

The time-varying correlation between popular narratives and TRY/USD FX rate: Evidence from a DCC-GARCH model

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Abstract

Understanding the effects of people's interactions on social media on economic fluctuations is essential for analyzing economic dynamics and making predictions. 'Time-varying' and 'time-scale dependent' volatilities between tweets sent from Turkey containing the terms "economic crisis", "inflation", "unemployment", "economic recession", "#dolar" (also their lagged series), and TL/USD FX rate was examined with dynamic conditional correlation (DCC) GARCH model. 7.402.035 Tweet data were used for the study, and their count was averaged between the dates 01.10.2020 and 11.03.2022, and a time series of 15, 30 and 60 minutes was obtained. These series of tweets were compared with the USD/TL FX rate data for the same periods. The results show that examining -delayed relationships of up to 10 lags-6th and 10th lag of 60 min frequency Twitter data have high level of conditional correlations with TL/USD FX rate. However, except for these series 12 of that is not dynamic but a CC process and for 105 series are statistically not significant to explain CC and DCC relationship.

JEL classification numbers: G12, G17, G41.

Keywords: Twitter narratives, DCC-GARCH, USD/TL FX rate, narrative economics.

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1. Introduction

The effect of the interaction of people in daily life on the financial decisions they make plays an important role in understanding nationwide economic dynamics. Today, the easiest and most common way of this interaction is through social media channels. According to Mayfield (2008), with the introduction of social media into our lives in the early 2000s, the way we receive news has changed significantly, and it has become much easier to communicate with each other in mass.

Shiller (2017) showed that the narratives that people heard from other people, both in economics and in other fields (especially from people who were taken into account and cared for by a large audience) became highly influential.

According to Datareportal 2021 report, 7.91 billion people live in the world, 4.95 billion of them have internet access and 4.62 billion of them have social media accounts. In addition, Buckle C. & Moran S. (2022) indicates in GWI Q3 Report that people between the ages of 16 and 64 also spend an average of 6 hours and 58 minutes on the internet per day using any device, including computers and phones. Understanding the behavior of the smallest building blocks of the society, which directs the economy with its mass movements, is of great importance in terms of forming economic policies and reacting much more quickly to the deterioration in economic data.

Hereof, Narrative economics is explained by Shiller (2017) as “*Studies the spread and dynamics of popular narratives, the stories, particularly those of human interest and emotion, and how these change through time, to understand economic fluctuations*”

There have been many studies on the effects of narratives in various disciplines, including human behavior. In Marketing (Escalas, 2007), in journalism (Machill & Köhler & Waldhauser, 2007), in education (McQuiggan & Rowe & Lee & Lester, 2008), in health interventions (Slater & Buller & Waters & Archibeque & LeBlanc, 2003) and in philanthropy (Weber & Martin & Members & Corrigan, 2006) are the main examples.

There are limited studies conducted in this area that examine the quantitative relationship between economics data and narratives. The aim of this study is to determine the relationship between the temporal change of tweets sent from Turkey and containing the terms "economic crisis", "inflation", "unemployment", "economic recession" and "#dolar" and the change in the Dollar/TL exchange rate. For this purpose, series spanning the time between 01.10.2020 and 11.03.2022 were obtained. Furthermore, the ‘time-varying’ and ‘time-scale dependent’ volatilities were analyzed using the dynamic conditional correlation (DCC) GARCH model.

People living in Turkey commonly prefer foreign currencies to protect themselves from inflation. However, according to Ozer & Kucuksakarya (2021); there are strong statistical relationships between exchange rate and inflation volatility for both long-run and short-run. Therefore, not only tweets about "dollar" but also tweets with the words "economic crisis", "inflation", "unemployment", and "economic recession" was included in the analysis and their relationship with TL/USD FX rate was examined.

2. Literature Review

When looking at the literature, it is seen that the term "narrative economics" was used for the first time in the Dictionary of Political Economy by Inglis Palgrave in 1912. In the study, narrative economics is described as a historical narrative method performed by the person. Although the concepts stated by Palgrave do not fully overlap with our current research purpose, there are touchstone studies conducted to understand the economic decisions of narratives.

Shiller (2017) and Akerlof & Shiller (2010) described that narratives are highly contagious and their effects on the economy, which should not be ignored while creating economic policies. In addition, narratives play a critical role in individual and collective decision-making. Hence, as Ash, E., Gauthier, G., & Widmer, P. (2021) mentioned, both science and policy would benefit from a better understanding of how narratives form, spread, and influence behavior.

Another study showing the effect of narratives on emotions was conducted by Taffler, R. J. & Agarwal, V. & Obring, M. (2021). In this study, a textual analysis was applied to financial media reports and the words were compared with the words in the context-specific emotion word dictionaries created by the research group. Consequently, they found that investor emotions explain up to 40% of market returns and 70% of market uncertainty during the two recent extreme market events explored. Moreover, they are more salient in market bubbles than in normal market conditions.

One of another cornerstones study in this field is carried out by Bertsch C., Hull I & Zhang X. (2021). Properties of business cycle narratives processed by the natural language processing method from newspaper articles between 1950 and 2019. Their main findings are that narratives tend to consolidate around a dominant explanation during expansions and fragment into competing explanations during contractions. Furthermore, past reference events are strongly associated with increased narrative consolidation.

Additionally, it is observed that reviews of dynamics of the covariance of assets in the literature have increased over the last 30 years. For the Garch analysis high number of parameters are always seen as a problem. To solve the mentioned problem Bollerslev (1990) argued that keeping the correlations constant and recommend using the Constant Conditional Correlation model (CCC). Engle (2002) and Tse & Tsui (2002) integrated the Bollerslev's CCC model a dynamic in the correlations and introduced the DCC-GARCH model. DCC-GARCH models proposed by Engle (2002) and Tse & Tsui (2002) can be applied for multivariate and high-dimensional data sets.

It has been determined that the relationship between narratives about Turkish economy and the variables in the Turkish economy has not been examined in literature. Therefore, the ultimate purpose of this research is to fill the research gap in the mentioned field.

3. Data & Methodology

All of the analyzes used in this article were carried out in the R using the “rmgarch” and “rugarch” packages prepared by Ghalanos (2018). The data are downloaded from Thomson Reuters EIKON and Twitter Inc. Databases.

The data consists of tweet data sent from Turkey which contains "economic crisis", "inflation", "unemployment", "economic recession" and "#dolar" words and TL/USD fx rate data. The date range is between 01.10.2020 and 11.03.2022. To determine the dynamic relationship, 7.402.035 Tweet data and 50.593 USD/TL FX rate data were obtained. In addition, the average number of tweets was taken for 15, 30 and 60 minutes to obtain time-series data and prepare them for analysis.

In addition, the TL/USD FX market operates from Monday 00:00 to Friday 24:00 (weekdays only). Thus, while creating the data, a twin data set was obtained by extracting not only the 7-days relationship but also the weekend data, and the relationships between TL/USD and Tweet count data on weekdays were also examined. For our seven days data set, it is assumed that the number of tweets was changing for the weekend while the FX rate remained constant for Saturday and Sunday.

The main purpose of the study is to measure whether tweets in Turkish (thus assuming that those tweeting are related to Turkish and somehow TL investors) trigger a massive movement and whether they have the ability to cause extreme movements in TL/USD FX rate. The possibility of volatile movements in TL/USD to increase the number of tweets after this movement has been tried to be eliminated by taking the 1 to 10 lags of the tweeter data in the data sets.

Soosung Hwang & Pedro L. Valls Pereira (2006) state that applying the DCC-Garch Method to less than 500 pieces of data may produce misleading results. However, the number of data used in the analysis given in the table below has exceeded this critical threshold mentioned.

Table 1: Number of Data Used in Analysis

Period	Label	15-Min Period	30-Min Period	60-Min Period
Weekdays	FX Rate Data Number	50,593	25,297	12,649
	Dolar Tweet Data Number			
	Cumulative Tweet Number Data Number			
7 Days	FX Rate Data Number	36,193	18,096	9,048

As it can be seen in Figure 1, Figure 2 and Figure 3, the change in the numerical data of the terms with the formula: $R_T = (N_t - N_{t-1})/N_{t-1}$ “economic crisis”, “inflation”, “unemployment”, “economic recession” and “#dollar” and the TL/USD FX rate shows heteroskedastic tendency. However, rather than visual analysis, the Augmented Dickey-Fuller (ADF) unit root test was applied to the data and it was

also tested whether the data was stationary or not. As a result, the null hypothesis of ADF which implies data has unit root is accepted for all the series. Further, Ljung–Box Q-statistics testing proves the presence of serial correlation and heteroskedasticity in all series.

Table 2: Augmented Dickey-Fuller Test Results

Period	Data Type	Results	15-Min Period	30-Min Period	60-Min Period
Weekdays	TL/USD FX Rate	Test Statistics	-33.935	-23.919	-19.613
		P-Value	0.01	0.01	0.01
	Dolar Tweet Count Data	Test Statistics	-19.984	-19.376	-20.431
		P-Value	0.01	0.01	0.01
	Cumulative Tweet Count Data	Test Statistics	-16.814	-16.404	-19.865
		P-Value	0.01	0.01	0.01
7 Days	TL/USD FX Rate	Test Statistics	-38.33	-27.232	-21.844
		P-Value	0.01	0.01	0.01
	Dolar Tweet Count Data	Test Statistics	-21.785	-20.278	-20.504
		P-Value	0.01	0.01	0.01
	Cumulative Tweet Count Data	Test Statistics	-20.396	-19.995	-21.721
		P-Value	0.01	0.01	0.01

Table 3: Ljung–Box Q-statistics Test Results (lag=24)

Period	Data Type	Results	15-Min Period	30-Min Period	60-Min Period
Weekdays	TL/USD FX Rate	Test Statistics	1083.2	1395.2	987.82
		P-Value	2.20E-16	2.20E-16	2.20E-16
	Dolar Tweet Data	Test Statistics	13310	1633.3	991.23
		P-Value	2.20E-16	2.20E-16	2.20E-16
	Cumulative Tweet Number Data	Test Statistics	12044	2208.8	511.77
		P-Value	2.20E-16	2.20E-16	2.20E-16
7 Days	TL/USD FX Rate	Test Statistics	1446.9	2197.7	411.7
		P-Value	2.20E-16	2.20E-16	2.20E-16
	Dolar Tweet Data	Test Statistics	14040	2555.5	1061.2
		P-Value	2.20E-16	2.20E-16	2.20E-16
	Cumulative Tweet Number Data	Test Statistics	8352.4	1048.1	40.207
		P-Value	2.20E-16	2.20E-16	0.02032

The Dynamic Conditional Correlation (DCC-GARCH) method is one of the most suitable methods that can be used to examine the relationship between data with this feature. One of the biggest benefits of the DCC-GARCH method is that it reveals changes in conditional correlations over time, if any.

Christodoulakis & Satchell (2002), Engle (2002), and Tse & Tsui (2002) developed the constant conditional correlation GARCH (CCC-GARCH) model in the structure where the conditional correlation matrix is time-dependent.

These models are known as Dynamic Conditional Correlation GARCH (DCC-GARCH) model. The model proposed by Christodoulakis & Satchell (2002) can only be applied to bivariate models. On the other hand, DCC-GARCH models proposed by Engle (2002) and Tse & Tsui (2002) can be applied for multivariate and high-dimensional data sets. The basic idea of the model is that the covariance matrix H_t , can be splitted correlation matrix R_t and conditional standard deviations D_t .

Atmaca (2018) and Özdurak & Karataş (2021) defined the Dynamic Conditional Correlation (DCC) GARCH model with n assets with expected value 0 and covariance matrix H_t as;

$$r_t = \mu_t + a_t \quad (1)$$

$$a_t = H_t^{1/2} Z_t \quad (2)$$

$$H_t = D_t R_t D_t \quad (3)$$

Where;

r_t : $n \times 1$ vector of returns of n assets at time t ,

a_t : $E[a_t]=0$ and $Cov[a_t]= H_t$ x ($n \times 1$) vector of mean-corrected returns of n assets at the time

t ,

μ_t : $n \times 1$ vector of the expected value of the conditional r_t

H_t : $n \times n$ matrix of conditional variances of a_t at time t H_t

$H_t^{1/2}$: Any $n \times n$ matrix at time t such that H_t is the conditional variance matrix of a_t

D_t : $n \times n$, diagonal matrix of conditional standard deviations of a_t at time t

R_t : $n \times n$ conditional correlation matrix of a_t at time t

Z_t : $n \times n$ conditional correlation matrix of a_t at time t $n \times 1$ vector of i.i.d errors such that $E[Z_t]=0$ and $E[Z_t Z_t^T]= I$

Engle’s DCC – GARCH model analysis consists of 2 stages: the first is to estimate the univariate GARCH model and the second is to measure the conditional correlations varying over time.

