

Analysis of Tesla stock returns

STA 9701 Time Series Analysis - Final Project

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Introduction

Time series plot of Tesla stock price



Price increase:

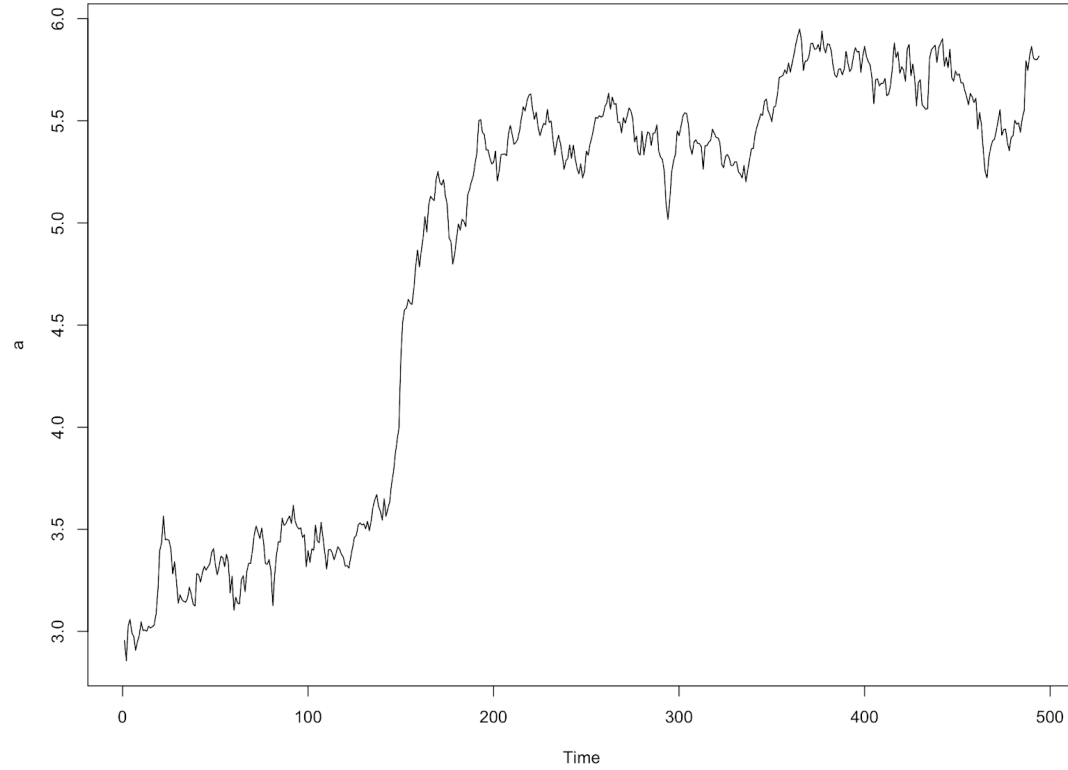
- Model S released in 2013
- Model 3 released in 2015
- Model X released in 2017
- Cybertruck released in 2019

Price decrease:

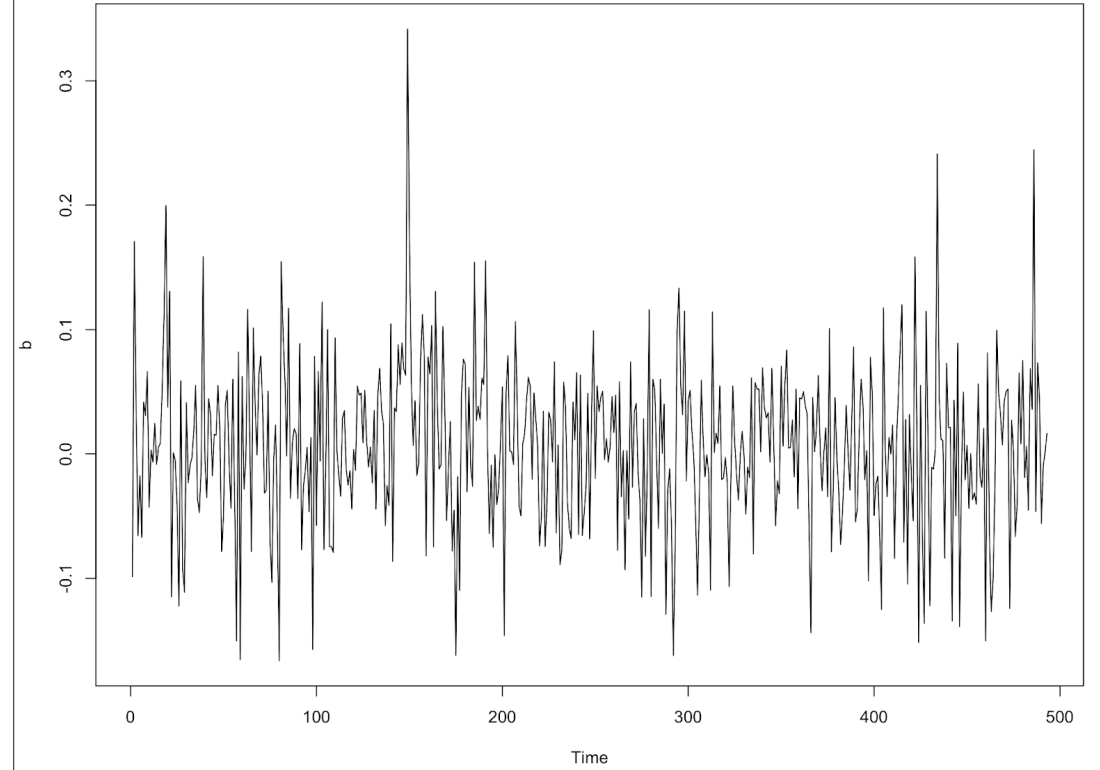
- Model S sedan delayed in 2016
- Announcement of cost-cutting program in 2019

