Black Swan Global Market: Analysis of the Effect of the Covid-19 Death Rate on the Volatility of European Football Club Stock Prices (Case Study of Juventus F.C., Manchester United, Ajax Amsterdam and Borussia Dortmund)

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Abstract

Portfolio investment is an essential instrument in the economy because it has short-term effects that can provide quick returns to investors and the economy. On the other hand, this short-term investment also has a substantial risk of economic shocks, causing stock returns volatility. The Covid-19 pandemic that hit the world also directly affected financial markets and global stock markets; this condition in economic terminology is known as the Black Swann Global Market Effect. Black Swan Global Market Effect is also experienced by sports industries in the financial industry, the football industry.

The purpose of this paper is to see whether there is an influence between the Covid-19 pandemic conditions on the share value of several major European football clubs, namely Ajax Amsterdam, Borussia Dortmund, Juventus F.C., and Manchester United, as a result of the Black Swan Global Market Effect.

The data used in this paper is time-series data from March 2020 to August 2020. Meanwhile, to answer the black swan effect phenomenon, the Threshold Generalized Autoregressive Conditional Heteroskedasticity (TGARCH) method is used.

The results showed that stocks that were the object of research (Ajax, Borussia Dortmund, Juventus, and Machester United) showed a large response to bad News (an increase in deaths due to covid-19).

Keywords: Black Swan Global Market, Covid-19 Pandemic, TGARCH Models

I.   Introduction

The novel Coronavirus Disease, known as Covid-19 was first reported in Wuhan City, China, with a ferocious and fast spread to many countries (Xu et al., 2020). (WHO, 2020a) explains that the method of spreading the coronavirus is through people who have been infected with Covid-19. This virus can spread through tiny droplets from the nose or mouth. When infected with this virus will experience sneezes or coughs. The droplets then land on an object or surface where they are touched, and the healthy person touches their eyes, nose, or mouth. Covid-19 can also spread when the tiny droplets are inhaled by someone when they are in close contact with an infected person.

Tabel 1. WHO Data Positive Cases and Covid-19 Death Rate

Area	Confirmed Possitive	Deaths
Global	2.397.217	162.956
European Region	1.187.184	106.342
Region of the Americas	893.119	42.686
Western Pasific Region	134.507	5.685
Eastern Mediterranean Region	134.507	6.185
Southeast Asia Region	31.670	1.341
African Region	15.555	704

Source : (WHO, *from national authorities by 10:00 CEST***, April 21, 2020)**

However, since the first case of Covid-19 was announced in Europe on February 21, 2020 (Spiteri et al. 2020), the European continent has become the worst-hit region with the highest number of positive cases highest mortality rate in the world (see Table 1). Covid-19 has become a pandemic that has paralyzed many activities in other parts of the world, including European football competitions. Postponements of matches and competitions occurred after several soccer players tested positive for Covid-19. The postponement of all matches is a form of protection for soccer players and prevents rapid spread. Covid-19 is not only harmful to humans. Personally, it can cripple business entities such as the football industry.

(Gunardi 2014) explained that the European football industry had entered an era of great business. Data from the Deloitte Money League (Deloitte U.K. 2020) explains that in the 2018/2019 period, the top 20 clubs in the ranking they created generated a combined income of € 9.3 billion, up 11% from the previous season. The € 939 million increase in revenue was driven by broadcast revenue of € 575 million (up 16%), commercial revenue of € 313 million (up 9%), and matchday revenue of € 51 million (up 4%). This was confirmed by (Herdyastoro and Frensidy 2014), who explained that clubs carry out two complementary functions in the football industry: competition and business function. The postponement of this match resulted in the postponement of local competitions' schedule to the big European competition, namely EURO 2020. On the other hand, European football clubs also suffered losses due to the delay. The club is very dependent on matches because the source of club income comes from match

tickets, the sale of match broadcasting rights, and commercial contract revenue (Haryoprasetyo and Kiswara 2013).

For example, Juventus F.C., which is involved in three tournaments, namely the Italian League, Copa Italia, and UEFA Champions League, certainly feels the impact of Covid-19 on club revenues. This match's postponement made the club management and the players and first-team coaches agree to cut wages during March - June 2020 (www.juventus.com, 2020). The club made savings of 90 Million Euros to help finance the club in the 2019-2020 financial period. The German League club, Borussia Dortmund (ESPN 2020), also imposed a pay cut for players to help finance the club. The health condition of the players and also the health of the club remains a priority for management. However, cutting players' wages does not apply to the Premier League club: Manchester United, who feel confident in their financial condition.

