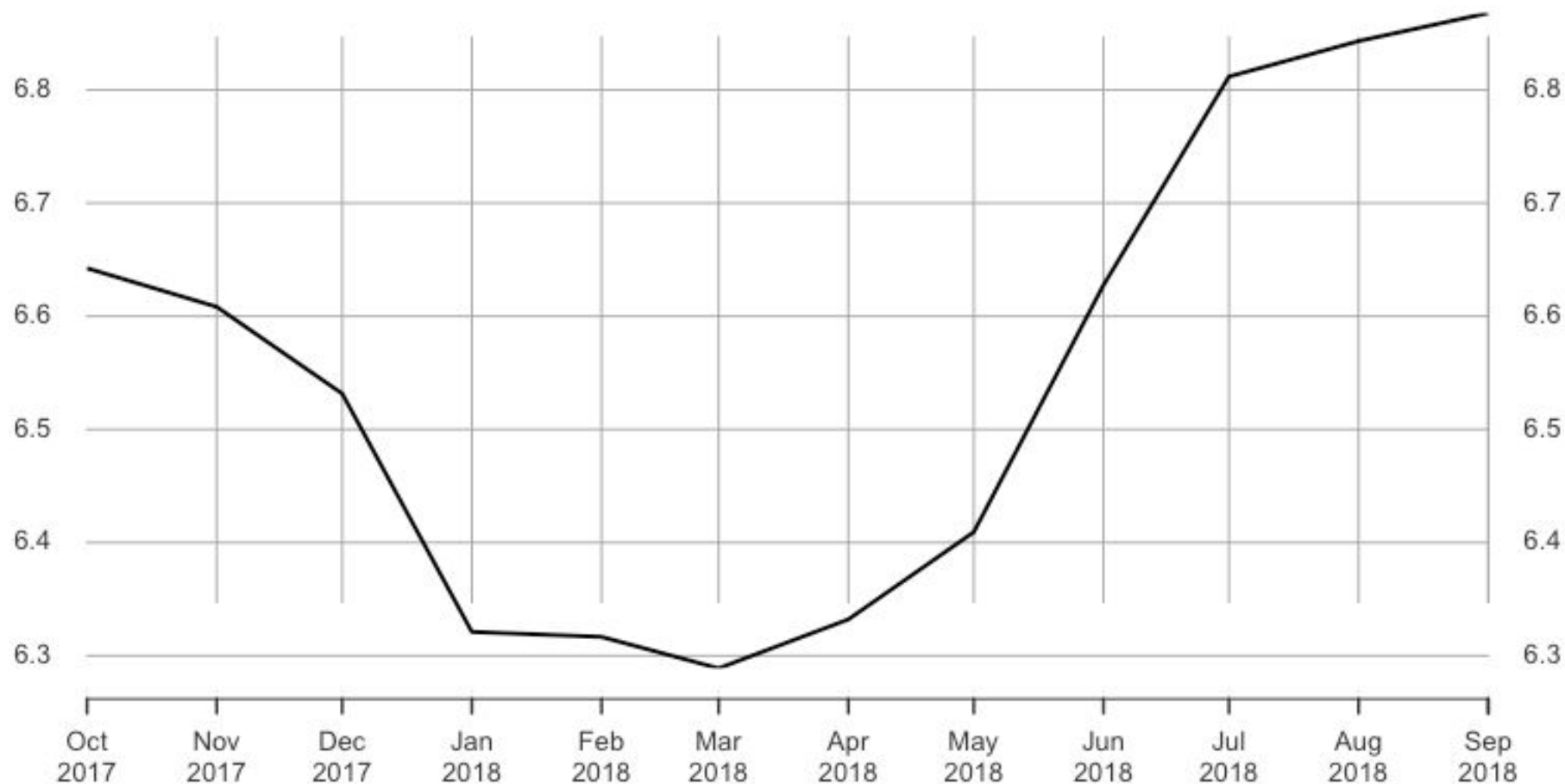
Assets Adjusted Close

Oct 2017 / Sep 2018



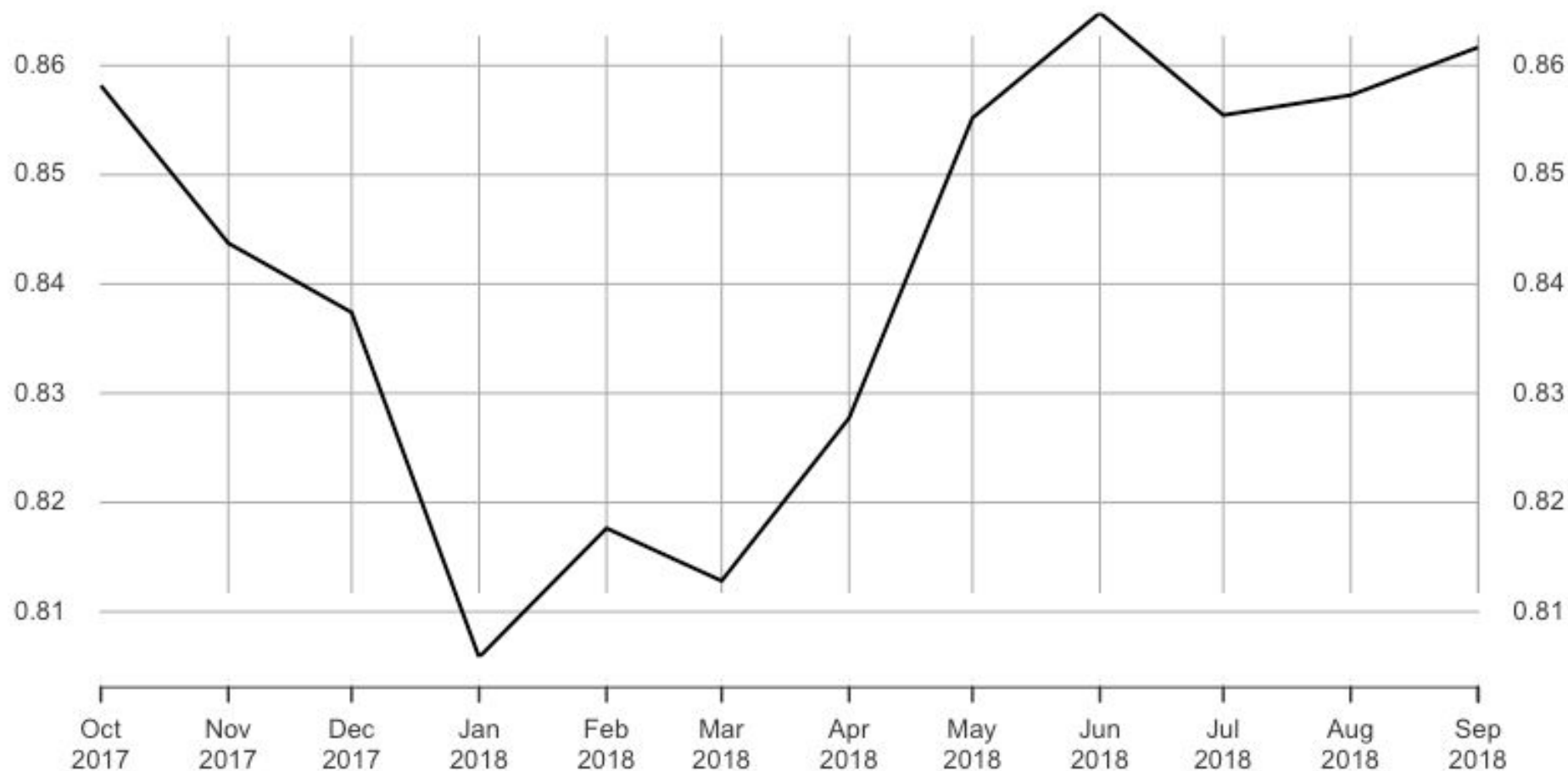
USD/CNY Monthly AdjClose

Oct 2017 / Sep 2018



USD/EUR Monthly AdjClose

Oct 2017 / Sep 2018



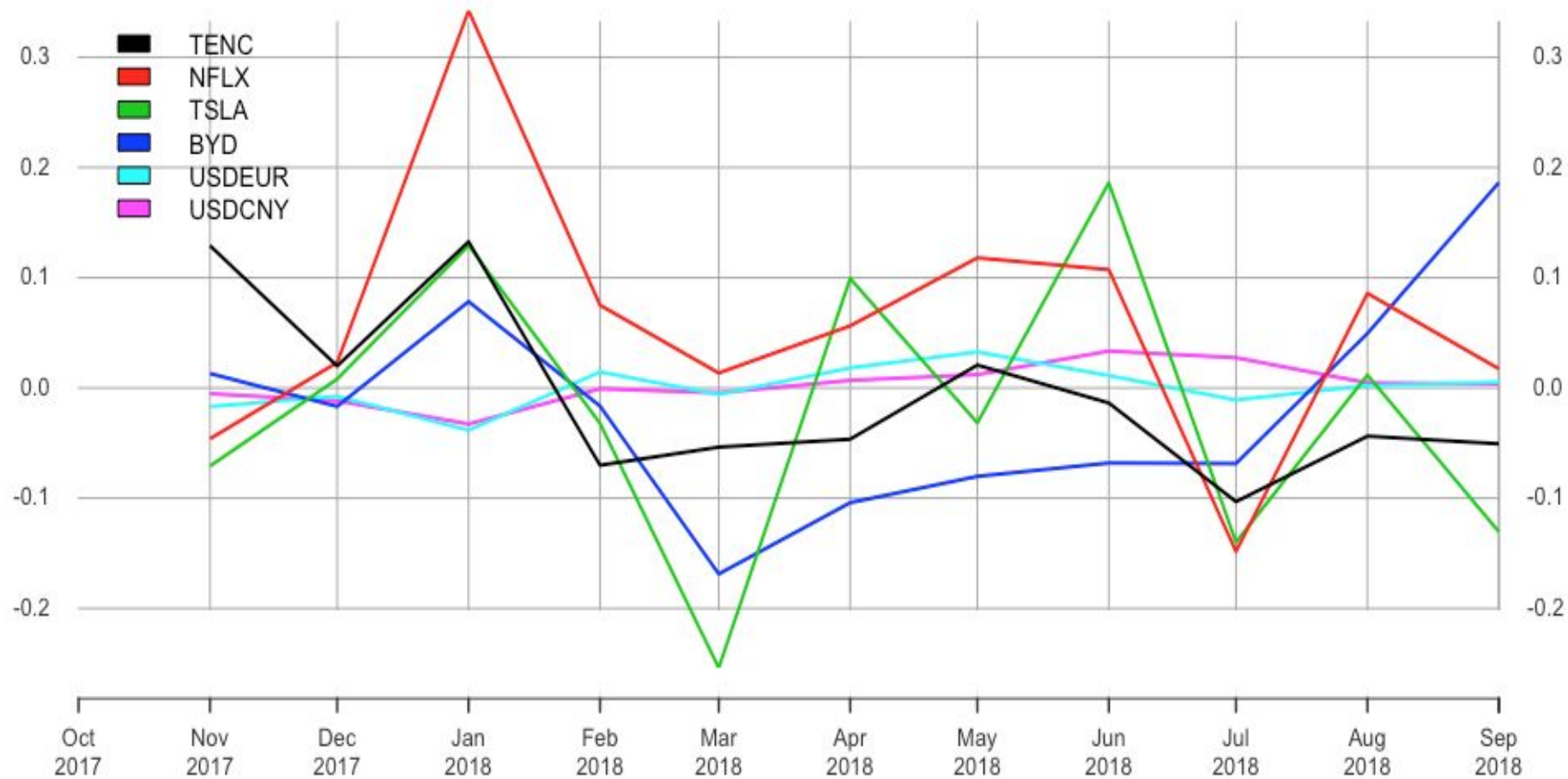
RITORNI CC

- I ritorni sono stati calcolati da ottobre 2017 a ottobre 2018.



