



DEPARTMENT OF ACCOUNTING AND FINANCE

The impact of Recep Tayyip Erdogan on the Turkish Lira.

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Master Thesis in Finance

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Abstract

Turkey and its President Recep Tayyip Erdogan have been in the middle of attention for the past few years. Through the current event study, we examine the effect of the commentaries of President Erdogan to the Exchange rate of the Turkish Lira with the US Dollar. For the analysis the intraday exchange rate of the Turkish Lira with the US Dollar was used. Also, 229 announcements of Erdogan were gathered for the analysis for the years 2004 to 2021. The announcements separated into 3 categories: Inflation, Interest Rates and other announcements related to Turkey's economy including the Turkish Lira. Through the analysis we conclude that generally the announcements of President Erdogan affect the Exchange rate. The announcements related to Interest rates influence extensively the Exchange rate and specifically depreciate the Turkish Lira in terms of US Dollar per minute.

Keywords: Event Study, Turkey, Erdogan, Turkish Lira, Impact, Inflation, Interest Rate

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**ΤΜΗΜΑ ΛΟΓΙΣΤΙΚΗΣ
ΚΑΙ ΧΡΗΜΑΤΟΟΙΚΟΝΟΜΙΚΗΣ**

26 Ιανουαρίου 2022

Συντονιστή Μεταπτυχιακών Προγραμμάτων
Τμήματος Λογιστικής και Χρηματοοικονομικής

Β Ε Β Α Ι Ω Σ Η

Βεβαιούται ότι η μεταπτυχιακή φοιτήτρια Αφροδίτη Δαυίδ (Αρ. Ταυτότητας)
ολοκλήρωσε με επιτυχία την προφορική υποστήριξη της διπλωματικής της μελέτης σε
εξέταση που έλαβε χώραν ενώπιον διμελούς εξεταστικής επιτροπής, στις 27 Δεκεμβρίου
2021. Παρέδωσε την διπλωματική της μελέτη στις _____.

Η εξεταστική επιτροπή,

Ανδρέας Μιλιδώνης
(Πρόεδρος, Σύμβουλος)

Μάριος Παναγίδης
(Σύμβουλος)

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1. Introduction

Turkey and its President Recep Tayyip Erdogan have been in the middle of attention for the past few years. The high inflation of the country and the continuing depreciation of the Turkish Lira are some occurrences that took place in the last two years. Throughout the current study, I would try to examine whether the announcements of Erdogan significantly influence the exchange rate of the Turkish Lira with the US Dollar. A few studies analyze the economic system of Turkey and precisely the impact of Turkey's president on the exchange rate. Through an event study methodology, I will examine the above hypothesis.

The political commentaries which lead to lower policy rates seem to rise after 2013 (Demiralp & Demiralp, 2019). The increasing pressure of the Turkish Government about the lower policy rates, lead the Central Bank of Turkey, to a gradual reduction of independence. The government bodies control the political system in Turkey, while the traditionally independent government bodies gradually lose their power. Cukierman et al. (1992) indicate that the independence of a Central Bank has a strong correlation with the frequency of change of the Chief Executive Officer. The positive correlation among the two variables leads to the weakening of the Central Bank. In October, President Erdogan fired three top officials at the country's central bank (Malsin & Hirtenstein, 2021). Previously, Erdogan sacked Kavcioglu's predecessor and also fired two others in the last two and a half years (Factbox,2021). These incidents and many more examined through the event study, support the weakening of the Central Bank. Credibility in Turkey is gently deteriorating while the pandemic of COVID-19 caught the CBRT in a period of weak credibility (Çakmaklı & Demiralp, 2020).

The currency exchange rate is the most significant determinant of each country. The exchange rate has a considerable influence on the link between the local and the overseas market (Baxter & Stockman, 1989). As a consequence, the exchange rate affects the aggregate demand in the economy. An increasing exchange rate will lead to an unhealthy economy due to a reduction in new investments, a decrease in economic growth, and an increase in the unemployment rate (Çehreli et al., 2017). Thus, by observing the currency exchange rate, we can determine the economic health of each country.

An event study is a frequently used methodology by academics and it was introduced by the paper of Fama, Fisher, Jensen, and Roll (FFJR) (1969). FFJR started a methodological revolution in accounting and economics as well as finance. The event study methodology is widely used in academics however, it presents limitations on its application. According to MacKinlay (1997), there is an issue if the event announcement date cannot be defined accurately. To eliminate this problem, according to MacKinlay we could extend the event window. The second limitation is the horizon of the event studies, as Kothari and Warner (1996) proved, the long-horizon event studies were imprecise, and those event studies need to be exceptionally cautious.

The primary assumption of the event study methodology is the hypothesis of market efficiency. The Efficient Market Hypothesis (EMH), introduced by Fama (1969) states that, if markets are efficient, stock prices will rapidly and accurately reflect all available information. There are three forms of efficiency: weak, semi-strong, and strong (Fama, 1970).

Consequently, the current event study is focused solely on the announcements of Erdogan, related to Turkey's Economy. It contributes to the literature giving answers about the effect of Erdogan's commentaries related to Interest rate, Inflation, Turkish Lira, and other announcements related to the Turkish Economy. A fundamental element that differentiates the current study from the literature, is the usage of intraday exchange rates of the Turkish Lira with the US Dollar. To examine the primary hypothesis, the Exchange rate of the Turkish Lira with the US Dollars was retrieved from Portara CQG, and 229 announcements/events were gathered through LexisNexis data mining platform, via Google News and Tweeter as well. The process of the data was made through SAS software. The determination of the event window is 30 minutes before the announcement and 30 minutes after the announcement ([-30,30]). Also, an event window of 15 minutes before the announcement and 15 minutes after the announcement was tested too.

First, the estimation of the returns was made, using the log-returns equation. The estimated window in the current study is equal to 150 minutes before each announcement of Erdogan. According to Brown and Warner (1980), the model used to calculate the abnormal returns is the Mean Adjusted Model. Since there is an absence of any overlap among the event windows and the maintained distributional assumptions apply (MacKinlay, 1997), the cumulative and the abnormal returns would be independent. The Cumulative Abnormal Returns and the Cumulative Average Abnormal

Returns were estimated through the equations, proposed, again, by MacKinlay (1997). Using the student distribution and the p-value, the primary hypothesis was examined.

Finally, through the analysis introduced above, significant results were extracted. Firstly, by examining the hypothesis using the 61-minutes event window and the full dataset of announcements, a significant mean value of the CAAR was presented. Regarding the 31-minutes event window, there were not any significant results. In addition, by examining a group of announcements consisting of commentaries related to Inflation and Interest rate, the average CAAR was statistically significant. The 2nd category of announcements related specifically to Interest rate was also statistically significant.

Generally, an announcement of Erdogan increases the exchange rate which implies that the Turkish Lira depreciated in terms of the US Dollar in an event window of 61 minutes of an announcement. Finally, while the announcement is related to Interest rate, the average increase in the exchange rate of the Turkish Lira and US Dollar is considerably higher compared to the other categories. Therefore, the Turkish Lira depreciates extensively when President Erdogan comments about the Interest rate of Turkey.

2. Literature Review

2.1 Turkey

The Turkish judiciary was less autonomous since Erdogan's Justice and Development Party (AKP) was elected in 2003 (Meyersson & Rodrik, 2014). Since the day Erdogan became the president of Turkey, the Turkish media could not freely express their opinions on the government and its decisions (Meyersson & Rodrik, 2014). The journalists were cautious regarding the news and the articles published, as the risk of enormous fines prevailed among the media owners (Meyersson & Rodrik, 2014). There are many examples of media owners where the government levied huge penalties. Such an example is the Dogan Holding, in 2009, where a vast fine was imposed on the owner of the leading independent daily newspaper, Hürriyet. Journalists were unable to work properly; they could not share their pure views and opinions regarding the government policies. They were supposed to reproduce what the government remarked without assessing subjective the

releases. The fear of assessing the government's decisions publicly still prevails. Meyersson and Rodrik (2014) mention that there is no press freedom in Turkey. Statistics show that pro-government business people controlled 90% of the Turkish media (Turkey, 2021). Also, more than 200 journalists and media workers have been imprisoned in Turkey since 2016 (Turkey, 2021).

Not only the Turkish judiciary, as mentioned before, was less independent, but also the Central Bank of Turkey as well. Cukierman et al. (1992) indicate that the independence of a Central Bank has a strong correlation with the frequency of change of the Chief Executive Officer. Specifically, they denote a positive correlation between the two variables. Given the level of independence of the Central Bank, a government achieves price stability. The pursuance of price stability could reduce the costs of inflation (Cukierman et al., 1992). Furthermore, it contributes to lending. By achieving price stability, both the government and the businesses can borrow funds with lower interest rates in the long run. The independence of the Central Bank is crucial and should be implemented in all countries. Since the Erdogan election, the Chief Executive Officer of the Central Bank has frequently been replaced (Turkey, 2021). Those incidents in Turkey, regarding the results of Cukierman et al. (1992), signal the increasing dependence of the Central Bank on the government. As a consequence, we observe price instability in Turkey and high inflation.

The independence of the Central Bank is a prerequisite for the effective implementation of monetary policy (Çakmaklı et al., 2021). The Central Bank of each country should be independent of the government, to avoid any pressure that will lead to the pursuit of the government's interests. Populist commentaries from political leaders regarding interest rates, should not influence extensively the exchange rate, while the Central Bank should be independent (Çakmaklı et al., 2021). According to Çakmaklı et al. analysis, the volume of the political pressure and the institutional strength are the major factors that affect the variability of the exchange rate. Analysis of Erdogan's numerous commentaries, asking for lower interest rates or lower inflation, indicate that they affect both the level and the volatility of the exchange rate. Announcements about interest rates can confuse the financial markets and volatile exchange rates. Çakmaklı et al. (2021) conclude that in emerging markets the negotiations of the central bank with the government should take place in private discussions, to ensure the credibility of the Central Bank.

The political commentaries, which lead to lower policy rates, seem to rise after 2013 as Demiralp and Demiralp (2019) point out. The increasing pressure of the Turkish Government about the lower

policy rates leads the Central Bank of the Republic of Turkey (CBRT) to a gradual reduction of independence. The government bodies control the political system in Turkey, while the traditionally independent government bodies erode (Demiralp Demiralp, 2019). Neither the macroeconomic goals nor the development of the Turkish system could be achieved through the declining independence of CBRT. The macroeconomic goals regarding the normalization of inflation and interest rates cannot be accomplished under those circumstances (Demiralp Demiralp, 2019). The current study supports the existing literature of Cukierman et al. (1992) regarding the independence of the Central Bank. The political system of the country requires institutional checks on government power. This is the only way the country could prioritize the long-term interests of the whole society, instead of the short-term populist concerns.

The Central Bank conducts a nation's monetary policy and controls its money supply, often mandated with maintaining low inflation and steady GDP growth. On a macroeconomic basis, central banks influence interest rates and participate in open market operations to control the cost of borrowing and lending throughout an economy. Since the independence of Turkey's Central Bank eroded through the years, and the pressure of President Erdogan on the Executives of the Central Bank for lower interest rates increased, then, his commentaries especially for the interest rates, affecting the primary operations of the nation's Central Bank.

The credibility of the Central Bank is the most considerable measure for the implementation of Monetary Policy. As Blinder (2012) reported in his speech at the Jackson Hole meetings,

” Credibility means believability and trust. You build it by matching deeds to words. Promising and then delivering low inflation is one important aspect of central bank credibility...”

Credibility in Turkey is gently deteriorating, while the pandemic of COVID-19 caught the CBRT in a period of weak credibility (Çakmaklı & Demiralp, 2020). Regarding the Quantitative easing program in Turkey, they conclude that there is a need for information about Quantitative easing, to finance the economic costs of the pandemic. A well-defined plan to escape is needed to offset inflationary risks and enhance the credibility of CBRT.

2.2 Event Studies

An event study is a frequently used methodology used by academics. The methodology was introduced by the paper of Fama, Fisher, Jensen, and Roll (FFJR) (1969). FFJR started a

methodological revolution in accounting and economics as well as finance. The event study methodology is designed to examine the effect of an event on a specific dependent variable. Usually, the dependent variable is the stock price or the value of the firm (Fama et al., 1969). Using this methodology, we examine the changes in stock prices beyond expectations over a specific period of time (Woon, 2004). Events such as accounting rule changes, earnings announcements, changes in the severity of regulation, and money supply announcements.

The first step in an event study according to Woon (2004), is to identify the event question and gather the data of companies that went through such an event. The second step is to decide the period that will be examined for the specific event. This is the so-called event window. Armitage (1995) noted that the shorter the interval between each return observation measured, the more effortless it is to determine the abnormal returns. The estimation window and the post-event window should be determined during this step. The next step is the estimation of the parameters that will give us the expected returns during the event window (Woon, 2004).

A benchmark price is needed to have abnormal returns. Thus, a model should be selected to generate the expected returns. Brown and Warner (1980) concentrate on three general models. The Mean Adjusted Returns model, where the expected return for security i , is equal to a constant K_i and the abnormal return is the difference among the observed return, R_i , and the constant K_i . The Market Adjusted Returns model assumes that abnormal return on any security i , is given by the difference between its return and that on the market portfolio. Both models are consistent with the Capital Asset Pricing Model (CAPM). The third model is the Market and Risk-Adjusted Returns model. This model is a version of the CAPM and generates expected returns. The event study methods came with many variations, and they are widely used in empirical research (Armitage, 1995). Armitage (1995) tests the significance of each model and highlights the differences among each model. He claims that the market model is the most frequently used model, due to its alteration and the wide range of applications. The CAPM is also widely used in tests of investment rules and fund performance, which are not strictly event studies. By adding up the abnormal returns over a period, we get the cumulative abnormal return (Woon, 2004).

