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THE EFFECTS OF RELIGIOUS HOLIDAYS ON STOCK RETURNS: EVIDENCE FROM ISTANBUL STOCK EXCHANGE

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ABBREVIATIONS

ACF - AutoCorrelation Function

ADF - Augmented Dickey-Fuller

AIC - Akaike Information Criterion

ARCH - AutoRegressive Conditional Heteroskedasticity

CEE - Central and Eastern European

CSD - Central Securities Depository

DF - Dickey-Fuller

GARCH - Generalized AutoRegressive Conditional Heteroskedasticity

ISE - Istanbul Stock Exchange

PACF - Partial AutoCorrelation Function

S&P - Standard and Poors

SIC - Schwarz Information Criterion

TUYID - Turkish Investor Relations Society

UAE - United Arab Emirates

USA - United States of America

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ABSTRACT

Holiday effect is observing abnormal returns than usual in official holidays. This effect has been proven by researches in many developed and developing countries, especially in USA. The most of the studies indicate that higher positive returns before and/or after holidays. However, in a few studies, there are more returns that are negative or no significantly different return before holiday, as well as a negative return after holiday. Furthermore, in some studies, more positive return before and/or after holidays is observed just in some countries while not observed in some others. These different findings obtained in the previous researches stem from that almost every study use different methodological approaches and analysis techniques. In some studies, the effect is examined only before or after the holiday, while both before and after the holiday in some studies. In many studies examine that different series of datasets for different holiday types and countries while few studies are based on a single series of dataset. In these studies, there is also no consensus on how many days should be use to examine the impact before and/or after the holiday and whether the impact should be examined cumulatively for a group of days or together for pre- and post-holiday or separately for each day. Regarding the effects of religious holidays on returns in stock exchanges, this approach differences continues, and in these studies, the analyzes are mostly based on religious days, not on religious holidays, but they are mostly focused on Ramadan month (not on the feasts of Ramadan and Sacrifice which are quite long-lasting holidays and have different structure as they are holiday) in almost all of these studies. Therefore, there is no study that accepts Ramadan and Sacrifice holidays as a single dataset and analyze 4 days before and after these religious holidays as cumulative (not on a daily basis) as well as no study investigating pre- and post-effects in each model together. These reasons have necessitated to conduct such a study.

In this research, the effect of religious holidays in Turkey on returns in stock exchanges are investigated with daily returns of BIST100 index of Istanbul Stock Exchange (ISE) for 21 years from 01.01.1999 to 31.12.2019 including 4 days before and 4 days after holidays.

Primarily, non-parametric chi-square test used in detecting the existence of holiday effect. In chi-square test, percentage of positive and negative returns to number of all returns used on the transaction days before and after the religious holidays. In estimating specified models, primarily the classical linear regression models which are estimated by Ordinary Least Squares (OLS) and Newey-West's correction are used in calculating standard errors are benefited from. As in case of varying variance, classical linear regression models with (OLS) might be fail in estimating. As in our data, the returns are leptokurtic (having wider tail) and the variance cluster (volatility) is observed, The Autoregressive Conditional Heteroscedasticity (ARCH) family models that are suggested in case of volatility and wider tails in financial return series in order to be able to estimate the models better. In the analysis, Generalized Autoregressive Conditional Heteroskedasticity (GARCH) models used to capture symmetrical effect and The Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) models used to capture asymmetrical effects.

According to the findings obtained in the research, in none of the GARCH and EGARCH models or multivariate regression analysis, it is found that average daily returns before the religious holiday in Turkey differ significantly compared to the ones on normal days. Therefore, in all methods, both daily average returns before and after the religious holiday in Turkey are not significantly different together.

Keywords: GARCH, EGARCH, Holiday Effect, Religious Holiday, Stock Return

ÖZET

Tatil etkisi, resmî tatillere yakın zamanlarda normalden farklı getiriler gözlemlenmesidir. ABD başta olmak üzere birçok gelişmiş ve gelişmekte olan ülkede bu etkiyi kanıtlayan çalışmalar bulunmaktadır. Çalışmaların çoğu tatilden önce ve/veya sonra yüksek pozitif getiri olduğunu göstermektedir. Ancak az sayıda araştırmada tatilden sonra negatif getirilerin bulunmasının yanı sıra tatilden önce daha çok negatif getiri veya anlamlı farklılık göstermeyen getiriler yer almaktadır. Ayrıca, bazı çalışmalarda, tatilden önce ve/veya sonra daha çok pozitif getiri sadece bazı ülkelerde gözlemlenirken bazılarında gözlenmemiştir. Önceki araştırmalarda elde edilen bu farklı bulgular, hemen hemen her çalışmanın farklı metodolojik yaklaşımlar ve analiz teknikleri kullanmasından kaynaklanmaktadır. Bazı çalışmalarda, etki sadece tatil öncesi veya sonrası için, bazı çalışmalarda ise hem tatil öncesi hem de sonrası için incelenmektedir. Birçok çalışmada, farklı tatil türleri ve ülkeler için farklı veriseti serileri incelenirken, çok az çalışma tek veriseti serisine dayanmaktadır. Bu çalışmalarda, tatil öncesi ve / veya sonrası etkiyi incelemek için kaç günün kullanılması gerektiği ve etkinin, tatil öncesi ve /veya sonrası için kümülatif olarak gün grubu için mi ya da tatil öncesi ve sonrası için birlikte mi veyahut her gün için ayrı ayrı mı incelenmesi gerektiği konusunda da fikir birliği bulunmamaktadır. Dini bayramların borsa getirileri üzerindeki etkilerine ilişkin, bu yaklaşım farklılıkları devam etmekte ve bu çalışmalarda analizler dini bayramlara göre değil, çoğunlukla dini günler temelinde yapılmakta, ancak neredeyse bu çalışmaların tamamına yakınında çoğunlukla Ramazan ayına odaklanmaktadır (dini tatil olmaları nedeniyle farklı bir yapıya sahip olan Ramazan ve Kurban bayram tatillerine değil). Dolayısıyla Ramazan ve Kurban bayram tatillerini tek bir veriseti serisi olarak kabul eden ve bu dini bayramlardan 4 gün önce ve sonra getiriler üzerindeki etkiyi kümülatif olarak (günlük olarak değil) analiz eden bir çalışmaya rastlanmadığı gibi her modelde tatil öncesi ve sonrası etkiyi birlikte araştıran bir çalışmaya da rastlanmamıştır. Bu nedenler, böyle bir çalışmanın yapılmasını gerektirmiştir.