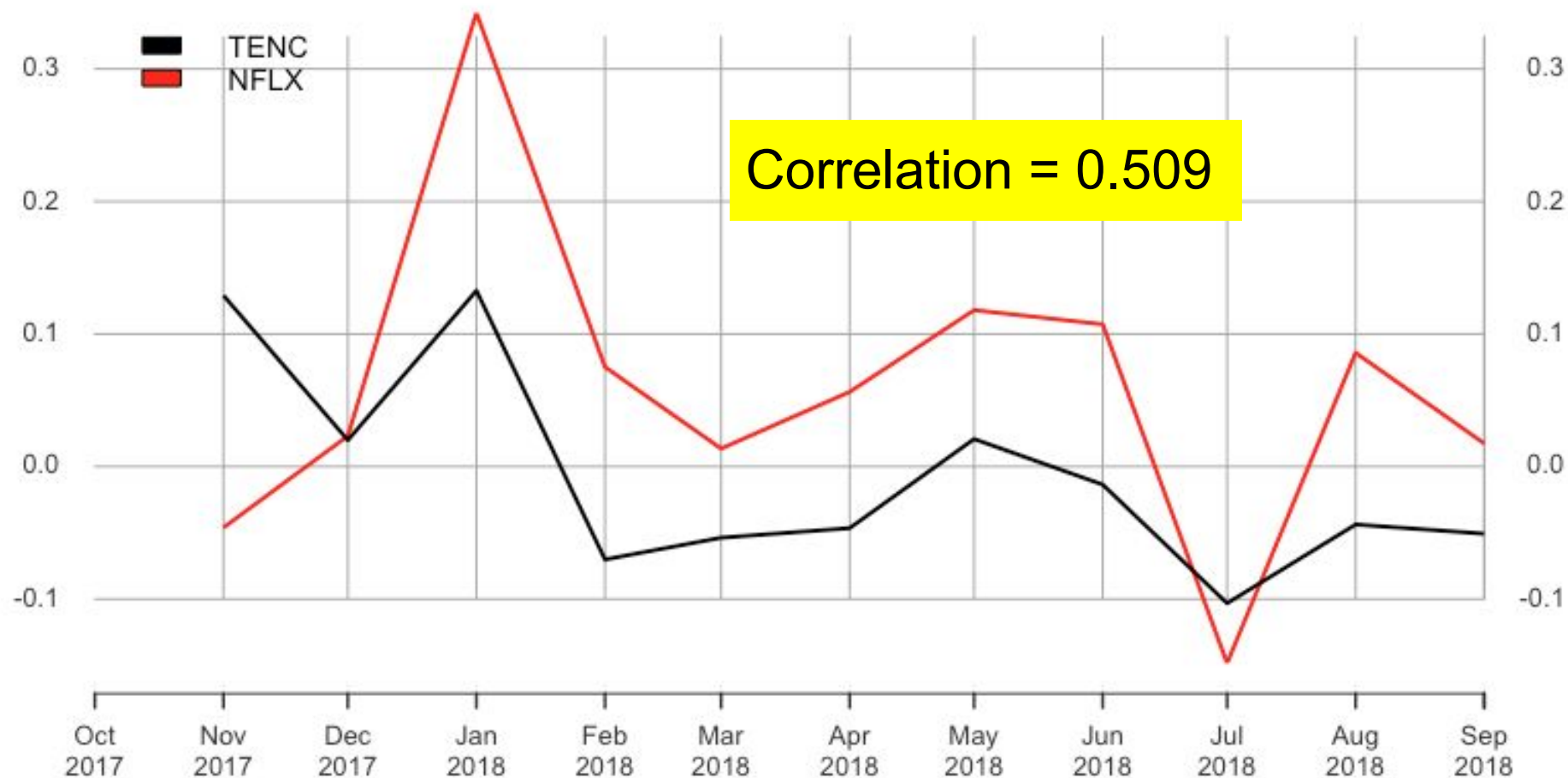
CC Return

Oct 2017 / Sep 2018



TENC & NFLX CC Return

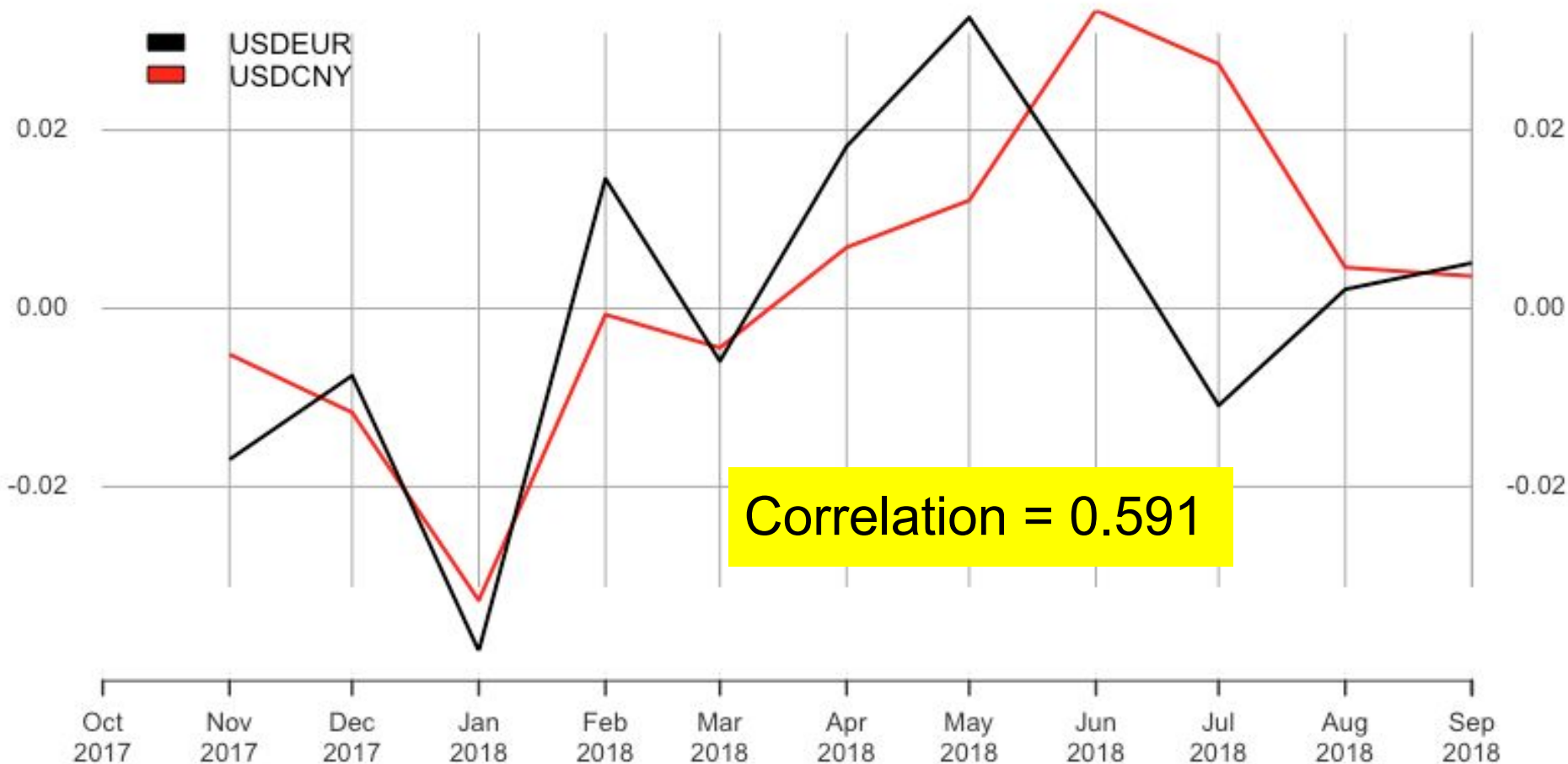
Oct 2017 / Sep 2018



USD/EUR & USD/CNY CC Return

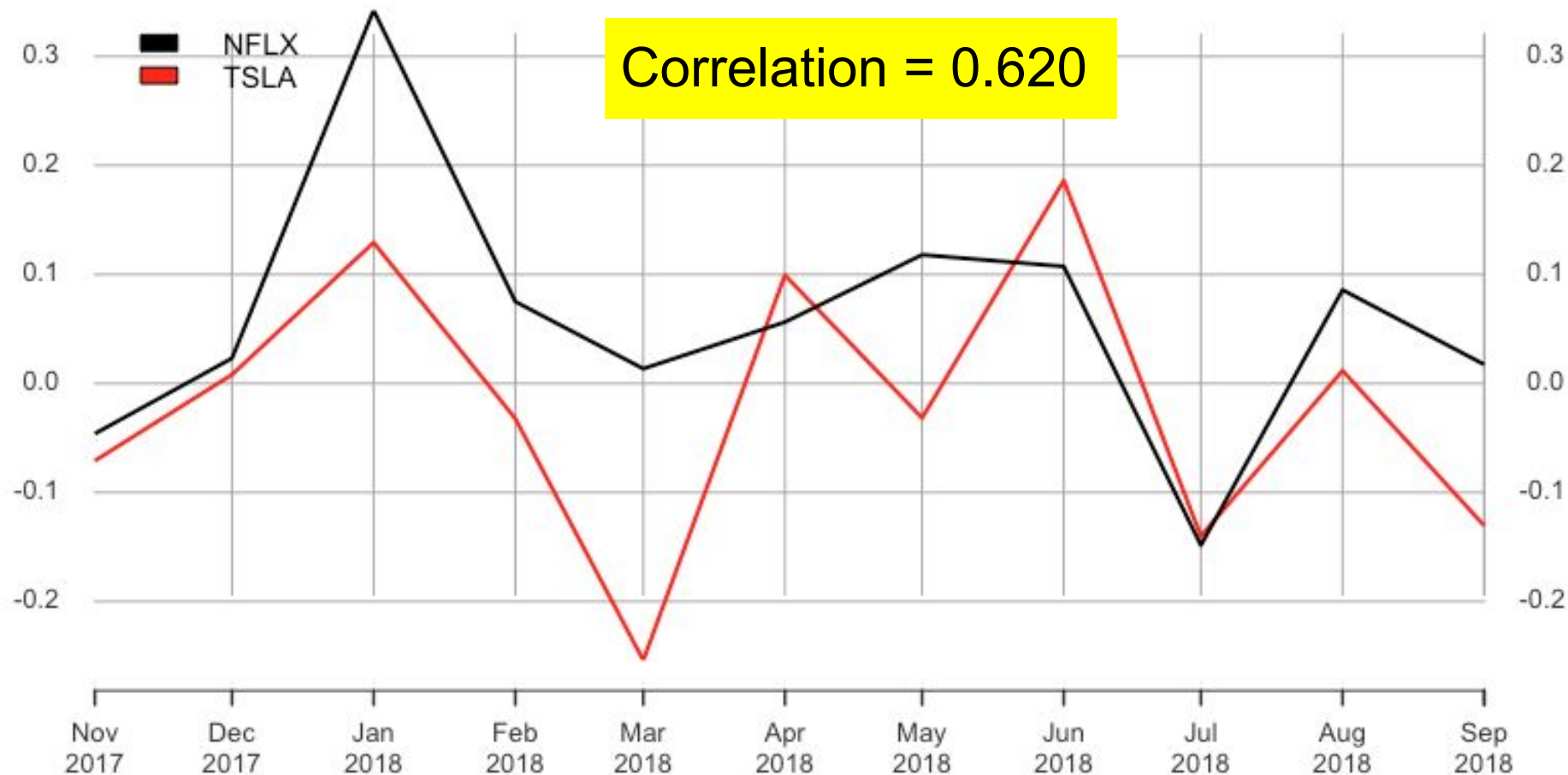
Oct 2017 / Sep 2018

■ USDEUR
■ USDCNY



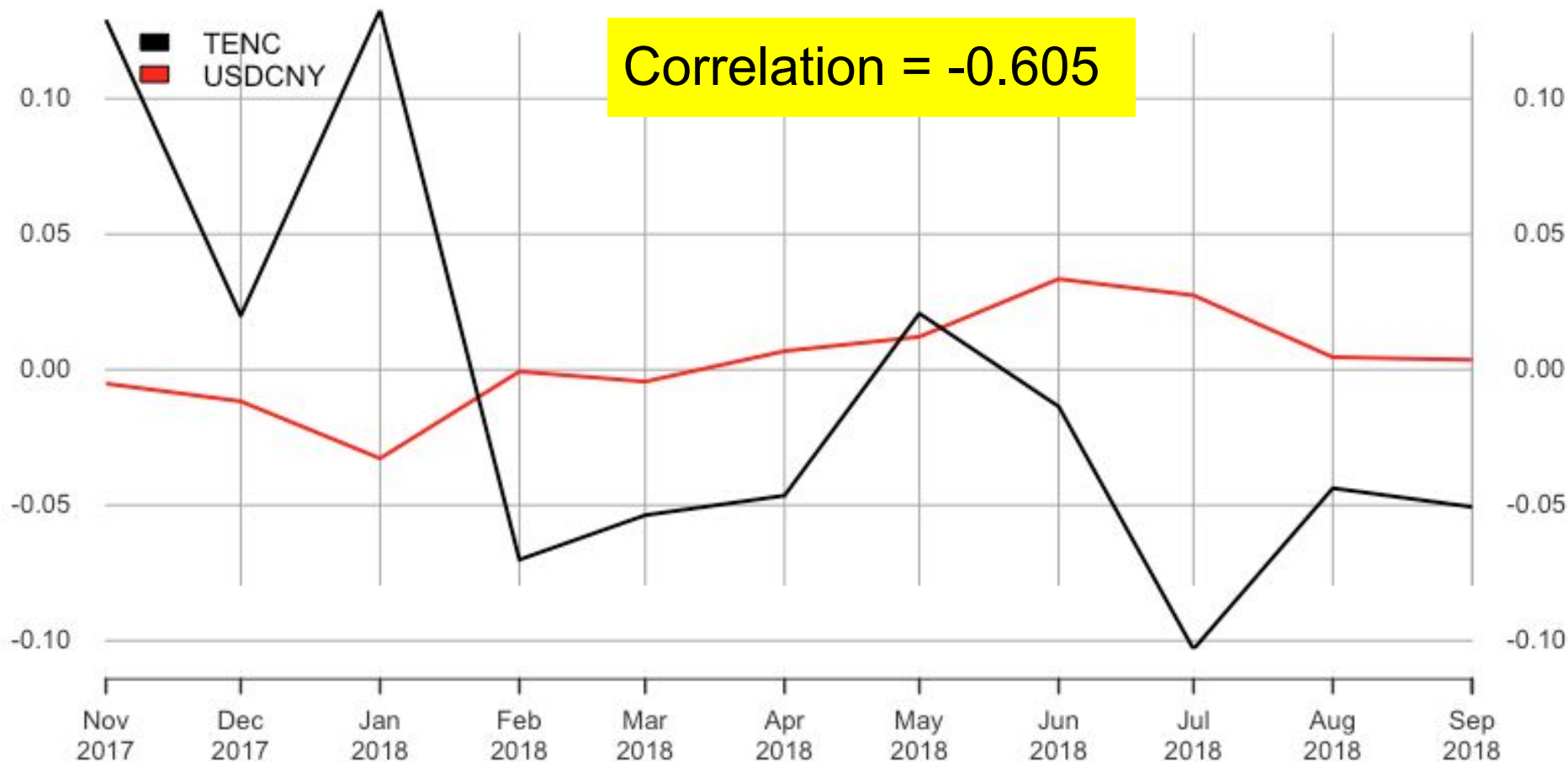
NFLX & TSLA CC Return

Nov 2017 / Sep 2018



TENC & USD/CNY CC Return

Nov 2017 / Sep 2018



Correlazione tra i ritorni

Intrattenimento

I ritorni di TENC e di NFLX appaiono fortemente correlati, sia visibilmente, dal grafico, sia tramite l'indice di correlazione. (= 0.509)

Valute

I tassi di cambio USD/EUR e USD/CNY sono anch'essi fortemente correlati.

Ciò può indicare una notevole influenza da parte del dollaro.

Massima Correlazione

Il valore di correlazione più forte si ottiene tra TSLA e NFLX, entrambe parte dell'indice NASDAQ.

RITORNI INUSUALI - NFLX

Tra dicembre 2017 e gennaio 2018 le azioni di Netflix sono cresciute di oltre il 30%, per poi stabilizzarsi ad un tasso di crescita compreso tra il 0% e il 10% nei mesi successivi.

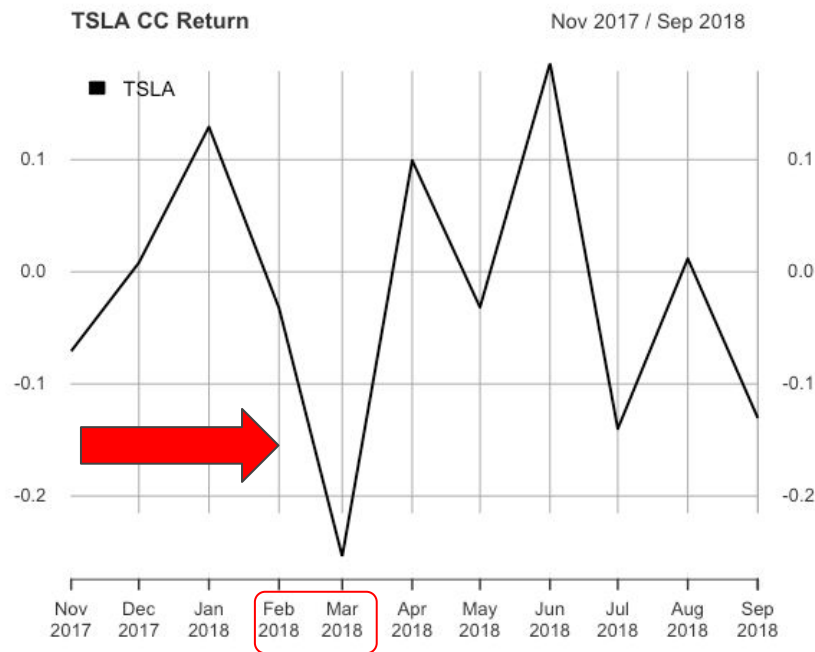
Negli ultimi 3 mesi del 2017 il numero di abbonati è salito di 8,33 milioni, contro i 5,1 milioni attesi dagli analisti.



RITORNI INUSUALI - TSLA

Tra febbraio 2018 e marzo 2018, Tesla scivola in ribasso, con una perdita del 22%.

Titoli FANG nel mirino dei sell, con il Nyse FANG Index che è sceso del 5,6%, con una perdita settimanale del 6% nell'arco dell'ultima settimana. Si tratta della peggiore performance da quando l'indice è stato creato.



RITORNI INUSUALI - TSLA

Anything negatively impacting Tesla's production at this point is a reason for investors to be concerned.

This is why investors may be uneasy after Tesla CEO Elon Musk sent a company email in which he said that "a Tesla employee who had conducted quite extensive and damaging sabotage to our operations," according to a copy of the email obtained by [CNBC](#).

In another email, Musk said there was "another strange incident that was hard to explain." It was a small fire in the company's "body-in-white production line," Musk [said](#).



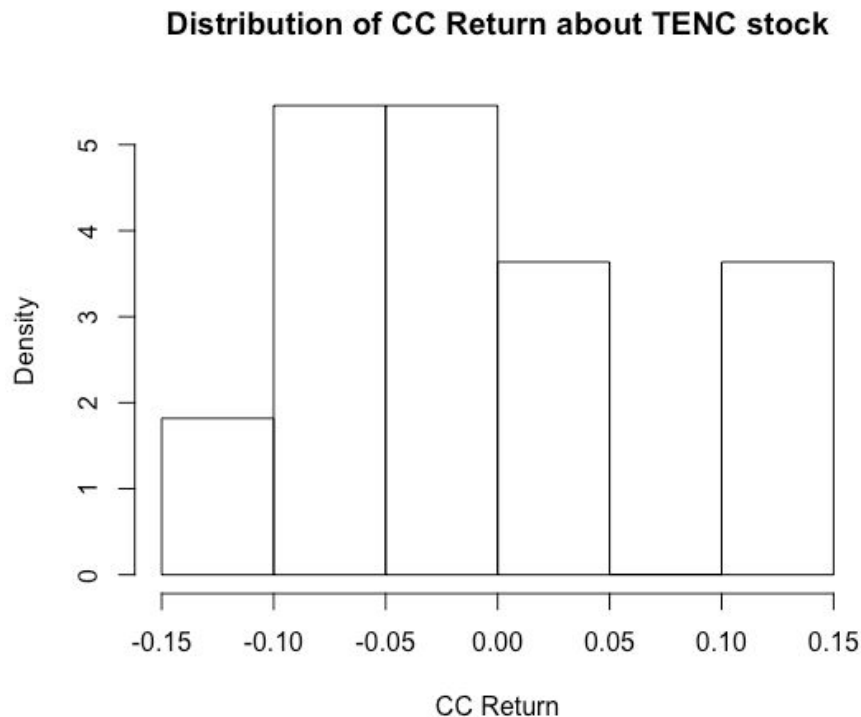
Istogrammi dei Ritorni

Mostra la dispersione relativa per il ritorno di ciascun mese

Istogramma dei Ritorni - TENC

Range = (Max. Value – Min. Value)

Range = $0.15 - (-0.15) = 0.3$

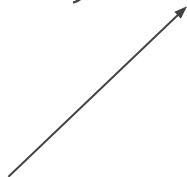


Istogramma dei Ritorni - NFLX

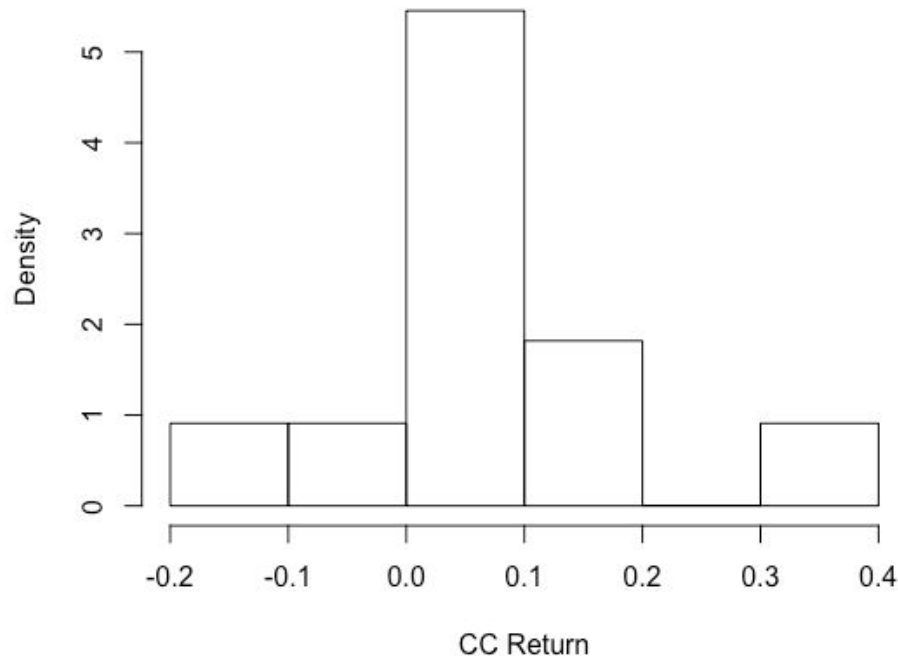
Range = (Max. Value – Min. Value)

Range = $0.4 - (-0.2) = 0.6$

Dispersione Massima



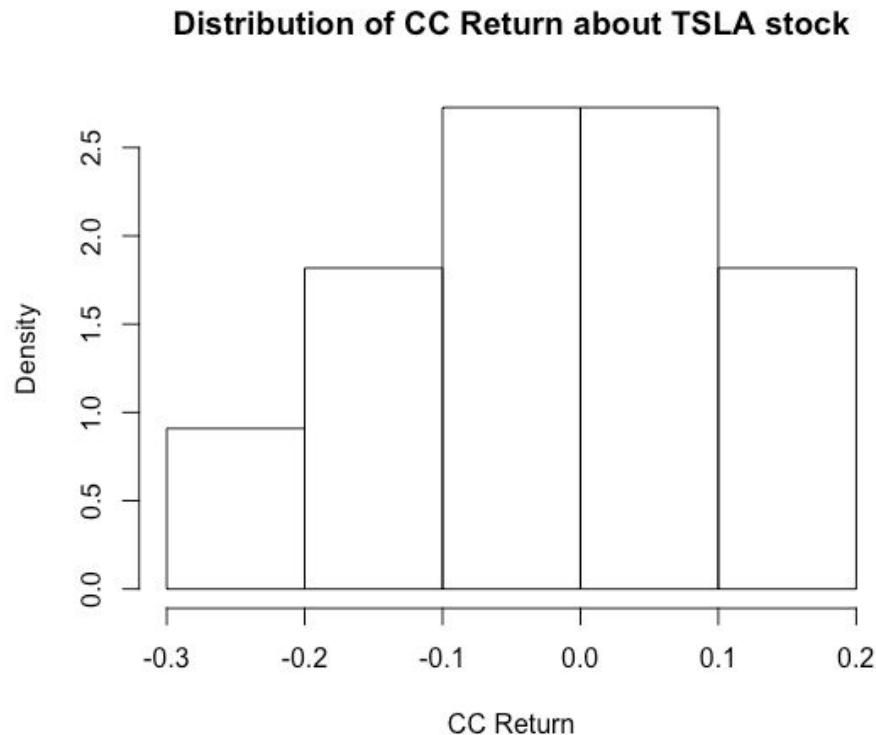
Distribution of CC Return about NFLX stock



Istogramma dei Ritorni - TSLA

Range = (Max. Value – Min. Value)