The event study methodology is widely used in academics however, limitations may appear during its application. According to MacKinlay (1997), there is a problem if the event announcement date cannot be defined accurately. As a result, this methodology will not work appropriately. Usually,

this happens in cases of gathering financial publications. The paper may take place the day after the event announcement. The usual method of handling this problem, according to MacKinlay(1977), is to expand the event window from 1 day to 2 days. The cost of extending the event window is worth it, rather than the risk of not including the event. The second limitation is the horizon of the event studies. Kothari and Warner (1996) proved that the long-horizon event studies were imprecise, and these event studies need to be exceptionally cautious. Continuing, they claimed that nonparametric tests and the usage of bootstrap tests are likely to downsize the misspecification.

2.3 Efficient Market Hypothesis

The primary assumption of the event study methodology is the hypothesis of market efficiency. The Efficient Market Hypothesis (EMH) introduced by Fama (1969) states that if markets are efficient, stock prices will rapidly and accurately reflect all available information. Kendall (1953) found that stock prices follow a random path and there is no predictable pattern in stock price changes. Prices are likely to go up and down on any day. According to Market Equilibrium Theory, no one can outperform the market, as the market is efficient and reflects all publicly available information Fama (1970). Added information is unpredictable while the stock prices move in response to that information.

According to Fama (1970), there are three major forms of Market Efficiency. The first form is the Weak Form Efficiency where prices follow the random walk model. It assumes that the occurrence of an event is determined by a series of random movements. Using the random walk model is impossible to predict the stock prices. Through Technical Analysis, analysts/investors try to beat the market, using prices and volume information. Regarding the Weak Form Efficiency, signals become useless as they have been integrated, already, into the observed prices.

The second form of efficiency is the Semi-Strong Form of Efficiency. In addition to the information in the Weak Form Efficiency, investors or analysts have information related to the company. In that form, researchers look at specific events, such as announcements of earnings, new regulations, changes in accounting practices, etc. Through fundamental analysis,

analysts/investors are using economic and accounting information to predict stock prices. Again, in this form, observed prices already reflect all publicly available information.

Finally, the third form of efficiency is the Strong Form of Efficiency. In this form of efficiency, analysts/investors have not only the information of the semi-strong form efficiency but also the information related to insiders. This form is quite extreme, especially in countries with high institutional quality. It is illegal to trade on inside information. No one can earn excess returns using the inside information.

3. Motivation & Contribution

Previous literature investigates that political pressure has a significant impact on the Exchange rates (Çakmaklı et al., 2021). Specifically, they illustrate that Erdogan's commentaries have a notable impact on the Exchange rate of the Turkish Lira with the US Dollar. The paper of Çakmaklı, Demiralp, and Güneş (2021) examined not only the political commentaries about President Erdogan, but for many populist leaders as well. They support that evidence, by analyzing political commentaries using a regression model. In their study, the commentaries gathered were about the criticizing of the Central Bank from the populist Leaders.

The currency exchange rate is the most considerable determinant of each country. By observing the currency exchange rate, we can determine the economic health of each country. The exchange rate has a significant impact on the link between the local and the overseas market, so it affects the aggregate demand in the economy (Baxter & Stockman, 1989). An increasing exchange rate will lead to an unhealthy economy due to a reduction in new investments, a decrease in economic growth, and an increase in the unemployment rate (Çehreli et al., 2017).

In addition, according to Demiralp and Demiralp (2018), the independence of Turkey's Central Bank is gradually eroded since the government extends the pressure regarding the dynamics of the economic system. The announcements of President Erdogan are highlighted news to get into, regarding the price variation of the Turkish lira. Many analysts and investors are following the announcements of Erdogan. The commentaries are incredibly important not only for Turkey's economy but also for many other countries, related to Turkey. As a result, an event study regarding

the commentaries of President Erdogan would be helpful to understand the impact on the Exchange rates and the economy.

A few studies analyze the economic system of Turkey and precisely the impact of Turkey's president on the exchange rate. Thus, the current event study is focused solely on the announcements of Erdogan related to Turkey's Economy. It contributes to the literature giving answers about the effect of Erdogan's commentaries related to Interest rate, Inflation, Turkish Lira, and other announcements related to the Turkish Economy. Another fundamental element that differentiates the current study from the literature, is the usage of intraday exchange rates of the Turkish Lira with the US Dollar. Specifically, the 1-minute exchange rate was retrieved and examined for the specific event study. Also, the announcements gathered in the current study are generally for Turkey's economy and not specifically related to critiques about the Central Bank. Moreover, through the current study, we can measure the effectiveness of the commentaries of President Erdogan on the exchange rate. Through the paper of Çakmaklı, Demiralp, and Güneş (2021), illustrated that political pressure has a significant impact on the Exchange rates, but they did not measure the effect.

By applying the followed methodology, we will observe the average Cumulative Average Abnormal Return. Throughout the analysis, we will examine the significance of the principal hypothesis. The major hypothetical statement of the current study is that the commentaries of Erdogan, related to the Turkish economic system, significantly influence the exchange rate of the Turkish Lira with the US Dollar. In such a case, the mean of the Cumulative Average Abnormal Returns (CAARs), estimated for each retrieved event, will be statistically significant. It means that the null hypothesis, which stands if the mean is equal to zero, will be rejected. The average will be statistically different from zero since the null hypothesis would be rejected. Thus, by examining the mean of CAARs for a specified confidence interval, we would be able to confirm the significance of the primary hypothesis of the current event study.

4. Data

To examine the impact on the exchange rate of the announcements of Erdogan through the current event study, the prices of the Exchange rate of the Turkish Lira with the US Dollars were needed. Specifically, to examine the considerable influence of President Erdogan on the exchange rate, the

intraday exchange rate was used. The 1-minute exchange rates for Turkish Lira with US Dollar were retrieved from Portara CQG. The minute-by-minute prices collected were between the 25th of November 1996 at 01:55 PM to the 5th of October 2021 at 08:28 AM and are defined as the number of Turkish Lira per US Dollar. Overall, 5.098.809 observations were retrieved for the specified period. The data regarding the exchange rate include the prices of every minute of every weekday. It should be noted that the dataset has quite a lot of missing values, in particular for the earlier years. Also, the weekends are excluded from the specific dataset. The usage of a high-frequency exchange rate was one of the fundamental components that distinguish the current study from the literature.

To examine the primary hypothesis of the current event study, several announcements of President Erdogan should be gathered. The events used for the event study were collected through the LexisNexis data mining platform and via Google News. The database of LexisNexis consists of premium news and business sources. The data collected from all the articles were the date and time of the articles' publication and the articles' category. Three groups were created to separate the articles depending on their categories. Those groups were as follows: Inflation, Interest Rates, and other announcements that may cause a change in the Exchange rate of the Turkish Lira with the US Dollar. The category of other announcements also includes statements related to the Turkish Lira. According to Çakmaklı et al. (2021), political commentaries of leaders indicate an influence on the exchange rate.

Throughout this process, 281 of Erdogan's announcements were collected from 2004 to 2021. The publication time reported for each article was different from the actual announcement of Erdogan. As a result, this parameter could not be used for the event study. Twitter was used to find the exact time of the 83 announcements and also another 105 announcements were discovered. Twitter's content regarding Turkey, included events starting from 2012 to 2021. On the other hand, for the years 2004 to 2011, the date and time reported on each article were used for the event study, as the resources were limited. Also, in the years 2004 to 2011, the economy in Turkey was doing better and President Erdogan had less power in Turkey than recently.

By observing the prices around each event, the alteration in prices caused by the announcements of Erdogan seems to take place about an hour before the time reported in the articles or the Tweets. Thus, the time of some events was changed manually, depending on the variation of the prices.

Before execution, it ensured that nothing else happened around that time, either to Turkey or the US, that could affect the Exchange Rate of the Turkish Lira with the US Dollar. The events were deleted in cases where another event took place at the same time. Two cases were found where the results were not clear, as the price change could not be clearly defined. It might be affected by Erdogan's announcement or another event. As a result, those events were deleted from the dataset.

As mentioned before, Exchange Rate for the Turkish Lira and US Dollars are not available for the weekends. That was the major constraint of the dataset. Many events from the initial dataset occurred on weekends. As a result, 23 events were removed from the dataset. Finally, the dataset used consists of 229 statements of Erdogan. The 69 statements were about Interest Rates, 14 were about inflation, and 147 spoke about other matters regarding Turkey's Economy. About 147 commentaries of Turkey's president regarding other schemes were related to Turkey's economic system, and 20 of those affiliated to the Turkish Lira. Table 1 presents the number of announcements for each year. As we move to earlier years the number of announcements gathered is declining since there were not enough sources for that period.

Each search result was carefully screened for relevance, and from these results, the announcements were grouped into three subsamples. The double-counting and the dropping of multiple entries of the same news were avoided. The complete dataset consisting of 229 observations was applied to test the primary hypothesis. However, the hypothesis was tested also for the three subcategories of events, mentioned above and a combination of those. The development of the sample is obtained through table 2.

The moment of the announcement ($t=0$) is determined as the time where Erdogan referred to something related to interest rates, inflation, or something else related to Turkey's economy. The length of the 1-minute Exchange Rate dataset is extensive. As a result, SAS Enterprise Guide was selected to process the data. The matching of the two datasets was the first thing that has been done using SAS. The two datasets were the ones with the 1-minute Exchange Rates and the other with the announcements of Erdogan. The evaluation followed was the estimation of log returns for the whole dataset. The estimation period is equal to 150 minutes before the event window. The determination of the event window is 30 minutes before the announcement and 30 minutes after the announcement ($[-30,30]$). Also, an event window of 15 minutes before the announcement and 15 minutes after the announcement was tested too.

5. Methodology

As mentioned earlier the data was uploaded and processed using the SAS software. The first step of the methodology is the calculation of the stock returns using the log-returns equation:

$$R_t = LN\left(\frac{P_t}{P_{t-1}}\right) \quad (1)$$

Where P_t is the price of the exchange rate of the Turkish Lira with the US Dollar at a specific minute and P_{t-1} is the price at the previous minute.

The estimation window in the current study is equal to 150 minutes ($[-180, -31]$ when the event window is $[-30,30]$ and $[-165, -16]$ when the event window is $[-15,15]$) before each announcement of Erdogan. Brown and Warner (1980) introduced three models for estimating the benchmark return and, hence evaluating the abnormal returns. The model used to calculate the abnormal returns is the Mean Adjusted Model. The predicted return of the exchange rate is equal to a constant, by estimating the average of the series of returns within the estimation window. The expected returns are evaluated for each event/announcement of Erdogan. There are 229 events, thus there are 229 estimated expected returns for each event window.

$$\overline{R}_k = \frac{1}{N} \sum_{t=1}^{150} R_{t,k} \quad (2)$$

Where $R_{t,k}$ is the log-return of the exchange rate at time t and the event $k=1, 2, \dots, 229$, and R_k is the mean log-return for each event, k . The summation of the returns is divided by N , which is the minutes included in the estimation window. The abnormal return observations must be aggregated for the event window and across the observations of the event (MacKinlay, 1997). The aggregation implies that there is not any overlap in the event windows of the included announcements of Erdogan. The abnormal returns and the cumulative abnormal returns will be independent across the commentaries of Erdogan. Since there is an absence of any overlap among the event windows and the maintained distributional assumption applies (MacKinlay, 1997), the cumulative and the abnormal returns would be independent. The Abnormal Returns (AR) are calculated within the event window, for each event, using the following equation:

$$AR_k = R_t - \overline{R}_k \quad (3)$$

Where $AR_{i,k}$ is the abnormal return estimated for the k events. Abnormal Return is the difference between the actual log-return and the mean log-return of each return. To measure the impact of an event over a particular period, one can add up the individual abnormal returns ($AB_{i,k}$), for each event, to generate the Cumulative Abnormal Returns (CARs). The methodology outlined by MacKinlay (1997) was followed for the estimation of the cumulative abnormal returns. The Cumulative Abnormal Returns were calculated through the following equation:

$$CAR_{(t_1, t_2)} = \sum_{t=t_1}^{t_2} AR_{t,k} \quad (4)$$

Where t_1 is the starting point which is equal to -30 minutes and t_2 is the ending point equal to $+30$ minutes while the event window was $[-30,30]$. The t_1 and t_2 were adjusted for the event window of $[-15,15]$.

Next the standard deviation for each event was estimated. The variability for each event was estimated through the abnormal returns included in each event window using the following equation:

$$\sigma_k = \sqrt{\frac{\sum (AR_{t,k} - \overline{AR}_k)^2}{n-1}} \quad (5)$$

Where $AR_{t,k}$ is the abnormal returns at time t (the minutes consisting of the event window) and $k=1$ to 229 events. \overline{AR}_k is the mean value of the abnormal returns included in each event window. N is the number of observations included in each event window.