Bu araştırmada, Türkiye'deki dini bayramların borsa getirileri üzerindeki etkisi, tatil öncesi 4 gün ve sonrası 4 günü içine alacak şekilde 01.01.1999-31.12.2019 tarihleri arasındaki 21 yıllık periyot için Borsa İstanbul Bist100 endeksi günlük getirileri ile araştırılmıştır.

Öncelikli olarak tatil etkisinin varlığını saptamada parametrik olmayan ki-kare testi yapılmıştır. Ki-kare testinde dini tatiller öncesi ve sonrasındaki işlem günlerinde pozitif ve negatif getirilerin sayısının tüm getirilerin sayısına yüzdece oranı kullanılmıştır. Belirlenen modelleri tahmin etmede öncelikle En Küçük Kareler yöntemi ile tahmin edilen ve standart hataların Newey-West'in düzeltmesi kullanılarak hesaplandığı klasik lineer regresyon modelleri kullanılmıştır. Değişen varyans durumunda En Küçük Kareler'li klasik lineer regresyon yöntemi, modelleri tahmin etmede başarısız olabilir. Verisetimizde getirilerin leptokurtik (daha geniş kuyruğa sahip) olması ve varyans kümesi (volatilite) gözlenmesi nedeniyle modeller, volatiliteye ve daha geniş kuyruğa sahip finansal getiri serileri için önerilen ve modelleri daha iyi tahmin edebilmeyi sağlayan ARCH ailesi modelleri ile tahmin edilmektedir. Analizde simetrik etkiyi yakalamak için GARCH modelleri, olası asimetrik etkileri yakalamak içinse EGARCH modelleri kullanılmıştır.

Araştırmada elde edilen bulgulara göre, GARCH ve EGARCH modellerinin hiçbirinde veya çok değişkenli regresyon analizinde, Türkiye'deki dini tatiller öncesi ortalama getirilerin normal günlerdeki ortalama getirilere göre önemli ölçüde farklı olmadığı bulunmuştur. Bu nedenle, tüm yöntemlerde Türkiye'deki dini tatiller öncesi ve sonrası ortalama getiriler birlikte anlamlı bir farklılık göstermemektedir.

Anahtar Kelimeler: GARCH, EGARCH, Tatil Etkisi, Dini Tatil, Borsa Getirisi

CHAPTER ONE

INTRODUCTION

The primary scope of this study includes searching religious holidays' effect on stock returns. However, in order to identify long holidays that are suitable for comparison with the religious holidays' effect on stock returns analyzed in the research, all the types of calendar effect are examined in the literature and the studies for the effect of long holidays are collected in a separate title and formed the basis of comparison of the research. Therefore, this research mainly focuses on the effect of 3 days or more holidays on daily stock returns.

In the research, holidays, which are longer than 3 days called long holidays. In this context, the comparison of Islamic holidays' effect such as Ramadan and Sacrifice Feasts on stock returns in Turkey are based on the studies that fit this definition of long holidays.

The data used in the research are limited in;

- The religious holidays (Ramadan and Sacrifice Feasts) in Turkey,
- The effect of religious holidays on daily average returns in BIST 100 (ISE 100) Index of ISE,
- Daily closing prices of BIST 100 data between the dates 01.01.1999-31.12.2019,
- The effects on 4 days before and after the religious holidays (8 days in total for each religious holidays).

In First Chapter, includes the purpose, the scope, the assumptions and limitations, and the organization of report. In Second Chapter, includes theoretical framework of behavioral finance and calendar effect. In Third Chapter, includes the motivations and hypotheses of this research. In Fourth Chapter, includes the data and sample descriptions. In Fifth Section, includes the empirical methodology and specified models. In Sixth Chapter, includes the study's empirical findings. In Seventh Section named Conclusion and Discussion, the empirical results of the research are summarized and discussed by being compared to the findings obtained in similar past researched in the literature.

The findings obtained in the research show that religious holidays in Turkey have no effect on daily average returns. That is, in none of the GARCH and EGARCH models or multivariate regression analysis, both daily average returns before and after holidays are not significantly different together.

CHAPTER TWO

LITERATURE REVIEW

2.1. Behavioral Finance

Behavioral finance, which attracts the attention of the financial world today, is first introduced in the science of psychology in 1913 as a new approach. It has been suggested that the factors influence by human behavior depend on the external environment instead of internal trends, and this prediction has continued to be developed later (Daniel, Hirshleifer and Teoh, 2001). According to behavioral finance, the most determining factor in individuals' decision making in winning and losing is their own behavior (Bernstein, 2005).

Traditional finance theories argue that investors act with rational decisions. A rational-minded investor can always (i) change their beliefs in a timely manner and show a proper attitude while acquiring new information; (ii) makes its choices in a normative and acceptable manner (Thaler, 2005). Traditional finance theories express that individuals objectively determine possibilities in cases of uncertainty and aim to maximize their benefits by making consistent and logical decisions (Yalçınkaya, 2004). However, in financial markets, it has seen that investors do not always show reasonable and rational behavior. For example, Dow Jones Industrial (DJI), which is 14,164.53 on October 9, 2007, fell to 6,594.44 on March 6, 2009, suffering 54% depreciation over a period of approximately 1.5 years. Similarly, on October 19, 2008, 11.5 billion stocks exchanged contrary to daily trading volume of roughly 5 billion shares. On the day of the transaction and the following days, investors began to be desperate and withdraw from the market with a sales panic. This situation caused a sharp free fall. Traditional finance theory predicts that this should not have happened, but this extraordinary situation has occurred (Smith and Harvey, 2011). The reason for this stems from human psychology (Tufan, 2008)

and behaviors, which are the focus point of behavioral finance (Lu, Zhang and Ang, 2008).