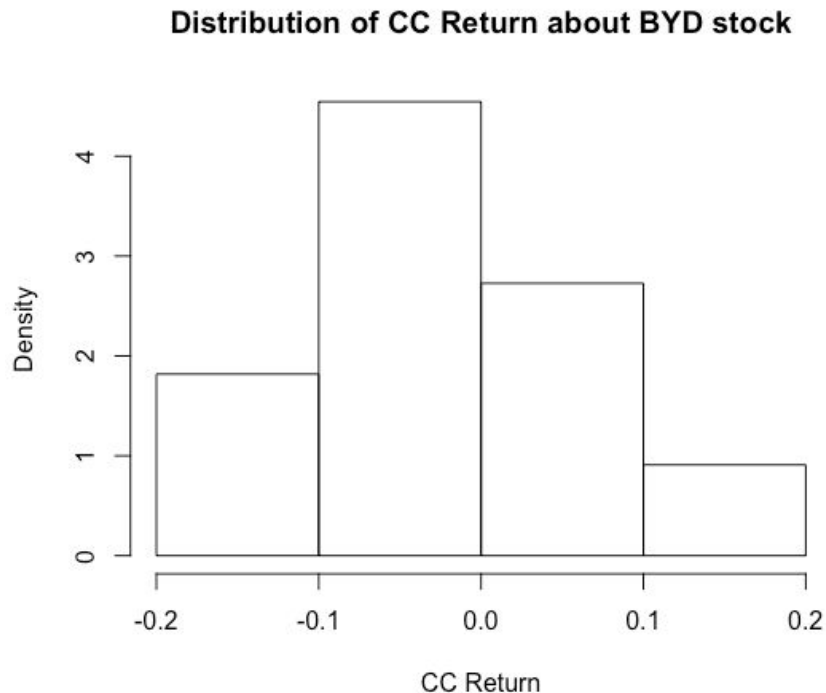
$$\text{Range} = 0.2 - (-0.3) = 0.5$$



Istogramma dei Ritorni - BYD

Range = (Max. Value – Min. Value)

$$\text{Range} = 0.2 - (-0.2) = 0.4$$



Istogramma dei Ritorni - USD/EUR

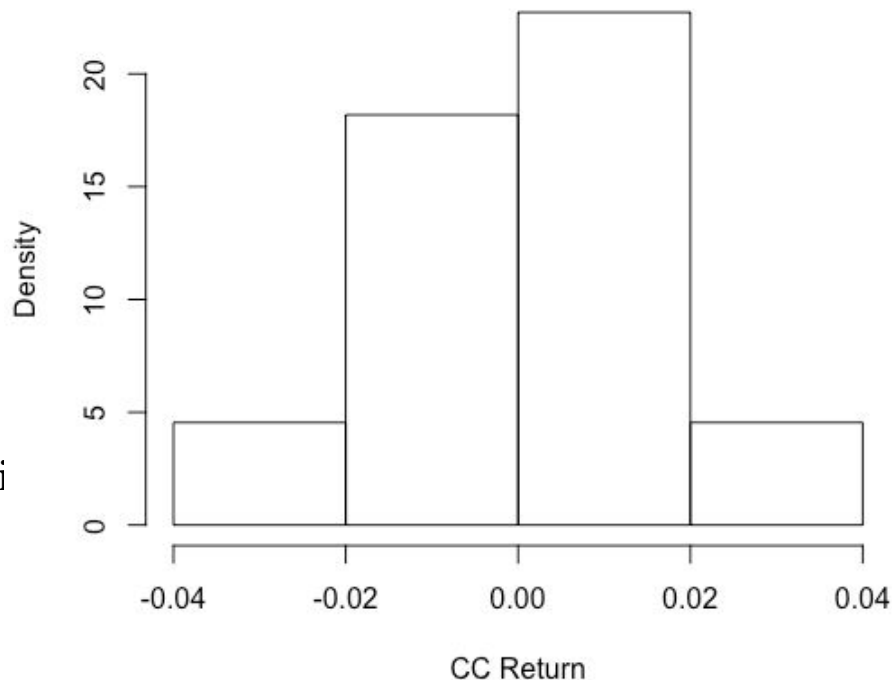
Range = (Max. Value – Min. Value)

$$\text{Range} = 0.04 - (-0.04) = 0.08$$

Dispersione Minima

Trattandosi di tasso di cambio tra valute è normale aspettarsi minore variazione nei ritorni rispetto a dei titoli aziendali.

Distribution of CC Return about USD/EUR stock

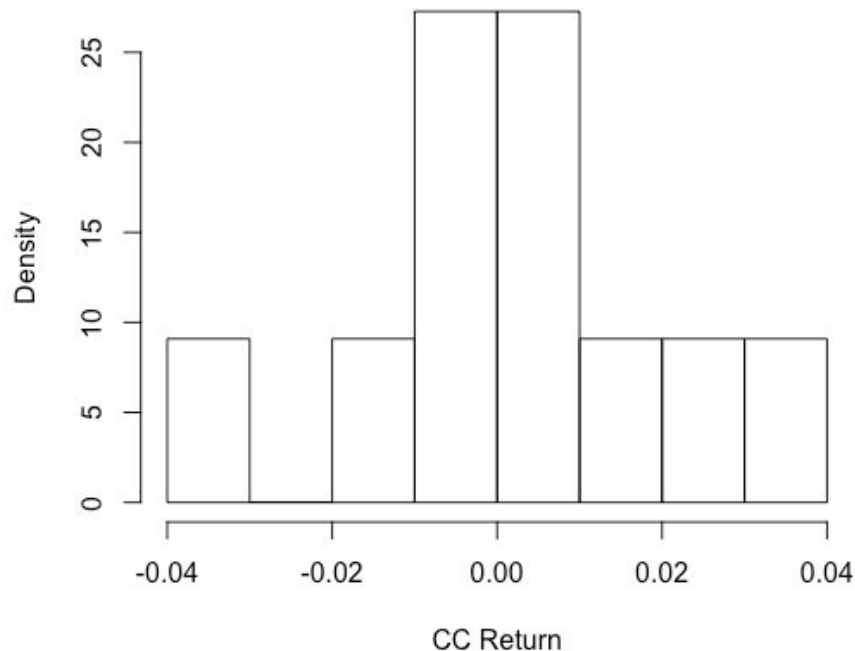


Istogramma dei Ritorni - USD/CNY

Range = (Max. Value – Min. Value)

$$\text{Range} = 0.04 - (-0.04) = 0.08$$






Distribution of CC Return about USD/CNY stock



4 Panel Diagnostic Plots

1. Histogramma
2. Smoothed Density
3. Boxplot
4. qq-plot

Statistiche Descrittive

	Mean 	Variance 	Standard Deviation 	Skewness 	Kurtosis 
0700.HK	-0.00719001495486651	0.00597951473823162	0.0773273220681514	0.763354312080605	-0.860025446558761
NFLX	0.0585724768959113	0.0146172625196718	0.120901871448178	0.666682635098658	0.598476072184558
TSLA	-0.0204415288367841	0.0164940041404491	0.128428984814368	-0.0845439652959235	-1.0431711018397
1211.HK	-0.0177931599286875	0.00955828513473179	0.0977664826754639	0.49932179463415	-0.569230914322978
EUR=X	0.000370013788998132	0.000373730787732304	0.0193321180353396	-0.280257664281734	-0.644773184890968
CNY=X	0.00303500351672598	0.000325458219347772	0.0180404606190577	-0.101535855745062	-0.498773213664587

Skewness & Kurtosis

Skewness measures symmetry of a distribution around the mean:

$$\text{Skew}(X) = E \left[\left(\frac{X - \mu_X}{\sigma_X} \right)^3 \right]$$

if = 0 symmetric (Normal distribution) ,

if > 0 pdf long right tail (log normal),

if < 0 pdf long left tail.

Kurtosis measures tail thickness

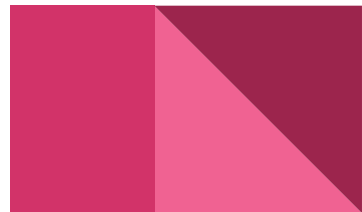
$$\text{Kurt}(X) = E \left[\left(\frac{X - \mu_X}{\sigma_X} \right)^4 \right], \text{ fat tails or thin tails}$$

$$X \sim N(\mu_X, \sigma_X), \text{ Kurt}(X) = 3 \Rightarrow \text{Excess kurtosis} = \text{Kurt}(X) - 3$$

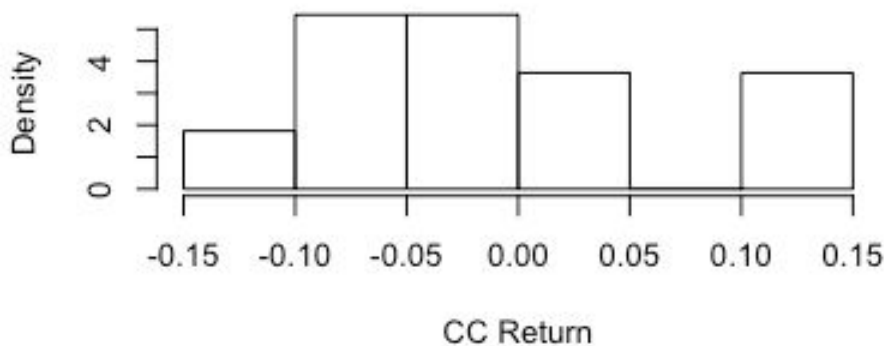
> 0 fatter tail than normal

< 0 thinner tails than normal

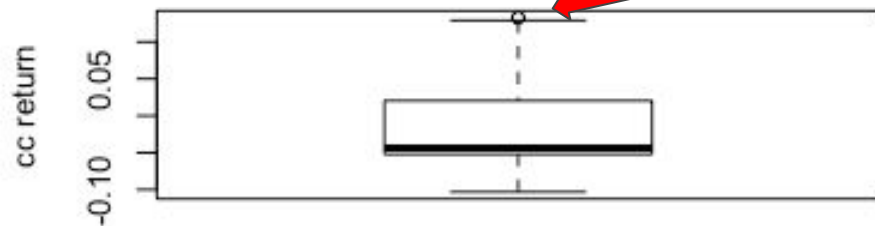
=0 same tails as normal distr.



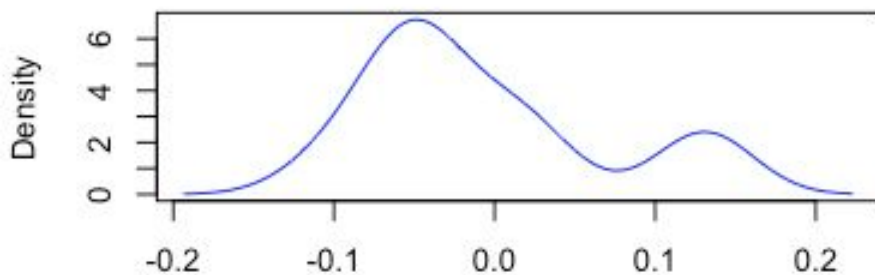
Distribution of CC Return about TENC stock



TENC CC Return OUTLIER

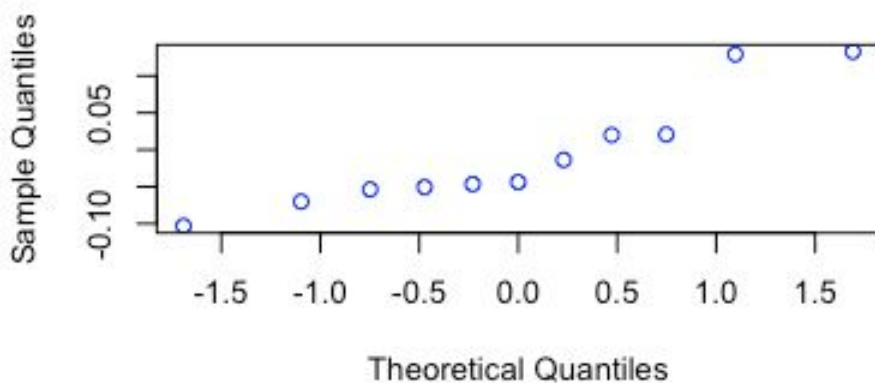


Smoothed Density

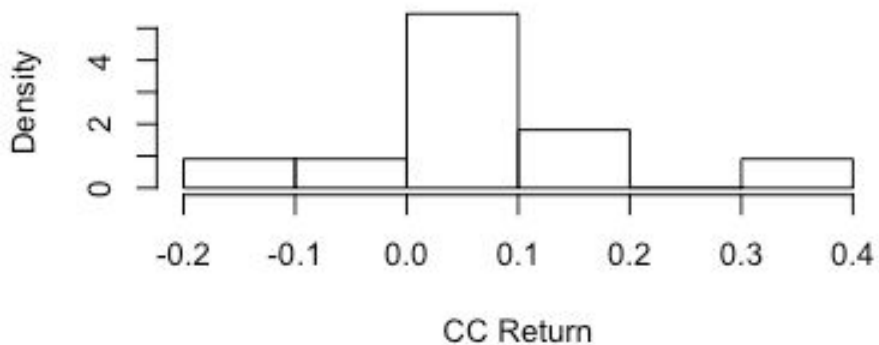


N = 11 Bandwidth = 0.03015

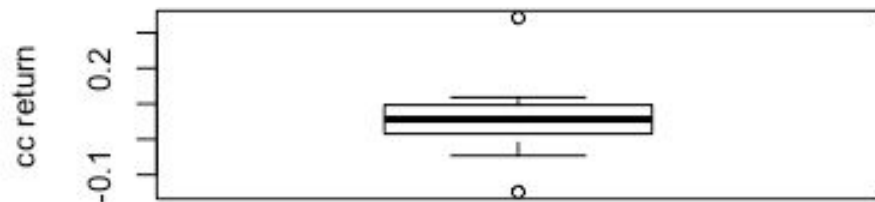
TENC



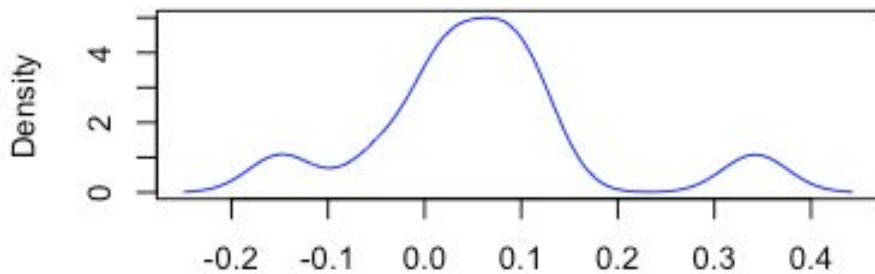
Distribution of CC Return about NFLX stock



NFLX CC Return

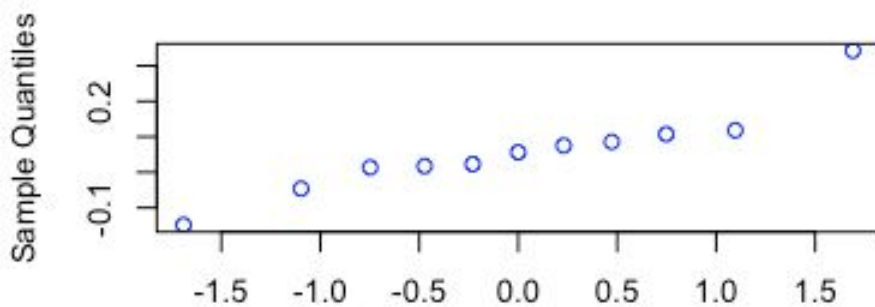


Smoothed Density

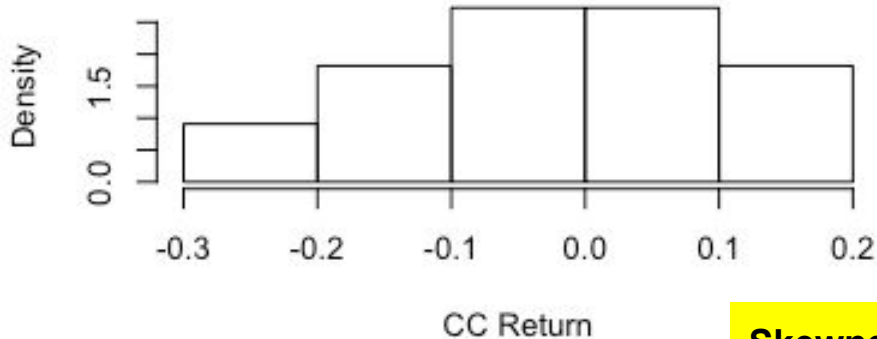


N = 11 Bandwidth = 0.03372

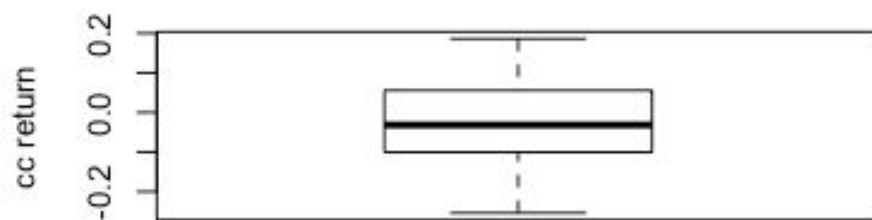
NFLX



Distribution of CC Return about TSLA stock

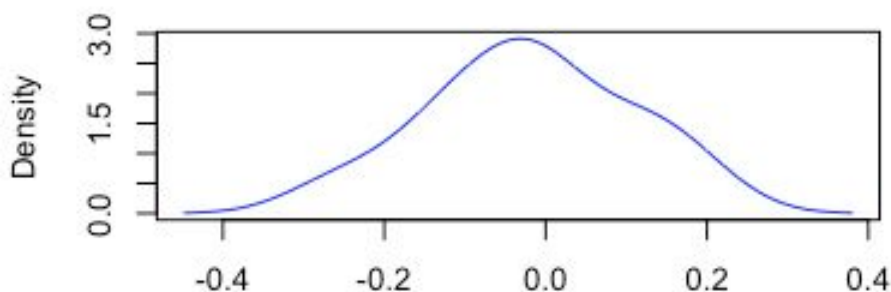


TSLA CC Return



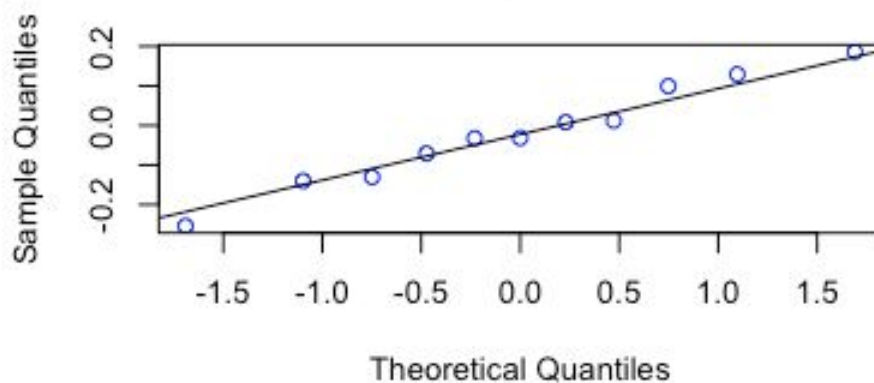
Skewness = -0.084
E' la distribuzione più
simmetrica

