

Contents

halaman

TITLE PAGE	
FINAL ASSIGNMENT STATEMENT AND UPLOAD AGREEMENT	
APPROVAL BY THESIS SUPERVISORS	
APPROVAL BY THESIS EXAMINATION COMMITTEE	
ABSTRACT	v
ACKNOWLEDGMENT	vi
TABLE OF CONTENTS	viii
LIST OF FIGURES	x
LIST OF TABLES	xii
LIST OF APPENDICES	xiii
CHAPTER I INTRODUCTION	
1.1 Background	1
1.2 Problem Statement	3
1.3 Objectives	3
1.4 Limitations	4
1.5 Benefits	4
1.6 Thesis Structure	4
CHAPTER II THEORETICAL FRAMEWORK	
2.1 Short Selling	6
2.1.1 Short Interest	6
2.1.2 Short Squeeze	6
2.2 The GameStop Short Squeeze	7
2.2.1 Timeline	7
2.2.2 Causes	8
2.3 Quantitative Analysis	9
2.3.1 Trading Price and Volume	10
2.3.2 Volume-weighted Average Price	10
2.4 Law of One Price	11
2.5 Box-and-Whisker Plot	11
2.6 Simple Linear Regression	12
2.6.1 Simple Linear Regression Model	12
2.6.2 Error Model	13
2.6.3 Model Assumptions	14
2.6.4 Statistical Hypotheses	14
CHAPTER III METHODOLOGY	
3.1 Data Collection	17
3.1.1 Trading Data	17
3.1.2 Twitter Data	17

3.2	Coefficient of Variation	18
3.2.1	Computing the Volume-weighted Average Price	18
3.2.2	Coefficient of Variation	19
3.3	Log-scaling Daily Volume of Trades	20
3.4	Intraday Cumulative Volume	20
3.5	Boxplot Outlier Detection Model	21
3.6	Simple Linear Regression	22
3.6.1	Regression Model	22
3.6.2	Model Assumptions	23
3.6.2.1	Testing Linearity	23
3.6.2.2	Testing Independence	24
3.6.2.3	Testing for Normality	25
3.6.2.4	Testing for Homoscedasticity	25
3.7	Methods Evaluation	26
3.7.1	Comparing the Methods' Performances	26
CHAPTER IV EXPERIMENT AND RESULTS		
4.1	Data	27
4.1.1	Trading Data	27
4.1.2	Twitter Data	28
4.2	Traditional Methods	28
4.2.1	Log-scaling the Daily Volume of Trades	28
4.2.2	Intraday Cumulative Volume	31
4.2.3	Boxplot Outlier Detection Method	33
4.3	Coefficient of Variation Method	34
4.4	Simple Linear Regression	37
4.4.1	Regression Model	37
4.4.2	Verifying the Model Assumptions	43
4.4.2.1	Linearity	43
4.4.2.2	Independence of Errors	44
4.4.2.3	Normality of Errors	45
4.4.2.4	Homoscedasticity	46
4.5	Methods Evaluation	46
4.6	How the Volkswagen Short Squeeze Differs from the GameStop Short Squeeze	47
CHAPTER V CLOSING		50
5.1	Conclusion	50
5.2	Future Works	51
BIBLIOGRAPHY		
APPENDICES		

List of Figures

halaman

Figure 1.1	GameStop annual revenue in millions of US dollars	1
Figure 1.2	GameStop stock price history	2
Figure 2.1	Boxplot	12
Figure 3.1	A flowchart diagram depicting the process of the thesis	16
Figure 3.2	The straight-line model	23
Figure 3.3	Durbin-Watson table	24
Figure 4.1	Daily volume of GameStop trades from January 2020 to March 2021 plotted on a log scale with 22 and 25 January highlighted	29
Figure 4.2	Daily volume of Microsoft trades from January 2020 to March 2021 plotted on a log scale	30
Figure 4.3	Daily volume of Google trades from January 2020 to March 2021 plotted on a log scale	30
Figure 4.4	Daily volume of Volkswagen trades from January 2008 to December 2008 plotted on a log scale with 27 and 28 October highlighted	31
Figure 4.5	GameStop's intraday cumulative volume in percent of the day's volume.	31
Figure 4.6	Google's intraday cumulative volume in percent of the day's volume.	32
Figure 4.7	Microsoft's intraday cumulative volume in percent of the day's volume.	32
Figure 4.8	Volkswagen's intraday cumulative volume in percent of the day's volume	33
Figure 4.9	Boxplot of GameStop's closing price from January 25 to February 3 2021	33
Figure 4.10	Boxplot of Google's closing price from January 25 to February 3 2021	34
Figure 4.11	Boxplot of Microsoft's closing price from January 25 to February 3 2021	34
Figure 4.12	The coefficient of variation (CV) in the daily volume-weighted average prices (VWAPs) of Volkswagen trades across the eight German regional exchanges in 2008 with incomplete days omitted.	35
Figure 4.13	The coefficient of variation (CV) in the daily volume-weighted average prices (VWAPs) of Volkswagen trades across the seven German regional exchanges in 2008 with incomplete days omitted.	36

Figure 4.14 The coefficient of variation (CV) in the daily volume-weighted average prices (VWAPs) of Volkswagen trades across the six German regional exchanges in 2008 with incomplete days omitted.	36
Figure 4.15 Scatterplot of close price vs number of tweets.	44
Figure 4.16 Normal probability plot of the residuals.	45
Figure 4.17 Residuals versus order plot.	46
Figure 4.18 GameStop price data	49



List of Tables

	halaman
Table 1.1 GameStop's short interest history [3]	2
Table 2.1 GameStop short interest ratio [3]	9
Table 4.1 Time-adjusted dataset of GameStop's closing price and number of related tweets per thirty minutes	38
Table 4.2 Regression results for closing price vs. number of tweets . . .	40
Table 4.3 Time-adjusted dataset of GameStop's closing price and number of related tweets per thirty minutes with t-10 lag . . .	41



LIST OF APPENDICES

		halaman
Appendix A	Code	
A.1	Python Code	A-1
Appendix B	Data	
B.1	Twitter data and closing price	B-1