Investors who trade in the market under the influence of psychological prejudices hold the lost shares for a long time, also quickly sells the winning shares. With a sense of overconfidence, they make excessive transactions, ties emotionally to the shares they have, shows excessive and low reactions, and tends to seek information that supports his own truth. As a result, investment decisions are no longer rational decisions but they are replaced by investors' psychological feelings and thoughts (Kıyılar and Akkaya, 2016).

When it comes to dealing with stock market returns, behavioral finance is about human behaviors' effect on stock prices and index returns' formation (Ülkü, 2001). According to behavioral finance, when people are happy and sad, they have different beliefs and expectations, and people who are happier have a tendency of believing in positive results. Thus, behavioral finance has made a possible explanation for the reason that positive returns on public holidays are higher than the ones on normal days (Thaler, 1999). The happiness' source leading results that are more positive can be not only about the personal mood of the individual, but also the situations affecting a large part of people such as social and economic events or weather. Hirshleifer and Shumway (2003) argue that weather can affect individuals' moods in investment decisions and perceiving financial information. In their research, they find that 24.8% of returns are realized in sunny weather, whereas this rate is 8.7% in cloudy weather (almost 1/3 of the ones in sunny days), and there is a significant difference between these two cases. According to Dodd and Gakhovich (2011), this behavioral effect on investment decisions can create a happier mood just before and after the official holidays, which can be used as a possible argument in explaining why the returns at these times are different from normal days, i.e., in explaining the holiday effect.

When we come to the relationship between behavioral finance and our work, in line with the results obtained in studies mentioned in literature (in section called Calendar Effect), it can be considered that the positive effect on the individual may increase even more when the number of days of public holidays is longer or coincides with religious holidays, thus may make the holiday effect more prominent and permanent during long holidays. Official holidays are longer during the feasts of Ramadan (Eid al-Fitr) and Sacrifice (Eid al-Adha), two important religious holidays for Muslims. Ramadan feast covers 3 days, Sacrifice feast covers 4 days. When these festive days coincide with the weekdays, they combine with the weekend holidays before and after it, in this case, the duration of the religious holiday increases even more. For example; regarding to the religious holidays in ISE between the dates 01.01.1999-31.12.2019, the average number of religious holiday days is 6.2 days. Besides official holidays' effect on creating a positive mood for the individual, religious values also have an impact on investment decisions around religious holidays. In fact, Tan (2017) reported that belief has an important effect on individuals' decisions and actions, and that religious values' impact on economic growth is notable. Beit-Hallami and Argyle (1997) found that religion is an important positive social support element and increase optimistic beliefs and happiness in humans.

2.2.Calendar Effect

The calendar effect is time-dependent anomalies amongst the market anomalies and means the observation of different results/values/prices/returns for the examined variable at any time period compare to other time periods (Khan, Nasir and Rossi, 2017).

In general, the calendar effect can be examined under three groups as (1) day effects, (2) month effects and (3) holiday effects (Bildik, 2000).

2.2.1. Day Effects

The calendar effect for days can be grouped into two groups, (1) Intraday effect and (2) Day-of-the-Week effect (Barak, 2008).

2.2.1.1. Intraday Effect

Intraday effect is a situation where stocks consistently provide different returns than other hours or time zones in a particular time of the day or in a particular time period that can be measure in minutes (Barak, 2006). In simpler terms, it means obtaining different values in any time interval of the day compare to the other time intervals.

Wood, Mclnish, and Ord (1985) are the first to study intraday effect by examining minute-to-minute return distribution on New York Stock Exchange. In their research has two periods, they found that 2/3 of the total returns for the first period are obtained in the first 30 minutes and in the last minute of the session and the highest return for the second period is achieved in the first 30 minutes and in the last five minutes of the trading session. At day's other times, there is no significant difference in return.

In studies (Özmen, 1997; Temizel, 2008), intraday impact in returns in Turkey, findings prove its existence. For example, in the study of Özmen (1997), it is determined that the worst session of the week is the second session on Monday with a return of -0,1752, and the average returns of the first sessions are higher than those of the second sessions. In the study of Temizel (2008), it is revealed that the intraday price structures in the stock exchange shows a "W-shaped" structure and that price volatility decreases at end of day but generally complies with the W form. Accordingly, he states that an investment strategy can be apply by choosing the times that determine the most economically significant return offer by the intraday structure.

In all of the studies (Wood et al., 1985; Özmen, 1997; Temizel, 2008) examined, it is seen that the daily index prices and returns increase at the beginning and the end of the session (usually first and last 30min), and therefore it shows a "W" shaped curve for the whole day in the index consisting of 2 sessions. Furthermore, it shows that more returns in first sessions than second (last) sessions of the day.

2.2.1.2. Day-of-the-Week Effect

It means the observation of consistently higher or lower returns in week's one or more days than others (Hayırsever Baştürk, 2004). The most well-known of this effect is Monday and Friday effects, which relate to the weekend holiday effect (Barak, 2006). In many studies (Cross, 1973; Bildik, 2000; Akkoç, 2003; Eken and Üner, 2007; Tunçel, 2007; Atakan, 2008), it has been studied mostly for Friday and Monday, i.e. for the last before and the first after the weekend holidays. However, in some studies (Karan and Uygur, 2001; Çinko, 2006; Büyükşalvarcı, 2010), it's seen that the scope of weekend holiday effect is extended as it would include 2 transaction days before and after weekend holidays even include Wednesday. Thus, the weekend holiday effect could cover 4 of 5 or all weekdays. As we deal with the effects of the weekend holidays in a separate title in details, we will not further elaborate the day-of-the-week effect here. However, we can summarize the findings obtained in the above-mentioned studies as that positive returns are found on Fridays and negative on Mondays (Cross, 1973; Barak, 2006; Çinko, 2006; Eken and Üner, 2007; Tunçel, 2007; Atakan, 2008), positive on Wednesday, Thursday and Friday, negative on Monday and Tuesday (Akkoç, 2003), positive on Fridays and negative on Tuesdays (Bildik, 2000), positive on Thursdays and Fridays however no significant effect on Mondays (Karan and Uygur, 2001), negative on Mondays and in Tuesdays' first session, positive in other sessions of the week (Tunçel, 2008), positive in the financial, industrial and technology indices on Thursdays and Fridays, positive in financial indices on Wednesdays, positive in the service index only on Fridays (Büyükşalvarcı, 2010), negative on Mondays (Białkowski, Etebari and Wisniewski, 2012).