Smoothed Density

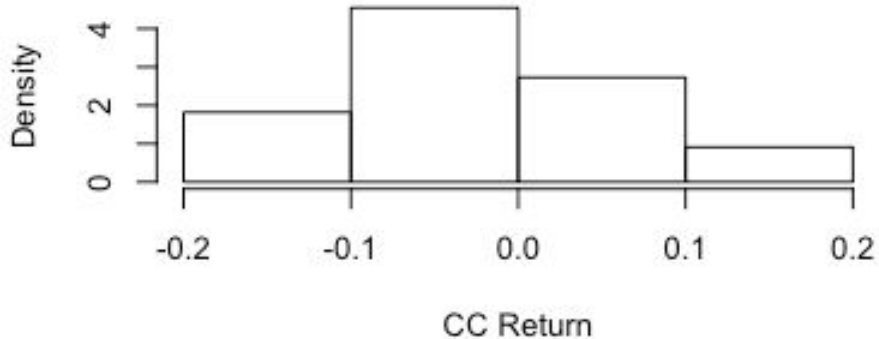


N = 11 Bandwidth = 0.06492

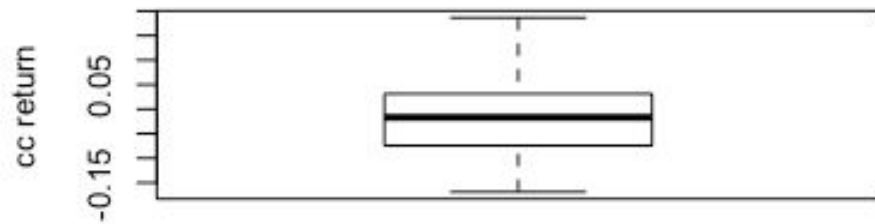
TSLA



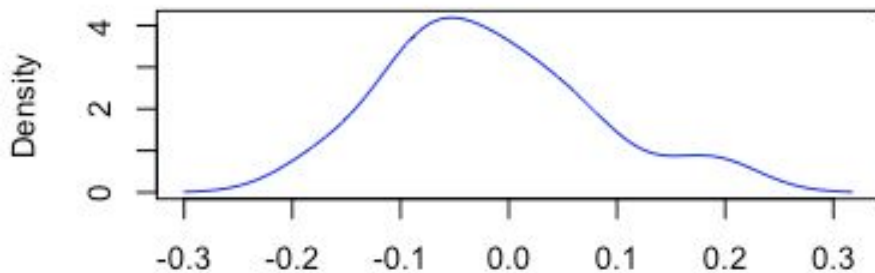
Distribution of CC Return about BYD stock



BYD CC Return

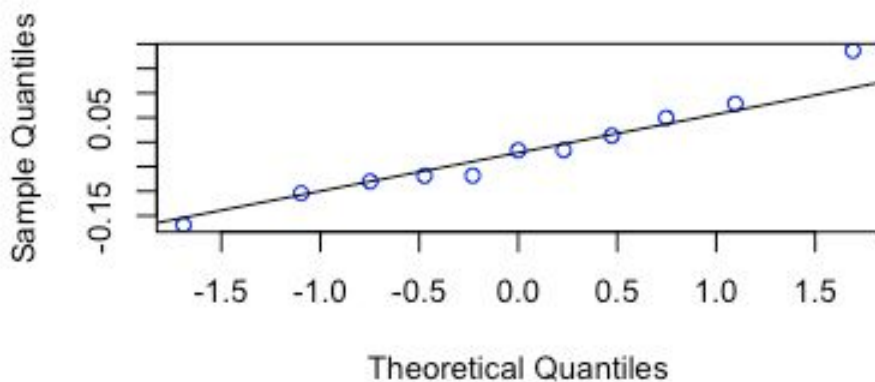


Smoothed Density

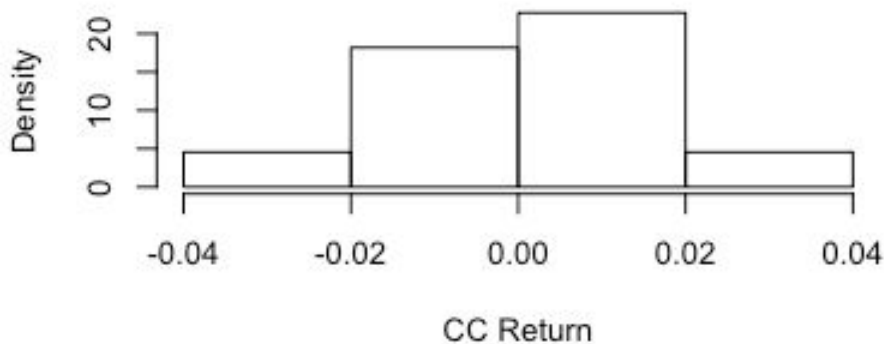


N = 11 Bandwidth = 0.04392

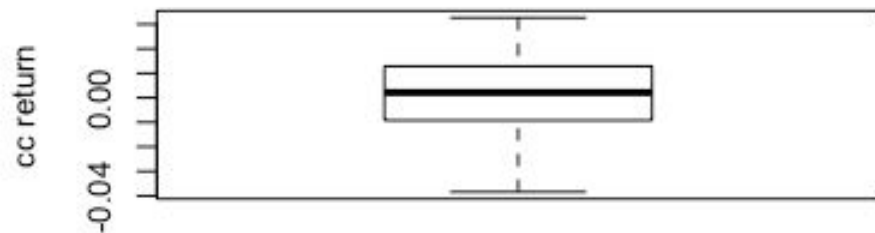
BYD



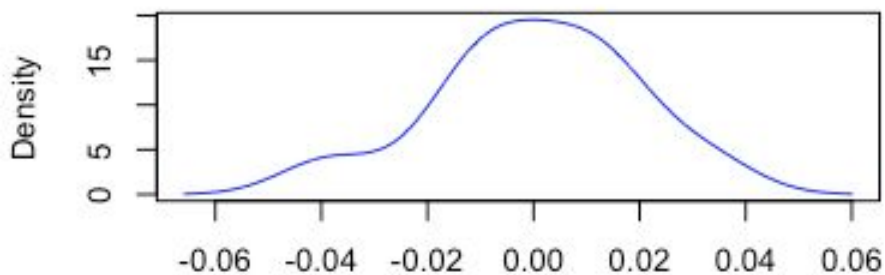
Distribution of CC Return about USD/EUR stock



USD/EUR CC Return

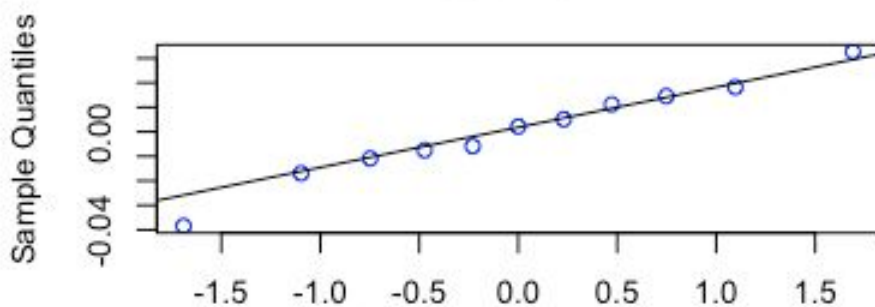


Smoothed Density

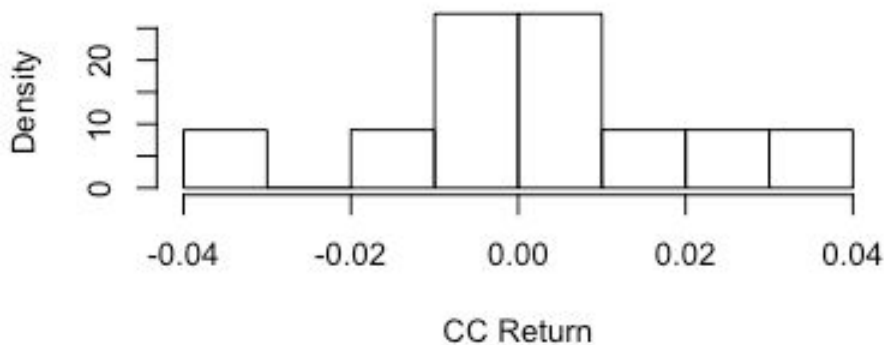


N = 11 Bandwidth = 0.009185

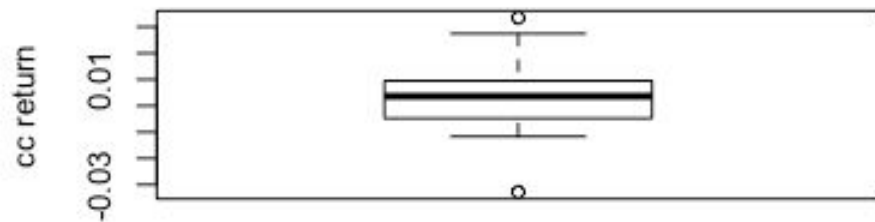
USD/EUR



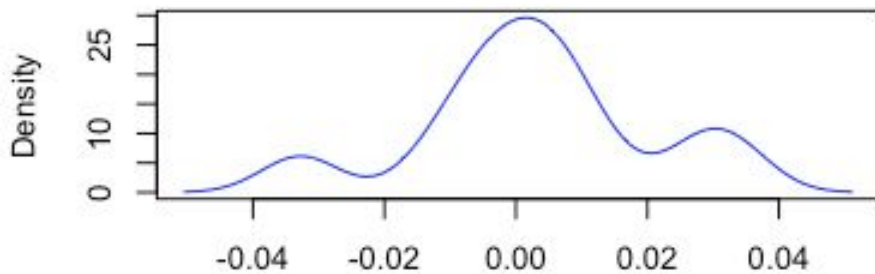
Distribution of CC Return about USD/CNY stock



USD/CNY CC Return

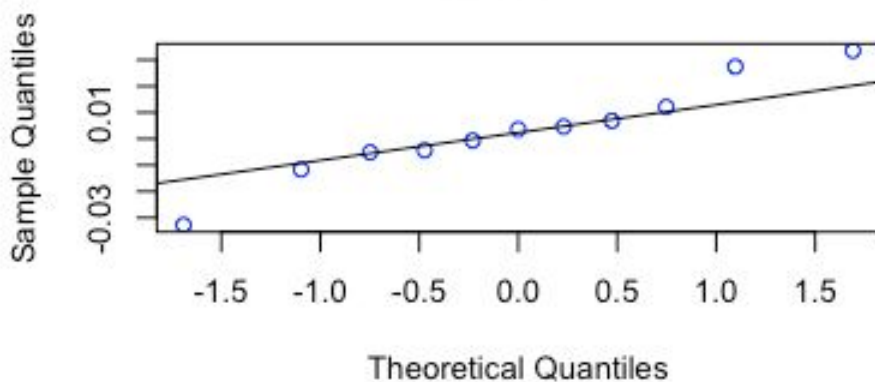


Smoothed Density



N = 11 Bandwidth = 0.005929

USD/CNY

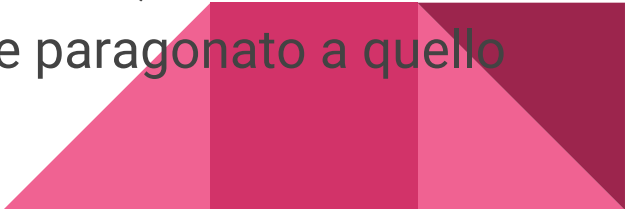


Distribuzioni

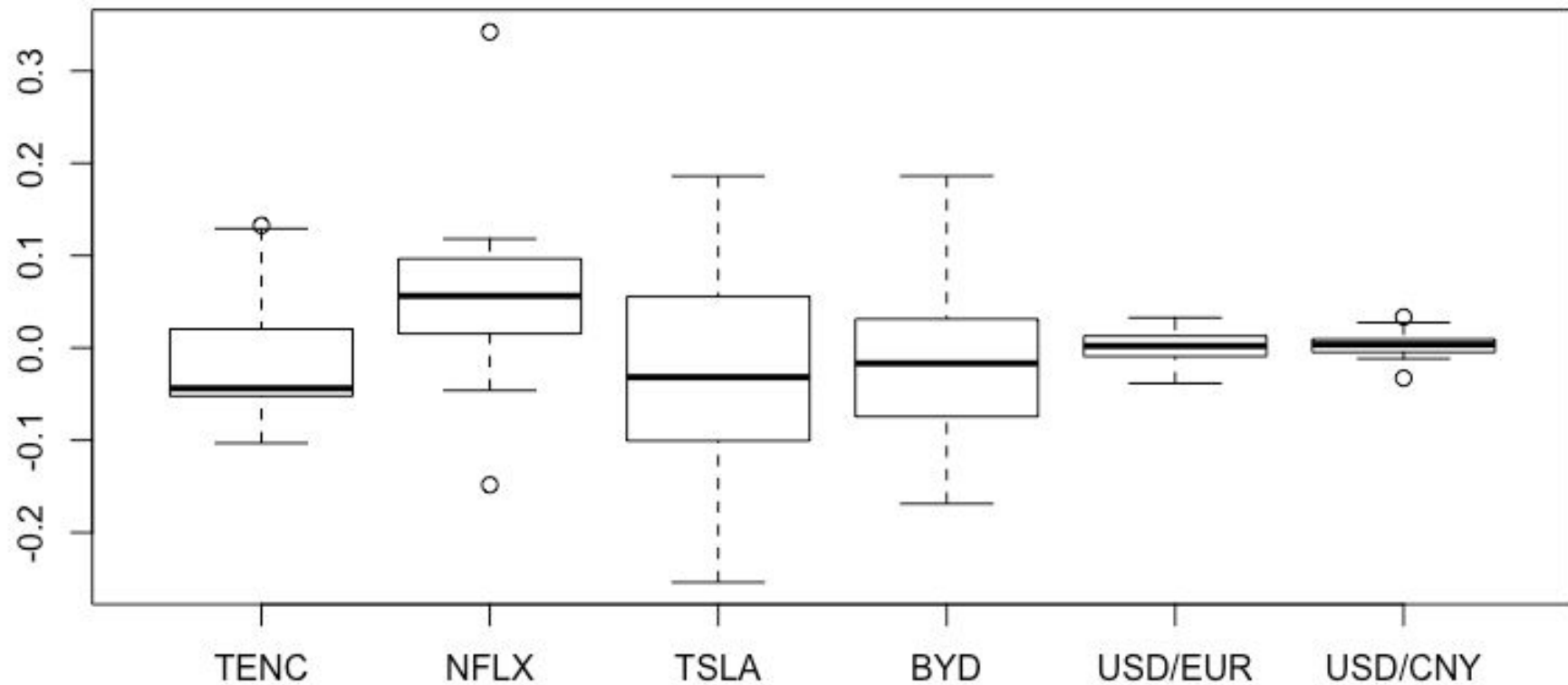
Nessun ritorno sembra essere distribuito come una normale, sebbene TSLA appaia come la più simmetrica di tutte, con un valore di skewness pari a -0.084. Tuttavia ha un forte valore di kurtosis, di -1.04

I ritorni che sembrano più lontani da una distribuzione normale sono quelli di TENCENT, con valori alti di kurtosis e skewness, rispettivamente di -0.86 e 0.76

Per quanto riguarda la kurtosis, il valore più basso è -0.49, considerato comunque un valore troppo elevato per poter essere paragonato a quello di una normale.



CC Return Boxplot



Outliers

Sono presenti alcuni outliers, come si può vedere dai boxplot.

Quelli più significativi appartengono a Netflix, che potevamo già vedere dal grafico dei ritorni.

Tesla, BYD e il cambio USD/EUR non hanno outliers.



Volatilità e Media

Il titolo con la volatilità più alta (varianza e deviazione standard) è TSLA.

La media più alta appartiene a NFLX, con un valore di 0.058



Matrice di Covarianza

	0700.HK ▼	NFLX ⬆	TSLA ⬆	1211.HK ⬆	EUR=X ⬆	CNY=X ⬆
0700.HK	0.00597951473823162	0.00475978288668344	0.00351815572532547	0.00201290666482346	-0.000765867750365626	-0.000845353515795371
NFLX	0.00475978288668344	0.0146172625196718	0.00963304027701758	0.00287898966008381	-0.000380346096931767	-0.00115172031274924
TSLA	0.00351815572532547	0.00963304027701758	0.0164940041404491	0.00138714011989268	0.00010269901658804	0.0000123551966849054
1211.HK	0.00201290666482346	0.00287898966008381	0.00138714011989268	0.00955828513473179	-0.000574639304138579	-0.000603010496890749
EUR=X	-0.000765867750365626	-0.000380346096931767	0.00010269901658804	-0.000574639304138579	0.000373730787732304	0.000206205023202681
CNY=X	-0.000845353515795371	-0.00115172031274924	0.0000123551966849054	-0.000603010496890749	0.000206205023202681	0.000325458219347772

Rischio

Il titolo che appare più rischioso è NFLX.

Si può già vedere dall'istogramma, dove il range di dispersione (0.6) è il più alto tra tutti.

Inoltre la sua varianza è il secondo valore più alto (0.14).