Finally, the Cumulative Average Abnormal Returns (CAARs) was estimated through the following equation, proposed, again, by MacKinlay (1997):

$$\overline{CAR}_{(t_1, t_2)} = \frac{1}{N} \sum_{t=t_1}^{t_2} AR_{t,k} \quad (6)$$

The CAARs were estimated for all the events, therefore 229 CAARs are estimated. Graphs 1 and 2 presents the CAARs and the standard deviation in terms of the years for each event window. Furthermore, for the statistical significance of the cumulative average abnormal returns, a t-test was applied. T-test was one of the methods proposed by Brown and Warner (1980). The equation for the t-test applied in the current study was:

$$t = \frac{CAAR * \sqrt{N}}{S} \quad t > t_{\frac{\alpha}{2}, n-1}$$

Where CAAR implies the mean Cumulative Average Abnormal Return among the announcements of Erdogan. N is the number of events and S is the standard deviation of the abnormal returns.

The hypothesis tested for the current study was:

Ho: The mean of the CAAR is equal to zero

H1: The mean of the CAAR is different from zero

The t-test presented here is a two-tailed test. Since the t-test is greater than the critical value, the Null hypothesis is rejected. The critical value depends on the confidence interval decided, and while the degrees of freedom are equal to 1, we deduct it from the total sample used for the event study. The tables of Student Distribution were used to determine the critical value. The significance of the average CAAR could be obtained through the p-value. Since the p-value is less than the specified significance level, the mean is statistically significant, and the null hypothesis is rejected. The mean is statistically different from zero. Otherwise, if the p-value is greater than the significance level, then the null hypothesis is not rejected, and the mean is neither statistically significant nor different from zero.

The expectation about the event study is that the null hypothesis is rejected, suggesting that the mean of the CAAR across the 229 events is not equivalent to zero. In that case, the average would be statistically significant and statistically different from zero. Regarding the commentaries of Erdogan, while the mean of the CAAR is statistically significant, it suggests that the fundamental

hypothesis of the event study occurs. As a consequence, the announcements of Erdogan are significantly affecting the exchange rate of the Turkish Lira and US Dollar.

The descriptive statistics for the Cumulative Average Abnormal Return were run through SAS. Table 3 shows the results of the descriptive statistics of this variable for the event window [-30,30] and [-15,15]. The mean of the CAARs is equal to 0.00091% and 0.001151% while the standard deviation is equal to 0.00818% and 0.0152%, respectively. The skewness and kurtosis are used as measures of exchange rate risk. Skewness is used to show the risk of currency collapse while Kurtosis measures whether these collapses are abrupt or not, according to SY and Tabarraei (2009). The skewness is equal to -0.5479 and 5.95, respectively, which is extremely high and shows us that there is a substantial risk of the Turkish Lira collapsing. The Kurtosis is equal to 30.711 for the longer event window and 75.045 for the shorter. Encore, the kurtosis is enormous and shows that the collapse would be sharp. The median of the CAARs is almost zero, for both event windows, meaning that by sorting the observations (ascending or descending), the middle observation is almost zero. The minimum value is equal to -0.000663 and the maximum observation is 0.000578 for the 61-minutes event window. Regarding the 31-minutes event window, the minimum value is equal to -0.000727 where the maximum value is equal to 0.00174.

6. Results

The current event study examines the impact of Erdogan's announcements on the exchange rate of the Turkish Lira with the US Dollars. To evaluate this impact, 229 statements of Erdogan were collected during the period 2004 to 2021. The estimation period was 150 minutes before the event window. The average return was calculated through the returns of the estimation window. The Abnormal Returns were the difference between the returns of the event window and the average return of each event. Then, the aggregation of the Abnormal Returns leads to the Cumulative Abnormal Returns. Finally, the Cumulative Abnormal Returns divided by the minutes of the event window, point out the Cumulative Average Abnormal Returns (CCARs). To test the hypothesis of an event study one examines the significance of the mean of CAARs for several event windows or different subsamples (MacKinlay, 1997). While the average of CAAR is significant, the null

hypothesis is rejected, and the assumption of the event study is accepted for a specified level of significance. The processing of data was made with SAS Enterprise Guide.

In the current event study, the event window was set firstly as [-30,30] and then as [15,15] and finally as [-60,60]. For the specific range, the hypothesis is tested that the average of CAAR is statistically different from zero. The results of table 4, show that the mean of the CAARs is equal to 0.00091%. The p-value is equal to 0.0929. Consequently, for a significance level of 10% ($\alpha=10\%$), the p-value is no greater than the significant level, so the null hypothesis is rejected. Meaning that the mean of the CAARs is statistically different from zero for the specified level of significance. As a consequence, the announcements of Erdogan regarding interest rates, inflation, or something else related to Turkey's economy, affect the Exchange Rate of the Turkish Lira with the US Dollar. For a significance level of 10%, the primary hypothesis of the current event study holds.

The same hypothesis could be examined using the t-distribution. SAS software also gives us the test statistic value for the two-tail test. The estimation of the test statistic is equal to 1.69. The confidence level is equal to 5% since the test is two-tailed, the significance level is half for each tail of the distribution. Using the table of student distribution for 5% significance level, and for a sample size greater than 120 (infinite), the critical value is equal to 1.645. Since the test statistic is greater than the critical value, the null hypothesis is rejected. The alternative hypothesis is accepted meaning that the average of the CAARs based on the whole dataset, is statistically different from zero. In a 61 minutes event window, an announcement of Erdogan increases the exchange rate by 0.00091% per minute, which implies that the Turkish Lira depreciated by 0.00091%, per minute, in terms of the US Dollar.

The second group developed was the commentaries of President Erdogan regarding Inflation and the Interest Rate. As shown in table 5 the total number of observations contained in this group is 84. The two categories are considerable for the change of the exchange rate. Through the analysis, we observe that the mean of the CAARs is equal to 0.0019%. The p-value is equal to 0.0134, meaning that the mean of the CAARs regarding the announcements of Erdogan about Inflation and the Turkish Lira, is significant in a 5% confidence level. The same applies to the t-static which is equal to 2.53. The null hypothesis is rejected in the case where the critical value, for the significant level equal to 5% ($\alpha/2=0.025$), is equal to 1.96. Those results lead to the approval of

the primary hypothesis. Specifically, the commentaries of Erdogan about the Inflation and the Interest Rates, prove to influence the Exchange rate. The standard deviation is equal to 0.0070% which figures out the variability of the Cumulative Average Abnormal Returns.

Furthermore, the same analysis was made for each of the announcements' groups. Each of the three groups was formed based on the content of each statement. The groups are Interest Rate, Inflation, and other things involving references for the Turkish Lira and generally Turkey's economy.

The first group of announcements shown in table 6, the Interest Rates, includes 69 statements of Erdogan. The mean of the CAARs is equal to 0.0021% and the p-value is equal to 0.020. Therefore, the average of The CAARs is statistically different from zero, and the null hypothesis is rejected for a confidence level of 5%. The t-statistic is equal to 2.38 while the critical value is equal to 1.96. Using the student distribution, we confirm that we reject the null hypothesis. The expectation about this category was the mean of the CAAR to be statistically significant, and as a result, the Exchange Rate was greatly impacted. Those results suggest that the announcements of Erdogan regarding the Interest Rates affect the Exchange Rate of the Turkish Lira with the US Dollar. Thus, the initial expectation is proved through the analysis.

In addition, the group of announcements with content about Inflation consists of 14 events, as we can observe through table 7. The mean of the CAARs is equal to 3.206E-6. The p-value is equal to 0.7873, which implies that it is not statistically different from zero. This statement was verified also by the t-test which is equal to 0.28. This group of announcements is expected to be statistically significant. An alteration of the Exchange Rate should be followed when Erdogan refers to Inflation. The small number of statements about Inflation could be a reason for the not statistically significant mean.

To conclude the analysis of the event window [-30,30], the third group obtained in table 9, contains announcements related to Turkey's economy. The group consists of 144 events where the mean of the CAARs is equal to 3.985E-6. The p-value through the analysis is equal to 0.5842 and the t-test is equal to 0.55. The sample mean is not statistically significant at any confidence level. Regarding the t-test, we observe that the t-test is no greater than the critical value. It implies that the null hypothesis is accepted, meaning that the average is not different from zero. The expectation

regarding the current subsample was expected to be positive, meaning that Erdogan's announcements regarding the Turkish Lira and generally the Economy of Turkey, have a positive effect on the Exchange Rate of the Turkish Lira with the US Dollar.

Continuing the analysis, as mentioned in many studies, the smaller the event window the more accurate the results are (Kothari & Warner, 1996). According to MacKinlay (1997), one way to review the adequacy of event study methodology is to detect non-zero abnormal returns, achieved by evaluating the power of the objectives of the study. If the power is not sufficient then one should search for ways of increasing the power. According to MacKinlay (1997), this can be done by increasing the sample size or shortening the event window. In the current study, a shorter event window will be examined. The shorter event window is set as [-15,15].

In table 10 we can observe the output of the first hypothesis testing, regarding the whole dataset of events. The mean of the CAARs is equal to 0.0012%. The p-value is equal to 0.2552 and the t-statistic is equal to 1.14. The mean value is not statistically significant neither with the p-value nor with the t-statistic. The expectation regarding the mean CAAR of this subcategory was to have a positive impact and also greater impact, related to the same subcategory with the longer event window. The closer to the event the more the abnormal returns.

The results for the second group developed are shown in Table 10. The second group consists of 84 announcements of Erdogan related to Inflation and Interest rates. The mean value of CAARs regarding the specific subsample is almost zero (3.901E-6). The average value is not statistically significant. As a result, the null hypothesis is not rejected. The mean value is statistically equal to zero. Concerning the analysis of the three categories of announcements, separated, the results are similar to those examined with the longer event window. Specifically, the average values of the categories Inflation (table 11) and other announcements related to Turkey's economy (table 12), are not statistically significant for the shorter event window. In addition, the average value of the commentaries related to Interest rates (table 13) is not statistically significant in the shorter event window. The expectations about those categories were to influence the exchange rate positively. Also, the impact was expected to be more considerable as we move closer to the announcement using the shortest event window.

Moreover, an analysis was made for the sample of announcements gathered from Twitter only. Meaning that those announcements took place after 2012. In total there are 186 announcements as we can observe in Table 14. The mean of the CAARs of those events is equal to 0.0011% The p-value is equal to 0.0434 while the t-test is equal to 2.03. For a significance level of 5%, the average CAAR is statistically significant. The same applies by examining the critical value which is less than the t-test. By examining only, the announcements of Erdogan discovered through Twitter, we conclude that the announcements of Erdogan after 2012 regarding Interest rate, Inflation, and generally Turkey's Economy, influence the Exchange rate of the Turkish Lira with the US Dollar.

Moreover, an analysis based on the time of each event was tested for the announcements after 2012. As mentioned in the Data section, the time of each event/announcement was manually changed to an hour before the time reported on Twitter. The change depends on the variation of the price of the Turkish Lira with the US Dollar. The current analysis tests the same hypothesis, but the time of each event remains as the initial. In addition, the hypothesis was tested by changing the time of all the events manually to an hour before the time reported on Twitter. Using the actual time of each announcement we do not have any significant results as we can observe through table 15. On the other hand, by changing manually the time of all the announcements to 1 hour before the time reported on Twitter, we have significant results. Through table 16, the mean of the CAARs is equal to 0.0011%, the p-value is equal to 0.0369 and the t-statistic is equal to 2.10. In such a case the mean is statistically significant, and the null hypothesis is rejected.

An analysis using an extensive event window of [-60,60] was tested too (table 15). The analysis was based on the whole dataset of announcements. Through the specific event window, we examine the abnormal returns an hour before the commentaries of President Erdogan and an hour after the announcement of Erdogan. The mean CAARs is equal to 0.000014%. The p-value and the t-statistic are equal to 0.5330 and 0.62, respectively. We do not reject the null hypothesis since the mean is not statistically significant. Since there are not any abnormal returns during the specific event window, it looks like there is not any leakage of information before the announcement of President Erdogan.

7. Limitations

The current study has some limitations that possibly could affect the above results. To begin with, the time of each announcement could not be identified accurately (by minute). Thus, the results may change if the event took place at a different time. In addition, regarding the events before 2012, the time reported was the time of the article's publication. There were not enough sources for the specific period. Also, the manual change to an hour before the time reported on Twitter may be false. Usually, there is a delay between the time of the announcement to the time each Tweet is posted. But the time cannot be defined accurately (by minute) and thus the approximation of an hour used in the current study. In any case, the current study contributes to the literature through the important results extracted.

8. Conclusions

The current event study examines the effect of the announcements of Erdogan on the exchange rate of the Turkish Lira and the US Dollar. Specifically, the announcements of Erdogan are concerned with Turkey's economy. The announcements are distinguished into 3 categories. The first category is the announcements related to Inflation, the second category of announcements is about the Interest rates and the third category is related generally to Turkey's economy, including references to the Turkish Lira. The analysis of the current event study was made according to the analysis of the multiple event study of MacKinlay (1997). The entire process was made through the software of SAS. The major hypothesis tested was that the announcements of Erdogan related to Turkey's economic system, influence the exchange rate of the Turkish Lira with the US Dollar. Based on that, the Cumulative Average Abnormal Returns (CAARs) were estimated to examine the primary hypothesis. If the CAARs were equal to zero (H_0) the primary hypothesis would be rejected, otherwise, the primary hypothesis would be accepted.