The first is to estimate the univariate GARCH model, and the second is to compute the conditional correlations varying over time. The DCC specification can be written as follows;

$$R_t = Q_{os,t}^{*-1} Q_{os,t} Q_{os,t}^{*-1} \tag{4}$$

Where;

$$Q_{os,t} = (1 - Q_1 - Q_2) \times Q^* + Q_1 \times (\varepsilon_{0,t-1} \varepsilon_{s,t-1}) + Q_2 \times (Q_{os,t-1}) \tag{5}$$

The first number of $Q_{os,t}$ (which is Q_0) need to be a positive definite number to ensure H_t is a positive definite number. In addition, the Q_1 and Q_2 should be greater than zero and $(Q_1 + Q_2)$ should be smaller than 1 to ensure that the univariate GARCH model is positive.

4. Empirical Results

The main purpose of the study is to measure whether tweets in Turkish (thus assuming that those tweeting are related to Turkish and somehow TL investors) trigger a massive movement and whether they have the ability to cause extreme movements in TL/USD FX rate. Firstly, CCC-GARCH models were estimated for The data used in the analysis. Subsequently, with the Lagrange Multiplier (LM) test proposed by Tse (2000), the existence of dynamic properties of conditional correlations obtained from the CCC-MGARCH model was investigated, and the null hypothesis of fixed correlation at a 5% significance level was rejected for all series. This shows us that there are dynamic features in the correlation series. Thus, to avoid model definition error, the model results that best capture the dynamic correlation structure were interpreted using the DCC-GARCH model.

According to Hammoudeh & Yuan & McAleer & Thompson (2010), ARCH coefficients show the effect of past shocks or news in the short run. GARCH coefficients, on the other hand, express the past conditional volatility dependence, in other words, the long-term persistence of past volatility. Accordingly, it captures the effect of past shocks on current (current) conditional correlations and the effect of past correlations. The fact that both parameters are statistically significant means that the conditional correlations are not constant.

According to Özdurak & Karataş (2021), the "dynamic" part comes from ϱ_1 . If ϱ_2 is close to 1, then the process is closer to being a CC. But in practice, a "large" value for DCC ϱ_1 is something like 0.1 to 0.2, with ϱ_2 being relatively close to $1-\varrho_2$. On the other hand, if both ϱ_1 and ϱ_2 are small, there appears to be no systematic correlation among the variables.

DCCA1 (ρ_1) and DCCB1 (ρ_2) DCC coefficients are exhibited for all GARCH models in every period. Most of the lagged data of US Dollar tweet count data and cumulative tweet count data positively impact the TL/USD FX Rate and are statistically significant. But especially for the five series in Table 4, the DCC-GARCH model showed the process is strong and dynamic.

Table 4: DCC GARCH Model Results

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
7 days	60	US Dollar Tweet Count Data	6	[Joint]DCCA1	0.193***	6.4642
7 days	60	US Dollar Tweet Count Data	6	[Joint]DCCB1	0.399***	6.4642
7 days	60	Cumulative Tweet Count Data	6	[Joint]DCCA1	0.219***	13.231
7 days	60	Cumulative Tweet Count Data	6	[Joint]DCCB1	0.477***	13.231
7 days	60	Cumulative Tweet Count Data	10	[Joint]DCCA1	0.168***	13.238
7 days	60	Cumulative Tweet Count Data	10	[Joint]DCCB1	0.614***	13.238

Notes: *** represents statistical significance at 0.01 level

As in can be seen at Table 5, all the GARCH series fulfill the criteria that $DCCA1(\rho_1) + DCCB1(\rho_2) < 1$. Moreover, the DCCA1 (ρ_1) and DCCB1 (ρ_2) parameters are all positive, and sum is less than 1, which shows positive unconditional variance. However, for 12 series DCCA1 (ρ_1) and/or DCCB1 (ρ_2) are both significant and DCCB1 (ρ_2) close to 1 which shows the process is not dynamic but a CC process. In addition, for 105 series, DCCA1 (ρ_1) and/or DCCB1 (ρ_2) are statistically not significant in explaining the CC and DCC relationship.

5. Conclusion

This study aims to evaluate the relationship between narratives about the Turkish economy in Twitter and TL/USD FX rate movement using the DCC-GARCH model. The reason for choosing the DCC-GARCH model is that the Tweeter and the TL/USD FX rate data are non-normal and heteroskedastic tendencies and have time varying conditional correlations in different lags.

Augmented Dickey-Fuller (ADF) unit root and Ljung–Box Q-statistics test were applied to the data. The result literately showed that all data has a unit root, the presence of serial correlation, and heteroskedasticity.

After examining delayed relationships of up to 10 lags, the DCC-Garch model shows that the 6th and 10th lag of 60 min frequency 7-days Twitter data have a high level of conditional correlations with 60 min frequency TL/USD FX rate data. Other than that for 12 series the process is not dynamic but a CC process, and for 105 series are statistically not significant to explain CC and DCC relationship.

As a result of the analyzes DCC-Garch model shows especially that volatility in the only contains “Dolar” and other containing keywords Twitter data, which we accept as narratives in this study, is likely to cause volatility in TL/USD at T+360 min and T+600 min (due to the delayed relationship). Therefore, with the model obtained, the estimation of this fluctuation in the TL/USD rate will enable investors to take positions before a minimum of T-360 minutes.

Although in this study, only the tweet data coming from Twitter, containing certain words and sent from the Turkey location are accepted as narratives and the analyzes are based on this, these analyzes can be expanded in terms of both channels and research scope and other relationships could be searched.

Another potential extension to this study, only the DCC-GARCH model was examined, and more models such as VEC and BEKK models (and their performance) could be examined. In addition, data in certain periods and certain locations containing abnormal movements can be examined with the DCC Garch model.

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Appendix: Additional Tables and Figures

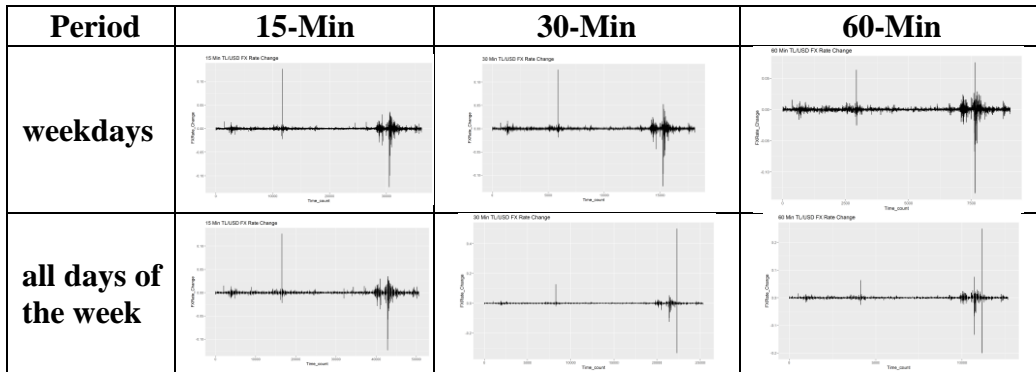


Figure 1: TL/USD FX Rate of Returns Graph For The Date Between 01.10.2020 and 11.03.2022

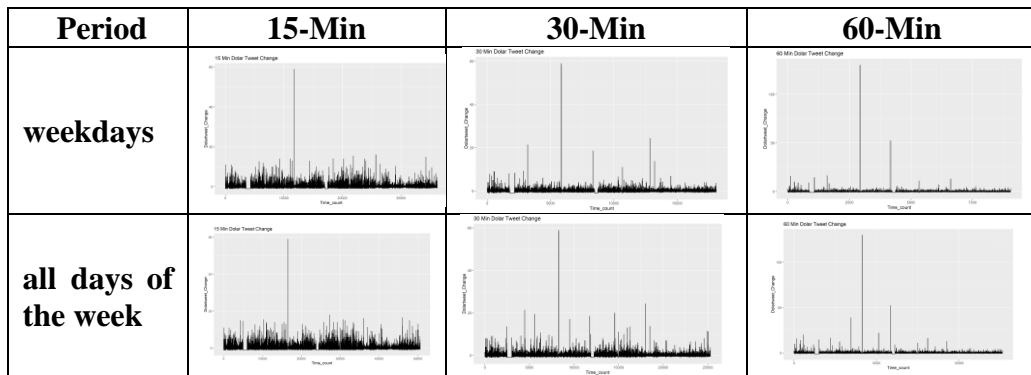


Figure 2: US Dollar Tweet Count Data For The Date Between 01.10.2020 and 11.03.2022

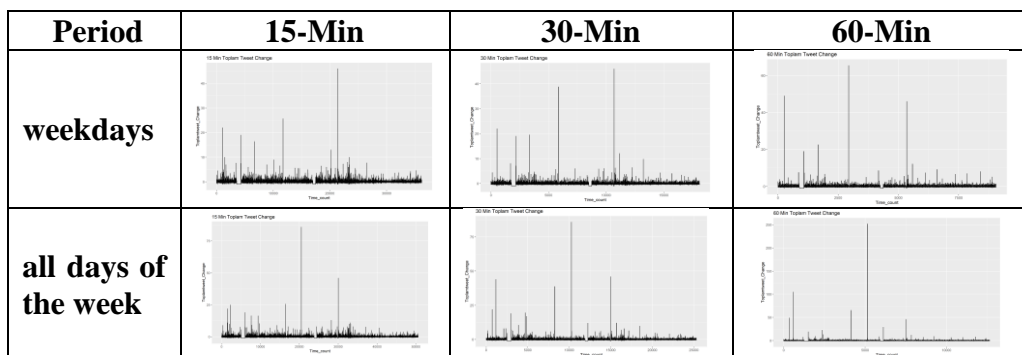


Figure 3: Cumulative Tweet Count Data For The Date Between 01.10.2020 and 11.03.2022

Table 5: DCC GARCH Model Results For All Series

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
7 days	15	US Dollar Tweet Count Data	0	Alpha(1st)	0.21*	84.419
7 days	15	US Dollar Tweet Count Data	0	Beta(1st)	0.789***	84.419
7 days	15	US Dollar Tweet Count Data	0	Alpha(2nd)	0.059***	84.419
7 days	15	US Dollar Tweet Count Data	0	Beta(2nd)	0.901***	84.419
7 days	15	US Dollar Tweet Count Data	0	[Joint]DCCA1	0	84.419
7 days	15	US Dollar Tweet Count Data	0	[Joint]DCCB1	0.883***	84.419
7 days	15	US Dollar Tweet Count Data	1	Alpha(1st)	0.21*	84.456
7 days	15	US Dollar Tweet Count Data	1	Beta(1st)	0.789***	84.456
7 days	15	US Dollar Tweet Count Data	1	Alpha(2nd)	0.059***	84.456
7 days	15	US Dollar Tweet Count Data	1	Beta(2nd)	0.901***	84.456
7 days	15	US Dollar Tweet Count Data	1	[Joint]DCCA1	0	84.456
7 days	15	US Dollar Tweet Count Data	1	[Joint]DCCB1	0.879***	84.456
7 days	15	US Dollar Tweet Count Data	2	Alpha(1st)	0.21*	84.492
7 days	15	US Dollar Tweet Count Data	2	Beta(1st)	0.789***	84.492
7 days	15	US Dollar Tweet Count Data	2	Alpha(2nd)	0.059***	84.492
7 days	15	US Dollar Tweet Count Data	2	Beta(2nd)	0.901***	84.492
7 days	15	US Dollar Tweet Count Data	2	[Joint]DCCA1	0	84.492
7 days	15	US Dollar Tweet Count Data	2	[Joint]DCCB1	0.888***	84.492
7 days	15	US Dollar Tweet Count Data	3	Alpha(1st)	0.21*	84.524
7 days	15	US Dollar Tweet Count Data	3	Beta(1st)	0.789***	84.524
7 days	15	US Dollar Tweet Count Data	3	Alpha(2nd)	0.059***	84.524
7 days	15	US Dollar Tweet Count Data	3	Beta(2nd)	0.901***	84.524
7 days	15	US Dollar Tweet Count Data	3	[Joint]DCCA1	0	84.524
7 days	15	US Dollar Tweet Count Data	3	[Joint]DCCB1	0.879***	84.524
7 days	15	US Dollar Tweet Count Data	4	Alpha(1st)	0.21*	84.557
7 days	15	US Dollar Tweet Count Data	4	Beta(1st)	0.789***	84.557
7 days	15	US Dollar Tweet Count Data	4	Alpha(2nd)	0.059***	84.557
7 days	15	US Dollar Tweet Count Data	4	Beta(2nd)	0.901***	84.557
7 days	15	US Dollar Tweet Count Data	4	[Joint]DCCA1	0	84.557
7 days	15	US Dollar Tweet Count Data	4	[Joint]DCCB1	0.866***	84.557
7 days	15	US Dollar Tweet Count Data	5	Alpha(1st)	0.21*	84.587
7 days	15	US Dollar Tweet Count Data	5	Beta(1st)	0.789***	84.587
7 days	15	US Dollar Tweet Count Data	5	Alpha(2nd)	0.059***	84.587
7 days	15	US Dollar Tweet Count Data	5	Beta(2nd)	0.901***	84.587
7 days	15	US Dollar Tweet Count Data	5	[Joint]DCCA1	0	84.587
7 days	15	US Dollar Tweet Count Data	5	[Joint]DCCB1	0.902***	84.587
7 days	15	US Dollar Tweet Count Data	6	Alpha(1st)	0.209*	84.618