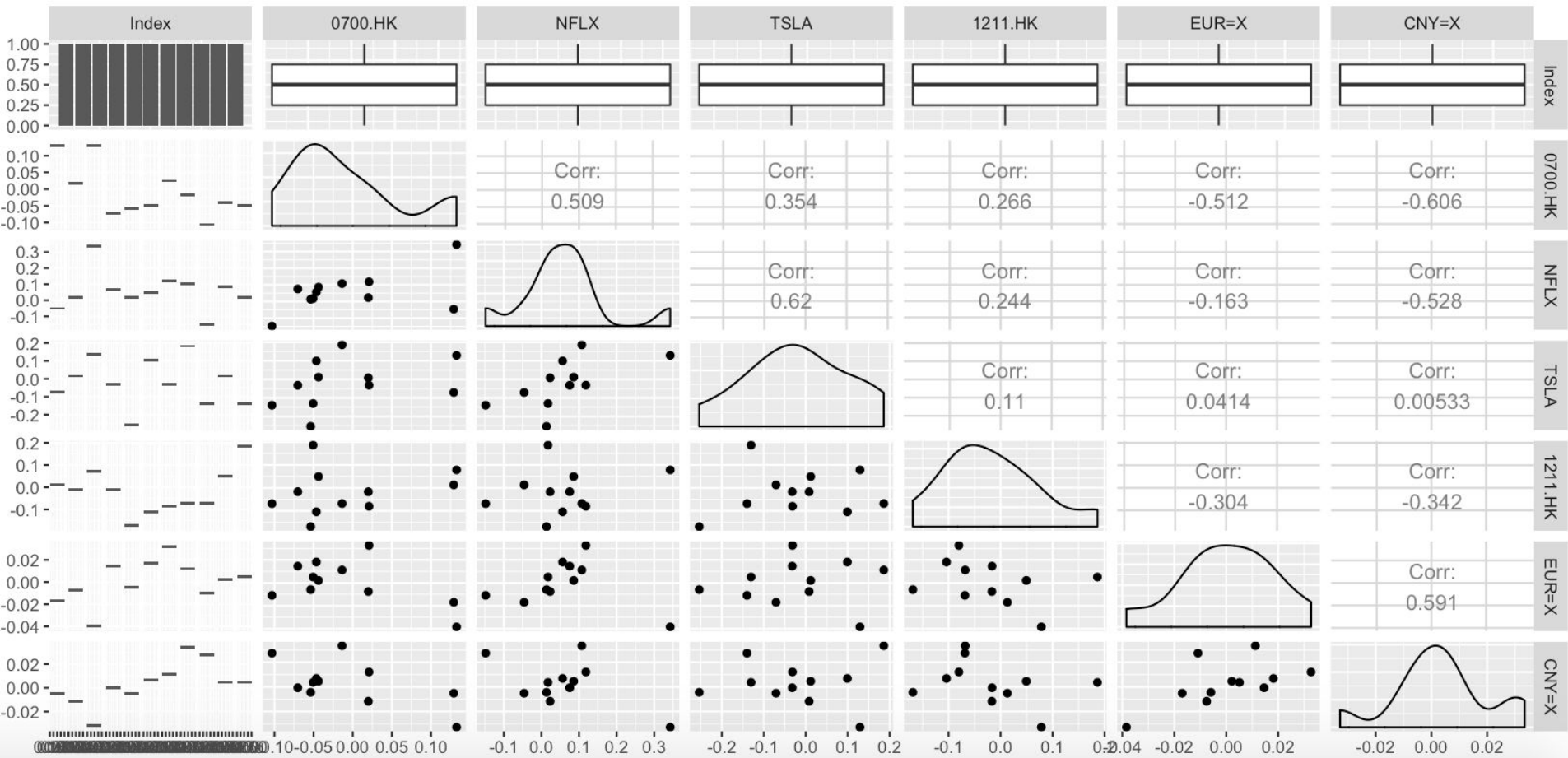
Anche il numero di outliers presenti è una prova dell'elevato rischio del titolo.



Matrice di Correlazione

	0700.HK ↕	NFLX ↕	TSLA ↕	1211.HK ↕	EUR=X ↕	CNY=X ↕
0700.HK	1	0.509121162357633	0.354257488116165	0.266256780633663	-0.512320075103271	-0.605979274581023
NFLX	0.509121162357633	1	0.620393591648855	0.243566239398495	-0.162729579579553	-0.528039463487036
TSLA	0.354257488116165	0.620393591648855	1	0.110475834897055	0.0413641207457134	0.00533259979688305
1211.HK	0.266256780633663	0.243566239398495	0.110475834897055	1	-0.304036621850165	-0.34189067781482
EUR=X	-0.512320075103271	-0.162729579579553	0.0413641207457134	-0.304036621850165	1	0.591251397783293
CNY=X	-0.605979274581023	-0.528039463487036	0.00533259979688305	-0.34189067781482	0.591251397783293	1

Pairwise Correlation Scatterplots



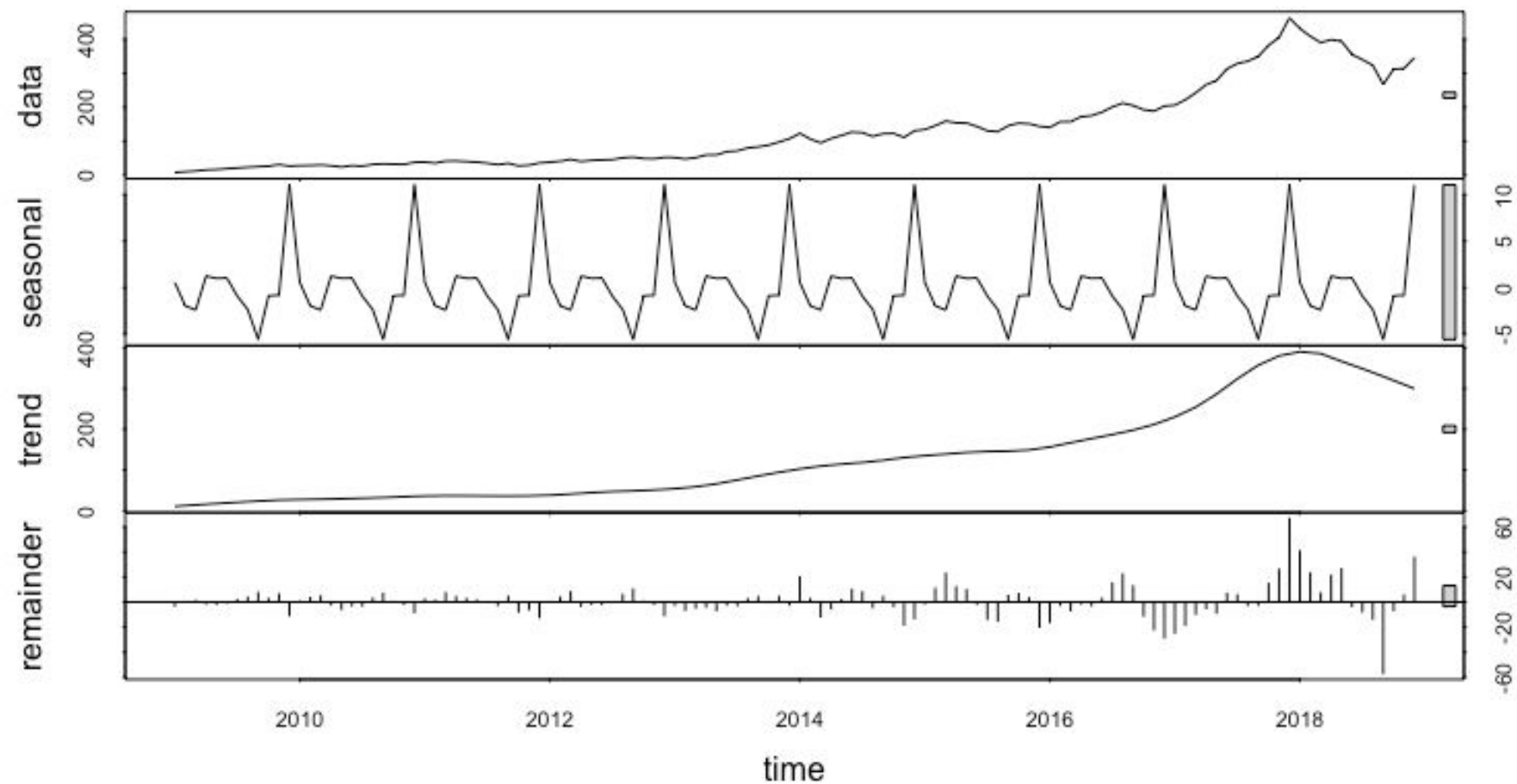
3. Predictive Analytics

Modello Arima

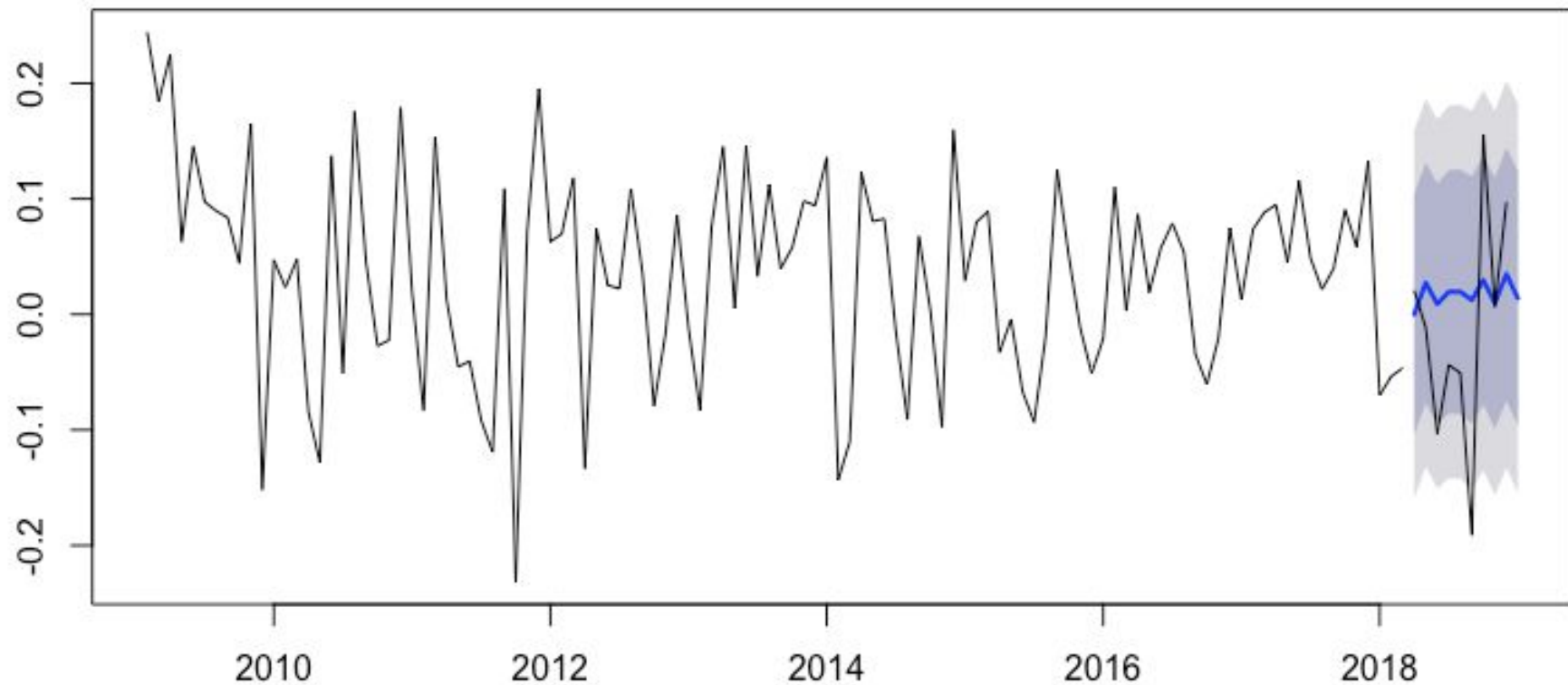
- 80 mesi di training
- 30 mesi di test
- 10 mesi di validazione