Researchers also studied on investigating the day-of-the-week effect other than the weekend effect. For example, the studies of Clare et al. (1998) conducted with Malaysia stock exchange's daily returns between 1983-1993 show the day-of-the-week effect. According to findings in study, daily return on stock exchange is higher on Wednesday and Thursday and lower on Monday.

In study of Ergül et al. (2008), no day-of-the-week effect is found in the ISE 100 Index for whole of 1988-2007 period (totally 20 years). However, some significant effects are found in year-based analysis for the years 1988, 1992, 1995, 1996, 2001, 2002, 2004 and 2006. According to the findings, the significant low returns are on Tuesdays compare to Fridays in 1988, significant low returns on Monday and Tuesday compare to Wednesday in 1992, significant low returns on Mondays compare to Fridays in 1995, significant low returns on Tuesdays compare to Thursdays in 1996, significant low returns on Monday by comparison with other weekdays in 2000, significant low returns on Monday, Tuesday and Wednesday compare to Thursday in 2001, the significant low returns on Monday by comparison with Thursday and Friday, and on Tuesdays compare to Thursdays in 2002, the significant low returns on Monday by comparison with Friday in 2004, the significant low returns on Monday by comparison with Thursday in 2006. In the aforementioned study, the weekdays compared to each other for day-of-the-week effect, i.e. not with averages of all days. Considering the majority of 18 different day-of-the-week effects detected on year basis, it is seen that 8 of them indicates low returns on Mondays compare to Thursdays and Fridays, and three of them indicates negative return on Tuesdays compare to Thursdays. Accordingly, findings of research can be interpreted as low returns mostly on Mondays and Tuesdays while high returns on Thursdays and Fridays. Ergül et al.'s (2008) findings appear to be parallel to the findings obtained in majority of literature.

A negative return on Monday and a positive return on Friday observed in almost all the studies examined, and in some studies the negative effect is sagged on Tuesday and the positive effect on Thursdays and even Wednesdays. Therefore, day-of-the-

week effect appears to indicate negative returns on Mondays and Tuesdays and positive returns on other weekdays.

2.2.2. Month Effects

Month effects includes four groups: (1) "Intramonth Effect", (2) "Month-of-the-Year Effect", (3) "Turn-of-the-Month Effect" and (4) "Turn-of-the-Year Effect" (Özmen, 1997).

2.2.2.1. Intramonth Effect

Intramonth effect means observing of different returns in months' first half by comparison with other halves. The fact that stock returns perform better in months' first half by comparison with its second half or in second half by comparison with first half indicates intramonth effect's existence. The existence of this anomaly has been proven by empirical studies (Ariel, 1987; Özmen, 1997). On the other hand, a study (Barone, 1990) prove that stock returns perform better in month's second half by comparison with its first half.

Ariel (1987) is the first who reveal the presence of intramonth effect. In his study, USA stock market between 1963-1981, days from 1st to 9th days of month are compare to returns of month's last 9 days and it is show that the average return of month's first 9 days is higher than the ones in last 9 days.

Özmen (1997) found that returns of months' first halves as 0.1539% and months' second halves as 0.0328% in his study on the ISE for the period 1988-1996. In addition, Özmen (1997) determines that the month in which this difference is most apparent in January and the months when the difference is not seen in March, July, November and December. Research results show intramonth effect that is first to introduce by Ariel (1987) exists for the period in ISE.

In a study on the Milan Stock Exchange (MSE) of Italy, the opposite result regarding the intramonth effect has been obtained. In the study conducted by Barone (1990) on the MSE between 02.01.1975 and 22.08.1989, it is revealed that the returns of stocks fall in month's first halves and increase in second halves.

In majority of studies (Ariel, 1987; Özmen, 1997), it is seen that month's first-half returns are higher than the second halves while an opposite result is obtained in one of the studies (Barone, 1990).

Although the causes of the intramonth effect are not fully known, the probable reasons are suggest that the companies tend to announce good news in months' first halves while bad news in last halves, as well as the fact that the dividends related to securities, interest and principal payments are mostly in these days, and such cash payments increase investors' stock demand and thus prices (Hayırsever Başt̨ürk, 2004).

2.2.2.2. Month-of-the-Year Effect

It means observing different returns in any month of the year than normal. The most known and most research among these is the "January effect" which is also known as "January anomaly" (Taner and Kayalıdere, 2003). According to the January effect, the securities provide a significance higher return in January (Sönmez, 2010). Wachtel (1942) is the first to observe January anomaly, then Rozeff and Kinney (1976).

In order to investigate the January effect, researches have been conducted in many country exchanges and findings supporting this effect have been reached. An anomaly of January (higher returns in January) is found in the studies of Van Den Berg and Wessels (1985) covering 16 years in Amsterdam Stock Exchange and the studies of McConnel and Schlarbaum (1985) covering the 30 years in the Toronto and Montreal Stock Exchange.

Another important study for testing the January effect is done by Gültekin and Gültekin (1983). They studied seventeen countries' exchanges and this effect is found in twelve countries. In other words, it is concluded that it is possible to obtain a return above normal with the investments made in January in these countries by using the January effect.

Wong et al. (1990) study shows that with data from 1970-1985, and a significant and positive January effect on Malaysian stock returns.

In Chan et al.'s (1996) study to determine impact of cultural and other public holidays on the exchanges of 4 Asian countries (Singapore, Malaysia, Thailand and India), working with daily stock returns, the positive month-of-the-year effect is found on the returns of Singapore and Malaysia for December and January. Conversely, this effect is not found for Thailand and India. In the same study, they also investigated this effect in lunar calendar for Malaysia, where official religion is Islam and India with the largest Muslim population in the World. Findings shows that the daily stock returns are significantly lower ($p<0.05$) in the 3rd month (Rabi I) of the lunar calendar for Malaysia, while significantly higher daily returns are found in 2nd month (Safar) ($p<0.01$) and in 8th month (Sha'ban) ($p<0.05$) of the lunar calendar for India.