Exploratory Data analysis

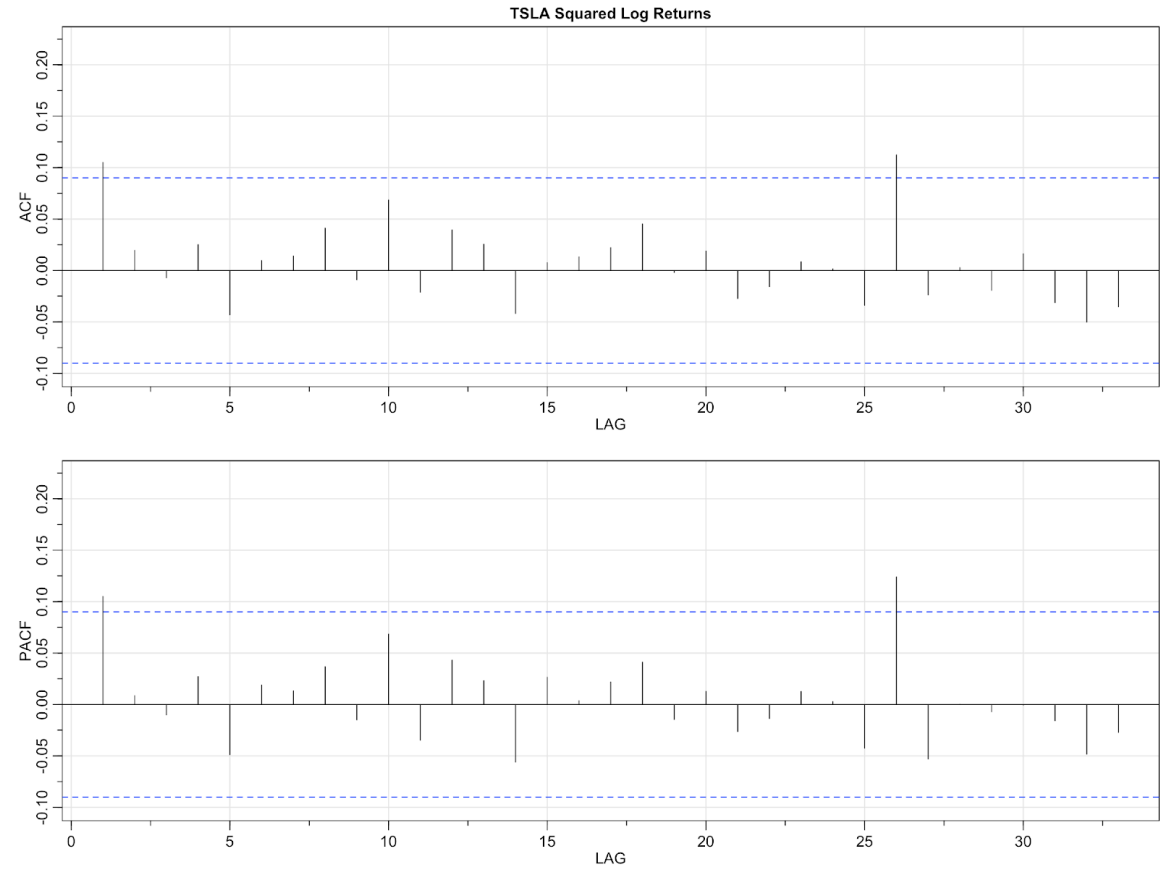