European football clubs must comply with UEFA's Financial Fair Play (FFP) rules that have been implemented since 2011. Through the FFP, which came into effect in 2011, each club is expected to increase the economic and financial capacity of a more transparent and credible club (UEFA 2018). Also, some active clubs on the stock exchange must comply with IFRS rules in presenting their financial activities fairly and maintain financial performance. Good financial performance will attract interest from investors. Before Covid-19 became a pandemic in the world, European club stock prices depended not only on financial performance but also on 11 players on the field (Setiaji 2018). Therefore, with the postponement of matches and reduced club income due to Covid-19, it will be difficult for management to maintain financial performance and keep stock price movements stable.

(Morales and Andreosso-O'Callaghan 2020) describes the spread of Covid-19 as a black swan on the global market. Lack of action and coordination from world leaders as a global effort to control Covid-19 panicked global stock markets and resulted in global stock markets plummeting Monday, March 9 and Thursday, March 12, 2020. Research findings using the Granger Causality Test show that markets are not reacted to the level of Volatility shown by the Chinese stock market identified as the epicenter of the Covid-19 spread. However, the stock market began to react to the threat of Covid-19 when Italy announced its first case, and it quickly took a toll on fear in Europe. Besides, a similar study was also conducted by (Onali 2020), who used the GARCH Model to explain that the reported mortality rate due to Covid-19 in America and five other countries (Italy, Spain, UK, France, and Iran) did not affect the return of

the American market. However, the VAR model shows that the reported mortality rate in Italy and France harms the market return and positively impacts the VIX return on the American stock market.

The spread of Covid-19 as an extraordinary phenomenon has also impacted the European football industry as an industry with a large turnover and involving many people, lockdown policies, and postponement of competition to prevent the spread of Covid-19 in several European countries affect club income. For soccer clubs that are active in the stock market, a decrease in income can trigger the possibility of a decline in share prices. The high mortality rate due to Covid-19 sends bad news signals to investors, resulting in Volatility in stock prices, including stock prices of European football clubs.

This study captures a gap from previous research conducted by Morales and Andreosso-O'Callaghan (2020) and Onali's research (2020), which explains the effect of Covid-19 on the global market. This study aims to analyze the black swan Covid-19 phenomenon, which focuses on the effect of death reports in Europe on the Volatility of stock prices of European football clubs, namely Juventus (Italy), Manchester United (England), Borussia Dortmund (Germany), and Ajax Amsterdam (Netherlands).

II. Theoretical Analysis
A. Black Swan Theory

Black Swan are events that happen unexpectedly and cause quite a stir in the financial markets. The term "Black Swan" originated in the 17th century, stems from the European assumption that all geese are white when there are black geese that live in the wild. In this context, the black swan (Black Swan) is often seen as a symbol for unpredictable and has a significant impact and something that is out of control.

(Taleb 2007) who popularized the term Black Swan in financial markets, explaining that Black Swan consists of three main characteristics, namely: (1) is an event that has never happened or an event that cannot be predicted, (2) has an enormous impact, (3) people rationalize the incident with simple explanations. The postponement of European football competitions due to the spread of Covid-19 was an unexpected event. The spread of Covid-19 has had a significant impact on the European football industry, the delays in competition, decreased income, and football clubs' stock price. The slow pace of prevention and weak awareness of the dangers of Covid-19 have made

European countries the region with the highest number of positive cases and death tolls in the world.

B. Stock Price Volatility

Stock price volatility is the fluctuation of shares, the return of a security or portfolio within a certain period (Hartono 2010). (Habib and Khan 2012) On the other hand, stock price volatility is a systemic risk that only investors who invest in stocks face. According to (Hussainey, Oscar Mgbame, and Chijoke-Mgbame 2011), stock price volatility is a measure in determining risk in investment. It can show the level of change in stock prices during a specific period. Market volatility can occur due to new information into the market or, As a result; market players re-evaluate the company's assets. The market price level will make a quick adjustment so that the price formed reflects the new information or condition.