Throughout the analysis, considerable conclusions were derived. First, by examining the mean CAARs through the whole dataset of announcements, the mean was statistically significant for the extended event window $([-30,30])$ but not for the shorter one $([-15,15])$. Generally, through the announcements of Erdogan, the exchange rate of USD to TRY increases. In a 61 minutes event window, an announcement of Erdogan increases the exchange rate which implies that the Turkish

Lira depreciated in terms of the US Dollar. In other words, the significance of the average CAAR means that each announcement of Erdogan regarding Inflation, Interest rate, and other announcements related to Turkey's economy (including the Turkish Lira), depreciate the Turkish Lira in terms of US Dollar, per minute. Through the analysis of the extensive event window ([-60,60]), it looks like there is no leakage of information regarding the announcement of President Erdogan. The average of the CAARs is not statistically significant and as a result, there is not an influence of President Erdogan on the Exchange rate of the Turkish Lira with the US Dollar. The event window is very extensive to capture the abnormal returns. If there were abnormal returns an hour before the announcement, it would be a leakage of the commentaries.

Moreover, by examining the average CAAR of the subsamples, significant results were obtained. The subsample consisting of commentaries related to Inflation and Interest Rate was also significant. It implies that the commentaries of Erdogan regarding those issues increase the exchange rate. Specifically, during an event window of 61 minutes, we can conclude that the announcements of Erdogan related to those main categories of announcements, increase the exchange rate of the Turkish Lira in terms of US Dollars. The depreciation of the Turkish Lira seems to relate to the commentaries of Erdogan regarding Inflation and Interest rates.

Finally, regarding the announcements of Erdogan specifically about Interest rates, we observe a significant average CAAR. Consequently, by focusing on a specific category of announcements a considerable result came up. While the announcement is related to the Interest rate, there is an influence on the exchange rate of the Turkish Lira with the US Dollar. By examining each category separated, the commentaries about Interest rates were the only category with significant mean CAAR. Furthermore, the average increase in the exchange rate of the Turkish Lira and US Dollar is considerably higher compared to the other categories. Therefore, the Turkish Lira depreciates extensively when President Erdogan comments about the Interest rates.

In addition, we observe that by examining the announcements of Erdogan after 2012 there are significant results. Regarding the time of each event, we conclude that there is a delay in the time of the actual announcement of President Erdogan and the time that the analysts react on Twitter. By changing the time of the whole dataset to an hour back, the results were significant. It ensured that nothing else happened in the meantime that could affect the Exchange rate. The mean of the CAARs of the announcements of Erdogan after 2012 is greater than the mean of the

CAAR for the announcements since 2004. The depreciation of the Turkish Lira by minute is increasing after 2012. As mentioned earlier the Turkey's economy was doing better before 2012. The increased power of President Erdogan and the recession of Turkey's Economy after 2012, concerning the commentaries of President Erdogan, depreciates extensively the Turkish Lira in terms of the US Dollar.

AFERODITI DAVID

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10. Appendix

Table 1
Denomination of Sample

This table shows the number of announcements of President Erdogan per year

Year	Number of Announcements
2004	3
2005	3
2006	8
2007	8
2008	5
2009	5
2010	7
2011	4
2012	9
2013	12
2014	11
2015	13
2016	13
2017	18
2018	33
2019	27
2020	27
2021	23

Table 2
Sample Construction

This table shows the sample construction process for the entire sample of 229 announcements of President Erdogan.

Announcements of Erdogan (Period: 2004-2021)	
1	Announcements gathered from NexisLexis 263
2	Announcements gathered from Google News 18
3	Drop Announcements that could not find exact time through Twitter 132
4	Announcements gathered from Twitter 105
5	Drop Announcements that occurred on weekends 23
6	Drop Announcements that another event took place at the same time and affect the exchange rate prices 2
Total number of Announcements 229	

TABLE 3
Descriptive Statistics

This table shows the descriptive statistics of the Cumulative Average Abnormal Return (CAAR) for an event window [-30,30].

Event Window	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles			Skewness	Kurtosis
						25th	50th (Median)	75th		
[-30,30]	229	9.13E-06	8.19E-05	-6.64E-04	5.78E-04	-1.76E-05	7.61E-06	2.94E-05	-0.54797	30.71144
[-15,15]	229	1.15E-05	1.53E-04	-7.28E-04	1.74E-03	-2.96E-05	1.83E-06	4.06E-05	5.95198	75.04568

TABLE 4
Descriptive Statistics

This table shows the descriptive statistics of the Cumulative Average Abnormal Return (CAAR) for an event window [-30,30] including the p-value and the t-value.

Event Window	N	Mean	Std. Deviation	Minimum	Maximum	Standard Error	Pr > t	T - Value
[-30,30]	229	9.13E-06	8.19E-05	-6.64E-04	5.78E-04	5.41E-06	0.0929 *	1.69

Note: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

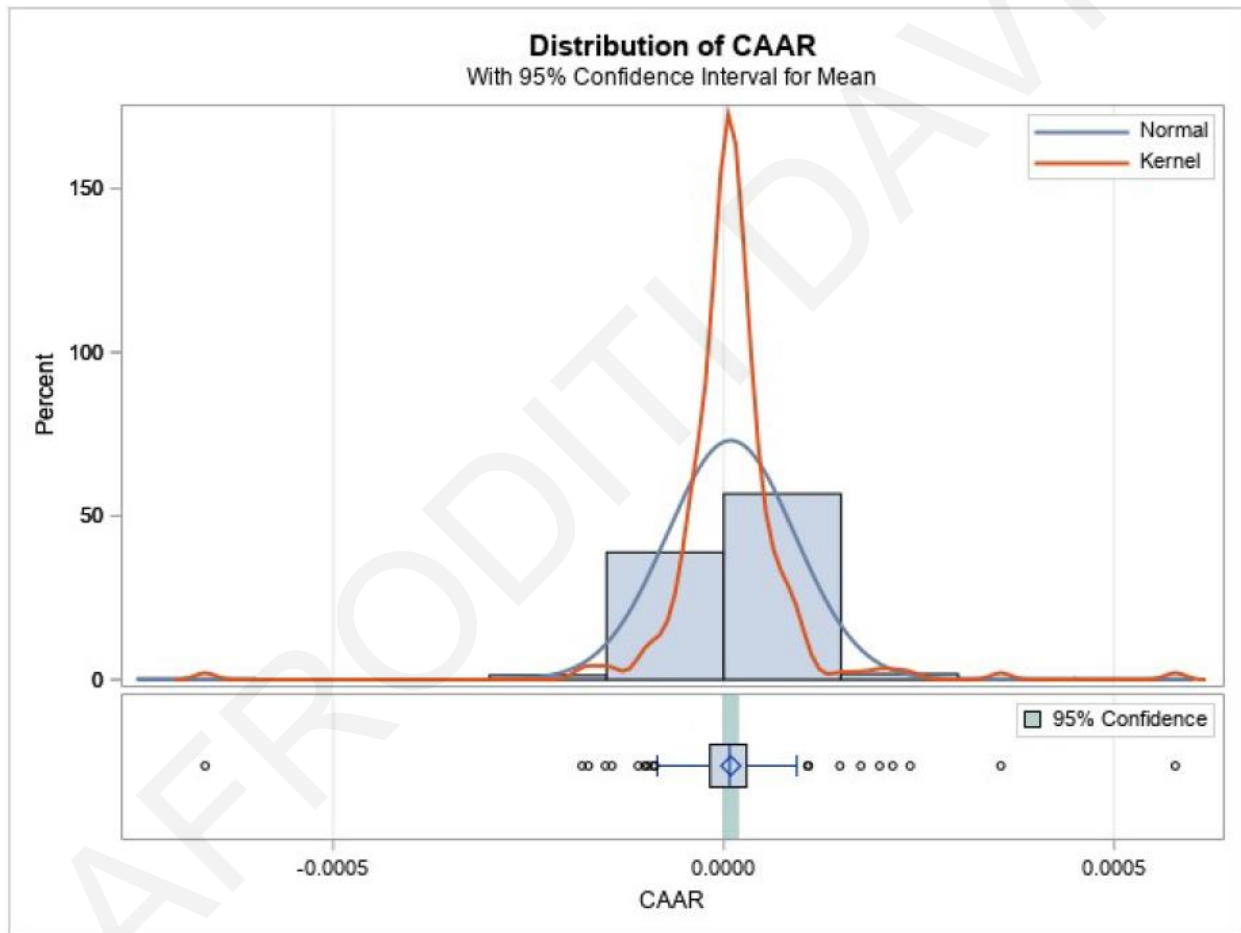


TABLE 5
Descriptive Statistics

This table shows the descriptive statistics of the Cumulative Average Abnormal Return (CAAR) for an event window [-30,30] including the p-value and the t-value, for the announcements related to Inflation and Interest Rates.

Event Window	N	Mean	Std. Deviation	Minimum	Maximum	Standard Error	Pr > t	T - Value
[-30,30]	84	0.000019	0.00007	-0.00014	0.000355	7.68E-06	0.0134**	2.53

Note: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

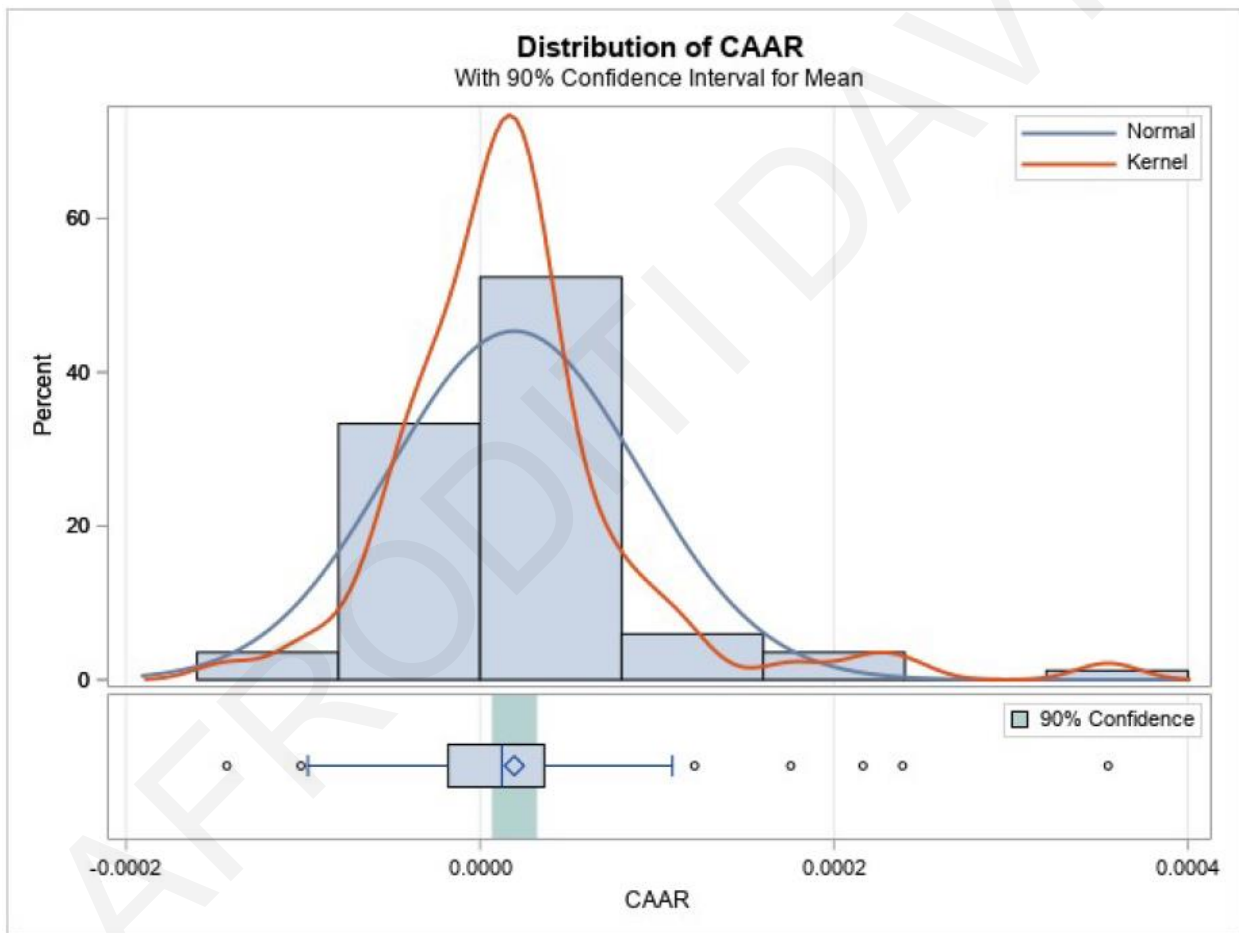


TABLE 6
Descriptive Statistics

This table shows the descriptive statistics of the Cumulative Average Abnormal Return (CAAR) for an event window [-30,30] including the p-value and the t-value, for the announcements related to Interest Rates.