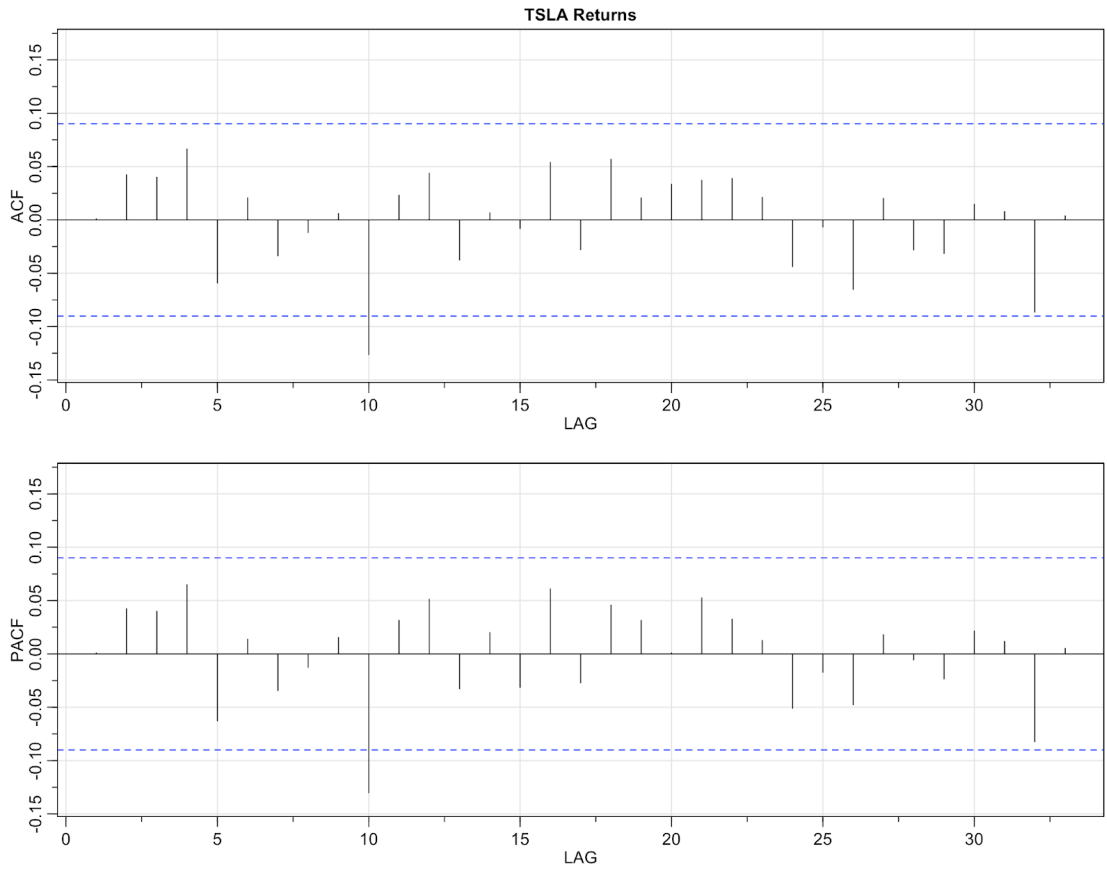
Log of Tesla stock price