Volatility can also be used in forecasting. Forecasting activities in finance are using time series data. This sometimes causes the phenomenon of heteroscedasticity. The Volatility can be caused by market movements that suddenly plummet, and if there is bad News, it will calm down sometime later. Volatility means that the data experiences extreme fluctuation or volatility clustering (Ariefianto 2012). Volatility reflects the level of risk of an investment asset. A high level of Volatility indicates high risk and also a high rate of return. Knowing the level of Volatility of investment assets owned will make investors wiser in managing their investments. The spread of Covid-19 in Europe is spreading rapidly, and the high death toll sends terrible News to investors. This condition can generate the Volatility of stock prices, including the stock prices of European football clubs.

III. Methodology

This study uses data from football clubs from four European countries that are actively on the stock market, including Juventus (Italy), Manchester United (U.K.), Borussia Dortmund (Germany), Ajax Amsterdam (Netherlands). The club's stock price volatility data was obtained from Yahoo! Finance. Meanwhile, the death rate report data obtained from the WHO daily data is data on death reports in Italy, the UK, Germany, and the Netherlands, where reports of mortality rates in the European region increased. The data used covers the period from February 01 to May 01, 2020. This

study uses the ARCH-GARCH (Autoregressive Conditional Heteroskedasticity-Generalized Autoregressive Conditional Heteroskedasticity) model.

The ARCH model was first introduced by (Engle, 1982), aiming to solve Varying Time-Dependent errors.

Meanwhile, the basic ARCH model developed by Engle is as follows:

$$y_t = x_t\beta + \varepsilon_t \text{ (Conditional Mean)} \dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

$$\sigma_t^2 = \gamma_0 + \gamma_1\epsilon_{t-1}^2 + \gamma_2\epsilon_{t-2}^2 + \cdots + \gamma_p\epsilon_{t-p}^2 \text{ (Conditional Variance)} \dots\dots (2)$$

Where:

$\epsilon_t^2 = $ *squared residual* (*innovation*), and

$y_i = $ ARCH Parameter

Meanwhile, the GARCH Model is a development of the ARCH model (Bollerslev 1986); in this model, the conditional variance lagged values are added. This development assumes that GARCH tends to have consistency with observed volatility clustering in financial return data. When there is a large change in stock return data, it tends to be followed by further significant changes (Rijoly 2015). The Simple GARCH model can be seen in the equation below:

$$\sigma_t^2 = \gamma_0 + \gamma_1\epsilon_{t-1}^2 + \gamma_2\epsilon_{t-2}^2 + \cdots + \gamma_p\epsilon_{t-p}^2 + \delta_1\sigma_{t-1}^2 + \delta_2\sigma_{t-2}^2 + \cdots + \delta_q\sigma_{t-q}^2 \dots.. (3)$$

Where:

γ_i is ARCH Parameter, and

δ_i is GARCH Parameter

The use of the GARCH model is used to measure the stochastic deviation / γ_i in the previous estimation period (σ_t) and see how it affects the current variance (δ_1) (Sukati, 2013).

Furthermore, to find out how good news and bad news affect stock volatility analysis on the object of observation, especially during the Covid-19 pandemic. So the TGARCH (Threshold GARCH) model is used as a modification to the simple GARCH model. This model was developed by (Zakoian 1994). In simple terms, this model can accommodate the Asymmetric Information in the conditional variation. Here is the TGARCH equation:

$$\sigma_t^2 = \alpha + \gamma_1 \varepsilon_{t-1}^2 + \partial d_{t-1} \varepsilon_{t-1}^2 + \delta_1 \sigma_{t-1}^2 \dots\dots\dots\dots (4)$$

Where:

$$d_t \begin{cases} 1 & \varepsilon_t < 0 & (Bad\ News) \\ 0 & \varepsilon_t \geq 0 & (Good\ News) \end{cases}$$