In the study conducted by Białkowski et al. (2012) for determining Ramadan effect on returns in 14 Islamic countries of which population is at least 51% in majority between 1989-2007, average returns in Ramadan month are found significantly and positively (9 times) higher by comparison with year's other days. However, on a country basis, it is shows that the relevant effect is only significant for S. Arabia and UAE while not significant for other countries including Turkey.

In the studies carried out by Al-Khazali et al. (2017) in 14 Islamic countries to determine the effect of Ramadan month and Feast on stock returns, daily returns in 10-year period are used. In the research, returns shows that increase significantly in

Ramadan month for 11 Islamic countries except for three countries including Turkey.

In a study carried out by Hassan and Kayser (2019) on Bangladesh stock exchange with daily data, it is show that Ramadan month has a significantly lower on daily trading volume, but it is not significant on daily returns in whole Ramadan. The probable reason for this finding in the related study may stem from that investors fasting during day in Ramadan show less commercial activity. In line with the findings, the significant effect disappeares for whole Ramadan month, since significant effect on daily basis is positive on some days and negative on some days in Ramadan, so they might have neutralized each other.

When we summarize the findings obtained in the above-mentioned studies, the month-of-the-year effect on returns is mostly positive for January (McConnel and Schlarbaum, 1985; Van Den Berg and Wessels, 1985; Gültekin and Gültekin, 1983; Wong et al., 1990; Chan et al.,1996), significant positive return in lunar month of Ramadan (Białkowski et al., 2012; Al-Khazali et al., 2017), positive in lunar months of Safar and Sha'ban, negative in lunar month of Rabi I (Chan et al.,1996) while it's not significant in basis of all lunar months (Chan et al.,1996) or no significant effect in lunar month of Ramadan (Hassan and Kayser, 2019).

2.2.2.3. Turn-of-the-Month Effect

It means observing different returns near month's beginning by comparison with month's other days. Barak (2006) define this effect as observing higher returns in months' first days and in previous months' last days in any month of year compare to the other days. In many studies (Lakonishok and Smidt, 1988; Agrawal and Tandon, 1994; Bildik, 2000) conducted on this subject, it is show that stocks provide higher returns between 1-4 days in month's end and 1-4 days in months' beginning.

Ariel (1987) analyzes cumulative returns of the Dow Jones Industrial Average (DJI) and determines that a significant part of high returns in months' last 9 days. In addition, he finds that investors realize their stock buying in the first days of the month while delaying their selling. He states that the reason for this is the high rate of returns that starts in months' last days.

Lakonishok and Smidt (1988) have similar study with DJI for a 90-year period. At the end of this study, it is show that a positive return can be obtain in the 4-day period covering month's last transaction day and following month's first 3 days.

In a study conducted by Özmen (1992) in ISE, month's last 3-day and first 3-day returns based on 4 years of data and no turn-of-the-month effect in ISE. In another study that Özmen (1997) conducts later, he compares the average returns by taking 2 days before months' ends (two days before 30^{th} or 31^{st} days) and 2 days before the beginning of the month (months' 15^{th} days are taken as months' beginnings while 13^{th} and 14^{th} days are taken as 2 days before the months' beginnings) for determining a turn-of-the-month effect existence in ISE. Consequently, average return of two days before month's 15th is found as 0.2434%, while average return of two days before month's end as 0.1431%. The average return of two days before month's beginning is 3.06 times higher than the ones other than these days. However, average return of 2 days and the ones of other days before month's last days are not significantly different from each other. Thus, he concludes that effect observed in around months' turn in international markets does not exist in the ISE.

Agrawal and Tandon (1994) investigated this effect with 4-day data from month's end and 4 days from month's beginning in 18 countries' exchanges. In their study, they find that in 10 of the 18 countries, the returns are significantly positive on months' last transaction days.

In research of Bildik (2000) based on the period 1988-1998 in ISE, it is shows that both month's 1st and 15th day is accepted as month's beginning, the average return

is higher than the ones seen in other days in months' turns periods. During the month, higher positive returns seen in three different periods (1^{st}-4^{th}, 14^{th}-16^{th}, 31^{st}-4^{th}), providing high returns, while returns on 24^{th} days are found significant and negative.

In the majority of the investigated studies (Lakonishok and Smidt, 1988; Agrawal and Tandon, 1994; Bildik, 2000), there are positive returns around months' turns periods (months' first and last 1-4 transaction days). In one study (Ariel, 1987), positive return is found on months' last 9 transaction days, while no such an effect on stock returns is found in one study (Özmen, 1992).

2.2.2.4. Turn-of-the-Year Effect

In stock markets, observing stock returns above the general average in present year's last few transaction days and following year's first few transaction days are expressed as "turn-of-the-year effect" or "turn-of-the-year anomaly" (Barak, 2006). In simpler terms, it can be defined as the observation of different returns in the right before and after years' turns by comparison with year's other times. In fact, it is similar to January effect but different as it does not cover whole December and January, but only covers December's last few days and January's first few days. With this aspect, it differs from the January Effect. In studies conducted on this effect (Berges, McConnel and Schlarbaum, 1984; Bildik, 2000), a significant positive return is observed for December's last and January's first transaction days.

Berges et al. (1984) data on the 1951-1980 period on the Canadian stock exchange and they determine that higher returns can be achieve in December's last few and January's first few transaction days by comparison with ones in other days.

Bildik (2000) determines that stocks have a high rate of return in December's last 5 days and January's first 8 days in study on ISE for the period between 1988-1998. According to the research, it is determine that an average return of 14.4% can be

achieve before the transaction costs are deducted if buying the index at beginning of the 5th transaction day before December's end and selling it at beginning of January's 9th transaction day (i.e., totally 13-days holding period). In the study, the effects of "turn-of-the-year" and "turn-of-the-month" are also compared, and it is determine that return that can be obtain with "turn-of-the-year effect" may be higher than return that can be obtain using "turn-of-the-month effect".