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
7 days	15	US Dollar Tweet Count Data	6	Beta(1st)	0.79***	84.618
7 days	15	US Dollar Tweet Count Data	6	Alpha(2nd)	0.059***	84.618
7 days	15	US Dollar Tweet Count Data	6	Beta(2nd)	0.901***	84.618
7 days	15	US Dollar Tweet Count Data	6	[Joint]DCCA1	0	84.618
7 days	15	US Dollar Tweet Count Data	6	[Joint]DCCB1	0.882***	84.618
7 days	15	US Dollar Tweet Count Data	7	Alpha(1st)	0.209*	84.643
7 days	15	US Dollar Tweet Count Data	7	Beta(1st)	0.79***	84.643
7 days	15	US Dollar Tweet Count Data	7	Alpha(2nd)	0.059***	84.643
7 days	15	US Dollar Tweet Count Data	7	Beta(2nd)	0.901***	84.643
7 days	15	US Dollar Tweet Count Data	7	[Joint]DCCA1	0	84.643
7 days	15	US Dollar Tweet Count Data	7	[Joint]DCCB1	0.878***	84.643
7 days	15	US Dollar Tweet Count Data	8	Alpha(1st)	0.209*	84.668
7 days	15	US Dollar Tweet Count Data	8	Beta(1st)	0.79***	84.668
7 days	15	US Dollar Tweet Count Data	8	Alpha(2nd)	0.059***	84.668
7 days	15	US Dollar Tweet Count Data	8	Beta(2nd)	0.901***	84.668
7 days	15	US Dollar Tweet Count Data	8	[Joint]DCCA1	0	84.668
7 days	15	US Dollar Tweet Count Data	8	[Joint]DCCB1	0.997***	84.668
7 days	15	US Dollar Tweet Count Data	9	Alpha(1st)	0.209*	84.696
7 days	15	US Dollar Tweet Count Data	9	Beta(1st)	0.79***	84.696
7 days	15	US Dollar Tweet Count Data	9	Alpha(2nd)	0.059***	84.696
7 days	15	US Dollar Tweet Count Data	9	Beta(2nd)	0.901***	84.696
7 days	15	US Dollar Tweet Count Data	9	[Joint]DCCA1	0.011	84.696
7 days	15	US Dollar Tweet Count Data	9	[Joint]DCCB1	0.769***	84.696
7 days	15	US Dollar Tweet Count Data	10	Alpha(1st)	0.209*	84.714
7 days	15	US Dollar Tweet Count Data	10	Beta(1st)	0.79***	84.714
7 days	15	US Dollar Tweet Count Data	10	Alpha(2nd)	0.059***	84.714
7 days	15	US Dollar Tweet Count Data	10	Beta(2nd)	0.901***	84.714
7 days	15	US Dollar Tweet Count Data	10	[Joint]DCCA1	0	84.714
7 days	15	US Dollar Tweet Count Data	10	[Joint]DCCB1	0.888***	84.714
7 days	15	Cumulative Tweet Count Data	0	Alpha(1st)	0.213***	83.063
7 days	15	Cumulative Tweet Count Data	0	Beta(1st)	0.786***	83.063
7 days	15	Cumulative Tweet Count Data	0	Alpha(2nd)	0.059***	83.063
7 days	15	Cumulative Tweet Count Data	0	Beta(2nd)	0.901***	83.063
7 days	15	Cumulative Tweet Count Data	0	[Joint]DCCA1	0.001	83.063
7 days	15	Cumulative Tweet Count Data	0	[Joint]DCCB1	0.977***	83.063
7 days	15	Cumulative Tweet Count Data	1	Alpha(1st)	0.213***	83.105
7 days	15	Cumulative Tweet Count Data	1	Beta(1st)	0.786***	83.105
7 days	15	Cumulative Tweet Count Data	1	Alpha(2nd)	0.059***	83.105

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
7 days	15	Cumulative Tweet Count Data	1	Beta(2nd)	0.901***	83.105
7 days	15	Cumulative Tweet Count Data	1	[Joint]DCCA1	0.012**	83.105
7 days	15	Cumulative Tweet Count Data	1	[Joint]DCCB1	0.983***	83.105
7 days	15	Cumulative Tweet Count Data	2	Alpha(1st)	0.222***	83.131
7 days	15	Cumulative Tweet Count Data	2	Beta(1st)	0.777***	83.131
7 days	15	Cumulative Tweet Count Data	2	Alpha(2nd)	0.059***	83.131
7 days	15	Cumulative Tweet Count Data	2	Beta(2nd)	0.901***	83.131
7 days	15	Cumulative Tweet Count Data	2	[Joint]DCCA1	0	83.131
7 days	15	Cumulative Tweet Count Data	2	[Joint]DCCB1	0.914***	83.131
7 days	15	Cumulative Tweet Count Data	3	Alpha(1st)	0.222***	83.162
7 days	15	Cumulative Tweet Count Data	3	Beta(1st)	0.777***	83.162
7 days	15	Cumulative Tweet Count Data	3	Alpha(2nd)	0.059***	83.162
7 days	15	Cumulative Tweet Count Data	3	Beta(2nd)	0.901***	83.162
7 days	15	Cumulative Tweet Count Data	3	[Joint]DCCA1	0.001***	83.162
7 days	15	Cumulative Tweet Count Data	3	[Joint]DCCB1	0.997***	83.162
7 days	15	Cumulative Tweet Count Data	4	Alpha(1st)	0.222***	83.195
7 days	15	Cumulative Tweet Count Data	4	Beta(1st)	0.777***	83.195
7 days	15	Cumulative Tweet Count Data	4	Alpha(2nd)	0.059***	83.195
7 days	15	Cumulative Tweet Count Data	4	Beta(2nd)	0.901***	83.195
7 days	15	Cumulative Tweet Count Data	4	[Joint]DCCA1	0	83.195
7 days	15	Cumulative Tweet Count Data	4	[Joint]DCCB1	0.989***	83.195
7 days	15	Cumulative Tweet Count Data	5	Alpha(1st)	0.221***	83.226
7 days	15	Cumulative Tweet Count Data	5	Beta(1st)	0.778***	83.226
7 days	15	Cumulative Tweet Count Data	5	Alpha(2nd)	0.059***	83.226
7 days	15	Cumulative Tweet Count Data	5	Beta(2nd)	0.901***	83.226
7 days	15	Cumulative Tweet Count Data	5	[Joint]DCCA1	0	83.226
7 days	15	Cumulative Tweet Count Data	5	[Joint]DCCB1	0.919***	83.226
7 days	15	Cumulative Tweet Count Data	6	Alpha(1st)	0.222***	83.256
7 days	15	Cumulative Tweet Count Data	6	Beta(1st)	0.777***	83.256
7 days	15	Cumulative Tweet Count Data	6	Alpha(2nd)	0.059***	83.256
7 days	15	Cumulative Tweet Count Data	6	Beta(2nd)	0.901***	83.256
7 days	15	Cumulative Tweet Count Data	6	[Joint]DCCA1	0	83.256
7 days	15	Cumulative Tweet Count Data	6	[Joint]DCCB1	0.925***	83.256
7 days	15	Cumulative Tweet Count Data	7	Alpha(1st)	0.221***	83.287
7 days	15	Cumulative Tweet Count Data	7	Beta(1st)	0.778***	83.287
7 days	15	Cumulative Tweet Count Data	7	Alpha(2nd)	0.059***	83.287
7 days	15	Cumulative Tweet Count Data	7	Beta(2nd)	0.901***	83.287
7 days	15	Cumulative Tweet Count Data	7	[Joint]DCCA1	0.005***	83.287

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
7 days	15	Cumulative Tweet Count Data	7	[Joint]DCCB1	0.994***	83.287
7 days	15	Cumulative Tweet Count Data	8	Alpha(1st)	0.221***	83.308
7 days	15	Cumulative Tweet Count Data	8	Beta(1st)	0.778***	83.308
7 days	15	Cumulative Tweet Count Data	8	Alpha(2nd)	0.059***	83.308
7 days	15	Cumulative Tweet Count Data	8	Beta(2nd)	0.901***	83.308
7 days	15	Cumulative Tweet Count Data	8	[Joint]DCCA1	0	83.308
7 days	15	Cumulative Tweet Count Data	8	[Joint]DCCB1	0.916***	83.308
7 days	15	Cumulative Tweet Count Data	9	Alpha(1st)	0.221***	83.332
7 days	15	Cumulative Tweet Count Data	9	Beta(1st)	0.778***	83.332
7 days	15	Cumulative Tweet Count Data	9	Alpha(2nd)	0.059***	83.332
7 days	15	Cumulative Tweet Count Data	9	Beta(2nd)	0.901***	83.332
7 days	15	Cumulative Tweet Count Data	9	[Joint]DCCA1	0.003**	83.332
7 days	15	Cumulative Tweet Count Data	9	[Joint]DCCB1	0.994***	83.332
7 days	15	Cumulative Tweet Count Data	10	Alpha(1st)	0.222***	83.354
7 days	15	Cumulative Tweet Count Data	10	Beta(1st)	0.777***	83.354
7 days	15	Cumulative Tweet Count Data	10	Alpha(2nd)	0.059***	83.354
7 days	15	Cumulative Tweet Count Data	10	Beta(2nd)	0.901***	83.354
7 days	15	Cumulative Tweet Count Data	10	[Joint]DCCA1	0.006	83.354
7 days	15	Cumulative Tweet Count Data	10	[Joint]DCCB1	0.987***	83.354
Weekdays	15	US Dollar Tweet Count Data	0	Alpha(1st)	0.333***	-6.3309
Weekdays	15	US Dollar Tweet Count Data	0	Beta(1st)	0.666***	-6.3309
Weekdays	15	US Dollar Tweet Count Data	0	Alpha(2nd)	0.095***	-6.3309
Weekdays	15	US Dollar Tweet Count Data	0	Beta(2nd)	0.89***	-6.3309
Weekdays	15	US Dollar Tweet Count Data	0	[Joint]DCCA1	0	-6.3309
Weekdays	15	US Dollar Tweet Count Data	0	[Joint]DCCB1	0.896***	-6.3309
Weekdays	15	US Dollar Tweet Count Data	1	Alpha(1st)	0.333***	-6.3316
Weekdays	15	US Dollar Tweet Count Data	1	Beta(1st)	0.666***	-6.3316
Weekdays	15	US Dollar Tweet Count Data	1	Alpha(2nd)	0.095***	-6.3316
Weekdays	15	US Dollar Tweet Count Data	1	Beta(2nd)	0.89***	-6.3316
Weekdays	15	US Dollar Tweet Count Data	1	[Joint]DCCA1	0	-6.3316
Weekdays	15	US Dollar Tweet Count Data	1	[Joint]DCCB1	0.944***	-6.3316
Weekdays	15	US Dollar Tweet Count Data	2	Alpha(1st)	0.333***	-6.3312
Weekdays	15	US Dollar Tweet Count Data	2	Beta(1st)	0.666***	-6.3312
Weekdays	15	US Dollar Tweet Count Data	2	Alpha(2nd)	0.095***	-6.3312
Weekdays	15	US Dollar Tweet Count Data	2	Beta(2nd)	0.89***	-6.3312
Weekdays	15	US Dollar Tweet Count Data	2	[Joint]DCCA1	0	-6.3312
Weekdays	15	US Dollar Tweet Count Data	2	[Joint]DCCB1	0.934***	-6.3312
Weekdays	15	US Dollar Tweet Count Data	3	Alpha(1st)	0.333***	-6.3287