The use of TGARCH will give better results than the GARCH model (Sabiruzzaman et al. 2010) because it can separate the impact caused by both Bad News and Good News.
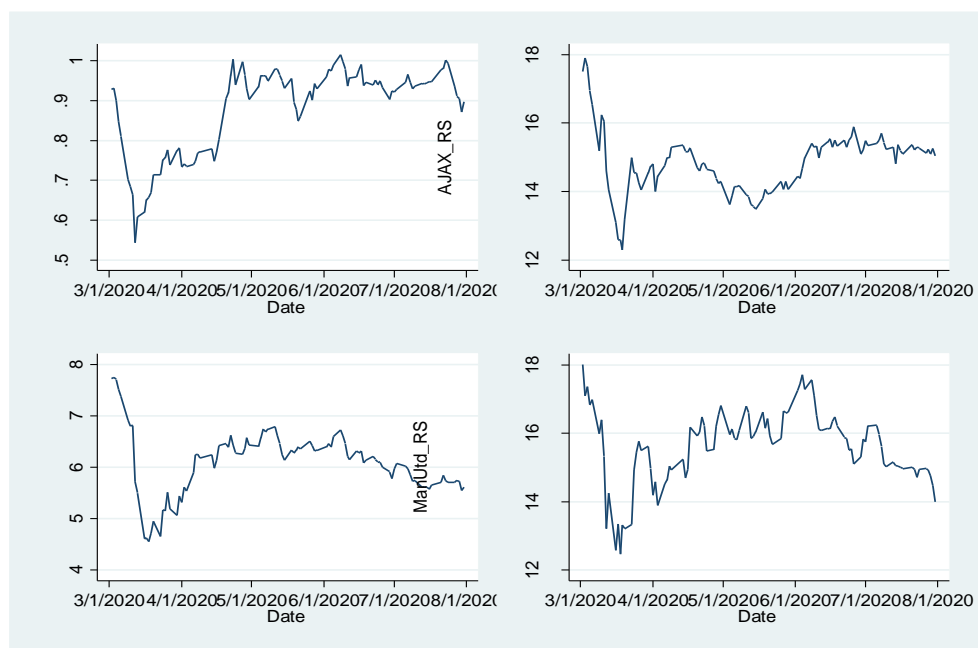
IV. Result
A. Data Characteristic

The data used in this study are daily data on stock closures from the four stocks selected in this study; besides that, it is also adjusted for the death rate due to the Covid-19 pandemic in the same countries as the 4 stocks listed (Italy, Germany, Netherlands, and U.K.). The research period itself starts from March 2020 to August 2020, while the data characteristics of the data can be seen in the image below:
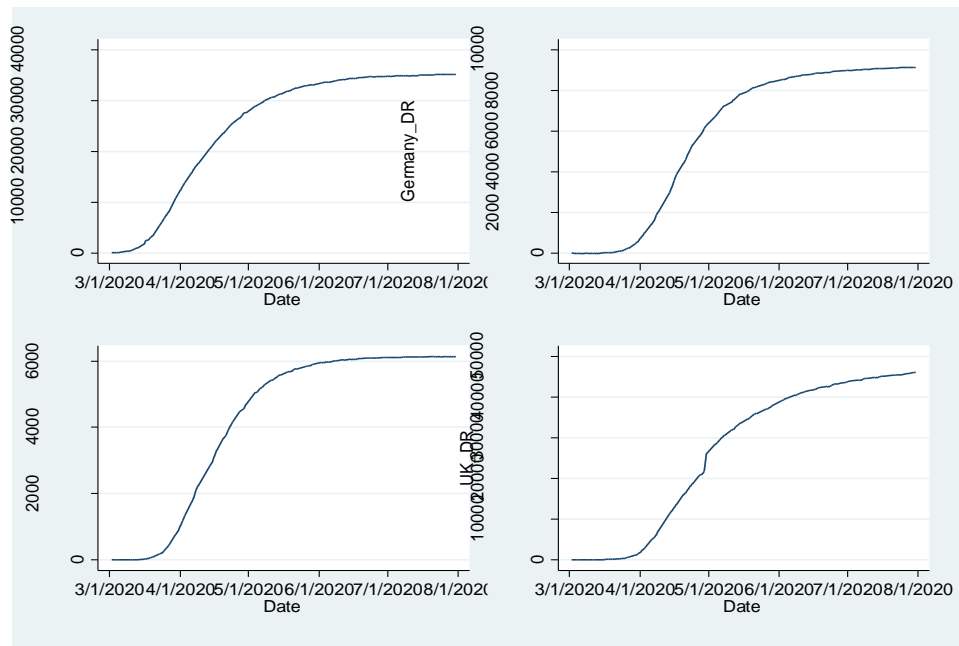
Graph 4. 1 Juventus, Ajax, BvB, and Manchester United Shares Vs Death rate in Italy, Germany, Netherlands, and U.K.