Event Window	N	Mean	Std. Deviation	Minimum	Maximum	Standard Error	Pr > t	T - Value
[-30,30]	69	0.000021	0.000074	-0.00014	0.000355	8.90E-06	0.0200**	2.38

Note: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

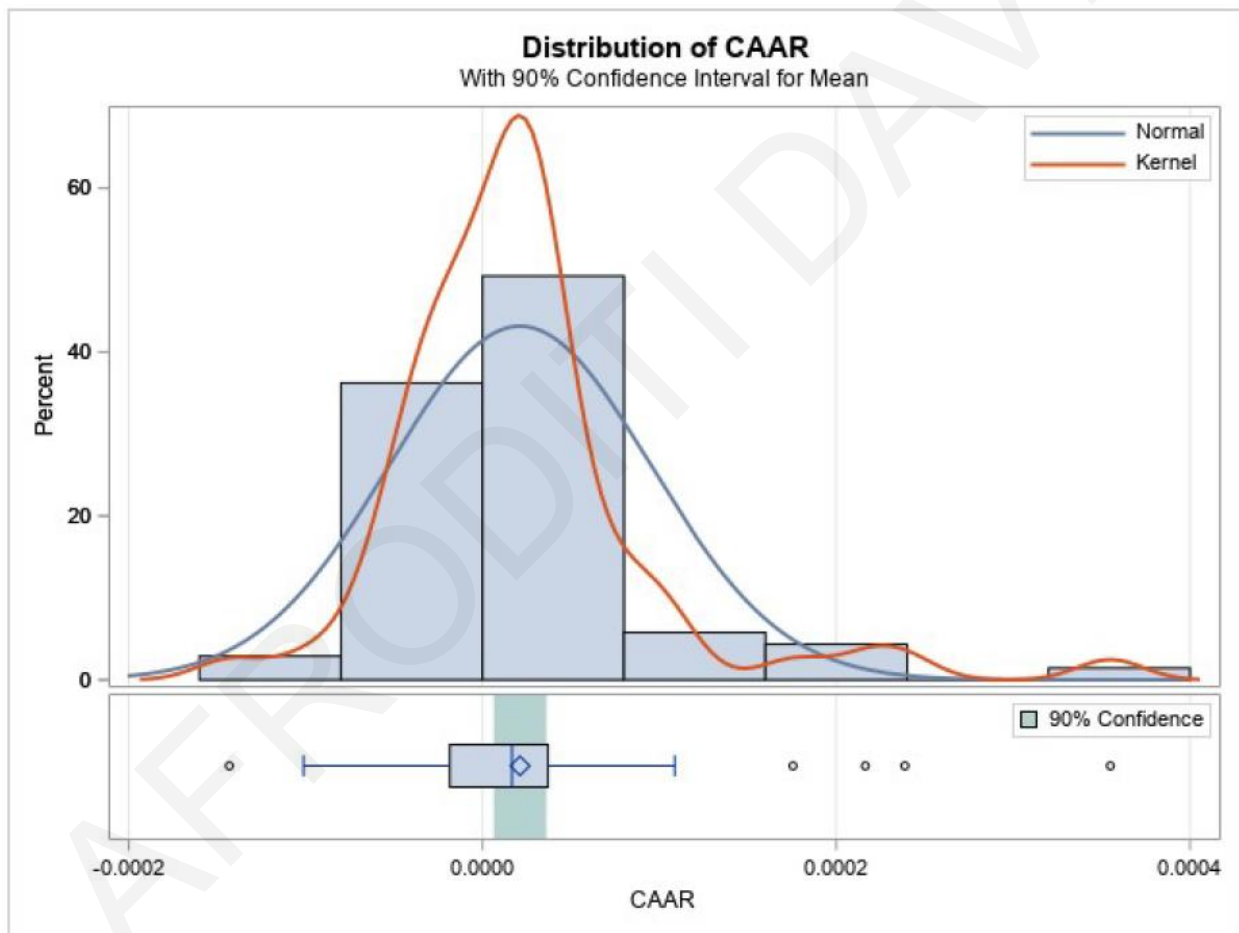


TABLE 7
Descriptive Statistics

This table shows the descriptive statistics of the Cumulative Average Abnormal Return (CAAR) for an event window [-30,30] including the p-value and the t-value, for the announcements related to Inflation.

Event Window	N	Mean	Std. Deviation	Minimum	Maximum	Standard Error	Pr > t	T - Value
[-30,30]	14	3.21E-06	0.000044	-0.0001	0.000071	1.20E-05	0.7873	0.28

Note: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

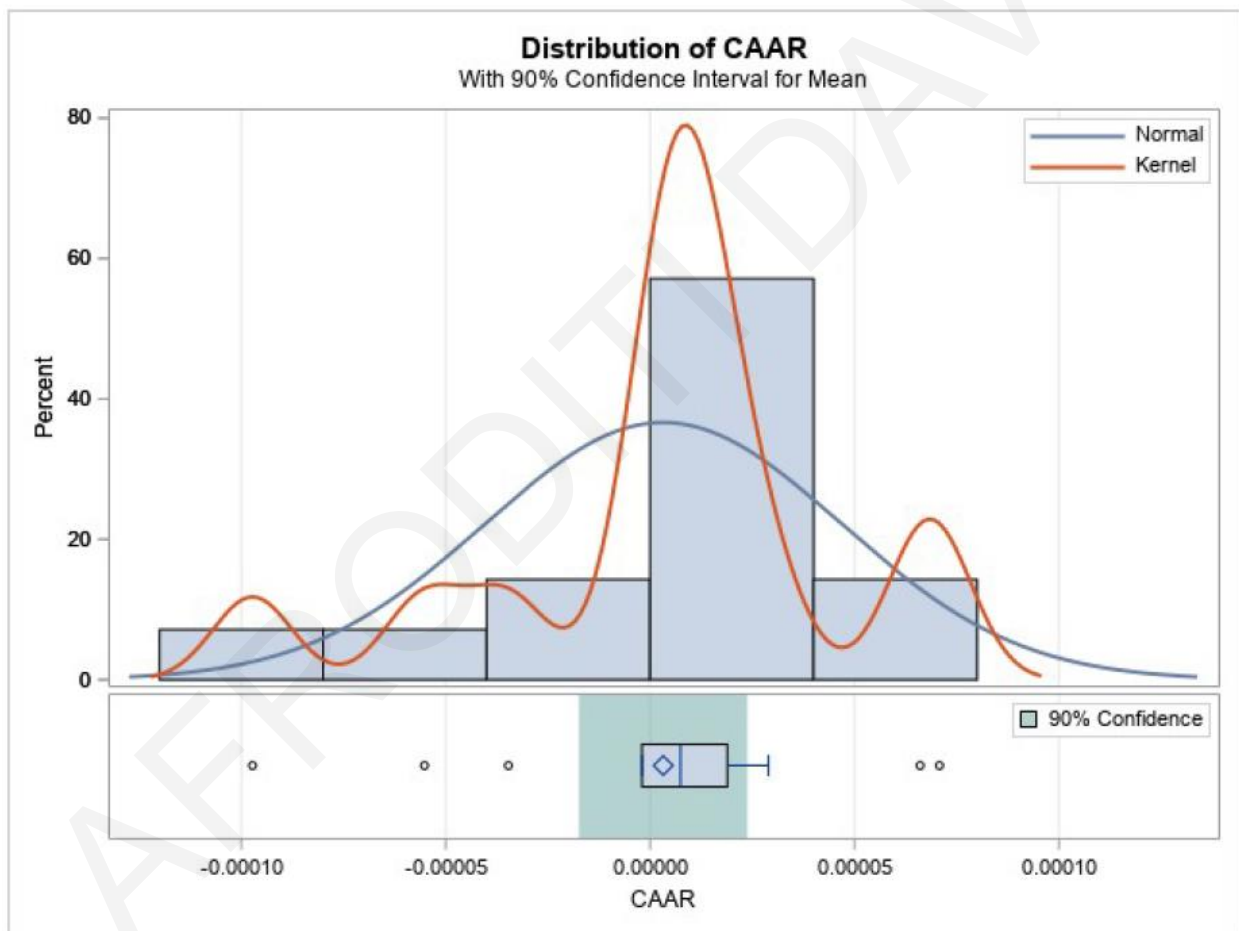


TABLE 8
Descriptive Statistics

This table shows the descriptive statistics of the Cumulative Average Abnormal Return (CAAR) for an event window [-30,30] including the p-value and the t-value, for the announcements related to other announcements about Turkey's Economy.

Event Window	N	Mean	Std. Deviation	Minimum	Maximum	Standard Error	Pr > t	T - Value
[-30,30]	146	3.99E-06	0.000088	-0.00066	0.000578	7.27E-06	0.5842	0.55

Note: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

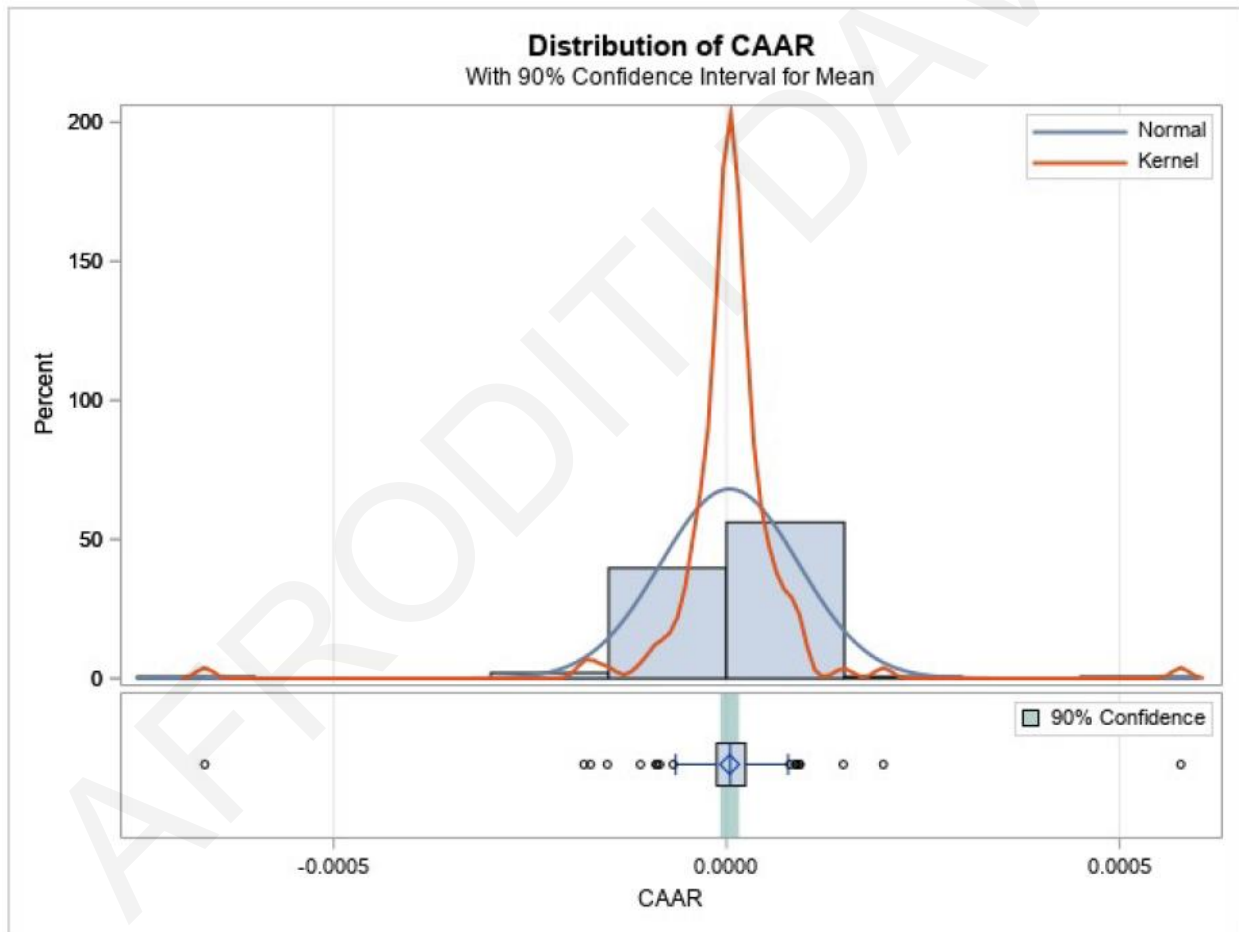


TABLE 9

Descriptive Statistics

This table shows the descriptive statistics of the Cumulative Average Abnormal Return (CAAR) for an event window [-15,15] including the p-value and the t-value.