Difference Log of TSLA



Exploratory Data analysis



Model selection and diagnostic

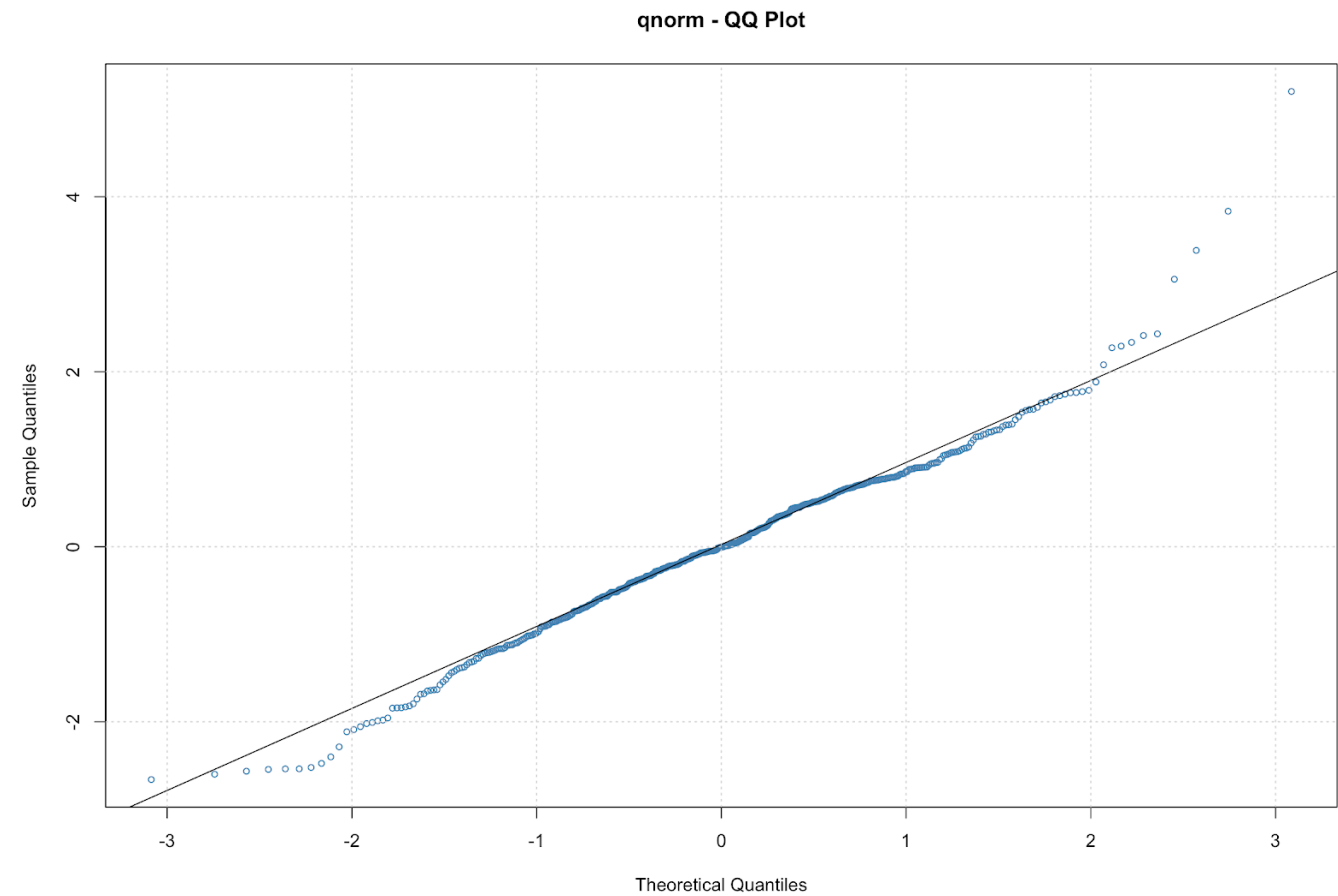
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> eacf(b^2)
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AR/MA
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	0	1	2	3	4	5	6	7	8	9	10	11	12	13
0	x	o	o	o	o	o	o	o	o	o	o	o	o	o
1	o	o	o	o	o	o	o	o	o	o	o	o	o	o
2	x	o	o	o	o	o	o	o	o	o	o	o	o	o
3	x	x	o	o	o	o	o	o	o	o	o	o	o	o
4	x	x	x	o	o	o	o	o	o	o	o	o	o	o
5	x	x	x	o	o	o	o	o	o	o	o	o	o	o
6	x	x	x	x	x	x	o	o	o	o	o	o	o	o
7	x	x	o	x	x	x	x	o	o	o	o	o	o	o