A. Shares

B. Death Rate

Source: Author Computation (2020)

B. TGARCH RESULT

1) Ajax Result

Table 4.1. TGARCH Estimation for Ajax Amsterdam FC Shares During the Covid-19 Pandemic March-August 2020 Period

Dependent Variable: AJAX
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Date: 09/04/20   Time: 11:56
Sample: 1 103
Included observations: 103

Variable	Coefficient	Std. Error	z-Statistic	Prob.
@SQRT(GARCH)	-1.098905	0.261210	-4.206973	0.0000
NETHERLANDS_DR	7.80E-05	2.49E-05	3.128712	0.0018
C	15.07228	0.177038	85.13571	0.0000
Variance Equation				
C	0.013432	0.008014	1.676090	0.0937
RESID(-1)^2	0.045082	0.045477	0.991319	0.3215
RESID(-1)^2*(RESID(-1)<0)	0.456803	0.141694	3.223870	0.0013
GARCH(-1)	0.632555	0.100945	6.266315	0.0000
R-squared	-1.030193	Mean dependent var		14.84874
Adjusted R-squared	-1.070797	S.D. dependent var		0.936586
S.E. of regression	1.347772	Akaike info criterion		1.551242
Sum squared resid	181.6490	Schwarz criterion		1.730301
Log likelihood	-72.88895	Hannan-Quinn criter.		1.623767
Durbin-Watson stat	0.117870			

Source: Author Computation (2020)

From the estimation results above on the F.C. ajax amsterdam stock during this pandemic, it shows the coefficient of the TARCH parameter (RESID (-1) ^ 2 * (RESID (-1) <0) is 0.456803 and significant (p value = 0.0013) which means that the market did respond more to bad News (the emergence of a pandemic followed by an increase in the number of deaths in the Netherlands), so it directly affects the level of Volatility of Ajax Amsterdam FC stock returns.

2) BVB Result

Table 4.2. Estimated Tgarch for Borussia Dortmund F.C. Shares During the Covid-19 Pandemic March-August 2020 Period

Dependent Variable: BVB
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Date: 09/04/20   Time: 11:55
Sample: 1 103
Included observations: 103

Variable	Coefficient	Std. Error	z-Statistic	Prob.
@SQRT(GARCH)	-4.315485	2.163040	-1.995101	0.0460
GERMANY_DR	-0.000162	3.29E-05	-4.920078	0.0000
C	8.275891	0.572681	14.45114	0.0000
Variance Equation				
C	0.000367	0.000907	0.404698	0.6857
RESID(-1)^2	-0.049436	0.046363	-1.066271	0.2863
RESID(-1)^2*(RESID(-1)<0)	0.557043	0.164332	3.389739	0.0007
GARCH(-1)	0.862731	0.060031	14.37144	0.0000

R-squared	-5.714408	Mean dependent var	6.095427
Adjusted R-squared	-5.848696	S.D. dependent var	0.629931
S.E. of regression	1.648531	Akaike info criterion	0.068986
Sum squared resid	271.7654	Schwarz criterion	0.248045
Log likelihood	3.447226	Hannan-Quinn criter.	0.141511
Durbin-Watson stat	1.000642		

Source: Author Computation (2020)

From the estimation results above for F.C. Borussia Dortmund's stock during this pandemic, it shows the coefficient of the TARCH parameter (RESID (-1) ^ 2 * (RESID (-1) <0)) is 0.557043 and significant (p value = 0.0007) which means that the market did respond more to bad News (the emergence of a pandemic followed by an increase in the number of deaths in Germany), so that directly affects the level of Volatility of F.C. stock returns. Borussia Dortmund.

3) Juventus Result

Tabble 4.3. Estimated Tgarch for F.C. Juventus Shares During the Covid-19 Pandemic March-August 2020 Period

Dependent Variable: JUVE
Method: ML ARCH - Generalized error distribution (GED) (BFGS / Marquardt
    steps)
Date: 09/04/20   Time: 11:46
Sample: 1 103
Included observations: 103

Variable	Coefficient	Std. Error	z-Statistic	Prob.
@SQRT(GARCH)	4.718135	0.899336	5.246240	0.0000
ITALY_DR	1.16E-05	7.82E-07	14.85985	0.0000
C	0.426180	0.036491	11.67894	0.0000
Variance Equation				
C	0.000168	4.89E-05	3.441271	0.0006
RESID(-1)^2	0.382611	0.139349	2.745700	0.0060
RESID(-1)^2*(RESID(-1)<0)	-0.467720	0.149891	-3.120399	0.0018
GARCH(-1)	0.684365	0.060537	11.30487	0.0000
R-squared	0.892710	Mean dependent var		0.881152
Adjusted R-squared	0.890564	S.D. dependent var		0.109128
S.E. of regression	0.036101	Akaike info criterion		-3.945907
Sum squared resid	0.130326	Schwarz criterion		-3.766848
Log likelihood	210.2142	Hannan-Quinn criter.		-3.873382
Durbin-Watson stat	1.779837			