Chan et al. (1996) work with daily returns to determine impact of cultural and other public holidays on stock exchanges in 4 Asian countries, and a positive turn-of-the-year effect on returns is determine for Singapore and Malaysia. However, in the study, it is seen that this effect when consider on a monthly basis and it is found by comparison with average return of December and January with the other 10 months of the year.

In all of the studies reviewed, there is a positive return in "turn-of-the-year". In most studies (Berges et al., 1984; Bildik, 2000), this effect can be seen for December's last and January's first transaction days while in one study (Chan et al., 1996) whole December and January months.

2.2.3. Holiday Effects

The first study on the holiday effect is done by Fields (1934) in US markets. This effect is proven by researches in many developed and developing countries, especially in USA. Regarding to holiday effect on stock returns, there are many researches (Cross, 1973; Roll, 1983; Berges et al. 1984; Lakonishok and Smidt, 1988; Pettengill, 1989; Ariel, 1990; Wong et al., 1990; Len, Yen and Zhang, 1992; Agrawal and Tandon, 1994; Kim and Park, 1994; Chan et al., 1996; Özmen, 1997; Bildik, 2000; Karan and Uygur, 2001; Brown, Chua and Mitchell, 2002; Xueyu and Jia, 2002; Akkoç, 2003; Menue and Pardo, 2004; Oğuzsoy and Güven, 2004; Barak, 2006; Çinko, 2006; Eken and Üner, 2007; Tunçel, 2007; Tunçel, 2008; Atakan, 2008; Cao, Premachandea, Bhabra, and Tang, 2009; Büyükşalvarcı, 2010; Dodd

and Gakhovich, 2011; Białkowski et al., 2012; Yuan and Gupta, 2014; Abidin et al., 2015; Majeed et al., 2015; Ahmad Al-Smadi, Almsafir and Binti Husni, 2017; Ali et al., 2017) that prove the existence of such effect covering all official holidays.

Various psychological researches show that individuals are positive before short holidays and with this positive effect, they enter high expectations. It suggests that they are in emotion or mood. This optimism can cause low-risk perception. Holiday effect, one of periodic anomalies, leads investors in investing on risky assets with low-risk expectations with positive emotions within the holiday. Investor optimism pre-holiday positively affects stock prices (Teng and Liu, 2013).

According to Akkoç (2003), stock returns provide above-normal returns in pre-holiday days, and under-normal returns in post-holiday days. This empirically observed effect in many markets is called the holiday effect (Akkoç, 2003). In simpler terms, the observation of different (mostly positive) returns than usual around public holidays are called holiday effect. According to Bildik (2000), transaction day before the days such as the religious and official holidays, is called "pre-holiday" while transaction day after holiday is called "post-holiday".

In literature, the closed-market hypothesis (French, 1980), swap methods (Lakonishok and Levy, 1982), stock change (Fabozzi, Ma and Briley, 1994), psychological and behavioral causes (Deldin and Levin, 1986) have been shown among the main causes of this effect. According to the closed-market hypothesis, French (1980) analyzes daily returns of stock for the period 1953-1977, it is assumed that expected returns after the holiday will decrease. Thus, the next transaction days after the holidays will be lower by comparison with other days. Lakonishok and Levy (1982), while investigating the week's day effect, found that swap methods, which are valid for the weekend effect, are also valid for holiday effect. Fabozzi et al. (1994) state there is an excessive increase in first transaction days' returns following holiday in eight futures contracts. They state this result may be the result of post-holiday stock correction. Deldin and Levin (1986) determine

that psychological changes vary according to week's day and they find that morale of people is the highest on Friday, before the weekend. Accordingly, it is assumed that investors may increase their morale and cause price changes (Fabozzi et al. 1994). These reasons can be amongst the main reasons for this effect.

Apart from the above-mentioned main reasons, the reasons such as increasing risk, particularly inflation of closing prices, interaction of this anomaly with other anomalies, position closings of short sales have also been suggested for explaining holiday effect in financial literature (Özmen, 1997).

2.3.Types of Holiday Effect

Although holiday effects are not clustering under any generally accepted classification in the literature, they vary depending on the different socio-cultural structures of different countries. From the religious aspect, Ramadan Feast holiday lasts three days, and the Sacrifice Feast holiday lasts four days. However, these religious holidays can be longer than four days when combine with a single weekend holiday before or after them even nine days if they are combined with both weekend holidays before or after them. For example; in our study, an average number of the religious holidays is 6.2 days in the 21 years (01.01.1999-31.12.2019). Therefore, the effects of holidays longer than three days on stock returns should be though to be similar and taken as comparable to those of religious holidays. Therefore, in our study, it is accepted that appropriate to classify the studies that examined the effect of 1-day official holidays or 2-day weekend holidays as "the short holiday effects", and the studies that examined the effect of 3-day holidays or more as "the long holiday effects". In line with this classification, in comparing the findings of the research, special emphasis will be given to studies on long holidays' effect on stock returns. All studies examined under the title of "types of holiday effects" are related to the holiday effect on stock returns.

2.3.1. Short Holiday Effect

In this study, the holidays that are lasting 2 days and less are called short holidays. Thus, the short holiday effect can be defined as the observation of different returns before and after holiday lasting 2 days and less by comparison with year's other times. This effect can be grouped as (1) "Weekend holiday effect" and (2) "Other short official holiday (one-day holiday) effect".

2.3.1.1. Weekend Holiday Effect

Because official working days, which are common in the world business and money markets, are held in 5 days, including Monday to Friday, and the weekends (Saturday-Sunday) are generally off days, the 2-day weekend holiday has an impact on various rates, prices and returns in the last transaction days (Fridays) before and first transaction days (Mondays) after weekends. In this frame, the effects of weekend holidays mean the observation of different returns on Friday and Monday compared to other weekdays (Barak, 2006). It has been studied in many studies under the heading of the-day-of-the-week effect and mostly for Friday and Monday, i.e. for the last before and the first after the weekend holidays. However, in some studies, it has seen that the scope of effect is extended as it will include 2 transaction days before and after the weekend holidays.