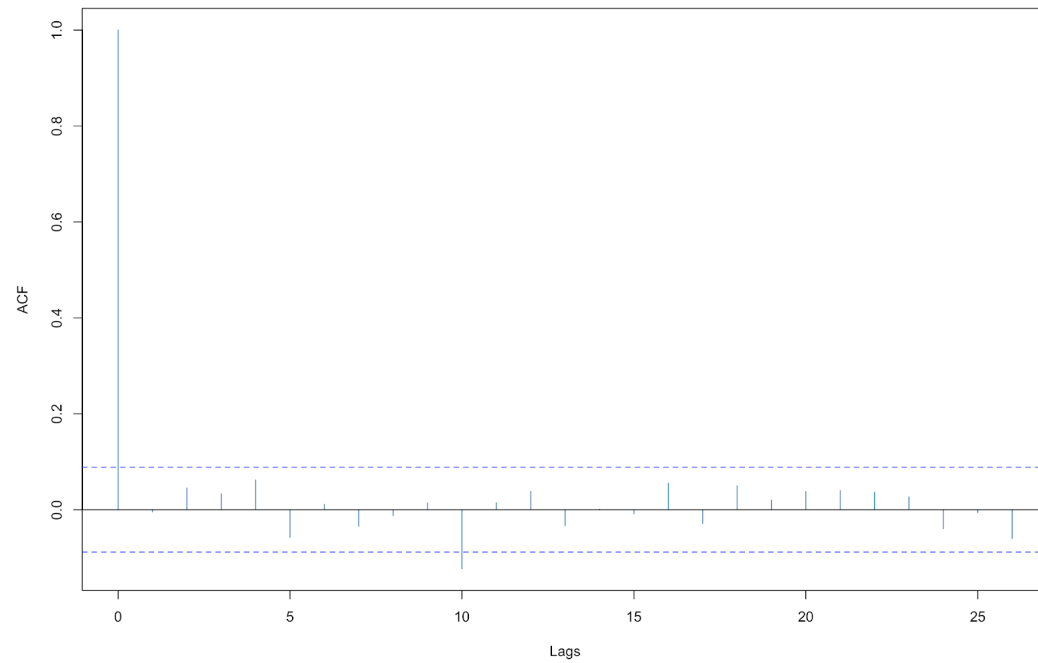
Model	AIC	BIC
GARCH (1,0)	-2.592059	-2.566498
GARCH (1,1)	-2.595563	-2.578522
GARCH (1,2)	-2.588282	-2.554201
GARCH (2,2)	-2.584225	-2.541623
GARCH (3,1)	-2.584596	-2.541994

	Estimate	Std. Error	t value	Pr(> t)
mu	0.006972	0.003035	2.2975	0.021592
omega	0.000512	0.000510	1.0032	0.315748
alpha1	0.036235	0.028426	1.2747	0.202416
beta1	0.850352	0.128302	6.6278	0.000000

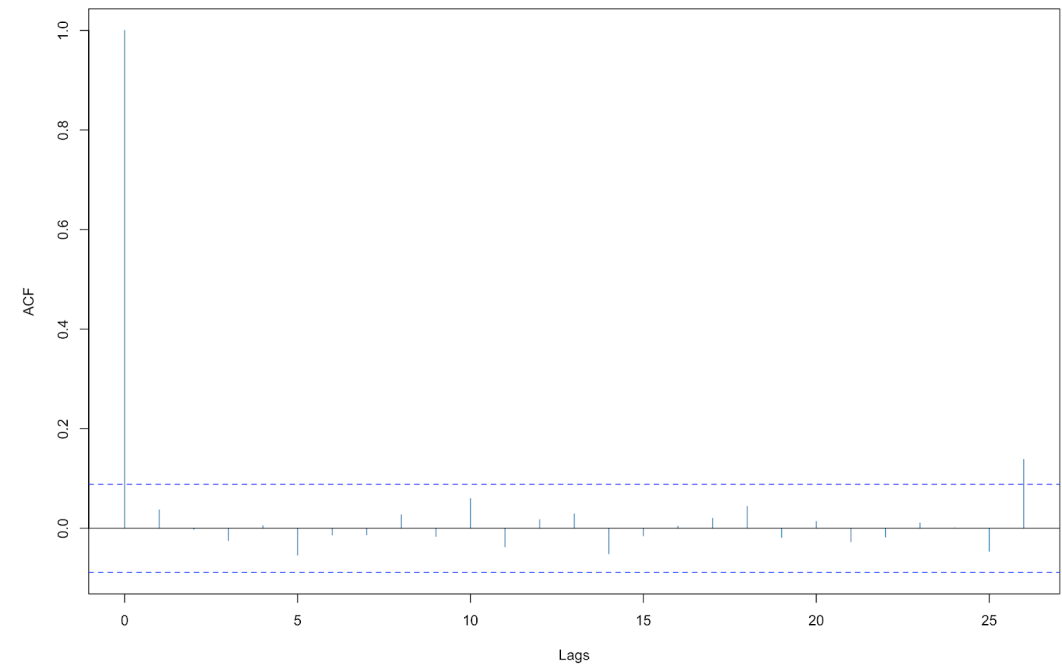


Model diagnostic

ACF of Standardized Residuals



ACF of Squared Standardized Residuals



Model Forecast