Source: Author Computation (2020)

From the estimation results above for Juventus F.C. stock during this pandemic, it shows the coefficient of the TARCH parameter (RESID (-1) ^ 2 * (RESID (-1) <0)) is -0.467720 and significant (p-value = 0.0018), which means that the market has indeed responded more to bad News (the emergence of a pandemic followed by an increase in the number of deaths in Italy), so it directly affects the level of Volatility of the stock returns of Juventus F.C.

4) Manchester United

Table 4.4. Estimated Tgarch for F.C. Juventus Shares During the Covid-19 Pandemic March-August 2020 Period

Dependent Variable: MANU
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Date: 09/05/20   Time: 17:52
Sample: 1 103
Included observations: 103

Variable	Coefficient	Std. Error	z-Statistic	Prob.
@SQRT(GARCH)	-1.024290	0.226087	-4.530511	0.0000
UK_DR	1.66E-05	2.83E-06	5.875962	0.0000
C	16.02003	0.163808	97.79751	0.0000
Variance Equation				
C	0.047743	0.025380	1.881105	0.0600
RESID(-1)^2	0.175286	0.070805	2.475616	0.0133
RESID(-1)^2*(RESID(-1)<0)	0.927953	0.287882	3.223382	0.0013
GARCH(-1)	0.462481	0.090554	5.107230	0.0000
R-squared	-0.007613	Mean dependent var		15.62311
Adjusted R-squared	-0.027765	S.D. dependent var		1.092894
S.E. of regression	1.107963	Akaike info criterion		2.408252
Sum squared resid	122.7581	Schwarz criterion		2.587312
Log likelihood	-117.0250	Hannan-Quinn criter.		2.480778
Durbin-Watson stat	0.369761			

Source: Author's Computation (2020)

From the estimation results above for Manchester United F.C. shares during this pandemic, it shows the coefficient of the TARCH parameter (RESID (-1) ^ 2 * (RESID (-1) <0)) is 0.927953 and significant (p value = 0.0013) which means that the market did respond more to bad News (the emergence of a pandemic followed by an increase in the number of deaths in Italy), thus directly affecting the Volatility of Manchester United's stock returns.

V.   Discussion

Ajax Amsterdam, Borrusia Dortmund, Juventus, and Manchester United are big European football clubs that have made an IPO (Initial Public Offering) or stock offering to the public to have a very volatile market tendency. This Volatility is increasingly fluctuating in 2020 when the world is experiencing a pandemic condition caused by the Covid-19 virus. This extraordinary event that failed to predict by all economists can be considered an implementation of the Black Swan theory in the financial industry.

This pandemic condition also directly affects activities involving a lot of the public, one of which is football as a prevalent sport in Europe, where the respective leagues with UEFA's approval are forced to stop and postpone competitions prevent the spread of a more virus massive. The first to stop the league was the Italian Serie A on March 10 because Italy became the European country most affected by the effects of Covid-19. This policy was also followed by the German Bundesliga and English Premier League on March 13, and finally the Dutch Eredivisie on March 13. In Germany, the Bundesliga was officially terminated on March 13, 2020, and finally, the Dutch Eredivisie on April 25, 2020.

From the estimation results using the TGARCH model, the shares of the 4 football clubs were observed (Ajax Amsterdam, Borussia Dortmund, Manchester United, and Juventus) have a strong response bad News, in this case, the increasing number of positive cases of coronavirus in their countries. This can be seen in the conditional variance chart on the 4 types of stocks studied, as follows:

Graph 4.2. Conditional Variance

(1) Ajax Amsterdam

(2) Borussia Dortmund

(3) Juventus F.C. (4) F.C. Manchester United
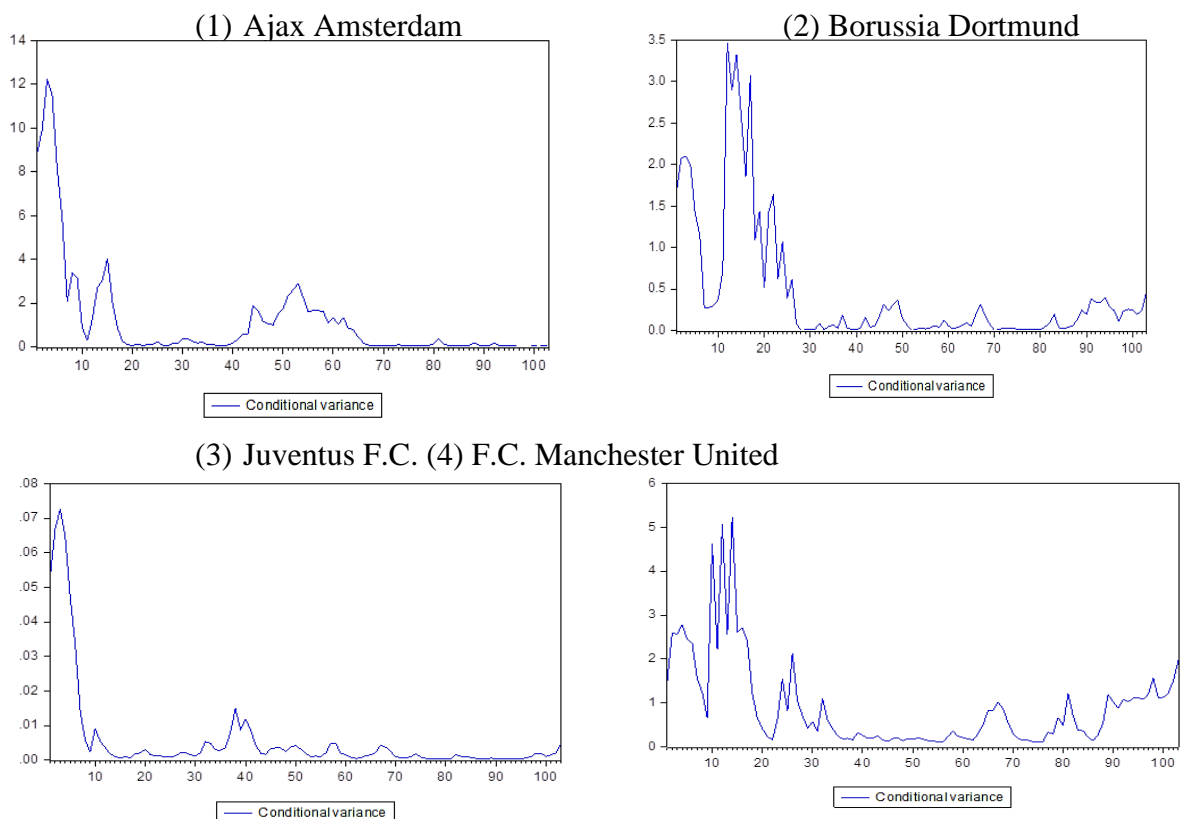
Source: Authors Computation (2020)

From the graph above, it can be seen that in general, the 4 types of stocks that are the focus of the study show similarities, namely experiencing a large swing or high Volatility were the start of the initial period of the Covid-19 pandemic in Europe, which forced the termination of football matches which then further impacted the stock value These football clubs on the stock market.

However, in the next period, it can be seen that there has been a decrease in the level of Volatility, especially entering the middle of 2020, when the implementation of protocols that allow football matches to be held so that it has a direct impact on the condition of the shares of these clubs in the stock market.

VI. Conclusion

The stock market as a short-term investment instrument has very volatile characteristics towards any shock in the economy. The condition of the Covid-19 pandemic has made the economic shock or shock even more significant so that the Covid-19 pandemic can be categorized as a black swan effect that affects the financial market due to a negative response to bad News that appears. The Black Swan Effect can be seen more specifically in response to the negative response of stocks of several football clubs that have IPOs in major European stock markets. Furthermore, Ajax Amsterdam (Netherlands), Borussia Dortmund (Germany), Juventus F.C. (Italy), and Manchester United (England) showed negative responses to bad News (covid-19), which was shown through the large swing in the value of club shares. -The club during the Covid-19 pandemic.

VII. Reference

Ariefianto, Muhammad Doddy. 2012. *Ekonometrika Esensi Dan Aplikasi Dengan Menggunakan EViews*. 1st Ed. Jakarta: Erlangga.