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
Weekdays	15	US Dollar Tweet Count Data	3	Beta(1st)	0.666***	-6.3287
Weekdays	15	US Dollar Tweet Count Data	3	Alpha(2nd)	0.095***	-6.3287
Weekdays	15	US Dollar Tweet Count Data	3	Beta(2nd)	0.89***	-6.3287
Weekdays	15	US Dollar Tweet Count Data	3	[Joint]DCCA1	0	-6.3287
Weekdays	15	US Dollar Tweet Count Data	3	[Joint]DCCB1	0.927***	-6.3287
Weekdays	15	US Dollar Tweet Count Data	4	Alpha(1st)	0.333***	-6.3294
Weekdays	15	US Dollar Tweet Count Data	4	Beta(1st)	0.666***	-6.3294
Weekdays	15	US Dollar Tweet Count Data	4	Alpha(2nd)	0.095***	-6.3294
Weekdays	15	US Dollar Tweet Count Data	4	Beta(2nd)	0.89***	-6.3294
Weekdays	15	US Dollar Tweet Count Data	4	[Joint]DCCA1	0.001	-6.3294
Weekdays	15	US Dollar Tweet Count Data	4	[Joint]DCCB1	0.989***	-6.3294
Weekdays	15	US Dollar Tweet Count Data	5	Alpha(1st)	0.333***	-6.3296
Weekdays	15	US Dollar Tweet Count Data	5	Beta(1st)	0.666***	-6.3296
Weekdays	15	US Dollar Tweet Count Data	5	Alpha(2nd)	0.095***	-6.3296
Weekdays	15	US Dollar Tweet Count Data	5	Beta(2nd)	0.89***	-6.3296
Weekdays	15	US Dollar Tweet Count Data	5	[Joint]DCCA1	0	-6.3296
Weekdays	15	US Dollar Tweet Count Data	5	[Joint]DCCB1	0.926***	-6.3296
Weekdays	15	US Dollar Tweet Count Data	6	Alpha(1st)	0.333***	-6.3304
Weekdays	15	US Dollar Tweet Count Data	6	Beta(1st)	0.666***	-6.3304
Weekdays	15	US Dollar Tweet Count Data	6	Alpha(2nd)	0.095***	-6.3304
Weekdays	15	US Dollar Tweet Count Data	6	Beta(2nd)	0.89***	-6.3304
Weekdays	15	US Dollar Tweet Count Data	6	[Joint]DCCA1	0	-6.3304
Weekdays	15	US Dollar Tweet Count Data	6	[Joint]DCCB1	0.938***	-6.3304
Weekdays	15	US Dollar Tweet Count Data	7	Alpha(1st)	0.332***	-6.3298
Weekdays	15	US Dollar Tweet Count Data	7	Beta(1st)	0.667***	-6.3298
Weekdays	15	US Dollar Tweet Count Data	7	Alpha(2nd)	0.095***	-6.3298
Weekdays	15	US Dollar Tweet Count Data	7	Beta(2nd)	0.89***	-6.3298
Weekdays	15	US Dollar Tweet Count Data	7	[Joint]DCCA1	0	-6.3298
Weekdays	15	US Dollar Tweet Count Data	7	[Joint]DCCB1	0.919***	-6.3298
Weekdays	15	US Dollar Tweet Count Data	8	Alpha(1st)	0.332***	-6.3297
Weekdays	15	US Dollar Tweet Count Data	8	Beta(1st)	0.667***	-6.3297
Weekdays	15	US Dollar Tweet Count Data	8	Alpha(2nd)	0.095***	-6.3297
Weekdays	15	US Dollar Tweet Count Data	8	Beta(2nd)	0.89***	-6.3297
Weekdays	15	US Dollar Tweet Count Data	8	[Joint]DCCA1	0	-6.3297
Weekdays	15	US Dollar Tweet Count Data	8	[Joint]DCCB1	0.928***	-6.3297
Weekdays	15	US Dollar Tweet Count Data	9	Alpha(1st)	0.332***	-6.33
Weekdays	15	US Dollar Tweet Count Data	9	Beta(1st)	0.667***	-6.33
Weekdays	15	US Dollar Tweet Count Data	9	Alpha(2nd)	0.095***	-6.33

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
Weekdays	15	US Dollar Tweet Count Data	9	Beta(2nd)	0.89***	-6.33
Weekdays	15	US Dollar Tweet Count Data	9	[Joint]DCCA1	0	-6.33
Weekdays	15	US Dollar Tweet Count Data	9	[Joint]DCCB1	0.987***	-6.33
Weekdays	15	US Dollar Tweet Count Data	10	Alpha(1st)	0.332***	-6.3295
Weekdays	15	US Dollar Tweet Count Data	10	Beta(1st)	0.667***	-6.3295
Weekdays	15	US Dollar Tweet Count Data	10	Alpha(2nd)	0.095***	-6.3295
Weekdays	15	US Dollar Tweet Count Data	10	Beta(2nd)	0.89***	-6.3295
Weekdays	15	US Dollar Tweet Count Data	10	[Joint]DCCA1	0	-6.3295
Weekdays	15	US Dollar Tweet Count Data	10	[Joint]DCCB1	0.933***	-6.3295
Weekdays	15	Cumulative Tweet Count Data	0	Alpha(1st)	0.289***	-7.6967
Weekdays	15	Cumulative Tweet Count Data	0	Beta(1st)	0.71***	-7.6967
Weekdays	15	Cumulative Tweet Count Data	0	Alpha(2nd)	0.095***	-7.6967
Weekdays	15	Cumulative Tweet Count Data	0	Beta(2nd)	0.89***	-7.6967
Weekdays	15	Cumulative Tweet Count Data	0	[Joint]DCCA1	0	-7.6967
Weekdays	15	Cumulative Tweet Count Data	0	[Joint]DCCB1	0.993***	-7.6967
Weekdays	15	Cumulative Tweet Count Data	1	Alpha(1st)	0.289***	-7.6976
Weekdays	15	Cumulative Tweet Count Data	1	Beta(1st)	0.71***	-7.6976
Weekdays	15	Cumulative Tweet Count Data	1	Alpha(2nd)	0.095***	-7.6976
Weekdays	15	Cumulative Tweet Count Data	1	Beta(2nd)	0.89***	-7.6976
Weekdays	15	Cumulative Tweet Count Data	1	[Joint]DCCA1	0	-7.6976
Weekdays	15	Cumulative Tweet Count Data	1	[Joint]DCCB1	0.916***	-7.6976
Weekdays	15	Cumulative Tweet Count Data	2	Alpha(1st)	0.289***	-7.6972
Weekdays	15	Cumulative Tweet Count Data	2	Beta(1st)	0.71***	-7.6972
Weekdays	15	Cumulative Tweet Count Data	2	Alpha(2nd)	0.095***	-7.6972
Weekdays	15	Cumulative Tweet Count Data	2	Beta(2nd)	0.89***	-7.6972
Weekdays	15	Cumulative Tweet Count Data	2	[Joint]DCCA1	0.001*	-7.6972
Weekdays	15	Cumulative Tweet Count Data	2	[Joint]DCCB1	0.995***	-7.6972
Weekdays	15	Cumulative Tweet Count Data	3	Alpha(1st)	0.289***	-7.6946
Weekdays	15	Cumulative Tweet Count Data	3	Beta(1st)	0.71***	-7.6946
Weekdays	15	Cumulative Tweet Count Data	3	Alpha(2nd)	0.095***	-7.6946
Weekdays	15	Cumulative Tweet Count Data	3	Beta(2nd)	0.89***	-7.6946
Weekdays	15	Cumulative Tweet Count Data	3	[Joint]DCCA1	0.001**	-7.6946
Weekdays	15	Cumulative Tweet Count Data	3	[Joint]DCCB1	0.997***	-7.6946
Weekdays	15	Cumulative Tweet Count Data	4	Alpha(1st)	0.289***	-7.6952
Weekdays	15	Cumulative Tweet Count Data	4	Beta(1st)	0.71***	-7.6952
Weekdays	15	Cumulative Tweet Count Data	4	Alpha(2nd)	0.095***	-7.6952
Weekdays	15	Cumulative Tweet Count Data	4	Beta(2nd)	0.89***	-7.6952
Weekdays	15	Cumulative Tweet Count Data	4	[Joint]DCCA1	0	-7.6952

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
Weekdays	15	Cumulative Tweet Count Data	4	[Joint]DCCB1	0.956***	-7.6952
Weekdays	15	Cumulative Tweet Count Data	5	Alpha(1st)	0.289***	-7.6955
Weekdays	15	Cumulative Tweet Count Data	5	Beta(1st)	0.71***	-7.6955
Weekdays	15	Cumulative Tweet Count Data	5	Alpha(2nd)	0.095***	-7.6955
Weekdays	15	Cumulative Tweet Count Data	5	Beta(2nd)	0.89***	-7.6955
Weekdays	15	Cumulative Tweet Count Data	5	[Joint]DCCA1	0	-7.6955
Weekdays	15	Cumulative Tweet Count Data	5	[Joint]DCCB1	0.914***	-7.6955
Weekdays	15	Cumulative Tweet Count Data	6	Alpha(1st)	0.289***	-7.6963
Weekdays	15	Cumulative Tweet Count Data	6	Beta(1st)	0.71***	-7.6963
Weekdays	15	Cumulative Tweet Count Data	6	Alpha(2nd)	0.095***	-7.6963
Weekdays	15	Cumulative Tweet Count Data	6	Beta(2nd)	0.89***	-7.6963
Weekdays	15	Cumulative Tweet Count Data	6	[Joint]DCCA1	0	-7.6963
Weekdays	15	Cumulative Tweet Count Data	6	[Joint]DCCB1	0.928***	-7.6963
Weekdays	15	Cumulative Tweet Count Data	7	Alpha(1st)	0.289***	-7.6958
Weekdays	15	Cumulative Tweet Count Data	7	Beta(1st)	0.71***	-7.6958
Weekdays	15	Cumulative Tweet Count Data	7	Alpha(2nd)	0.095***	-7.6958
Weekdays	15	Cumulative Tweet Count Data	7	Beta(2nd)	0.89***	-7.6958
Weekdays	15	Cumulative Tweet Count Data	7	[Joint]DCCA1	0	-7.6958
Weekdays	15	Cumulative Tweet Count Data	7	[Joint]DCCB1	0.917***	-7.6958
Weekdays	15	Cumulative Tweet Count Data	8	Alpha(1st)	0.289***	-7.6955
Weekdays	15	Cumulative Tweet Count Data	8	Beta(1st)	0.71***	-7.6955
Weekdays	15	Cumulative Tweet Count Data	8	Alpha(2nd)	0.095***	-7.6955
Weekdays	15	Cumulative Tweet Count Data	8	Beta(2nd)	0.89***	-7.6955
Weekdays	15	Cumulative Tweet Count Data	8	[Joint]DCCA1	0	-7.6955
Weekdays	15	Cumulative Tweet Count Data	8	[Joint]DCCB1	0.927***	-7.6955
Weekdays	15	Cumulative Tweet Count Data	9	Alpha(1st)	0.289***	-7.6959
Weekdays	15	Cumulative Tweet Count Data	9	Beta(1st)	0.71***	-7.6959
Weekdays	15	Cumulative Tweet Count Data	9	Alpha(2nd)	0.095***	-7.6959
Weekdays	15	Cumulative Tweet Count Data	9	Beta(2nd)	0.89***	-7.6959
Weekdays	15	Cumulative Tweet Count Data	9	[Joint]DCCA1	0	-7.6959
Weekdays	15	Cumulative Tweet Count Data	9	[Joint]DCCB1	0.921***	-7.6959
Weekdays	15	Cumulative Tweet Count Data	10	Alpha(1st)	0.289***	-7.6953
Weekdays	15	Cumulative Tweet Count Data	10	Beta(1st)	0.71***	-7.6953
Weekdays	15	Cumulative Tweet Count Data	10	Alpha(2nd)	0.095***	-7.6953
Weekdays	15	Cumulative Tweet Count Data	10	Beta(2nd)	0.89***	-7.6953
Weekdays	15	Cumulative Tweet Count Data	10	[Joint]DCCA1	0	-7.6953
Weekdays	15	Cumulative Tweet Count Data	10	[Joint]DCCB1	0.946***	-7.6953
7 days	30	US Dollar Tweet Count Data	0	Alpha(1st)	0.088	62.901