In the weekend holiday effect, average returns are mostly highest on last and lowest on first transaction days of the week. According to Barak (2006), many experimental studies in this field have revealed that this anomaly is an international anomaly.

Many studies have been made about this effect on stock markets in Turkey and in the World. In some of these studies, the lowest return is on Monday, while in some countries the lowest return is on Tuesday. In some studies, the day with the highest return is on Thursday instead of Friday. Finally, empirical studies show that stock

returns are low in the first half of the week (Monday through Tuesday), while they are positive and show an increasing trend in the second half of the week (Wednesday to Friday) (Akkoç, 2003).

The first study on this subject is done by Cross (1973) for all days of the week. The study is conducted in the S&P (Standard and Poors) Index based on the average returns of all days of the week for the period 1953-1970. As a result, it is shows that stocks provide negative returns on Monday and positive returns on Fridays. In this study, the index increases by 62% of Fridays, while it increases by 39.5% of Mondays. The average return on Fridays is 0.12%, while the average return on Mondays is -0.18%. The researcher states that this difference in return between days cannot be random.

Bildik (2000), in a study carried out the presence of an anomaly in the ISE in a period of approximately 11 years and a data set of 2755 days in the period 1988-1999. As a result, the week's highest return on Fridays (0.47%). It is determined that this return is 81% higher than the average of all days (0.26%). In addition, the lowest (and negative) return on Tuesdays.

Karan and Uygur (2001), in a study carried out the anomalies of the week and January in the ISE as of 1991-1998 by taking advantage of 10 portfolios created according to firm sizes. The study shows that there is no effect depending on the firm size. In general, significant and positive returns in all portfolios on Thursdays and Fridays, which are the last days of the week. Moreover, in the study, it is shows that the returns are statistically insignificantly negative on Mondays and Tuesdays.

Tunçel (2007) analyzes the existence of the anomaly of the-day-of-the-week using the closing values of the daily ISE 100 index for the period 1 January 2002-30 June 2005 and also for each year as sub-periods. In the research, it is shows that Mondays provide negative returns in all sub-periods except 2003, and Fridays provide the highest return of the week in all sub-periods except 2002.

Çinko (2006) analyzes the ISE 100 index returns between October 8, 1990 and November 16, 2005. In the study, where the returns are calculating by taking the logarithmic differences of day closings, the data set is divided into two as the period when the swap period is one day and two days. As a result of the research, it is determined that the returns in the ISE 100 index differ according to the days. He concludes that the returns on Monday and Tuesday are negative during the one-day swap period, and only the returns on Monday are negative during the two-day swap period. He determines that the returns on Fridays are significantly positive during the one-day swap period, and the returns for days other than Tuesday and Wednesday are significant during the two-day swap period.

Eken and Üner (2007) analyzes the existence of the periodicals seen in ISE numerically for the period of 04.01.1988-31.12.2007. As a result of the examination for 4.981 days, they conclude that 53% of returns are positive and 47% are negative. The study shows that the days with the most negative observations (513 days) and with the least positive observations (479 days) are Mondays. Also, the days with the least negative observations (413 days) and with the most positive observations (576 days) are Fridays.

Atakan (2008) analyzes the anomalies of the ISE 100 Index covering the period of 3 July 1987-18 July 2008 on the 5157-day dataset using ARCH-GARCH models. As a result of the research, it is shows that the return of the ISE 100 Index is higher on Fridays and the return is lower on Mondays compare to the average return of other days.

Tunçel (2008) investigates whether there is an anomaly in the ISE for a total of 5,110 sessions (two sessions in a day) for the period 02.01.1997-30.04.2007, and determines that there is a negative return in the first three sessions of the week and positive returns in the remaining sessions. In this study, the anomaly of the day of the week is examined on the basis of the session, which is a little narrower time.

Since the negative returns appear in three sessions of the week, it is shows that the effect is sagging on Tuesday.

Büyükşalvarcı (2010) investigates whether the day of the week effect exists in the ISE 100 index, service index, financial index, industrial index and technology indices before and during the economic crisis and whether this effect differs in the relevant periods. As a result, the researcher finds that before the 2001 economic crisis, the indices other than the service index provide a negative average return on Monday and a positive return on other days (except on Tuesday in the technology index). Büyükşalvarcı (2010) conclude that the average return in this period in the ISE 100 and financial indices on Wednesdays, Thursdays and Fridays; in industrial and technology indices on Thursdays and Fridays; and in the service index only on Fridays is statistically different and positive.

One of the reasons of the effect of the day of the week in BIST is that investors with credit transactions make purchases on Thursday and Friday in order to prevent credit interest from running at the weekend. In credit transactions, since the loan is subject to interest from the day of the settlement, then the interest of the investor purchasing on Thursday and Friday will be paid on Monday and Tuesday, so the interest will not be paid for the weekend. Due to such reasons on Friday, extra (credit) purchases in ISE may have an above-average effect (Atakan, 2008).

Another prediction put forward as one of the causes of this anomaly is that individual and institutional investors cannot find time to gather and interpret the information related to stocks and the intensity of the weekday working life. However, they can collect and interpret this information over the weekend and reflect intensely these decisions they take in the first session on Monday (Tunçel, 2008).

Another view put forward as the cause of the anomaly on the day of the week is the "announcement effect". According to the announcement effect hypothesis,

companies choose the timing of the advertisements (profit, profit share, etc.) that they intend to announce, in a way that softens the effects of these advertisements. Accordingly, advertisements that can be considered bad news about the company are usually announce late on Fridays, in order to cool down the investor's reaction at the weekend. For this reason, price drops generally occur on Mondays (Güngör, 2003).