Event Window	N	Mean	Std. Deviation	Minimum	Maximum	Standard Error	Pr > t	T - Value
[-15,15]	229	1.20E-05	1.53E-04	-7.30E-04	1.74E-03	1.00E-05	0.2552	1.14

Note: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

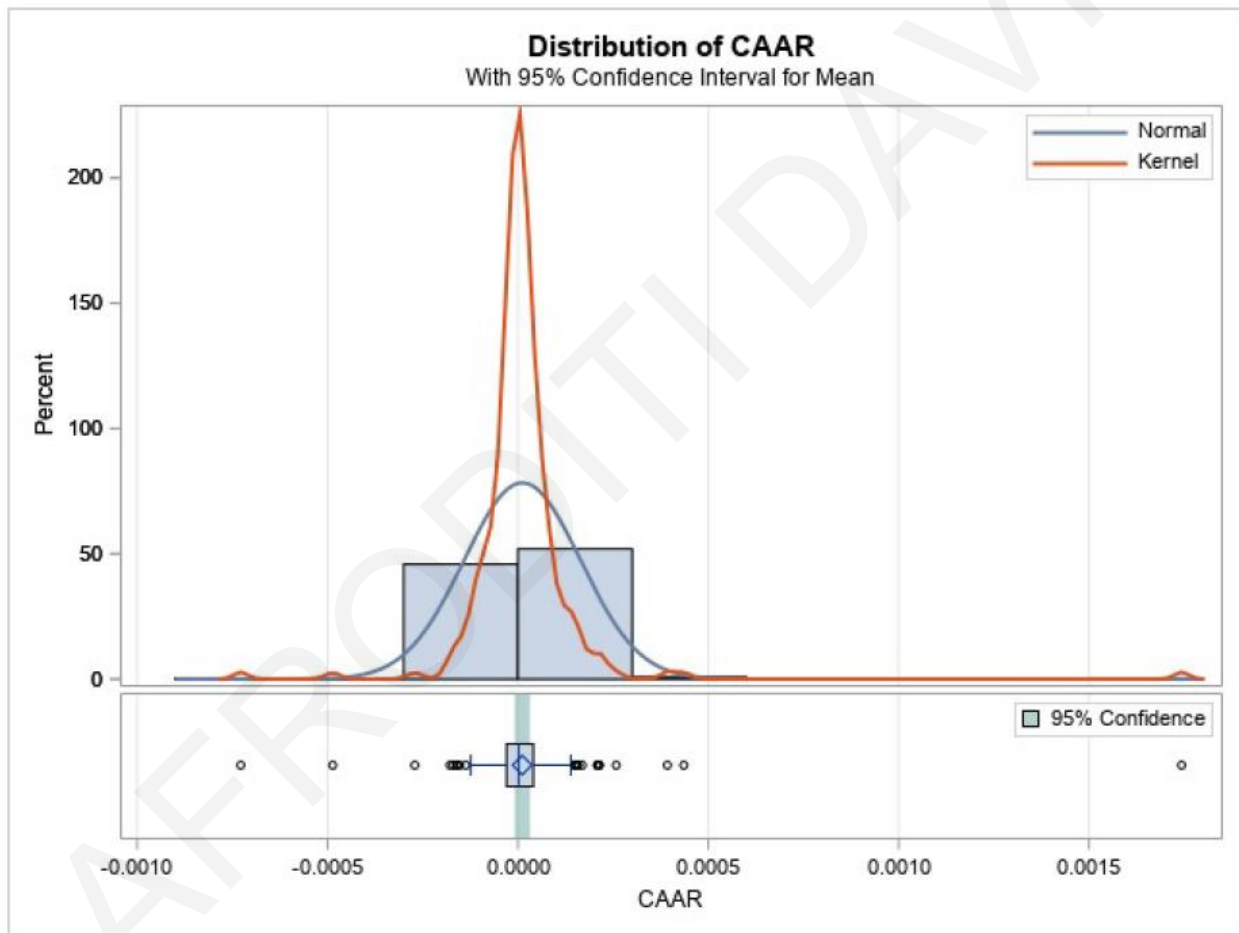


TABLE 10
Descriptive Statistics

This table shows the descriptive statistics of the Cumulative Average Abnormal Return (CAAR) for an event window [-15,15] including the p-value and the t-value, for the announcements related to Inflation and Interest Rates.

Event Window	N	Mean	Std. Deviation	Minimum	Maximum	Standard Error	Pr > t	T - Value
[-15,15]	84	3.90E-06	0.000127	-0.00062	0.000436	1.40E-05	0.7795	0.28

Note: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

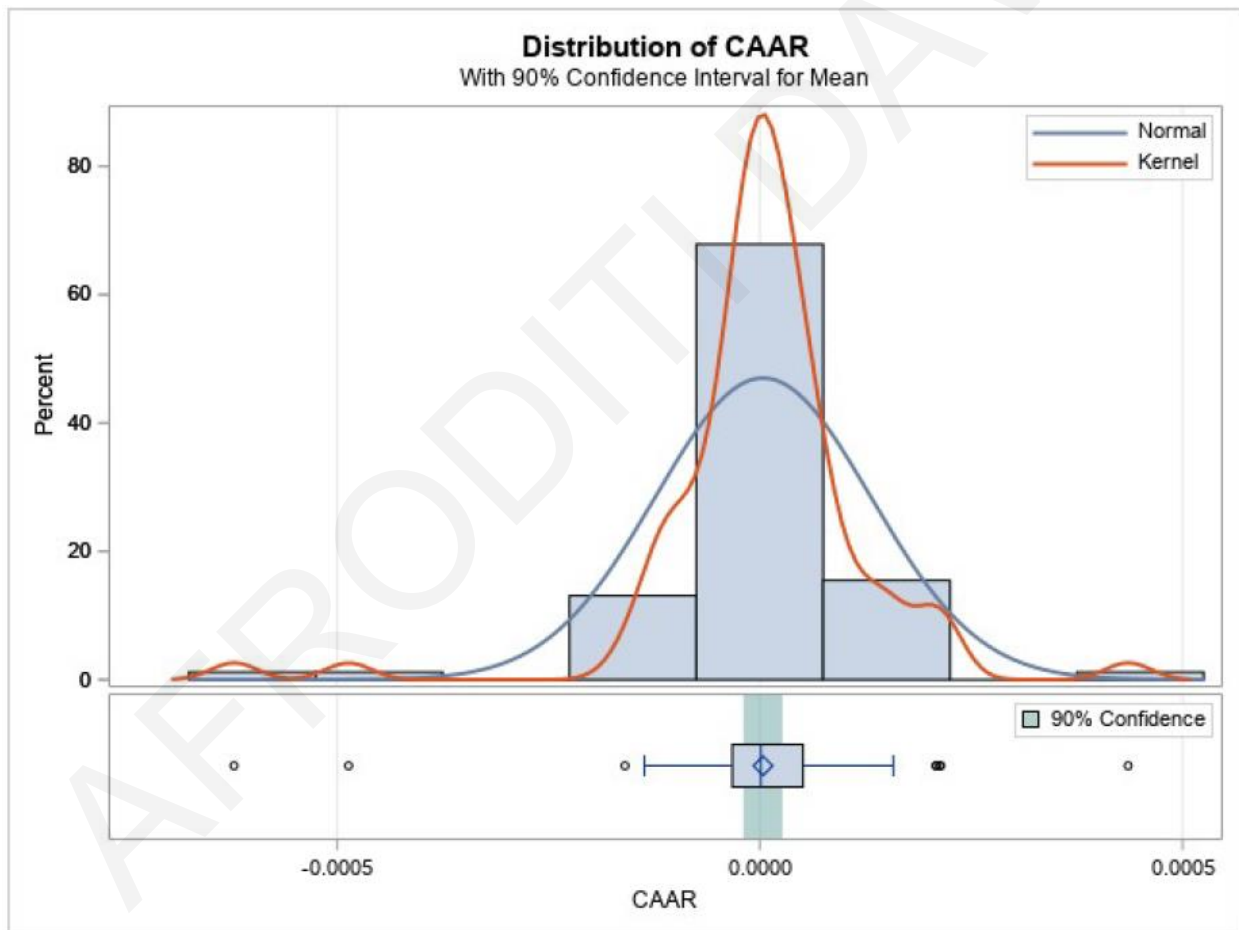


TABLE 11
Descriptive Statistics

This table shows the descriptive statistics of the Cumulative Average Abnormal Return (CAAR) for an event window [-15,15] including the p-value and the t-value, for the announcements related to Interest Rates.

Event Window	N	Mean	Std. Deviation	Minimum	Maximum	Standard Error	Pr > t	T - Value
[-15,15]	69	0.000013	0.000116	-0.00049	0.000436	1.40E-05	0.3711	0.90

Note: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

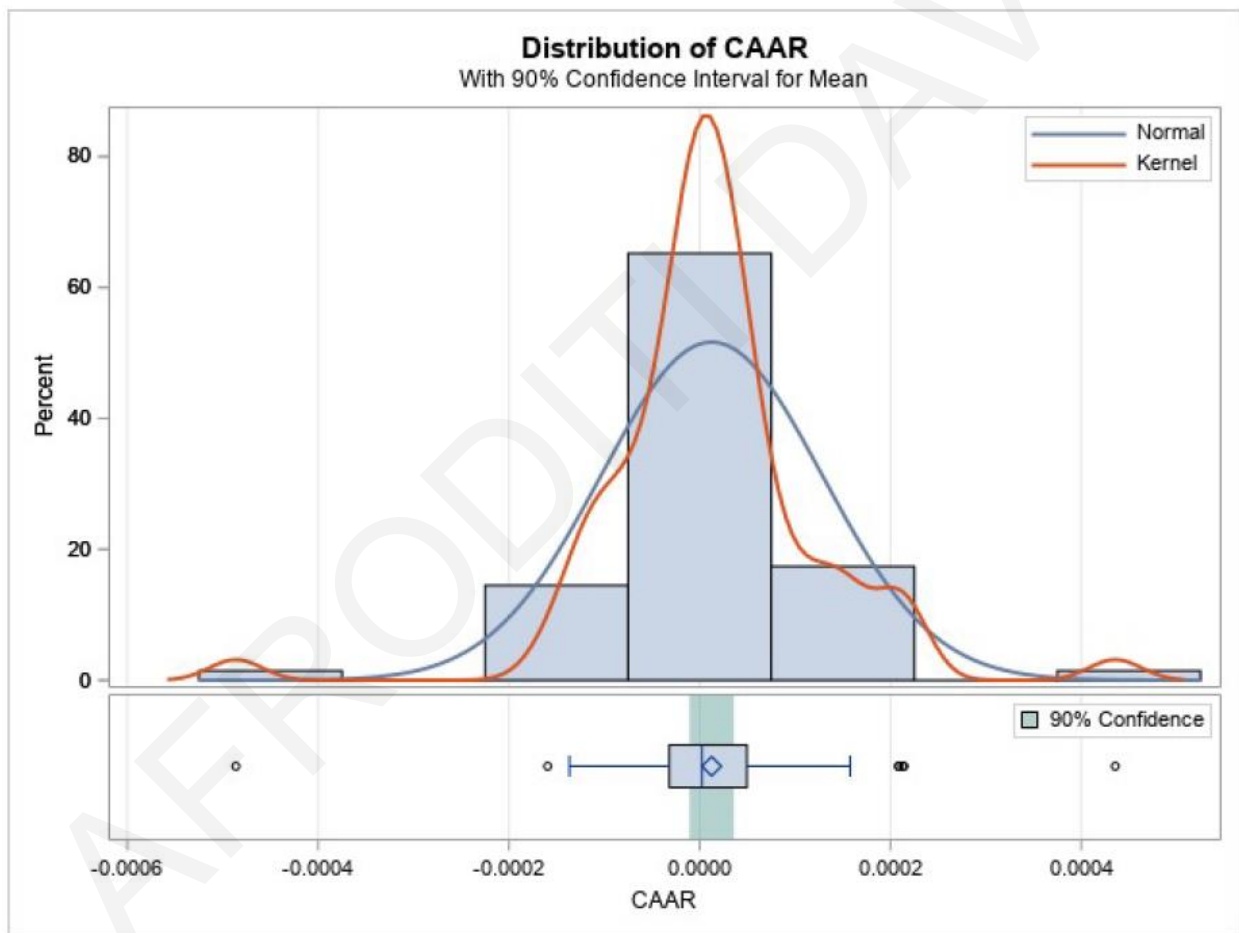


TABLE 12
Descriptive Statistics

This table shows the descriptive statistics of the Cumulative Average Abnormal Return (CAAR) for an event window [-15,15] including the p-value and the t-value, for the announcements related to Inflation.

Event Window	N	Mean	Std. Deviation	Minimum	Maximum	Standard Error	Pr > t	T - Value
[-15,15]	14	3.21E-06	0.000044	-0.00010	0.000071	1.20E-05	0.7873	0.28

Note: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

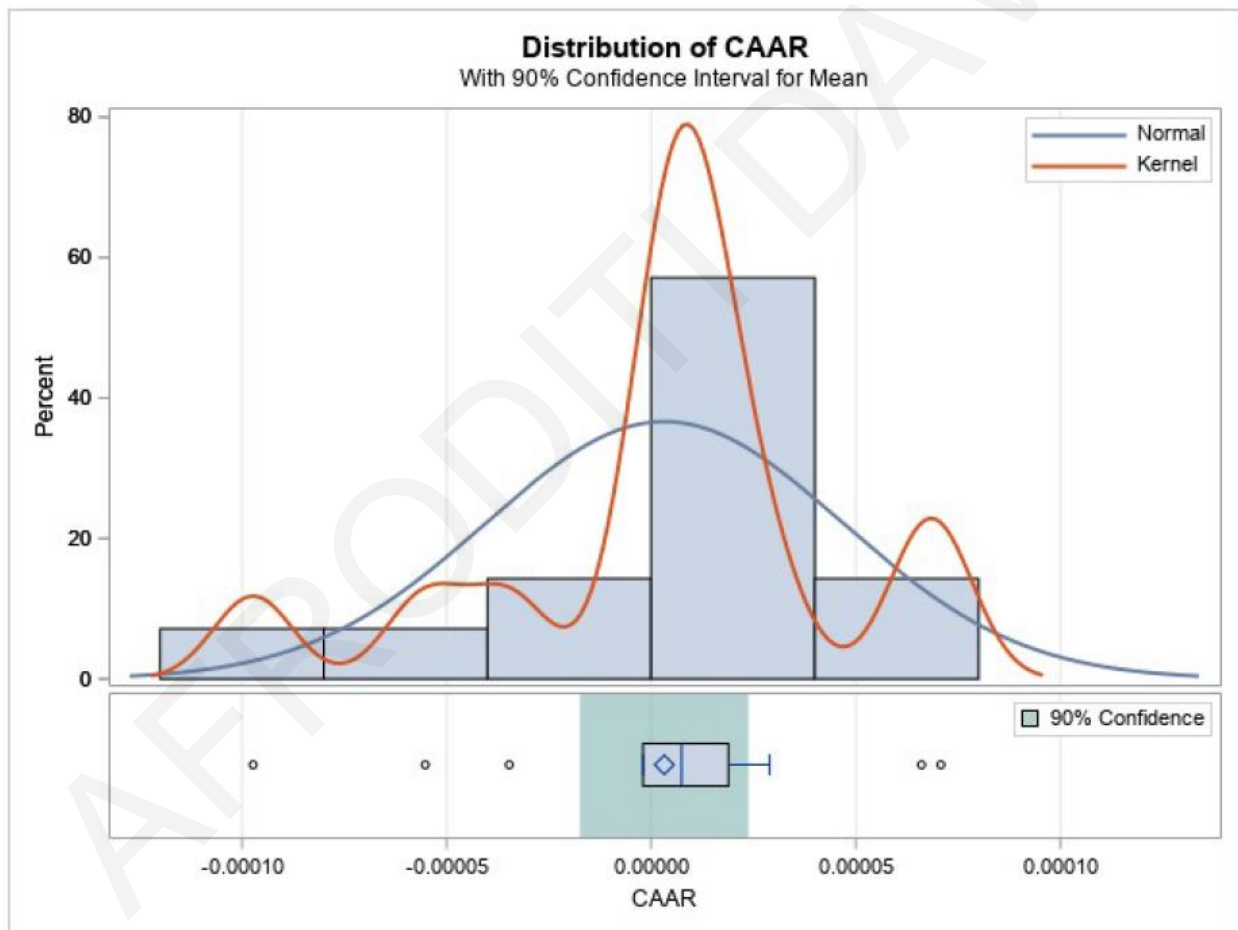


TABLE 13
Descriptive Statistics

This table shows the descriptive statistics of the Cumulative Average Abnormal Return (CAAR) for an event window [-15,15] including the p-value and the t-value, for the announcements related to other announcements about Turkey's Economy.