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
7 days	30	US Dollar Tweet Count Data	0	Beta(1st)	0.907	62.901
7 days	30	US Dollar Tweet Count Data	0	Alpha(2nd)	0.171***	62.901
7 days	30	US Dollar Tweet Count Data	0	Beta(2nd)	0.82***	62.901
7 days	30	US Dollar Tweet Count Data	0	[Joint]DCCA1	0.005*	62.901
7 days	30	US Dollar Tweet Count Data	0	[Joint]DCCB1	0.994***	62.901
7 days	30	US Dollar Tweet Count Data	2	Alpha(1st)	0.094	62.939
7 days	30	US Dollar Tweet Count Data	2	Beta(1st)	0.903	62.939
7 days	30	US Dollar Tweet Count Data	2	Alpha(2nd)	0.171***	62.939
7 days	30	US Dollar Tweet Count Data	2	Beta(2nd)	0.82***	62.939
7 days	30	US Dollar Tweet Count Data	2	[Joint]DCCA1	0	62.939
7 days	30	US Dollar Tweet Count Data	2	[Joint]DCCB1	0.922***	62.939
7 days	30	US Dollar Tweet Count Data	3	Alpha(1st)	0.191	62.919
7 days	30	US Dollar Tweet Count Data	3	Beta(1st)	0.807	62.919
7 days	30	US Dollar Tweet Count Data	3	Alpha(2nd)	0.17***	62.919
7 days	30	US Dollar Tweet Count Data	3	Beta(2nd)	0.821***	62.919
7 days	30	US Dollar Tweet Count Data	3	[Joint]DCCA1	0.002**	62.919
7 days	30	US Dollar Tweet Count Data	3	[Joint]DCCB1	0.995***	62.919
7 days	30	US Dollar Tweet Count Data	4	Alpha(1st)	0.067	63.071
7 days	30	US Dollar Tweet Count Data	4	Beta(1st)	0.923	63.071
7 days	30	US Dollar Tweet Count Data	4	Alpha(2nd)	0.17***	63.071
7 days	30	US Dollar Tweet Count Data	4	Beta(2nd)	0.821***	63.071
7 days	30	US Dollar Tweet Count Data	4	[Joint]DCCA1	0	63.071
7 days	30	US Dollar Tweet Count Data	4	[Joint]DCCB1	0.923***	63.071
7 days	30	US Dollar Tweet Count Data	5	Alpha(1st)	0.224	63.053
7 days	30	US Dollar Tweet Count Data	5	Beta(1st)	0.774	63.053
7 days	30	US Dollar Tweet Count Data	5	Alpha(2nd)	0.17**	63.053
7 days	30	US Dollar Tweet Count Data	5	Beta(2nd)	0.821***	63.053
7 days	30	US Dollar Tweet Count Data	5	[Joint]DCCA1	0	63.053
7 days	30	US Dollar Tweet Count Data	5	[Joint]DCCB1	0.954***	63.053
7 days	30	US Dollar Tweet Count Data	6	Alpha(1st)	0.173	63.225
7 days	30	US Dollar Tweet Count Data	6	Beta(1st)	0.826	63.225
7 days	30	US Dollar Tweet Count Data	6	Alpha(2nd)	0.17	63.225
7 days	30	US Dollar Tweet Count Data	6	Beta(2nd)	0.821***	63.225
7 days	30	US Dollar Tweet Count Data	6	[Joint]DCCA1	0.001	63.225
7 days	30	US Dollar Tweet Count Data	6	[Joint]DCCB1	0.988***	63.225
7 days	30	US Dollar Tweet Count Data	7	Alpha(1st)	0.137	63.518
7 days	30	US Dollar Tweet Count Data	7	Beta(1st)	0.857	63.518
7 days	30	US Dollar Tweet Count Data	7	Alpha(2nd)	0.17***	63.518

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
7 days	30	US Dollar Tweet Count Data	7	Beta(2nd)	0.821***	63.518
7 days	30	US Dollar Tweet Count Data	7	[Joint]DCCA1	0	63.518
7 days	30	US Dollar Tweet Count Data	7	[Joint]DCCB1	0.929***	63.518
7 days	30	US Dollar Tweet Count Data	8	Alpha(1st)	0.222***	63.437
7 days	30	US Dollar Tweet Count Data	8	Beta(1st)	0.777***	63.437
7 days	30	US Dollar Tweet Count Data	8	Alpha(2nd)	0.169***	63.437
7 days	30	US Dollar Tweet Count Data	8	Beta(2nd)	0.822***	63.437
7 days	30	US Dollar Tweet Count Data	8	[Joint]DCCA1	0	63.437
7 days	30	US Dollar Tweet Count Data	8	[Joint]DCCB1	0.917***	63.437
7 days	30	US Dollar Tweet Count Data	9	Alpha(1st)	0.072	63.688
7 days	30	US Dollar Tweet Count Data	9	Beta(1st)	0.926***	63.688
7 days	30	US Dollar Tweet Count Data	9	Alpha(2nd)	0.169***	63.688
7 days	30	US Dollar Tweet Count Data	9	Beta(2nd)	0.822***	63.688
7 days	30	US Dollar Tweet Count Data	9	[Joint]DCCA1	0*	63.688
7 days	30	US Dollar Tweet Count Data	9	[Joint]DCCB1	0.922***	63.688
7 days	30	Cumulative Tweet Count Data	0	Alpha(1st)	0.063***	62.336
7 days	30	Cumulative Tweet Count Data	0	Beta(1st)	0.926***	62.336
7 days	30	Cumulative Tweet Count Data	0	Alpha(2nd)	0.171***	62.336
7 days	30	Cumulative Tweet Count Data	0	Beta(2nd)	0.82***	62.336
7 days	30	Cumulative Tweet Count Data	0	[Joint]DCCA1	0	62.336
7 days	30	Cumulative Tweet Count Data	0	[Joint]DCCB1	0.957***	62.336
7 days	30	Cumulative Tweet Count Data	1	Alpha(1st)	0.065	62.495
7 days	30	Cumulative Tweet Count Data	1	Beta(1st)	0.883	62.495
7 days	30	Cumulative Tweet Count Data	1	Alpha(2nd)	0.171***	62.495
7 days	30	Cumulative Tweet Count Data	1	Beta(2nd)	0.82***	62.495
7 days	30	Cumulative Tweet Count Data	1	[Joint]DCCA1	0.031	62.495
7 days	30	Cumulative Tweet Count Data	1	[Joint]DCCB1	0.95***	62.495
7 days	30	Cumulative Tweet Count Data	2	Alpha(1st)	0.182	62.255
7 days	30	Cumulative Tweet Count Data	2	Beta(1st)	0.806	62.255
7 days	30	Cumulative Tweet Count Data	2	Alpha(2nd)	0.171***	62.255
7 days	30	Cumulative Tweet Count Data	2	Beta(2nd)	0.82***	62.255
7 days	30	Cumulative Tweet Count Data	2	[Joint]DCCA1	0	62.255
7 days	30	Cumulative Tweet Count Data	2	[Joint]DCCB1	0.925***	62.255
7 days	30	Cumulative Tweet Count Data	3	Alpha(1st)	0.188***	62.435
7 days	30	Cumulative Tweet Count Data	3	Beta(1st)	0.777***	62.435
7 days	30	Cumulative Tweet Count Data	3	Alpha(2nd)	0.17***	62.435
7 days	30	Cumulative Tweet Count Data	3	Beta(2nd)	0.821***	62.435
7 days	30	Cumulative Tweet Count Data	3	[Joint]DCCA1	0.089***	62.435

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
7 days	30	Cumulative Tweet Count Data	3	[Joint]DCCB1	0.001	62.435
7 days	30	Cumulative Tweet Count Data	4	Alpha(1st)	0.073	62.792
7 days	30	Cumulative Tweet Count Data	4	Beta(1st)	0.878	62.792
7 days	30	Cumulative Tweet Count Data	4	Alpha(2nd)	0.17***	62.792
7 days	30	Cumulative Tweet Count Data	4	Beta(2nd)	0.821***	62.792
7 days	30	Cumulative Tweet Count Data	4	[Joint]DCCA1	0.137***	62.792
7 days	30	Cumulative Tweet Count Data	4	[Joint]DCCB1	0.528***	62.792
7 days	30	Cumulative Tweet Count Data	6	Alpha(1st)	0.2	62.733
7 days	30	Cumulative Tweet Count Data	6	Beta(1st)	0.767	62.733
7 days	30	Cumulative Tweet Count Data	6	Alpha(2nd)	0.17	62.733
7 days	30	Cumulative Tweet Count Data	6	Beta(2nd)	0.821***	62.733
7 days	30	Cumulative Tweet Count Data	6	[Joint]DCCA1	0.039**	62.733
7 days	30	Cumulative Tweet Count Data	6	[Joint]DCCB1	0.951***	62.733
7 days	30	Cumulative Tweet Count Data	7	Alpha(1st)	0.208	62.903
7 days	30	Cumulative Tweet Count Data	7	Beta(1st)	0.722	62.903
7 days	30	Cumulative Tweet Count Data	7	Alpha(2nd)	0.17***	62.903
7 days	30	Cumulative Tweet Count Data	7	Beta(2nd)	0.821***	62.903
7 days	30	Cumulative Tweet Count Data	7	[Joint]DCCA1	0.301**	62.903
7 days	30	Cumulative Tweet Count Data	7	[Joint]DCCB1	0	62.903
7 days	30	Cumulative Tweet Count Data	8	Alpha(1st)	0.06***	63.111
7 days	30	Cumulative Tweet Count Data	8	Beta(1st)	0.926***	63.111
7 days	30	Cumulative Tweet Count Data	8	Alpha(2nd)	0.169***	63.111
7 days	30	Cumulative Tweet Count Data	8	Beta(2nd)	0.822***	63.111
7 days	30	Cumulative Tweet Count Data	8	[Joint]DCCA1	0.175**	63.111
7 days	30	Cumulative Tweet Count Data	8	[Joint]DCCB1	0.001	63.111
7 days	30	Cumulative Tweet Count Data	9	Alpha(1st)	0.068***	63.086
7 days	30	Cumulative Tweet Count Data	9	Beta(1st)	0.917***	63.086
7 days	30	Cumulative Tweet Count Data	9	Alpha(2nd)	0.169***	63.086
7 days	30	Cumulative Tweet Count Data	9	Beta(2nd)	0.822***	63.086
7 days	30	Cumulative Tweet Count Data	9	[Joint]DCCA1	0.033***	63.086
7 days	30	Cumulative Tweet Count Data	9	[Joint]DCCB1	0.948***	63.086
7 days	30	Cumulative Tweet Count Data	10	Alpha(1st)	0.068	63.254
7 days	30	Cumulative Tweet Count Data	10	Beta(1st)	0.92	63.254
7 days	30	Cumulative Tweet Count Data	10	Alpha(2nd)	0.169***	63.254
7 days	30	Cumulative Tweet Count Data	10	Beta(2nd)	0.822***	63.254
7 days	30	Cumulative Tweet Count Data	10	[Joint]DCCA1	0.124*	63.254
7 days	30	Cumulative Tweet Count Data	10	[Joint]DCCB1	0	63.254
Weekdays	30	US Dollar Tweet Count Data	0	Alpha(1st)	0.313***	-4.5475