Seasonal Decomposition of TENC Adjusted Close Price Time Series

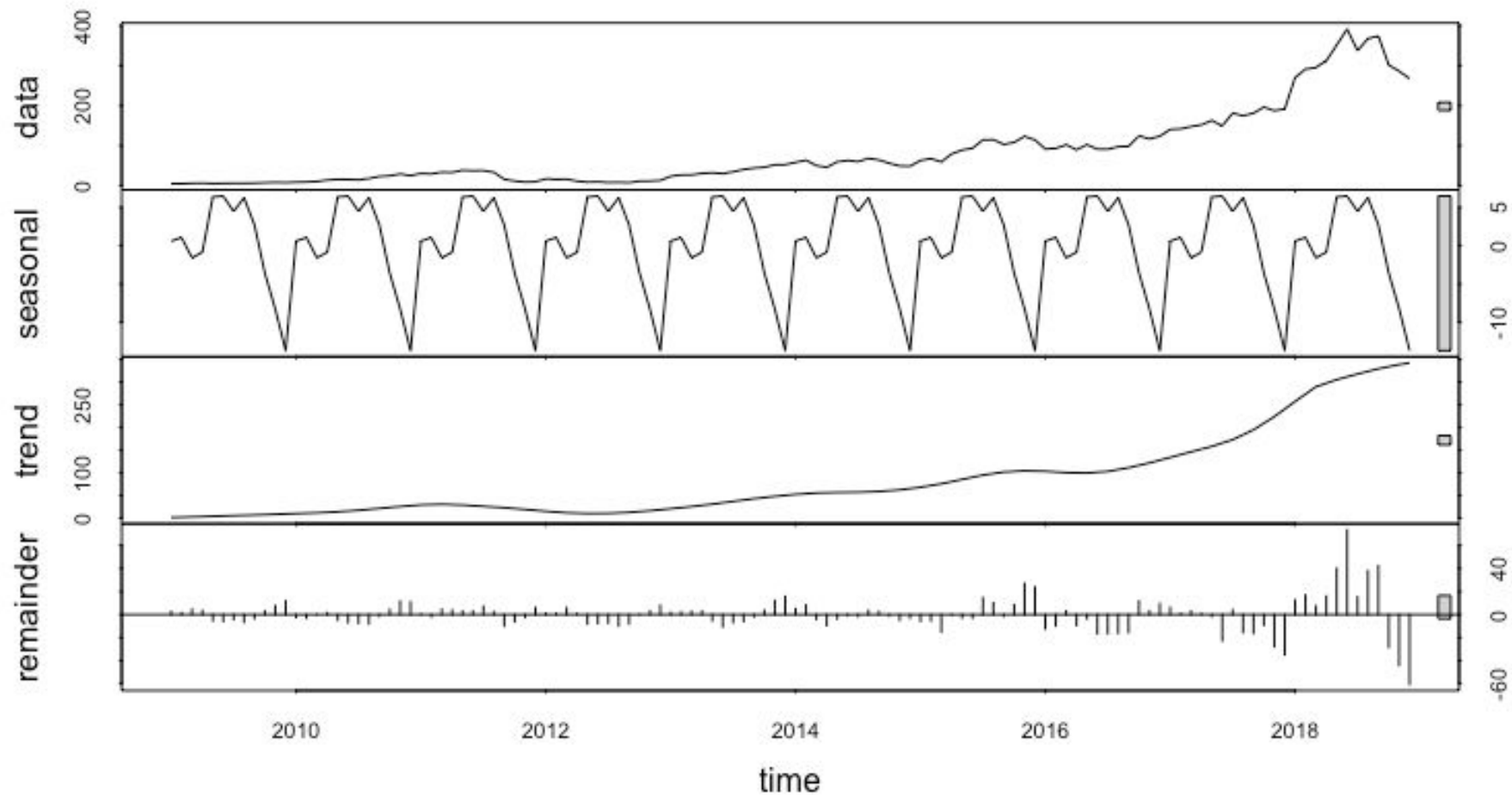


ARMA forecasts for TENC returns

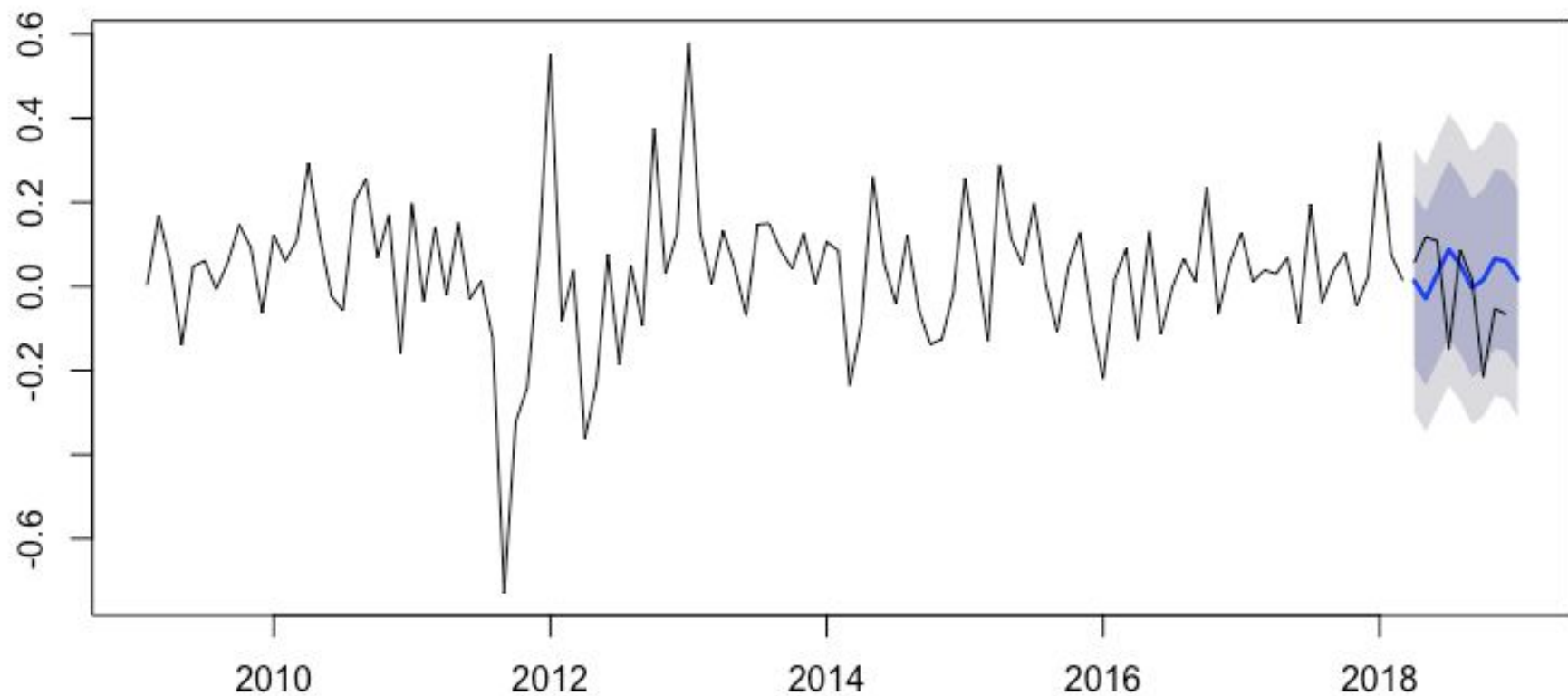


RMSE = 0.09694416

Seasonal Decomposition of NFLX Adjusted Close Price Time Series

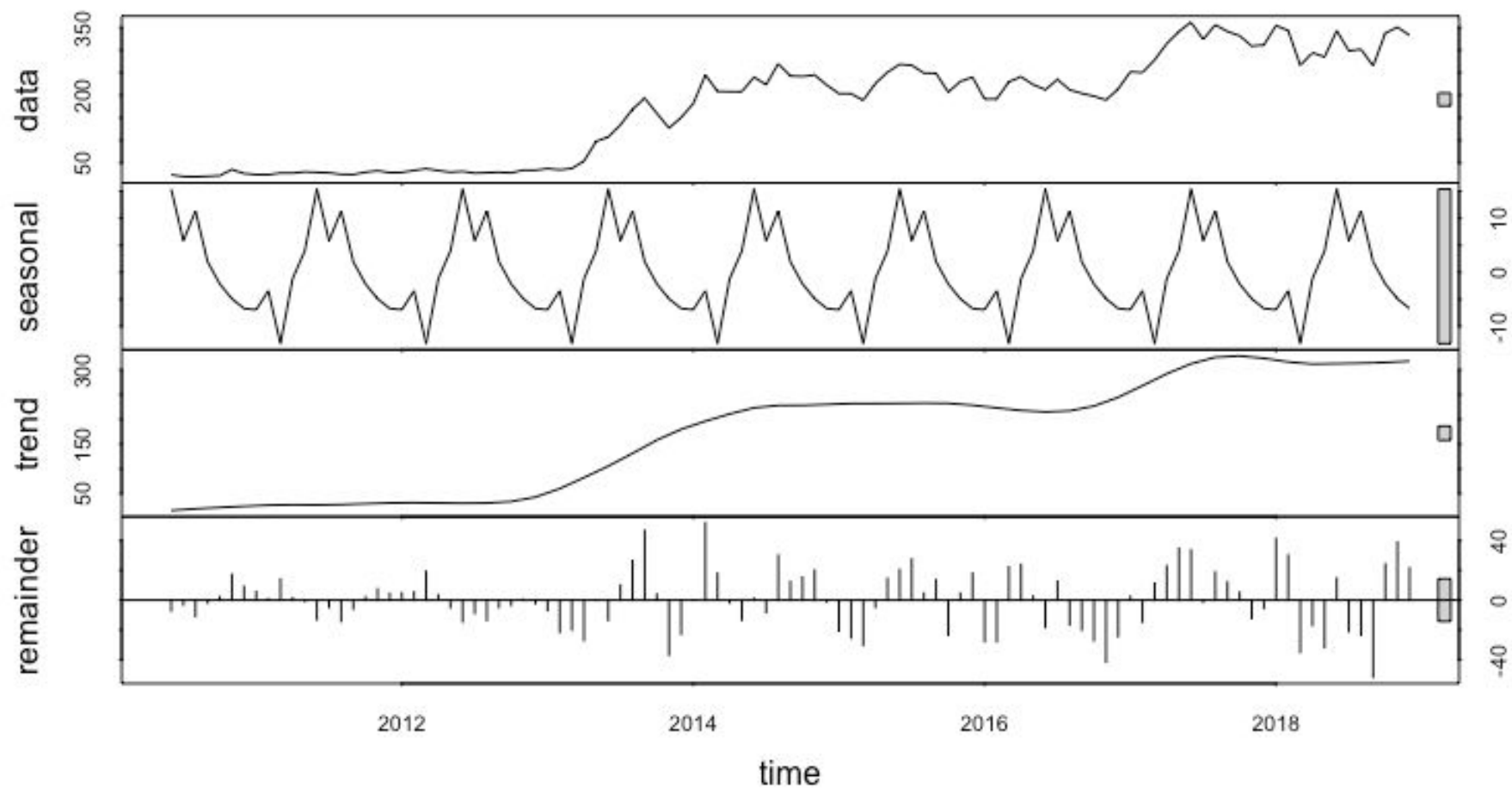


ARMA forecasts for NFLX returns

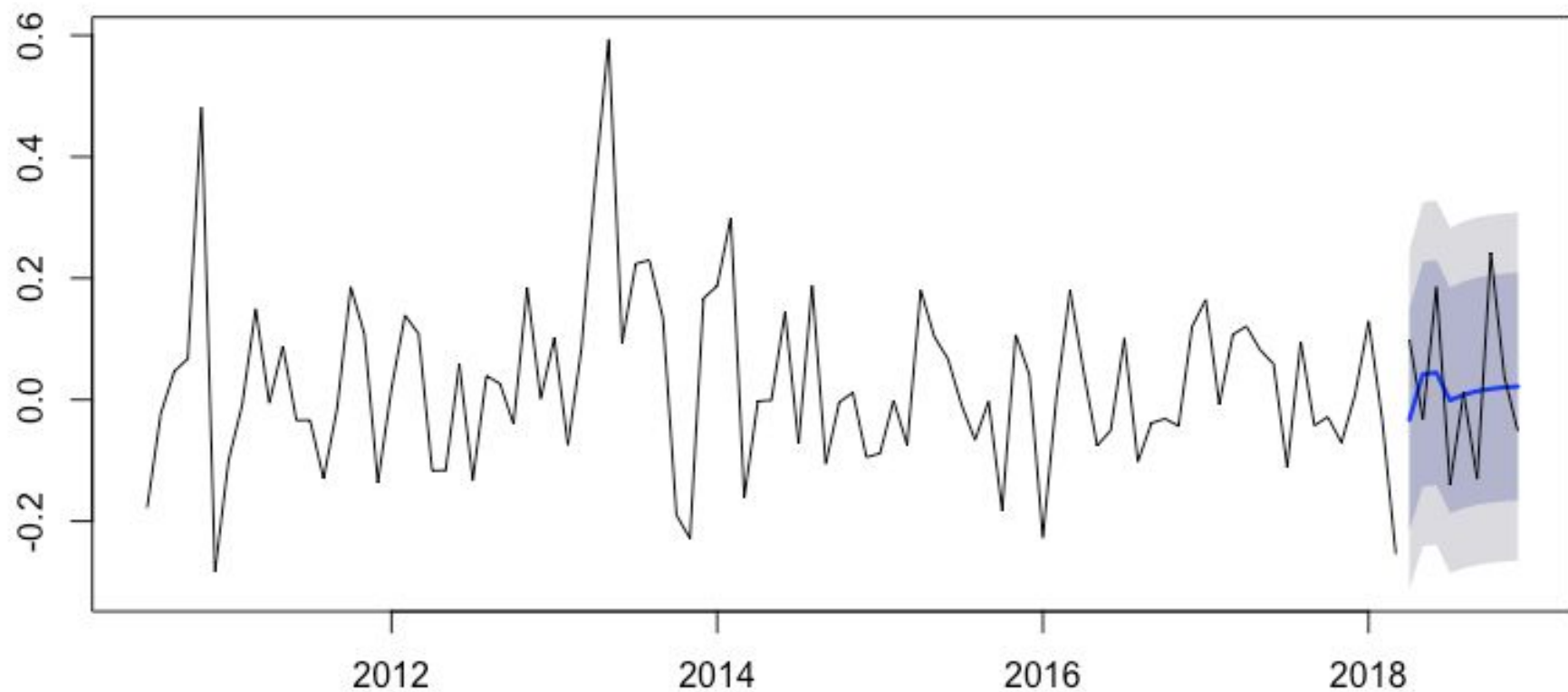


RMSE = 0.1353085

Seasonal Decomposition of TSLA Adjusted Close Price Time Series

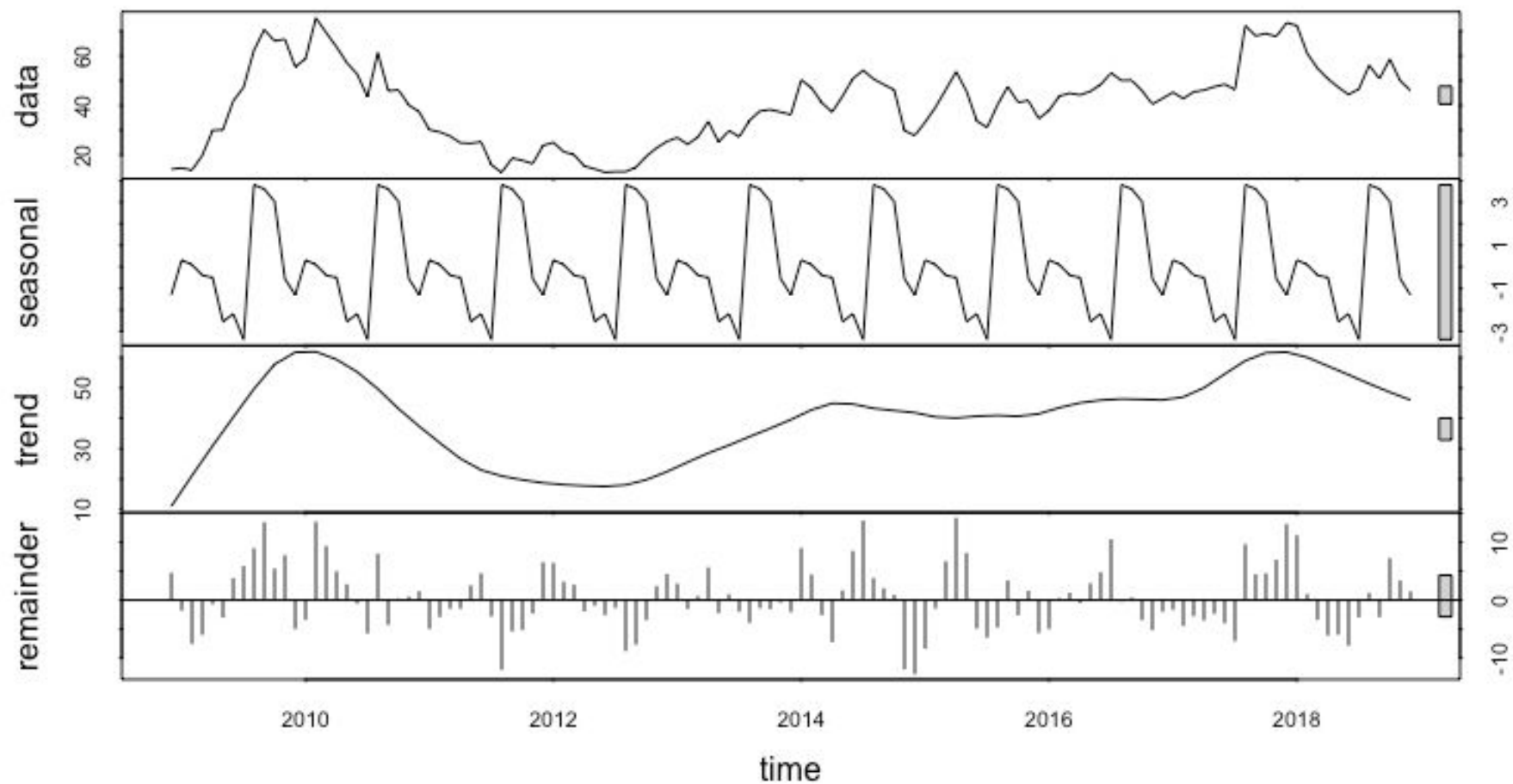


ARMA forecasts for TSLA returns

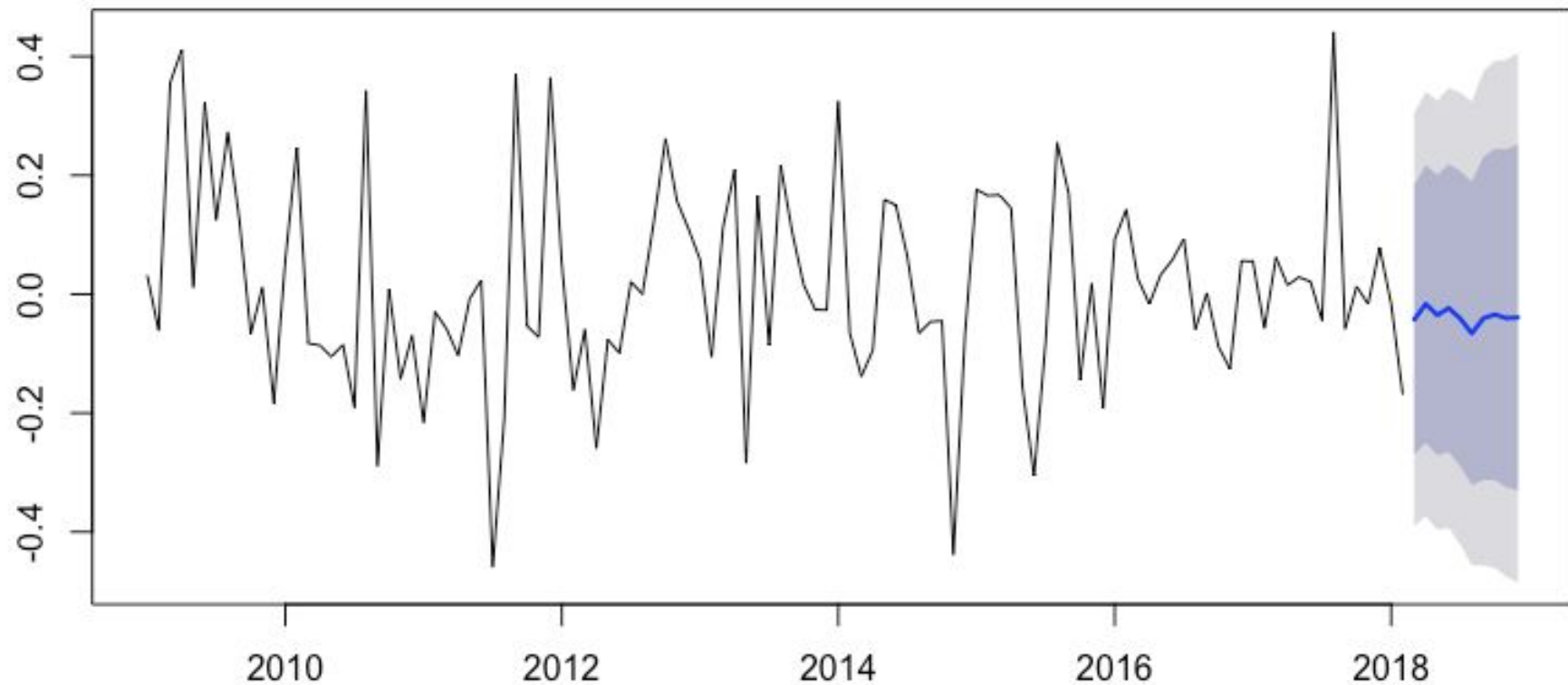


RMSE = 0.124341

Seasonal Decomposition of BYD Adjusted Close Price Time Series