Bollerslev, Tim. 1986. "Generalized Autoregressive Conditional Heteroskedasticity." *Journal of Econometrics*.

Deloitte U.K. 2020. *Deloitte Football Money League*. Manchester. https://www2.deloitte.com/uk/en/pages/sports-business-group/articles/deloitte-football-money-league.html?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%253A+DeloitteGlobal+%2528Deloitte+Global+headlines%2529#.

Engle, Robert F. 1982. "Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of United Kingdom Inflation." *Econometrica*.

ESPN. 2020. "Borussia Dortmund Players Take Wage Cut to Help Club amid Coronavirus Crisis." https://www.espn.com/soccer/borussia-dortmund/story/4078057/borussia-dortmund-players-take-wage-cut-to-help-club-amid-coronavirus-crisis.

Gunardi, Ardi. 2014. "The Implementation of UEFA Financial Fair Play: An Analysis of Financial Performance of Manchester United." *International Journal of Science and Research*.

Habib, ZIK, and MA Khan. 2012. "Dividend Policy and Share Price Volatility: Evidence from Pakistan." *Global Journal of Management And ….*

Hartono, Jogiyanto. 2010. Yogyakarta: BPFE *Teori Portofolio Dan Analisis Investasi (Edisi Sepuluh)*.

Haryoprasetyo, Riza, and Endang Kiswara. 2013. "ANALISIS ATAS KINERJA FINANSIAL KLUB SEPAKBOLA PROFESIONAL : STUDI KASUS PADA MANCHESTER UNITED." *DIPONEGORO JOURNAL OF ACCOUNTING* 2(3): 1–8. https://ejournal3.undip.ac.id/index.php/accounting/article/view/3467/3397.

Herdyastoro, Krisna Mukti, and Budi Frensidy. 2014. *Analisis Laporan Keuangan Dan Harga Saham Klub Sepakbola Manchester United, Juventus, Dan Borussia Dortmund*. Jakarta.

Hussainey, Khaled, Chijoke Oscar Mgbame, and Aruoriwo M. Chijoke-Mgbame. 2011. "Dividend Policy and Share Price Volatility: U.K. Evidence." *Journal of Risk Finance*.

Morales, Lucia, and Bernadette Andreosso-O'Callaghan. 2020. "Covid19: Global Stock Markets' Black Swan.'" *Critical Letters in Economics & Finance* 1(1).

Onali, Enrico. 2020. "COVID-19 and Stock Market Volatility." *SSRN Electronic Journal*.

Rijoly, Jacobus Cliff Diky. 2015. "ANALISIS TINGKAT VOLATILITAS RETURN SAHAM PADA PERUSAHAN TELEKOMUNIKASI DI INDONESIA (STUDY KASUS PT. TELKOM DAN PT. INDOSAT)." In *Peningkatan Daya Saing Dalam Menghadapi ASEAN ECONOMIC*

COMMUNITY (AEC) 2015, Bandung, ID: Himpunan Mahasiswa Pascasarjana FEB UNPAD.

Sabiruzzaman, Md, Md Monimul Huq, Rabiul Alam Beg, and Sajid Anwar. 2010. "Modeling and Forecasting Trading Volume Index: GARCH versus TGARCH Approach." *Quarterly Review of Economics and Finance*.

Setiaji, Hidayat. 2018. "Kala Harga Saham Ditentukan 11 Orang." https://www.cnbcindonesia.com/opini/20180114100114-14-1393/kala-harga-saham-ditentukan-11-orang.

Spiteri, Gianfranco et al. 2020. "First Cases of Coronavirus Disease 2019 (COVID-19) in the WHO European Region, January 24 to February 21 2020." *Eurosurveillance*.

Sukati, Mphumuzi Angelbert. 2013. "Measuring Maize Price Volatility in Swaziland Using ARCH/GARCH Approach." *Munic Personal REPEC Archive*.

Taleb, Nassim Nicholas. 2007. The Review of Austrian Economics *The Black Swan: The Impact of the Highly Improbable (Random House, 2007)*.

UEFA. 2018. "UEFA Club Licensing and Financial Fair Play Regulations." *Union of European Football Associations*.

Zakoian, Jean Michel. 1994. "Threshold Heteroskedastic Models." *Journal of Economic Dynamics and Control*.