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
Weekdays	30	US Dollar Tweet Count Data	0	Beta(1st)	0.686***	-4.5475
Weekdays	30	US Dollar Tweet Count Data	0	Alpha(2nd)	0.349***	-4.5475
Weekdays	30	US Dollar Tweet Count Data	0	Beta(2nd)	0.65***	-4.5475
Weekdays	30	US Dollar Tweet Count Data	0	[Joint]DCCA1	0.059*	-4.5475
Weekdays	30	US Dollar Tweet Count Data	0	[Joint]DCCB1	0.891***	-4.5475
Weekdays	30	US Dollar Tweet Count Data	1	Alpha(1st)	0.247	-4.5768
Weekdays	30	US Dollar Tweet Count Data	1	Beta(1st)	0.749	-4.5768
Weekdays	30	US Dollar Tweet Count Data	1	Alpha(2nd)	0.351***	-4.5768
Weekdays	30	US Dollar Tweet Count Data	1	Beta(2nd)	0.648***	-4.5768
Weekdays	30	US Dollar Tweet Count Data	1	[Joint]DCCA1	0.001	-4.5768
Weekdays	30	US Dollar Tweet Count Data	1	[Joint]DCCB1	0.995***	-4.5768
Weekdays	30	US Dollar Tweet Count Data	3	Alpha(1st)	0.299***	-4.5762
Weekdays	30	US Dollar Tweet Count Data	3	Beta(1st)	0.7***	-4.5762
Weekdays	30	US Dollar Tweet Count Data	3	Alpha(2nd)	0.352***	-4.5762
Weekdays	30	US Dollar Tweet Count Data	3	Beta(2nd)	0.647***	-4.5762
Weekdays	30	US Dollar Tweet Count Data	3	[Joint]DCCA1	0	-4.5762
Weekdays	30	US Dollar Tweet Count Data	3	[Joint]DCCB1	0.982***	-4.5762
Weekdays	30	US Dollar Tweet Count Data	4	Alpha(1st)	0.32	-5.9035
Weekdays	30	US Dollar Tweet Count Data	4	Beta(1st)	0.594	-5.9035
Weekdays	30	US Dollar Tweet Count Data	4	Alpha(2nd)	0.214***	-5.9035
Weekdays	30	US Dollar Tweet Count Data	4	Beta(2nd)	0.785***	-5.9035
Weekdays	30	US Dollar Tweet Count Data	4	[Joint]DCCA1	0	-5.9035
Weekdays	30	US Dollar Tweet Count Data	4	[Joint]DCCB1	0.917***	-5.9035
Weekdays	30	US Dollar Tweet Count Data	5	Alpha(1st)	0.286	-5.7609
Weekdays	30	US Dollar Tweet Count Data	5	Beta(1st)	0.705	-5.7609
Weekdays	30	US Dollar Tweet Count Data	5	Alpha(2nd)	0.214***	-5.7609
Weekdays	30	US Dollar Tweet Count Data	5	Beta(2nd)	0.785***	-5.7609
Weekdays	30	US Dollar Tweet Count Data	5	[Joint]DCCA1	0***	-5.7609
Weekdays	30	US Dollar Tweet Count Data	5	[Joint]DCCB1	0.824***	-5.7609
Weekdays	30	US Dollar Tweet Count Data	6	Alpha(1st)	0.282***	-5.7402
Weekdays	30	US Dollar Tweet Count Data	6	Beta(1st)	0.714***	-5.7402
Weekdays	30	US Dollar Tweet Count Data	6	Alpha(2nd)	0.214***	-5.7402
Weekdays	30	US Dollar Tweet Count Data	6	Beta(2nd)	0.784***	-5.7402
Weekdays	30	US Dollar Tweet Count Data	6	[Joint]DCCA1	0.019	-5.7402
Weekdays	30	US Dollar Tweet Count Data	6	[Joint]DCCB1	0.907***	-5.7402
Weekdays	30	US Dollar Tweet Count Data	7	Alpha(1st)	0.057	-5.5844
Weekdays	30	US Dollar Tweet Count Data	7	Beta(1st)	0.935	-5.5844
Weekdays	30	US Dollar Tweet Count Data	7	Alpha(2nd)	0.214***	-5.5844

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
Weekdays	30	US Dollar Tweet Count Data	7	Beta(2nd)	0.784***	-5.5844
Weekdays	30	US Dollar Tweet Count Data	7	[Joint]DCCA1	0.015	-5.5844
Weekdays	30	US Dollar Tweet Count Data	7	[Joint]DCCB1	0.573	-5.5844
Weekdays	30	US Dollar Tweet Count Data	9	Alpha(1st)	0.203***	-5.7045
Weekdays	30	US Dollar Tweet Count Data	9	Beta(1st)	0.78***	-5.7045
Weekdays	30	US Dollar Tweet Count Data	9	Alpha(2nd)	0.214***	-5.7045
Weekdays	30	US Dollar Tweet Count Data	9	Beta(2nd)	0.785***	-5.7045
Weekdays	30	US Dollar Tweet Count Data	9	[Joint]DCCA1	0	-5.7045
Weekdays	30	US Dollar Tweet Count Data	9	[Joint]DCCB1	0.916***	-5.7045
Weekdays	30	US Dollar Tweet Count Data	10	Alpha(1st)	0.3***	-5.7677
Weekdays	30	US Dollar Tweet Count Data	10	Beta(1st)	0.699***	-5.7677
Weekdays	30	US Dollar Tweet Count Data	10	Alpha(2nd)	0.215***	-5.7677
Weekdays	30	US Dollar Tweet Count Data	10	Beta(2nd)	0.784***	-5.7677
Weekdays	30	US Dollar Tweet Count Data	10	[Joint]DCCA1	0	-5.7677
Weekdays	30	US Dollar Tweet Count Data	10	[Joint]DCCB1	0.93	-5.7677
Weekdays	30	Cumulative Tweet Count Data	0	Alpha(1st)	0.053***	-5.1248
Weekdays	30	Cumulative Tweet Count Data	0	Beta(1st)	0.895***	-5.1248
Weekdays	30	Cumulative Tweet Count Data	0	Alpha(2nd)	0.349***	-5.1248
Weekdays	30	Cumulative Tweet Count Data	0	Beta(2nd)	0.65***	-5.1248
Weekdays	30	Cumulative Tweet Count Data	0	[Joint]DCCA1	0	-5.1248
Weekdays	30	Cumulative Tweet Count Data	0	[Joint]DCCB1	0.931	-5.1248
Weekdays	30	Cumulative Tweet Count Data	2	Alpha(1st)	0.061***	-6.3314
Weekdays	30	Cumulative Tweet Count Data	2	Beta(1st)	0.886***	-6.3314
Weekdays	30	Cumulative Tweet Count Data	2	Alpha(2nd)	0.214***	-6.3314
Weekdays	30	Cumulative Tweet Count Data	2	Beta(2nd)	0.785***	-6.3314
Weekdays	30	Cumulative Tweet Count Data	2	[Joint]DCCA1	0	-6.3314
Weekdays	30	Cumulative Tweet Count Data	2	[Joint]DCCB1	0.924***	-6.3314
Weekdays	30	Cumulative Tweet Count Data	3	Alpha(1st)	0.066***	-5.188
Weekdays	30	Cumulative Tweet Count Data	3	Beta(1st)	0.931***	-5.188
Weekdays	30	Cumulative Tweet Count Data	3	Alpha(2nd)	0.352***	-5.188
Weekdays	30	Cumulative Tweet Count Data	3	Beta(2nd)	0.647***	-5.188
Weekdays	30	Cumulative Tweet Count Data	3	[Joint]DCCA1	0.022**	-5.188
Weekdays	30	Cumulative Tweet Count Data	3	[Joint]DCCB1	0.13**	-5.188
Weekdays	30	Cumulative Tweet Count Data	5	Alpha(1st)	0.069***	-6.3288
Weekdays	30	Cumulative Tweet Count Data	5	Beta(1st)	0.928***	-6.3288
Weekdays	30	Cumulative Tweet Count Data	5	Alpha(2nd)	0.214***	-6.3288
Weekdays	30	Cumulative Tweet Count Data	5	Beta(2nd)	0.785***	-6.3288
Weekdays	30	Cumulative Tweet Count Data	5	[Joint]DCCA1	0.038***	-6.3288

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
Weekdays	30	Cumulative Tweet Count Data	5	[Joint]DCCB1	0	-6.3288
Weekdays	30	Cumulative Tweet Count Data	6	Alpha(1st)	0.068	-6.3265
Weekdays	30	Cumulative Tweet Count Data	6	Beta(1st)	0.929	-6.3265
Weekdays	30	Cumulative Tweet Count Data	6	Alpha(2nd)	0.214***	-6.3265
Weekdays	30	Cumulative Tweet Count Data	6	Beta(2nd)	0.784***	-6.3265
Weekdays	30	Cumulative Tweet Count Data	6	[Joint]DCCA1	0.029	-6.3265
Weekdays	30	Cumulative Tweet Count Data	6	[Joint]DCCB1	0.905***	-6.3265
Weekdays	30	Cumulative Tweet Count Data	7	Alpha(1st)	0.072	-6.3382
Weekdays	30	Cumulative Tweet Count Data	7	Beta(1st)	0.902	-6.3382
Weekdays	30	Cumulative Tweet Count Data	7	Alpha(2nd)	0.214***	-6.3382
Weekdays	30	Cumulative Tweet Count Data	7	Beta(2nd)	0.784***	-6.3382
Weekdays	30	Cumulative Tweet Count Data	7	[Joint]DCCA1	0.092*	-6.3382
Weekdays	30	Cumulative Tweet Count Data	7	[Joint]DCCB1	0	-6.3382
Weekdays	30	Cumulative Tweet Count Data	8	Alpha(1st)	0.069	-6.3242
Weekdays	30	Cumulative Tweet Count Data	8	Beta(1st)	0.929	-6.3242
Weekdays	30	Cumulative Tweet Count Data	8	Alpha(2nd)	0.215***	-6.3242
Weekdays	30	Cumulative Tweet Count Data	8	Beta(2nd)	0.784***	-6.3242
Weekdays	30	Cumulative Tweet Count Data	8	[Joint]DCCA1	0.026	-6.3242
Weekdays	30	Cumulative Tweet Count Data	8	[Joint]DCCB1	0.635	-6.3242
Weekdays	30	Cumulative Tweet Count Data	9	Alpha(1st)	0.062***	-6.3253
Weekdays	30	Cumulative Tweet Count Data	9	Beta(1st)	0.937***	-6.3253
Weekdays	30	Cumulative Tweet Count Data	9	Alpha(2nd)	0.214***	-6.3253
Weekdays	30	Cumulative Tweet Count Data	9	Beta(2nd)	0.785***	-6.3253
Weekdays	30	Cumulative Tweet Count Data	9	[Joint]DCCA1	0	-6.3253
Weekdays	30	Cumulative Tweet Count Data	9	[Joint]DCCB1	0.889***	-6.3253
Weekdays	30	Cumulative Tweet Count Data	10	Alpha(1st)	0.065***	-6.334
Weekdays	30	Cumulative Tweet Count Data	10	Beta(1st)	0.882***	-6.334
Weekdays	30	Cumulative Tweet Count Data	10	Alpha(2nd)	0.215***	-6.334
Weekdays	30	Cumulative Tweet Count Data	10	Beta(2nd)	0.784***	-6.334
Weekdays	30	Cumulative Tweet Count Data	10	[Joint]DCCA1	0.09***	-6.334
Weekdays	30	Cumulative Tweet Count Data	10	[Joint]DCCB1	0	-6.334
7 days	60	US Dollar Tweet Count Data	0	Alpha(1st)	0.955***	6.4684
7 days	60	US Dollar Tweet Count Data	0	Beta(1st)	0.044	6.4684
7 days	60	US Dollar Tweet Count Data	0	Alpha(2nd)	0.261***	6.4684
7 days	60	US Dollar Tweet Count Data	0	Beta(2nd)	0.738***	6.4684
7 days	60	US Dollar Tweet Count Data	0	[Joint]DCCA1	0.007	6.4684
7 days	60	US Dollar Tweet Count Data	0	[Joint]DCCB1	0.978***	6.4684
7 days	60	US Dollar Tweet Count Data	1	Alpha(1st)	0.955***	6.4534