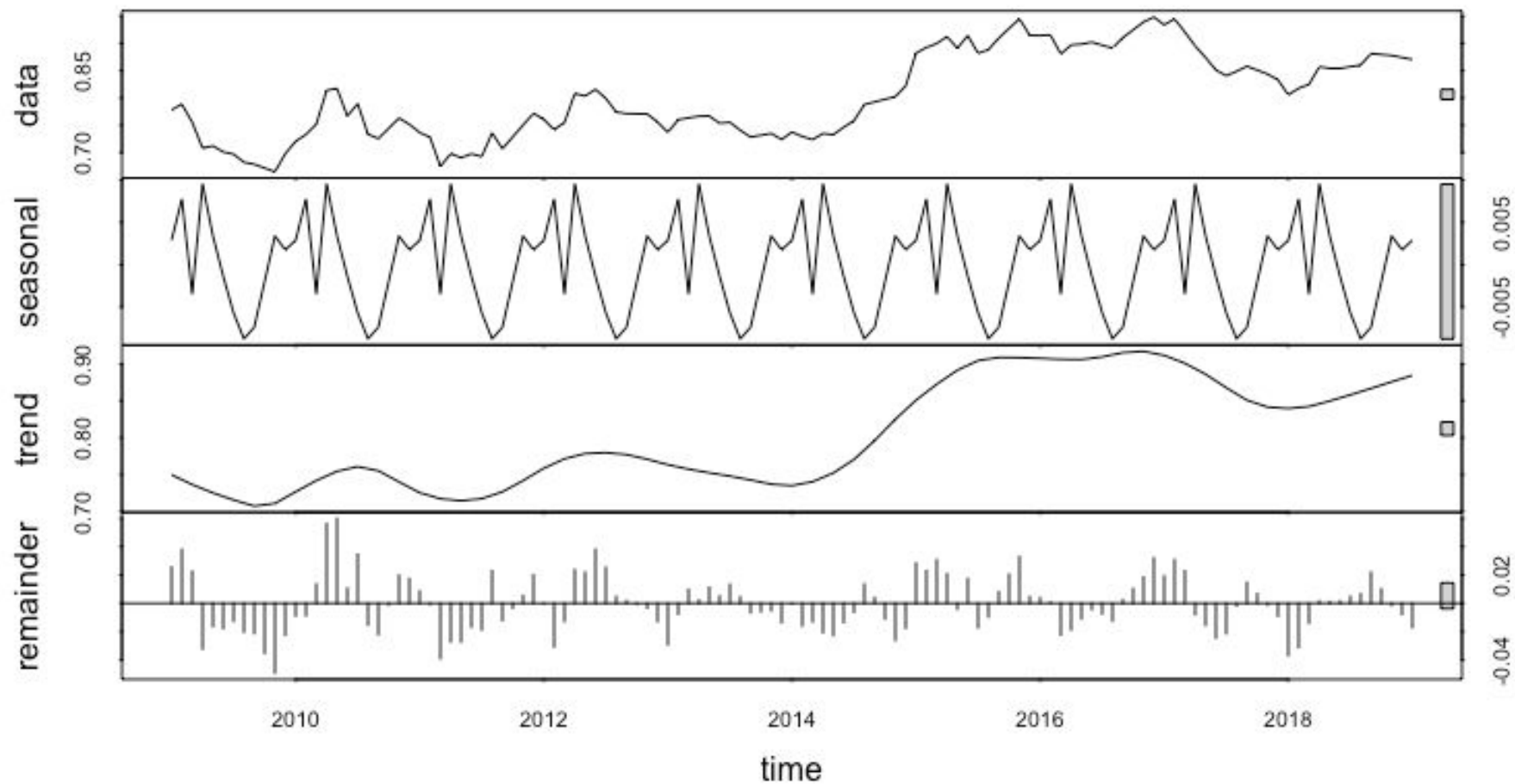


ARMA forecasts for BYD returns

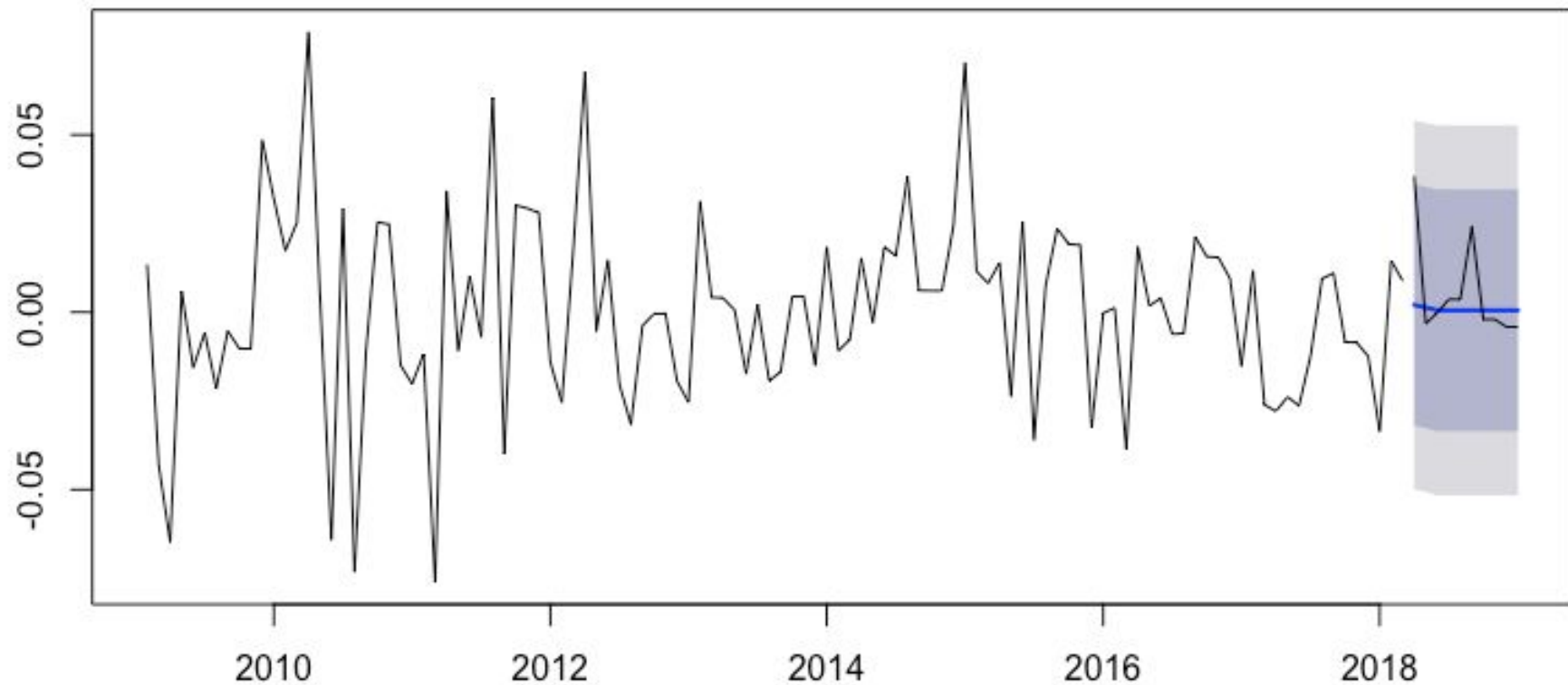


RMSE = 0.1157356

Seasonal Decomposition of USD/EUR Adjusted Close Price Time Series

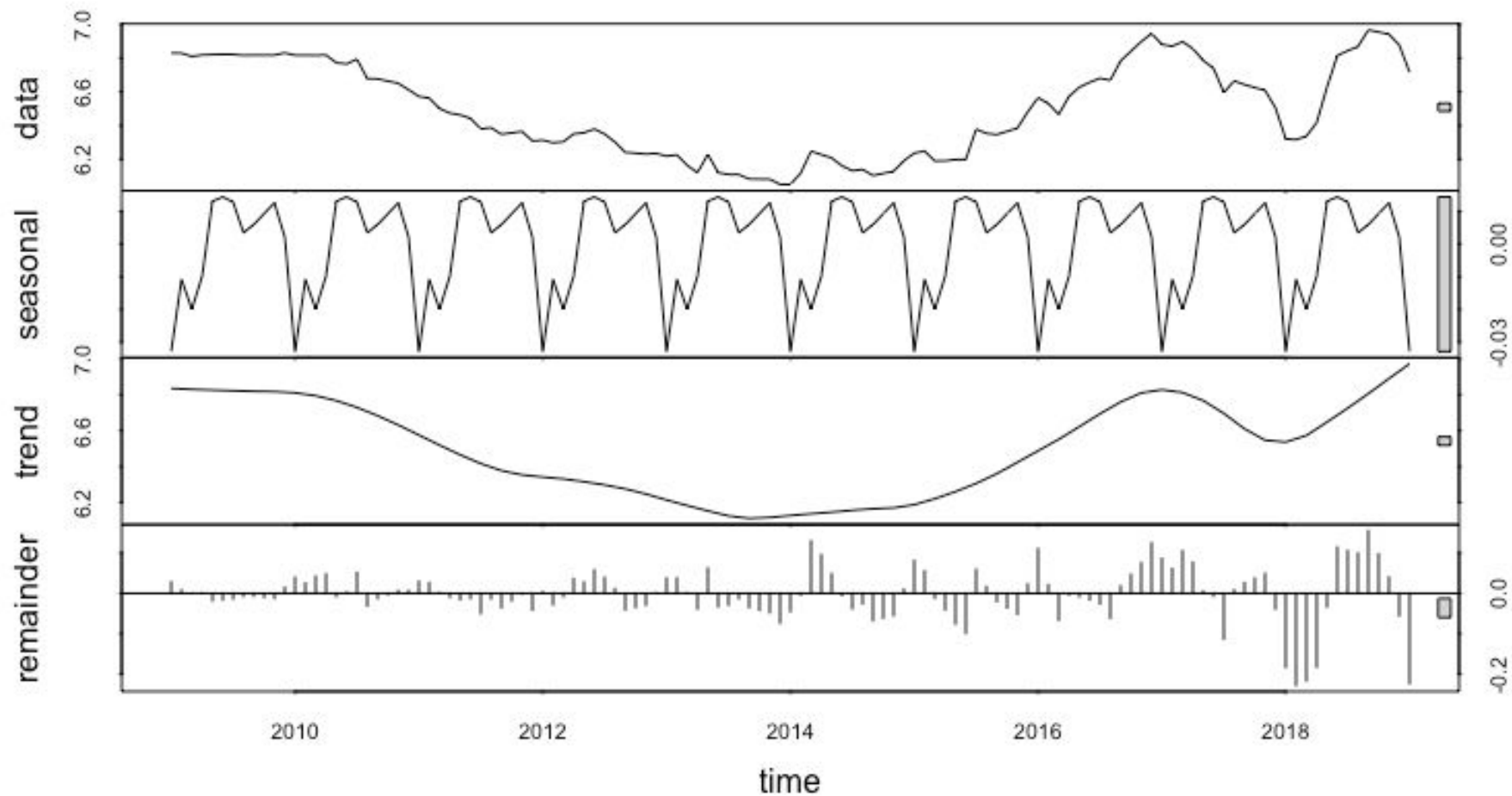


ARMA forecasts for USD/EUR returns

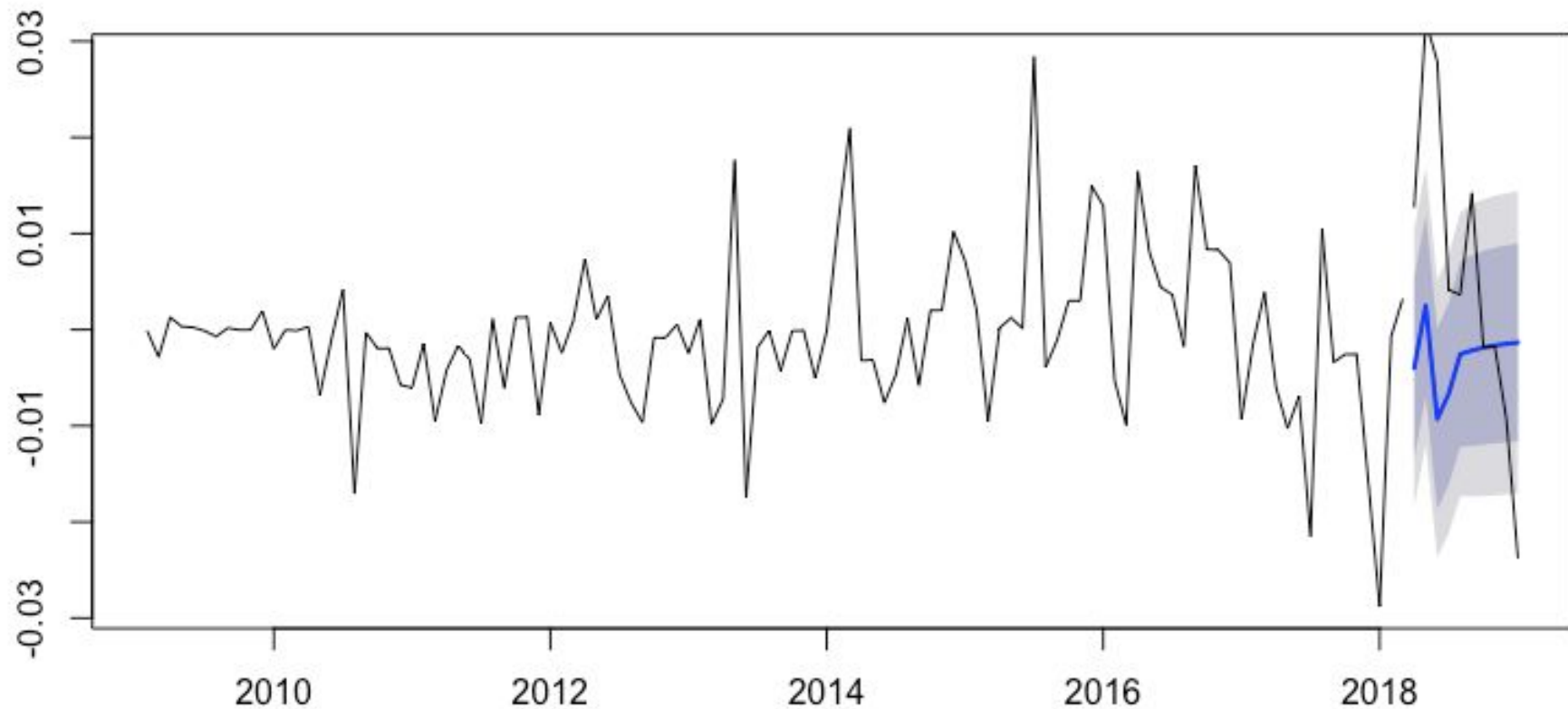


RMSE = 0.01401947

Seasonal Decomposition of USD/EUR Adjusted Close Price Time Series



ARMA forecasts for USD/CNY returns

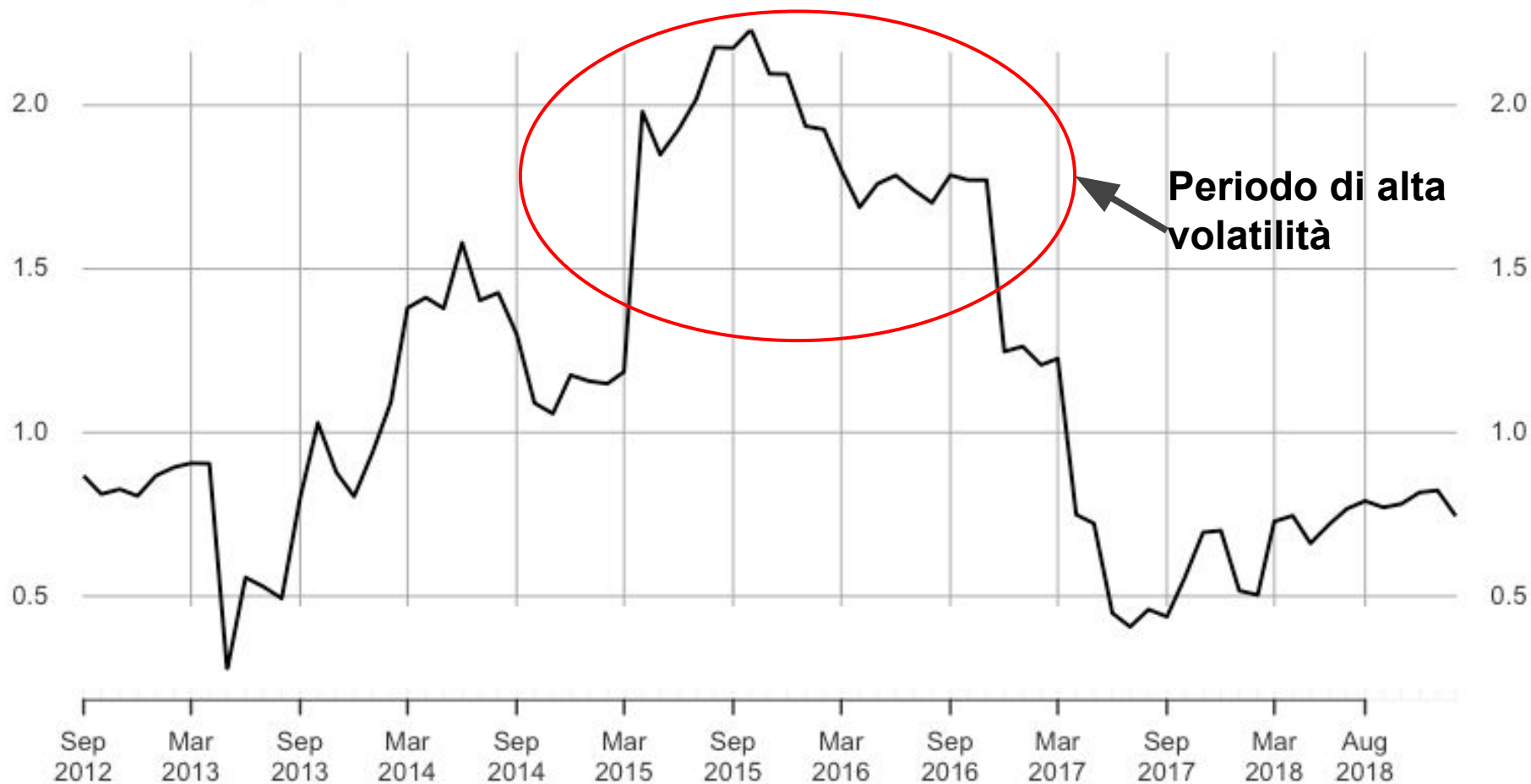


RMSE = 0.01877647

4. Beta Computation

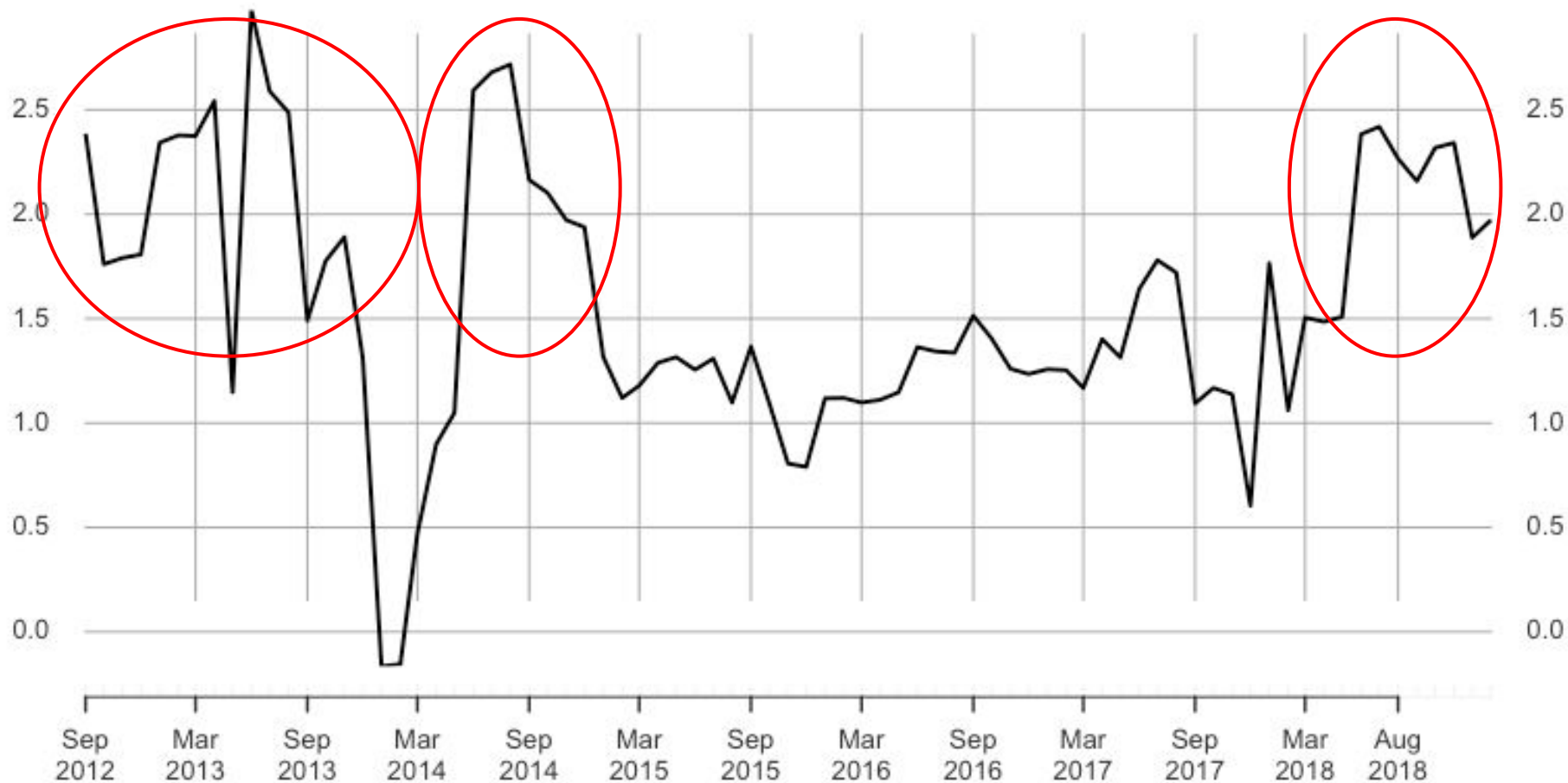
TENC Beta (^HSI)

Sep 2012 / Jan 2019



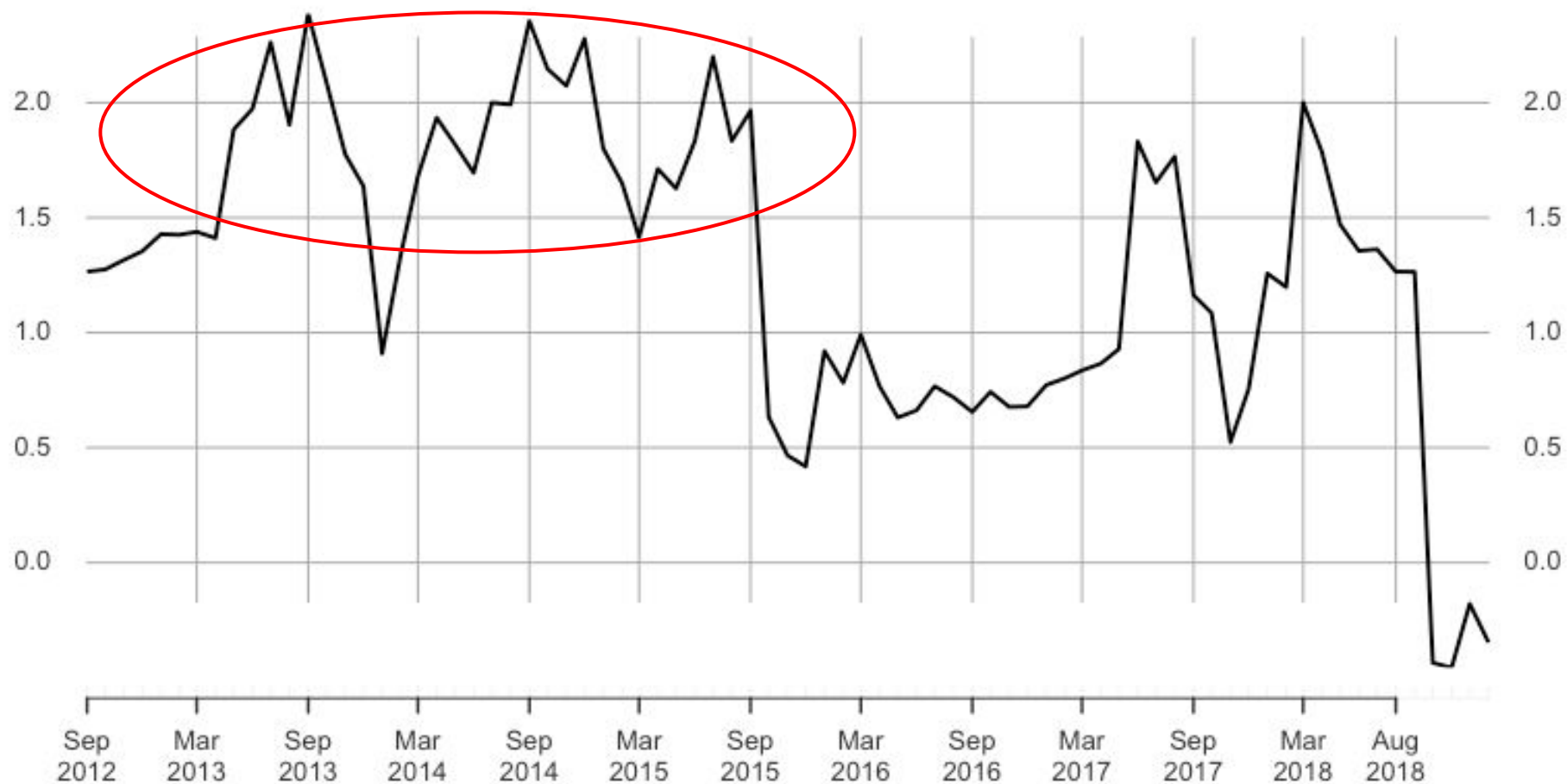
NFLX Beta (^IXIC)