Event Window	N	Mean	Std. Deviation	Minimum	Maximum	Standard Error	Pr > t	T - Value
[-15,15]	146	1.20E-05	0.000174	-0.00073	0.00174	1.40E-05	0.4225	0.80

Note: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

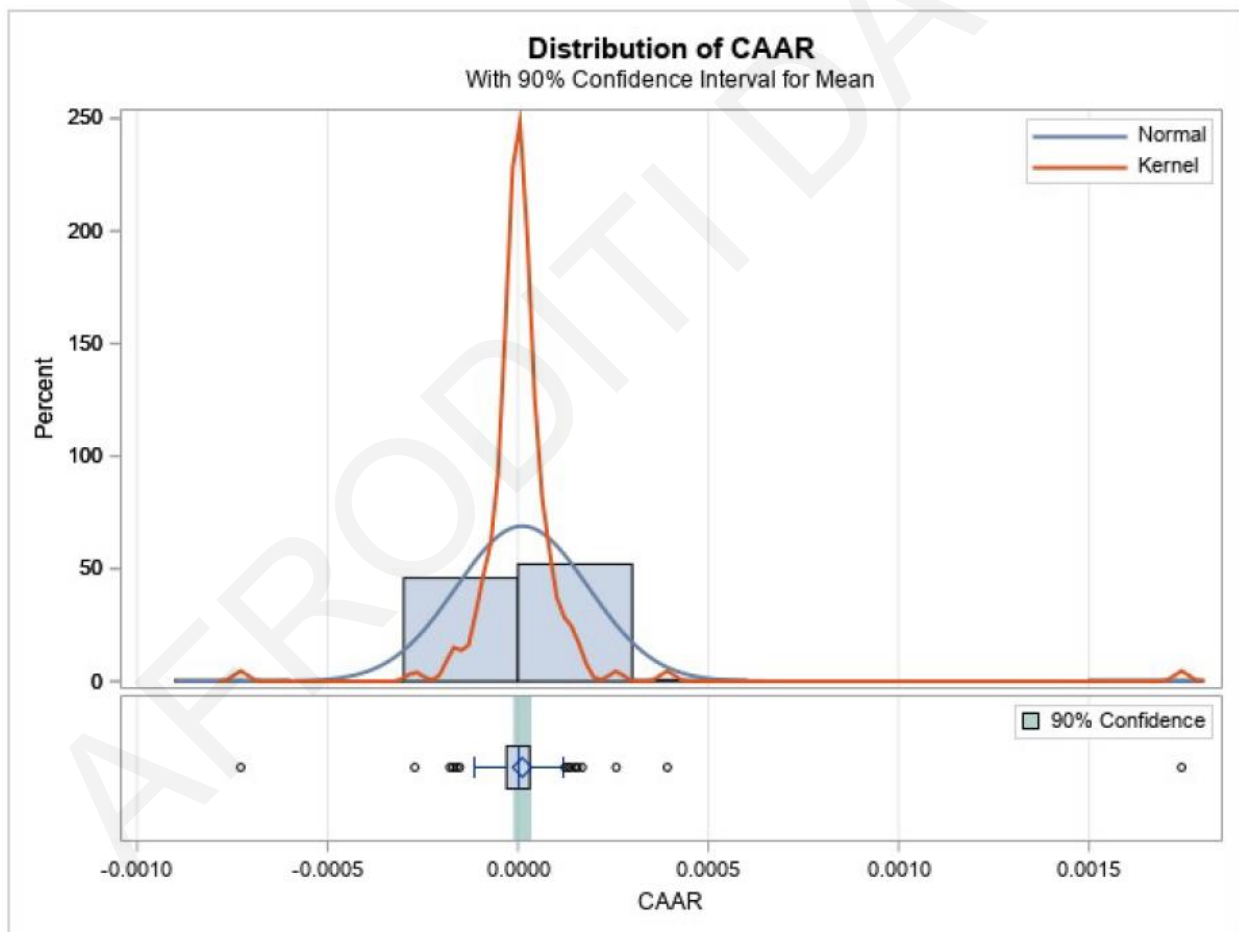


TABLE 14
Descriptive Statistics

This table shows the descriptive statistics of the Cumulative Average Abnormal Return (CAAR) for an event window [-30,30] including the p-value and the t-value, for the announcements occurred after 2012 and gathered from Twitter.

Event Window	N	Mean	Std. Deviation	Minimum	Maximum	Standard Error	Pr > t	T - Value
[-30,30]	186	0.000011	0.000075	-0.00066	0.000355	8.90E-06	0.0434**	2.03

Note: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

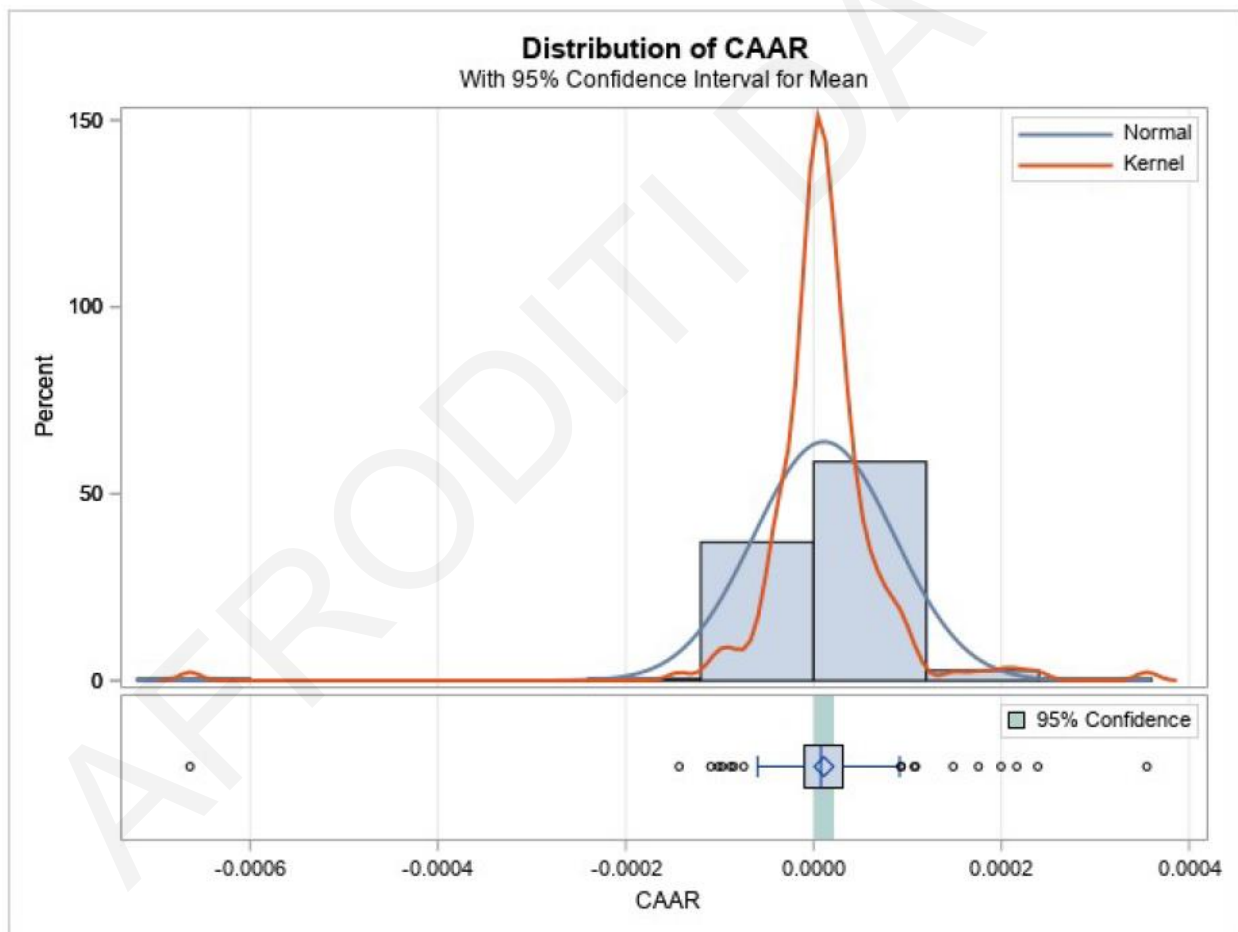


TABLE 15
Descriptive Statistics

This table shows the descriptive statistics of the Cumulative Average Abnormal Return (CAAR) for an event window [-30,30] including the p-value and the t-value, for the announcements occurred after 2012 and gathered from Twitter. The actual time reported on Twitter used for the announcements.

Event Window	N	Mean	Std. Deviation	Minimum	Maximum	Standard Error	Pr > t	T - Value
[-30,30]	186	2.20E-06	0.000076	-0.0007	0.000355	5.57E-06	0.6938	0.39

Note: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

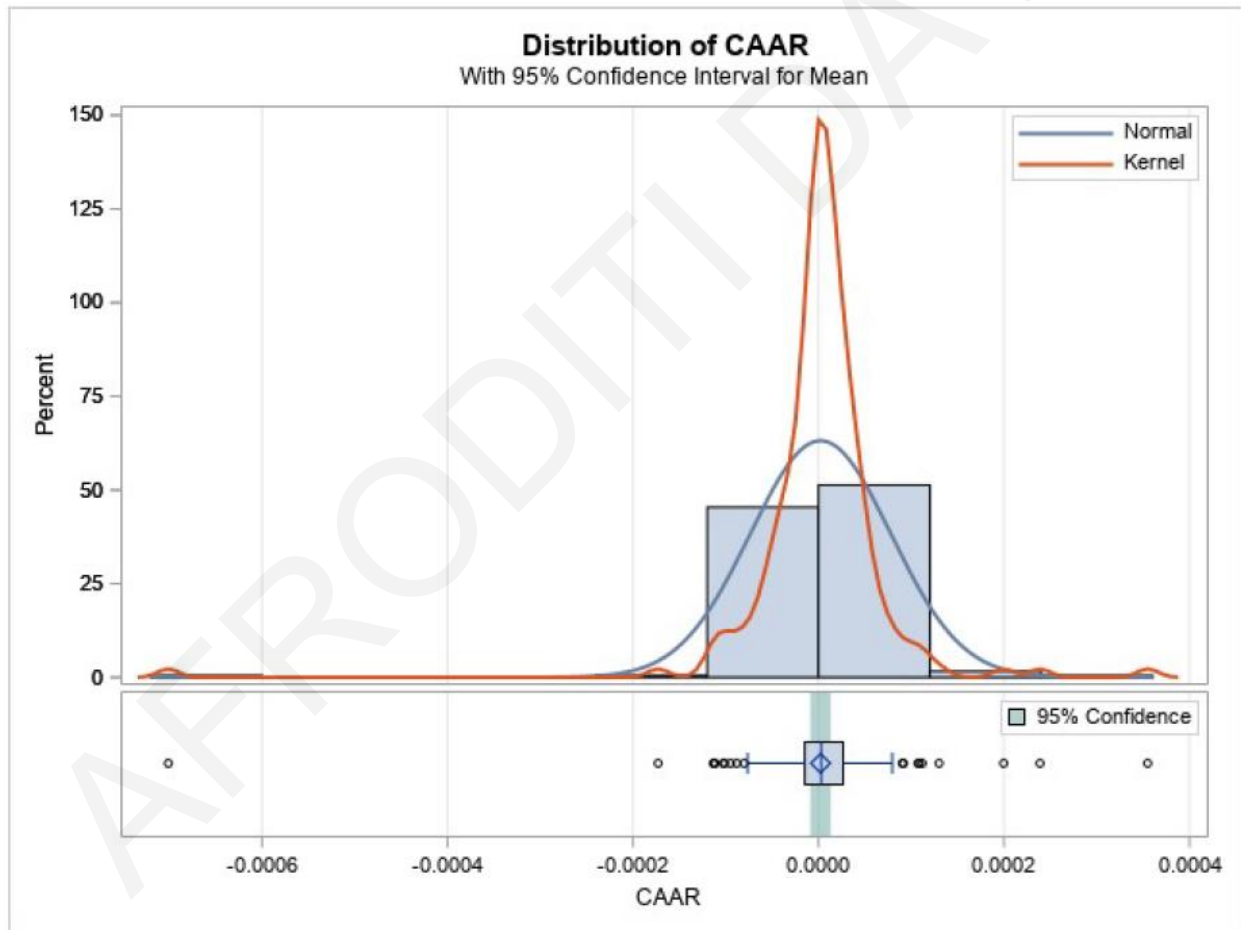


TABLE 16
Descriptive Statistics

This table shows the descriptive statistics of the Cumulative Average Abnormal Return (CAAR) for an event window [-30,30] including the p-value and the t-value, for the announcements occurred after 2012 and gathered from Twitter. The time of all the announcements changed to an hour before the time reported on Twitter.