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
7 days	60	US Dollar Tweet Count Data	1	Beta(1st)	0.044	6.4534
7 days	60	US Dollar Tweet Count Data	1	Alpha(2nd)	0.261***	6.4534
7 days	60	US Dollar Tweet Count Data	1	Beta(2nd)	0.738***	6.4534
7 days	60	US Dollar Tweet Count Data	1	[Joint]DCCA1	0	6.4534
7 days	60	US Dollar Tweet Count Data	1	[Joint]DCCB1	0.939***	6.4534
7 days	60	US Dollar Tweet Count Data	2	Alpha(1st)	0.955***	6.4577
7 days	60	US Dollar Tweet Count Data	2	Beta(1st)	0.044	6.4577
7 days	60	US Dollar Tweet Count Data	2	Alpha(2nd)	0.261***	6.4577
7 days	60	US Dollar Tweet Count Data	2	Beta(2nd)	0.738***	6.4577
7 days	60	US Dollar Tweet Count Data	2	[Joint]DCCA1	0	6.4577
7 days	60	US Dollar Tweet Count Data	2	[Joint]DCCB1	0.976***	6.4577
7 days	60	US Dollar Tweet Count Data	3	Alpha(1st)	0.955***	6.4588
7 days	60	US Dollar Tweet Count Data	3	Beta(1st)	0.044	6.4588
7 days	60	US Dollar Tweet Count Data	3	Alpha(2nd)	0.261***	6.4588
7 days	60	US Dollar Tweet Count Data	3	Beta(2nd)	0.738***	6.4588
7 days	60	US Dollar Tweet Count Data	3	[Joint]DCCA1	0.167***	6.4588
7 days	60	US Dollar Tweet Count Data	3	[Joint]DCCB1	0.073**	6.4588
7 days	60	US Dollar Tweet Count Data	4	Alpha(1st)	0.954***	6.2673
7 days	60	US Dollar Tweet Count Data	4	Beta(1st)	0.045	6.2673
7 days	60	US Dollar Tweet Count Data	4	Alpha(2nd)	0.263***	6.2673
7 days	60	US Dollar Tweet Count Data	4	Beta(2nd)	0.736***	6.2673
7 days	60	US Dollar Tweet Count Data	4	[Joint]DCCA1	0.093	6.2673
7 days	60	US Dollar Tweet Count Data	4	[Joint]DCCB1	0.161*	6.2673
7 days	60	US Dollar Tweet Count Data	5	Alpha(1st)	0.954***	6.4653
7 days	60	US Dollar Tweet Count Data	5	Beta(1st)	0.045	6.4653
7 days	60	US Dollar Tweet Count Data	5	Alpha(2nd)	0.261***	6.4653
7 days	60	US Dollar Tweet Count Data	5	Beta(2nd)	0.738***	6.4653
7 days	60	US Dollar Tweet Count Data	5	[Joint]DCCA1	0.006	6.4653
7 days	60	US Dollar Tweet Count Data	5	[Joint]DCCB1	0.968***	6.4653
7 days	60	US Dollar Tweet Count Data	6	Alpha(1st)	0.954***	6.4642
7 days	60	US Dollar Tweet Count Data	6	Beta(1st)	0.045	6.4642
7 days	60	US Dollar Tweet Count Data	6	Alpha(2nd)	0.261***	6.4642
7 days	60	US Dollar Tweet Count Data	6	Beta(2nd)	0.738***	6.4642
7 days	60	US Dollar Tweet Count Data	6	[Joint]DCCA1	0.194***	6.4642
7 days	60	US Dollar Tweet Count Data	6	[Joint]DCCB1	0.4***	6.4642
7 days	60	US Dollar Tweet Count Data	7	Alpha(1st)	0.954***	5.9839
7 days	60	US Dollar Tweet Count Data	7	Beta(1st)	0.045	5.9839
7 days	60	US Dollar Tweet Count Data	7	Alpha(2nd)	0.266***	5.9839

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
7 days	60	US Dollar Tweet Count Data	7	Beta(2nd)	0.732***	5.9839
7 days	60	US Dollar Tweet Count Data	7	[Joint]DCCA1	0.001	5.9839
7 days	60	US Dollar Tweet Count Data	7	[Joint]DCCB1	0.938***	5.9839
7 days	60	US Dollar Tweet Count Data	8	Alpha(1st)	0.955***	6.4684
7 days	60	US Dollar Tweet Count Data	8	Beta(1st)	0.044	6.4684
7 days	60	US Dollar Tweet Count Data	8	Alpha(2nd)	0.261***	6.4684
7 days	60	US Dollar Tweet Count Data	8	Beta(2nd)	0.738***	6.4684
7 days	60	US Dollar Tweet Count Data	8	[Joint]DCCA1	0	6.4684
7 days	60	US Dollar Tweet Count Data	8	[Joint]DCCB1	0.914***	6.4684
7 days	60	US Dollar Tweet Count Data	9	Alpha(1st)	0.955***	6.4692
7 days	60	US Dollar Tweet Count Data	9	Beta(1st)	0.044	6.4692
7 days	60	US Dollar Tweet Count Data	9	Alpha(2nd)	0.261***	6.4692
7 days	60	US Dollar Tweet Count Data	9	Beta(2nd)	0.738***	6.4692
7 days	60	US Dollar Tweet Count Data	9	[Joint]DCCA1	0	6.4692
7 days	60	US Dollar Tweet Count Data	9	[Joint]DCCB1	0.911***	6.4692
7 days	60	US Dollar Tweet Count Data	10	Alpha(1st)	0.955***	6.4696
7 days	60	US Dollar Tweet Count Data	10	Beta(1st)	0.044	6.4696
7 days	60	US Dollar Tweet Count Data	10	Alpha(2nd)	0.261***	6.4696
7 days	60	US Dollar Tweet Count Data	10	Beta(2nd)	0.738***	6.4696
7 days	60	US Dollar Tweet Count Data	10	[Joint]DCCA1	0.107	6.4696
7 days	60	US Dollar Tweet Count Data	10	[Joint]DCCB1	0	6.4696
7 days	60	Cumulative Tweet Count Data	0	Alpha(1st)	0.999***	13.217
7 days	60	Cumulative Tweet Count Data	0	Beta(1st)	0	13.217
7 days	60	Cumulative Tweet Count Data	0	Alpha(2nd)	0.261***	13.217
7 days	60	Cumulative Tweet Count Data	0	Beta(2nd)	0.738***	13.217
7 days	60	Cumulative Tweet Count Data	0	[Joint]DCCA1	0.004**	13.217
7 days	60	Cumulative Tweet Count Data	0	[Joint]DCCB1	0.99***	13.217
7 days	60	Cumulative Tweet Count Data	1	Alpha(1st)	0.999***	13.22
7 days	60	Cumulative Tweet Count Data	1	Beta(1st)	0	13.22
7 days	60	Cumulative Tweet Count Data	1	Alpha(2nd)	0.261***	13.22
7 days	60	Cumulative Tweet Count Data	1	Beta(2nd)	0.738***	13.22
7 days	60	Cumulative Tweet Count Data	1	[Joint]DCCA1	0	13.22
7 days	60	Cumulative Tweet Count Data	1	[Joint]DCCB1	0.929***	13.22
7 days	60	Cumulative Tweet Count Data	2	Alpha(1st)	0.999***	13.223
7 days	60	Cumulative Tweet Count Data	2	Beta(1st)	0	13.223
7 days	60	Cumulative Tweet Count Data	2	Alpha(2nd)	0.261***	13.223
7 days	60	Cumulative Tweet Count Data	2	Beta(2nd)	0.738***	13.223
7 days	60	Cumulative Tweet Count Data	2	[Joint]DCCA1	0.143***	13.223

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
7 days	60	Cumulative Tweet Count Data	2	[Joint]DCCB1	0	13.223
7 days	60	Cumulative Tweet Count Data	3	Alpha(1st)	0.999***	13.226
7 days	60	Cumulative Tweet Count Data	3	Beta(1st)	0	13.226
7 days	60	Cumulative Tweet Count Data	3	Alpha(2nd)	0.261***	13.226
7 days	60	Cumulative Tweet Count Data	3	Beta(2nd)	0.738***	13.226
7 days	60	Cumulative Tweet Count Data	3	[Joint]DCCA1	0.09	13.226
7 days	60	Cumulative Tweet Count Data	3	[Joint]DCCB1	0.868***	13.226
7 days	60	Cumulative Tweet Count Data	4	Alpha(1st)	0.999***	13.034
7 days	60	Cumulative Tweet Count Data	4	Beta(1st)	0	13.034
7 days	60	Cumulative Tweet Count Data	4	Alpha(2nd)	0.263***	13.034
7 days	60	Cumulative Tweet Count Data	4	Beta(2nd)	0.736***	13.034
7 days	60	Cumulative Tweet Count Data	4	[Joint]DCCA1	0.006	13.034
7 days	60	Cumulative Tweet Count Data	4	[Joint]DCCB1	0.955***	13.034
7 days	60	Cumulative Tweet Count Data	5	Alpha(1st)	0.999***	13.23
7 days	60	Cumulative Tweet Count Data	5	Beta(1st)	0	13.23
7 days	60	Cumulative Tweet Count Data	5	Alpha(2nd)	0.261***	13.23
7 days	60	Cumulative Tweet Count Data	5	Beta(2nd)	0.738***	13.23
7 days	60	Cumulative Tweet Count Data	5	[Joint]DCCA1	0.038***	13.23
7 days	60	Cumulative Tweet Count Data	5	[Joint]DCCB1	0.94***	13.23
7 days	60	Cumulative Tweet Count Data	6	Alpha(1st)	0.999***	13.231
7 days	60	Cumulative Tweet Count Data	6	Beta(1st)	0	13.231
7 days	60	Cumulative Tweet Count Data	6	Alpha(2nd)	0.261***	13.231
7 days	60	Cumulative Tweet Count Data	6	Beta(2nd)	0.738***	13.231
7 days	60	Cumulative Tweet Count Data	6	[Joint]DCCA1	0.219***	13.231
7 days	60	Cumulative Tweet Count Data	6	[Joint]DCCB1	0.477***	13.231
7 days	60	Cumulative Tweet Count Data	7	Alpha(1st)	0.999***	12.751
7 days	60	Cumulative Tweet Count Data	7	Beta(1st)	0	12.751
7 days	60	Cumulative Tweet Count Data	7	Alpha(2nd)	0.266***	12.751
7 days	60	Cumulative Tweet Count Data	7	Beta(2nd)	0.732***	12.751
7 days	60	Cumulative Tweet Count Data	7	[Joint]DCCA1	0.111	12.751
7 days	60	Cumulative Tweet Count Data	7	[Joint]DCCB1	0.475	12.751
7 days	60	Cumulative Tweet Count Data	8	Alpha(1st)	0.999***	13.237
7 days	60	Cumulative Tweet Count Data	8	Beta(1st)	0	13.237
7 days	60	Cumulative Tweet Count Data	8	Alpha(2nd)	0.261***	13.237
7 days	60	Cumulative Tweet Count Data	8	Beta(2nd)	0.738***	13.237
7 days	60	Cumulative Tweet Count Data	8	[Joint]DCCA1	0.02***	13.237
7 days	60	Cumulative Tweet Count Data	8	[Joint]DCCB1	0.964***	13.237
7 days	60	Cumulative Tweet Count Data	9	Alpha(1st)	0.999***	13.237

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
7 days	60	Cumulative Tweet Count Data	9	Beta(1st)	0	13.237
7 days	60	Cumulative Tweet Count Data	9	Alpha(2nd)	0.261***	13.237
7 days	60	Cumulative Tweet Count Data	9	Beta(2nd)	0.738***	13.237
7 days	60	Cumulative Tweet Count Data	9	[Joint]DCCA1	0	13.237
7 days	60	Cumulative Tweet Count Data	9	[Joint]DCCB1	0.908***	13.237
7 days	60	Cumulative Tweet Count Data	10	Alpha(1st)	0.999***	13.238
7 days	60	Cumulative Tweet Count Data	10	Beta(1st)	0	13.238
7 days	60	Cumulative Tweet Count Data	10	Alpha(2nd)	0.261***	13.238
7 days	60	Cumulative Tweet Count Data	10	Beta(2nd)	0.738***	13.238
7 days	60	Cumulative Tweet Count Data	10	[Joint]DCCA1	0.168***	13.238
7 days	60	Cumulative Tweet Count Data	10	[Joint]DCCB1	0.614***	13.238
Weekdays	60	US Dollar Tweet Count Data	0	Alpha(1st)	0.914***	-6.2229
Weekdays	60	US Dollar Tweet Count Data	0	Beta(1st)	0	-6.2229
Weekdays	60	US Dollar Tweet Count Data	0	Alpha(2nd)	0.06	-6.2229
Weekdays	60	US Dollar Tweet Count Data	0	Beta(2nd)	0.907	-6.2229
Weekdays	60	US Dollar Tweet Count Data	0	[Joint]DCCA1	0.009	-6.2229
Weekdays	60	US Dollar Tweet Count Data	0	[Joint]DCCB1	0.948	-6.2229
Weekdays	60	US Dollar Tweet Count Data	1	Alpha(1st)	0.914***	-6.2097
Weekdays	60	US Dollar Tweet Count Data	1	Beta(1st)	0	-6.2097
Weekdays	60	US Dollar Tweet Count Data	1	Alpha(2nd)	0.06	-6.2097
Weekdays	60	US Dollar Tweet Count Data	1	Beta(2nd)	0.907	-6.2097
Weekdays	60	US Dollar Tweet Count Data	1	[Joint]DCCA1	0	-6.2097
Weekdays	60	US Dollar Tweet Count Data	1	[Joint]DCCB1	0.944	-6.2097
Weekdays	60	US Dollar Tweet Count Data	2	Alpha(1st)	0.915***	-6.2028
Weekdays	60	US Dollar Tweet Count Data	2	Beta(1st)	0	-6.2028
Weekdays	60	US Dollar Tweet Count Data	2	Alpha(2nd)	0.06	-6.2028
Weekdays	60	US Dollar Tweet Count Data	2	Beta(2nd)	0.907	-6.2028
Weekdays	60	US Dollar Tweet Count Data	2	[Joint]DCCA1	0.001*	-6.2028
Weekdays	60	US Dollar Tweet Count Data	2	[Joint]DCCB1	0.906	-6.2028
Weekdays	60	US Dollar Tweet Count Data	3	Alpha(1st)	0.921***	-6.379
Weekdays	60	US Dollar Tweet Count Data	3	Beta(1st)	0	-6.379
Weekdays	60	US Dollar Tweet Count Data	3	Alpha(2nd)	0.137***	-6.379
Weekdays	60	US Dollar Tweet Count Data	3	Beta(2nd)	0.846***	-6.379
Weekdays	60	US Dollar Tweet Count Data	3	[Joint]DCCA1	0.011	-6.379
Weekdays	60	US Dollar Tweet Count Data	3	[Joint]DCCB1	0.955***	-6.379
Weekdays	60	US Dollar Tweet Count Data	4	Alpha(1st)	0.92***	-6.2035
Weekdays	60	US Dollar Tweet Count Data	4	Beta(1st)	0	-6.2035
Weekdays	60	US Dollar Tweet Count Data	4	Alpha(2nd)	0.06	-6.2035