Sep 2012 / Jan 2019



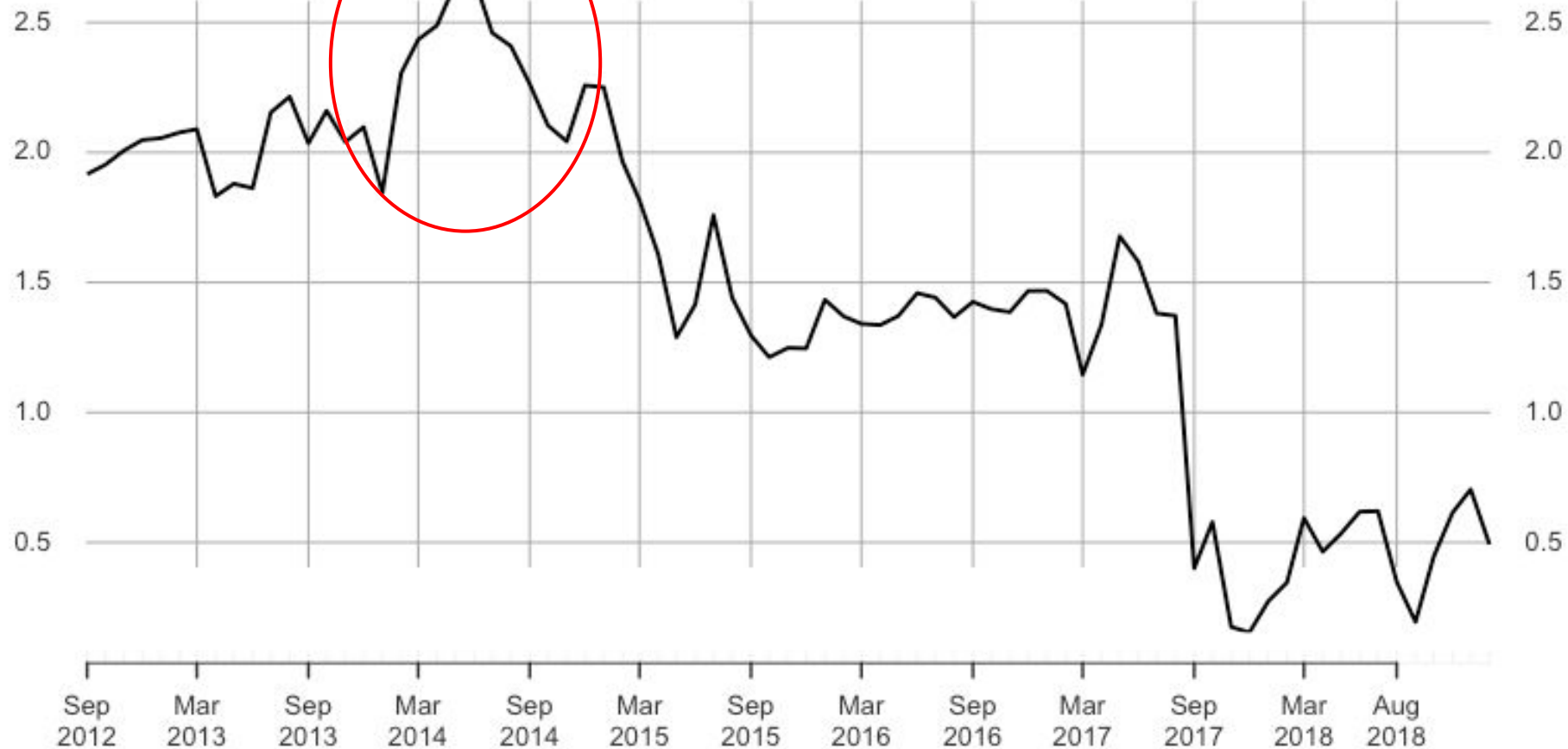
TSLA Beta (^IXIX)

Sep 2012 / Jan 2019



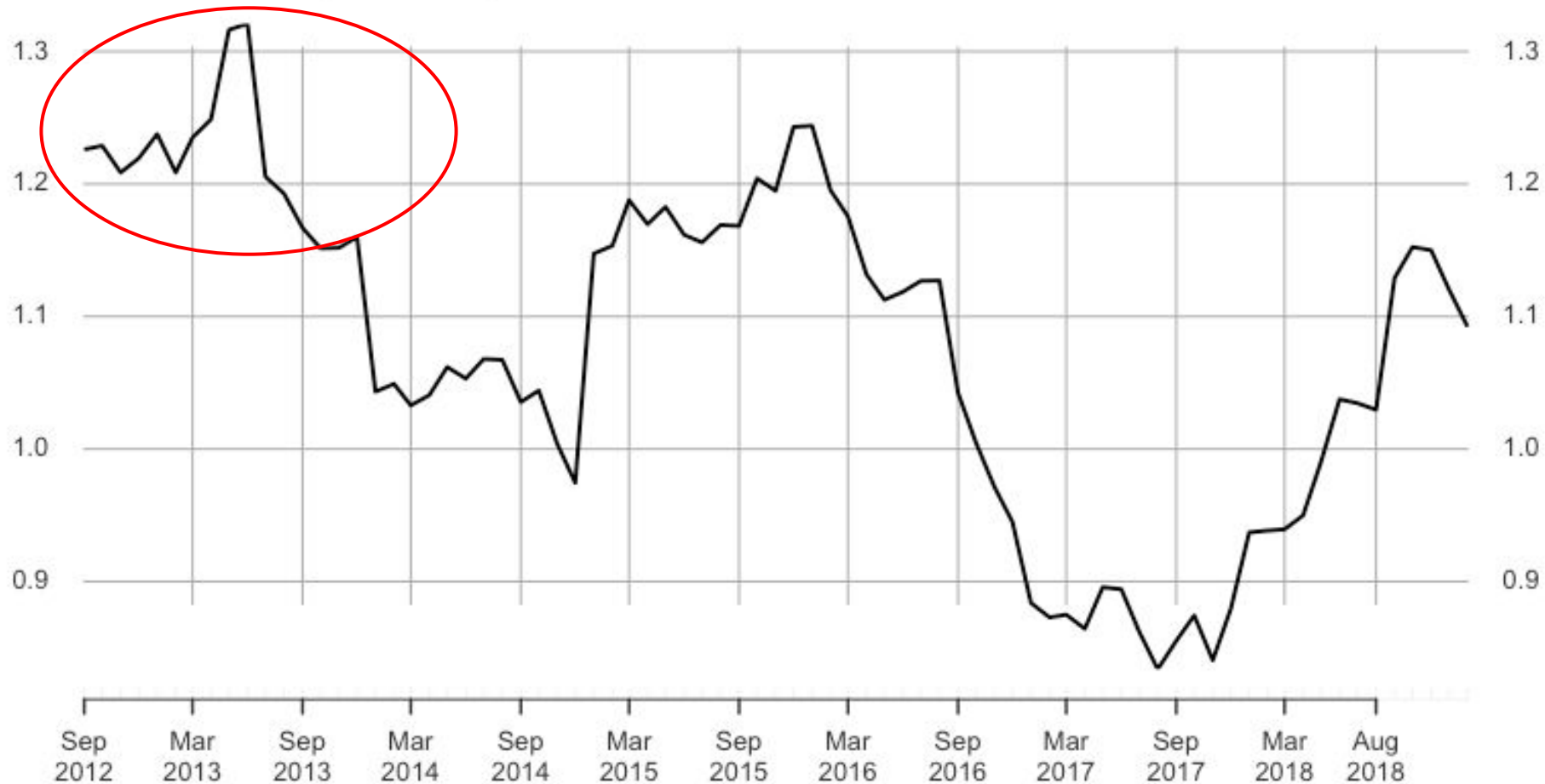
BYD Beta (^HSI)

Sep 2012 / Jan 2019



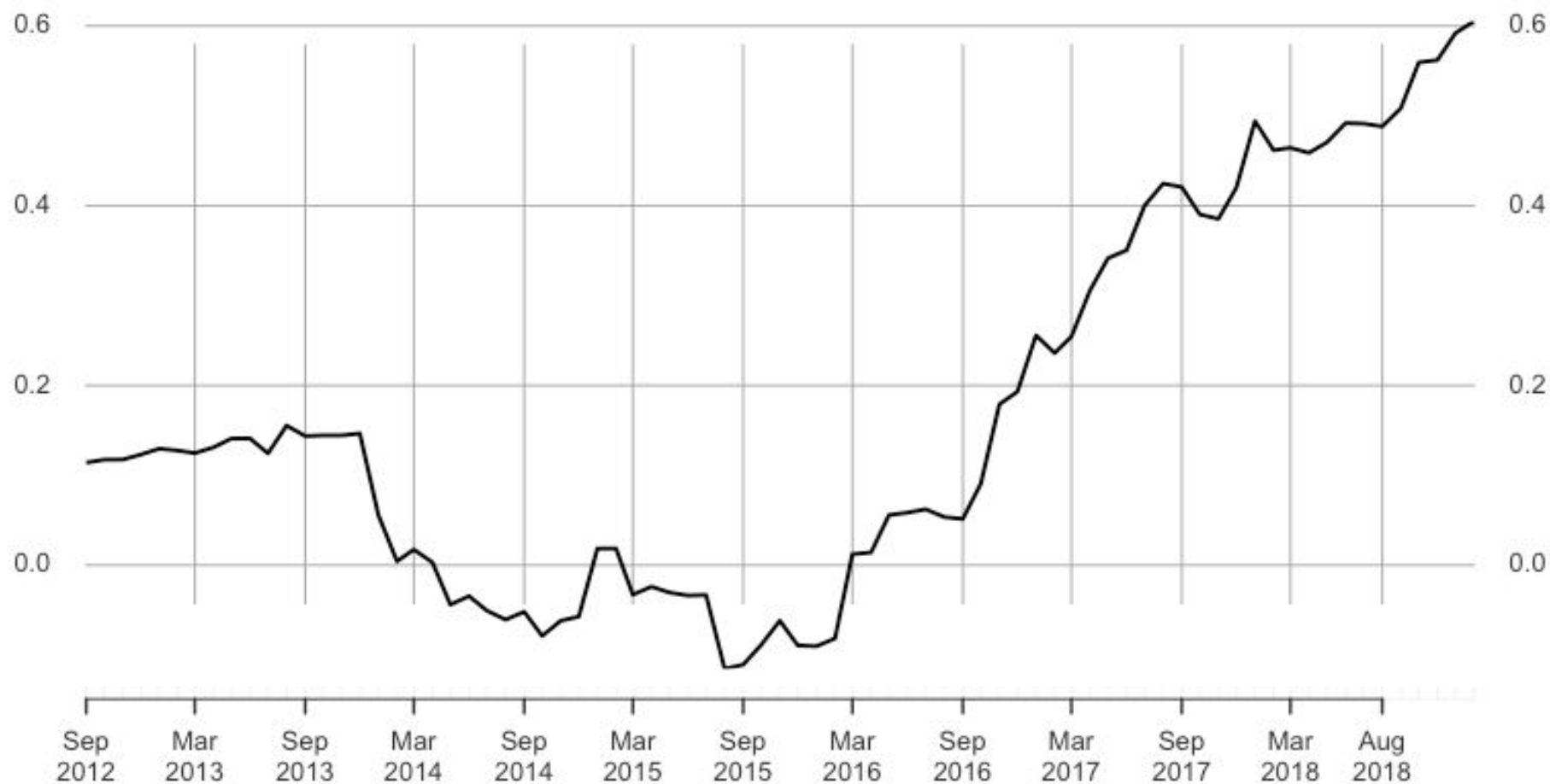
USD/EUR Beta (DX-Y.NYB)

Sep 2012 / Jan 2019



USD/CNY Beta (DX-Y.NYB)

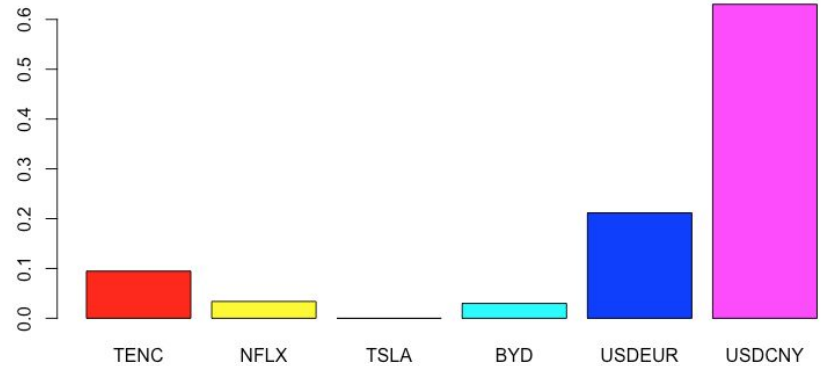
Sep 2012 / Jan 2019



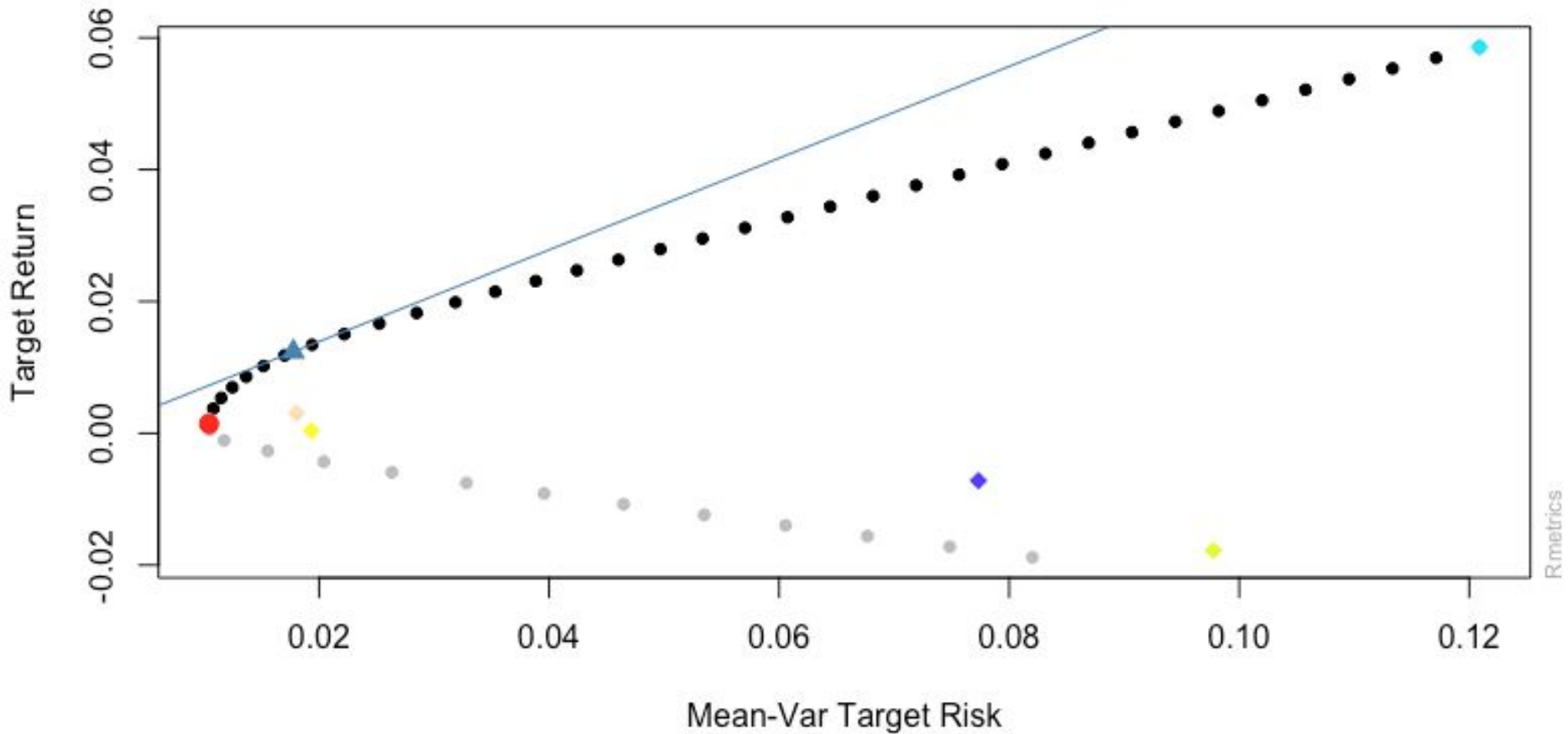
5. Portfolio Management

Modello Mean-Variance

- Budget di 10'000\$
- Target return = media dei ritorni



Efficient Frontier



Profitto

- Costi di transazione = 1%
- Strategia Buy And Hold
- Marzo 2018 -> compro le azioni in base al peso ottimo trovato
- Vendo a fine 2018

Prezzi iniziali:

	0700.HK	NFLX	TSLA	1211.HK	EUR=X	CNY=X
Mar 2018	409.6	295.35	266.13	61.2	0.81282	6.2889

Profitto

Prezzi Finali:

	0700.HK	NFLX	TSLA	1211.HK	EUR=X	CNY=X
Dec 2018	314	267.66	332.8	49.95	0.87413	6.8772

Profitto: -368.4884