Event Window	N	Mean	Std. Deviation	Minimum	Maximum	Standard Error	Pr > t	T - Value
[-30,30]	186	0.000011	0.000074	-0.00066	0.000252	5.44E-06	0.0369**	2.1

Note: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

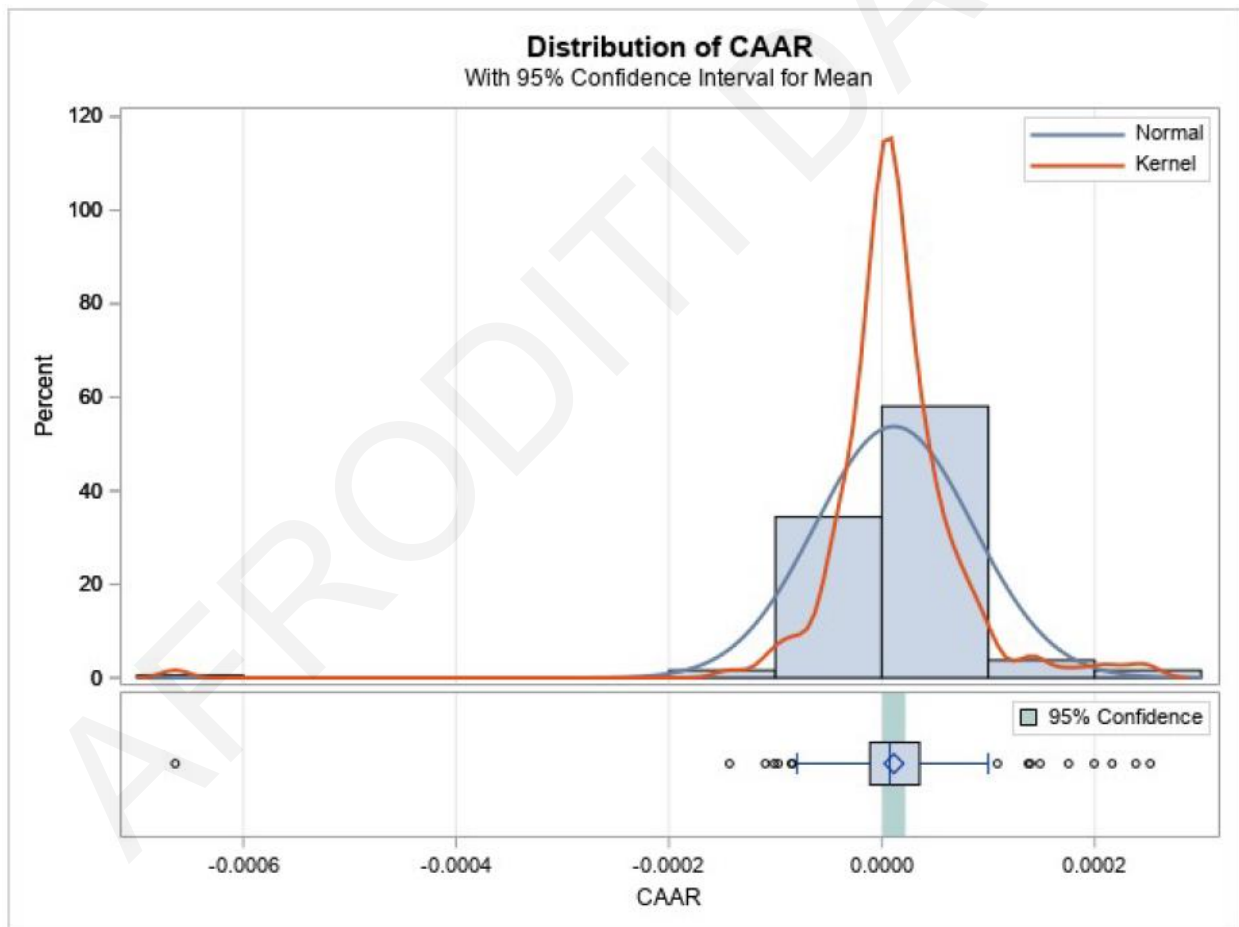
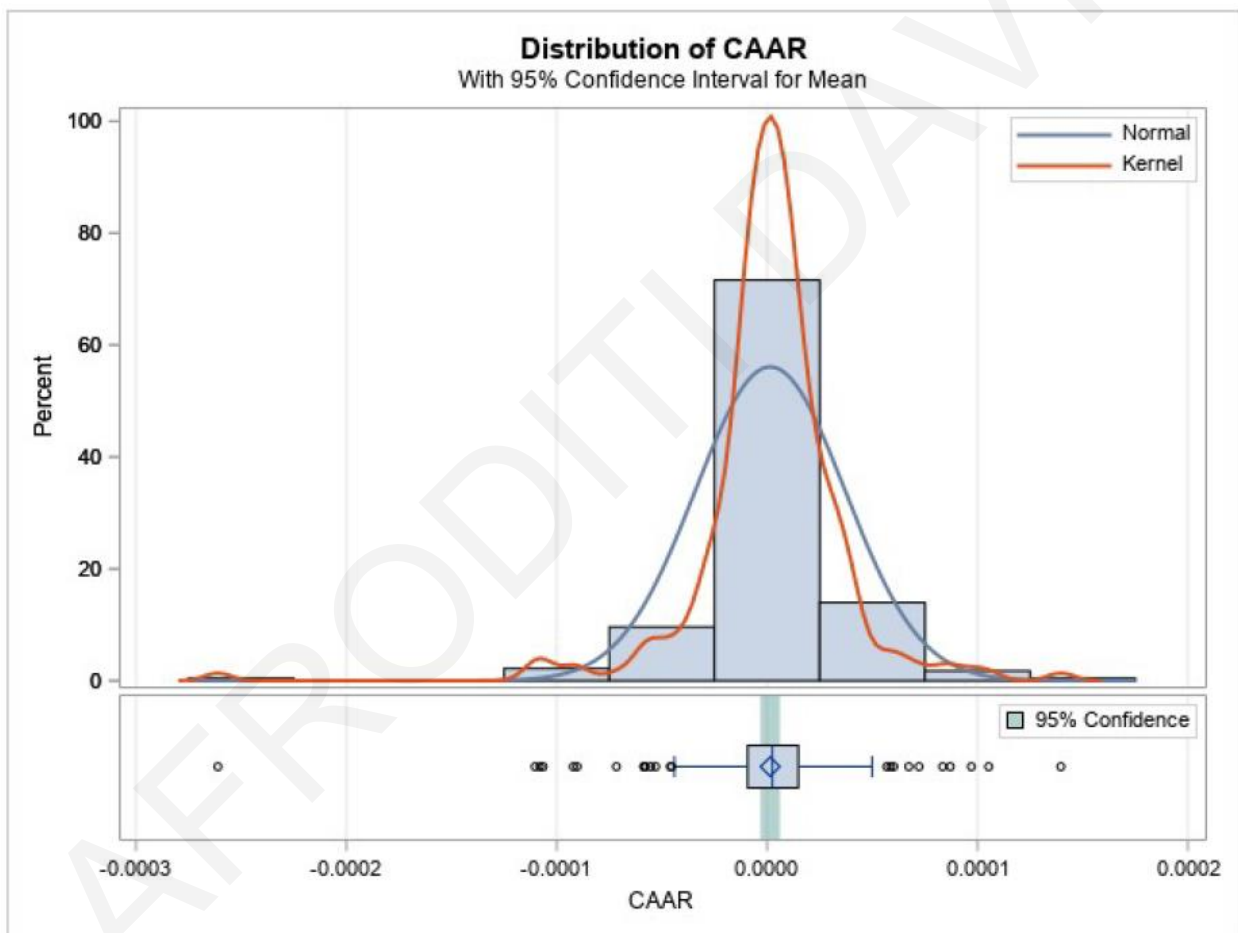


TABLE 17
Descriptive Statistics

This table shows the descriptive statistics of the Cumulative Average Abnormal Return (CAAR) for an event window [-60,60] including the p-value and the t-value.

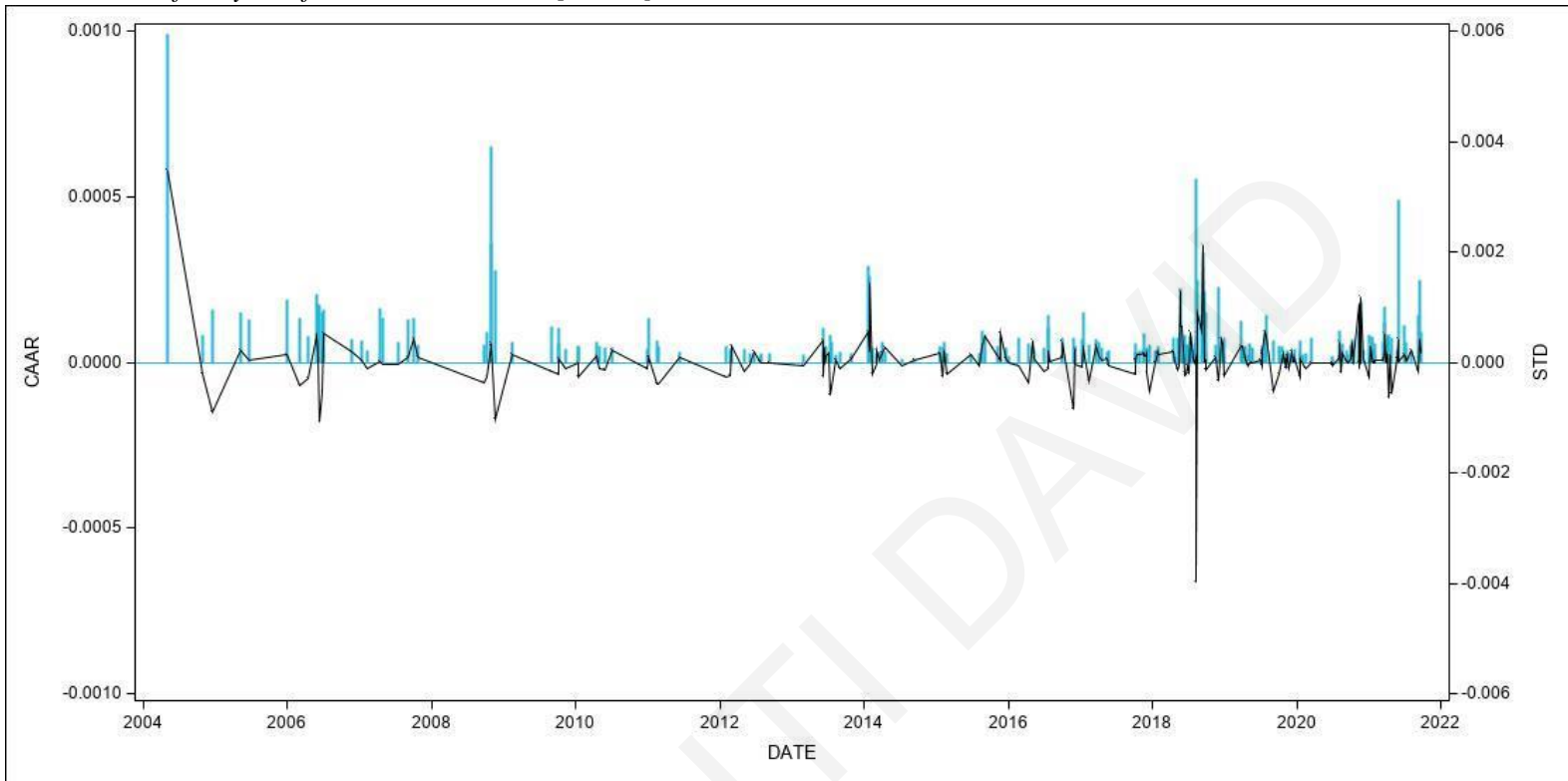
Event Window	N	Mean	Std. Deviation	Minimum	Maximum	Standard Error	Pr > t	T - Value
[-60,60]	229	1.47E-06	3.60E-05	-2.60E-04	1.40E-04	2.35E-06	0.533	0.62

Note: * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.



Graph 1

The graph shows the Cumulative Average Abnormal Returns (CAARs) and the standard deviation in terms of the years for the event window [-30,30].



Graph 2

The graph shows the Cumulative Average Abnormal Returns (CAARs) and the standard deviation in terms of the years for the event window [-15,15].