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
Weekdays	60	US Dollar Tweet Count Data	4	Beta(2nd)	0.907	-6.2035
Weekdays	60	US Dollar Tweet Count Data	4	[Joint]DCCA1	0.002	-6.2035
Weekdays	60	US Dollar Tweet Count Data	4	[Joint]DCCB1	0.983***	-6.2035
Weekdays	60	US Dollar Tweet Count Data	5	Alpha(1st)	0.92***	-6.1996
Weekdays	60	US Dollar Tweet Count Data	5	Beta(1st)	0	-6.1996
Weekdays	60	US Dollar Tweet Count Data	5	Alpha(2nd)	0.06	-6.1996
Weekdays	60	US Dollar Tweet Count Data	5	Beta(2nd)	0.907	-6.1996
Weekdays	60	US Dollar Tweet Count Data	5	[Joint]DCCA1	0.012***	-6.1996
Weekdays	60	US Dollar Tweet Count Data	5	[Joint]DCCB1	0.94***	-6.1996
Weekdays	60	US Dollar Tweet Count Data	6	Alpha(1st)	0.92***	-6.3388
Weekdays	60	US Dollar Tweet Count Data	6	Beta(1st)	0	-6.3388
Weekdays	60	US Dollar Tweet Count Data	6	Alpha(2nd)	0.076***	-6.3388
Weekdays	60	US Dollar Tweet Count Data	6	Beta(2nd)	0.877***	-6.3388
Weekdays	60	US Dollar Tweet Count Data	6	[Joint]DCCA1	0.06***	-6.3388
Weekdays	60	US Dollar Tweet Count Data	6	[Joint]DCCB1	0.495***	-6.3388
Weekdays	60	US Dollar Tweet Count Data	7	Alpha(1st)	0.92***	-6.1999
Weekdays	60	US Dollar Tweet Count Data	7	Beta(1st)	0	-6.1999
Weekdays	60	US Dollar Tweet Count Data	7	Alpha(2nd)	0.06	-6.1999
Weekdays	60	US Dollar Tweet Count Data	7	Beta(2nd)	0.907	-6.1999
Weekdays	60	US Dollar Tweet Count Data	7	[Joint]DCCA1	0.004	-6.1999
Weekdays	60	US Dollar Tweet Count Data	7	[Joint]DCCB1	0.967***	-6.1999
Weekdays	60	US Dollar Tweet Count Data	8	Alpha(1st)	0.92***	-6.3388
Weekdays	60	US Dollar Tweet Count Data	8	Beta(1st)	0	-6.3388
Weekdays	60	US Dollar Tweet Count Data	8	Alpha(2nd)	0.101***	-6.3388
Weekdays	60	US Dollar Tweet Count Data	8	Beta(2nd)	0.868***	-6.3388
Weekdays	60	US Dollar Tweet Count Data	8	[Joint]DCCA1	0.026*	-6.3388
Weekdays	60	US Dollar Tweet Count Data	8	[Joint]DCCB1	0.46***	-6.3388
Weekdays	60	US Dollar Tweet Count Data	9	Alpha(1st)	0.92***	-6.2018
Weekdays	60	US Dollar Tweet Count Data	9	Beta(1st)	0	-6.2018
Weekdays	60	US Dollar Tweet Count Data	9	Alpha(2nd)	0.06	-6.2018
Weekdays	60	US Dollar Tweet Count Data	9	Beta(2nd)	0.907	-6.2018
Weekdays	60	US Dollar Tweet Count Data	9	[Joint]DCCA1	0.039***	-6.2018
Weekdays	60	US Dollar Tweet Count Data	9	[Joint]DCCB1	0.11	-6.2018
Weekdays	60	US Dollar Tweet Count Data	10	Alpha(1st)	0.92***	-6.1933
Weekdays	60	US Dollar Tweet Count Data	10	Beta(1st)	0	-6.1933
Weekdays	60	US Dollar Tweet Count Data	10	Alpha(2nd)	0.06	-6.1933
Weekdays	60	US Dollar Tweet Count Data	10	Beta(2nd)	0.907	-6.1933
Weekdays	60	US Dollar Tweet Count Data	10	[Joint]DCCA1	0.002	-6.1933

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
Weekdays	60	US Dollar Tweet Count Data	10	[Joint]DCCB1	0.981***	-6.1933
Weekdays	60	Cumulative Tweet Count Data	0	Alpha(1st)	0.97***	-6.6479
Weekdays	60	Cumulative Tweet Count Data	0	Beta(1st)	0	-6.6479
Weekdays	60	Cumulative Tweet Count Data	0	Alpha(2nd)	0.06	-6.6479
Weekdays	60	Cumulative Tweet Count Data	0	Beta(2nd)	0.907	-6.6479
Weekdays	60	Cumulative Tweet Count Data	0	[Joint]DCCA1	0.002	-6.6479
Weekdays	60	Cumulative Tweet Count Data	0	[Joint]DCCB1	0.98***	-6.6479
Weekdays	60	Cumulative Tweet Count Data	1	Alpha(1st)	0.97***	-6.6524
Weekdays	60	Cumulative Tweet Count Data	1	Beta(1st)	0	-6.6524
Weekdays	60	Cumulative Tweet Count Data	1	Alpha(2nd)	0.06	-6.6524
Weekdays	60	Cumulative Tweet Count Data	1	Beta(2nd)	0.907	-6.6524
Weekdays	60	Cumulative Tweet Count Data	1	[Joint]DCCA1	0.004	-6.6524
Weekdays	60	Cumulative Tweet Count Data	1	[Joint]DCCB1	0.246	-6.6524
Weekdays	60	Cumulative Tweet Count Data	2	Alpha(1st)	0.97***	-6.6464
Weekdays	60	Cumulative Tweet Count Data	2	Beta(1st)	0	-6.6464
Weekdays	60	Cumulative Tweet Count Data	2	Alpha(2nd)	0.06	-6.6464
Weekdays	60	Cumulative Tweet Count Data	2	Beta(2nd)	0.907	-6.6464
Weekdays	60	Cumulative Tweet Count Data	2	[Joint]DCCA1	0.01	-6.6464
Weekdays	60	Cumulative Tweet Count Data	2	[Joint]DCCB1	0.252	-6.6464
Weekdays	60	Cumulative Tweet Count Data	3	Alpha(1st)	0.97***	-6.8154
Weekdays	60	Cumulative Tweet Count Data	3	Beta(1st)	0	-6.8154
Weekdays	60	Cumulative Tweet Count Data	3	Alpha(2nd)	0.149***	-6.8154
Weekdays	60	Cumulative Tweet Count Data	3	Beta(2nd)	0.841***	-6.8154
Weekdays	60	Cumulative Tweet Count Data	3	[Joint]DCCA1	0.074***	-6.8154
Weekdays	60	Cumulative Tweet Count Data	3	[Joint]DCCB1	0.334***	-6.8154
Weekdays	60	Cumulative Tweet Count Data	4	Alpha(1st)	0.97***	-6.6465
Weekdays	60	Cumulative Tweet Count Data	4	Beta(1st)	0	-6.6465
Weekdays	60	Cumulative Tweet Count Data	4	Alpha(2nd)	0.06	-6.6465
Weekdays	60	Cumulative Tweet Count Data	4	Beta(2nd)	0.907	-6.6465
Weekdays	60	Cumulative Tweet Count Data	4	[Joint]DCCA1	0.006	-6.6465
Weekdays	60	Cumulative Tweet Count Data	4	[Joint]DCCB1	0.977*	-6.6465
Weekdays	60	Cumulative Tweet Count Data	5	Alpha(1st)	0.971***	-6.6453
Weekdays	60	Cumulative Tweet Count Data	5	Beta(1st)	0	-6.6453
Weekdays	60	Cumulative Tweet Count Data	5	Alpha(2nd)	0.06	-6.6453
Weekdays	60	Cumulative Tweet Count Data	5	Beta(2nd)	0.907	-6.6453
Weekdays	60	Cumulative Tweet Count Data	5	[Joint]DCCA1	0.016	-6.6453
Weekdays	60	Cumulative Tweet Count Data	5	[Joint]DCCB1	0.891**	-6.6453
Weekdays	60	Cumulative Tweet Count Data	6	Alpha(1st)	0.97***	-6.7748

Category	Frequency (min)	2nd Variable	Lag of 2nd Variable	Parameter	Estimate	Akaike
Weekdays	60	Cumulative Tweet Count Data	6	Beta(1st)	0	-6.7748
Weekdays	60	Cumulative Tweet Count Data	6	Alpha(2nd)	0.104***	-6.7748
Weekdays	60	Cumulative Tweet Count Data	6	Beta(2nd)	0.871***	-6.7748
Weekdays	60	Cumulative Tweet Count Data	6	[Joint]DCCA1	0.046***	-6.7748
Weekdays	60	Cumulative Tweet Count Data	6	[Joint]DCCB1	0	-6.7748
Weekdays	60	Cumulative Tweet Count Data	7	Alpha(1st)	0.97***	-6.6466
Weekdays	60	Cumulative Tweet Count Data	7	Beta(1st)	0	-6.6466
Weekdays	60	Cumulative Tweet Count Data	7	Alpha(2nd)	0.06	-6.6466
Weekdays	60	Cumulative Tweet Count Data	7	Beta(2nd)	0.907	-6.6466
Weekdays	60	Cumulative Tweet Count Data	7	[Joint]DCCA1	0.012	-6.6466
Weekdays	60	Cumulative Tweet Count Data	7	[Joint]DCCB1	0.937	-6.6466
Weekdays	60	Cumulative Tweet Count Data	8	Alpha(1st)	0.97***	-6.8139
Weekdays	60	Cumulative Tweet Count Data	8	Beta(1st)	0	-6.8139
Weekdays	60	Cumulative Tweet Count Data	8	Alpha(2nd)	0.155***	-6.8139
Weekdays	60	Cumulative Tweet Count Data	8	Beta(2nd)	0.84***	-6.8139
Weekdays	60	Cumulative Tweet Count Data	8	[Joint]DCCA1	0.044***	-6.8139
Weekdays	60	Cumulative Tweet Count Data	8	[Joint]DCCB1	0.361***	-6.8139
Weekdays	60	Cumulative Tweet Count Data	9	Alpha(1st)	0.97***	-6.6477
Weekdays	60	Cumulative Tweet Count Data	9	Beta(1st)	0	-6.6477
Weekdays	60	Cumulative Tweet Count Data	9	Alpha(2nd)	0.06	-6.6477
Weekdays	60	Cumulative Tweet Count Data	9	Beta(2nd)	0.907	-6.6477
Weekdays	60	Cumulative Tweet Count Data	9	[Joint]DCCA1	0.036**	-6.6477
Weekdays	60	Cumulative Tweet Count Data	9	[Joint]DCCB1	0.213	-6.6477
Weekdays	60	Cumulative Tweet Count Data	10	Alpha(1st)	0.97***	-6.6392
Weekdays	60	Cumulative Tweet Count Data	10	Beta(1st)	0	-6.6392
Weekdays	60	Cumulative Tweet Count Data	10	Alpha(2nd)	0.06	-6.6392
Weekdays	60	Cumulative Tweet Count Data	10	Beta(2nd)	0.907	-6.6392
Weekdays	60	Cumulative Tweet Count Data	10	[Joint]DCCA1	0.018*	-6.6392
Weekdays	60	Cumulative Tweet Count Data	10	[Joint]DCCB1	0.726	-6.6392

Notes: *** represents statistical significance at 0.01 level, ** represents statistical significance at 0.05 level, * represents statistical significance at 0.1 level