When we summarize the findings in the above mentioned studies, the weekend holiday effect positive on Fridays and negative on Mondays (Cross, 1973; Barak, 2006; Çinko, 2006; Eken and Üner, 2007; Tunçel, 2007; Atakan, 2008), positive on Wednesday, Thursday and Friday, negative on Monday and Tuesday (Akkoç, 2003), positive on Fridays and negative on Tuesdays (Bildik, 2000), positive on Thursdays and Fridays but no significant effect on Mondays (Karan and Uygur, 2001), negative return on Monday and in the first session of Tuesday, positive in the other sessions of the week (Tunçel, 2008), positive in the financial, industrial and technology indices on Thursdays and Fridays, positive in financial indices on Wednesdays, positive in the service index only on Fridays (Büyükşalvarcı, 2010), negative return on Mondays (Białkowski et al., 2012). Briefly, in almost all of the studies, the effect of weekend holidays on stock returns is negative on the first transaction day (Monday) after the holiday, and positive on the last transaction pre-holiday day (Friday), and it is seen that this effect is including Tuesday and Thursday in many studies.

2.3.1.2. Other Short Official Holiday (One-Day Holiday) Effect

In this study, although they vary from country to country, the holidays that consist mostly of 1 day and may called as the short National Holidays, will be called other short official holidays. One of the most common of these one-day holiday effects worldwide is the “New Year Holiday effect” or “New Year effect”. The examples of these short (one day) official holidays in Turkey can be list as National Sovereignty and Children's Day (April 23), Labor and Solidarity Day (May 1),

Commemoration of Ataturk, Youth and Sports Day (May 19), Democracy and National Unity Day (July 15), Victory Day (August 30) and Republic Day (October 29) as well as New Year's Day (January 1). In this frame, a one-day holiday effect can be defined as the observation of different returns around one-day holidays (in a few transaction days right before and after the holiday) compare to other days of the year.

In the literature, there are not many studies especially examining the one-day holiday effect, and it is seen that the current studies are especially related to the Western New Year (not Christmas holiday lasting 12 days) holiday effect, which is 1 or 1.5 days long, or it is seen that the current studies are done in the context of turn-of-the-year effect in relation to year's last transaction day and following year's first transaction day, or it is the effect that on stock market returns has been analyze for a few days, or that it is subject to research include the whole months of December and January. Therefore, it can be said that these studies carry on in the context of the turn-of-the-year effect and examining the days near the beginning of the year also concern the Western New Year holiday effect, namely the one-day official holiday effect, and positive pre and post effect around one-day short official holidays is found in these studies (Berges et al. 1984; Chan et al., 1996; Bildik, 2000).

In the study of Keim (1981) who work with the average stock return data between 1963-1979, it is shows that the average returns are higher in small businesses trading on the AMEX and NYSE exchanges on the first transaction day after the New Year holiday.

In the study of Roll (1983) who work with the average stock return data between 1963-1980, it is shows that the small businesses trading on the stock exchange has a significantly higher return on the last transaction day before New Year holiday.

In the study of Chan et al. (1996), it is determined that there is no pre or post Western New Year holiday effect on Malaysia, India, Singapore and Thailand stock returns.

In the study conducted by Dodd and Gakhovich (2011) with the average returns of Central and Eastern European (CEE) countries (totally 14 countries) between 1991 and 2010, average returns are found to be significantly higher on last transaction day before New Year holidays ($p<0.01$) and on first transaction day after New Year holidays ($p<0.05$) for data belong to all countries. In the study, pre- and post-holiday effects are examined for only one day.

When we summarize the above studies that concern the effect of other short-term (1-1.5 days long) public holidays other than a 2-day weekend holiday, in almost all of these studies, we see positive pre and/or post effects. These are positive pre and post effects in most of the studies (Berges et al., 1984; Chan et al., 1996; Bildik, 2000; Dodd and Gakhovich, 2011), while a positive post effect in one study (Keim, 1981) and a positive pre effect in one study (Roll, 1983). However, there is no one-day holiday effect in one study (Chan et al., 1996).

2.3.2. Long Holiday Effect

In this study, the holidays equal to and more than 3 days are accepted as the long holidays. Long holiday effects can be listed as (1) Christmas holiday effect, (2) Asian New Year holiday effect and (3) Islamic religious holiday effect.

2.3.2.1. Christmas Holiday Effect

Christmas holiday is a religious holiday peculiar to the Christian community and officially covers 12 days from December 25 to January 5. In this frame, the Christmas holiday effect can be defined as the observation of different returns

around the Christmas holiday (in a few transaction days right before and after the holiday) compared to other days of the year.

In the study of Lakonishok and Smidt (1988), an unusual increase in stock returns before the last day of December and Christmas holidays. According to this, the average returns before these holidays are 0.220% and the returns on normal days are 0.0094%. According to the results, it is show that the average returns before these holidays are 23 times higher than those of normal days.

In the study of Chan et al. (1996), it is show that there is no Christmas effect on Malaysia stock market returns.

In the study of Xueyu and Jia (2002) on the Shanghai Stock Exchange with daily data of a period of 11 years including 1991-2002 New Years, there is a positive and significant Western New Year holiday effect in 8 out of 10 indexes for 12 new years before and after the new year. However, due to the fact that the length of the Western New Year holiday varies between 2-5 days in the relevant study and the average length of 3.6 days, it is consider that appropriate to evaluate within the scope of the long holiday effects on stock market returns, thus it is take part of the heading of the Christmas holiday effect.

In the study of Dodd and Gakhovich (2011) with average returns of CEE countries (totally 14 countries) between 1991 and 2010, average returns are significantly higher on last transaction day before Christmas holidays ($p<0.01$) and on first transaction day after Christmas holidays ($p<0.10$) for data belong to all countries. In the study, pre- and post-holiday effects analyzes for only one day.

In the study of Ahmad Al-Smadi et al. (2017), there is a positive significant Christmas effect. However, in the study, it is not clear that for how many days the effect is analyzes before or after Christmas.

When we summarize the findings of the above-mentioned studies regarding to Christmas holiday effect, we see positive pre- and post-holiday effect in most of the studies (Xueyu and Jia, 2002; Dodd and Gakhovich, 2011; Ahmad Al-Smadi et al., 2017), while a positive pre-holiday effect in one study (Lakonishok and Smidt, 1988) and no pre- or post- effect in one study (Chan et al., 1996).

2.3.2.2. Asian New Year Holiday Effect

Today, China has an important share in the world economy. Therefore, China's long holiday period, known as the Chinese New Year, is effective in both country and world trade. China's New Year holiday, which is mostly known as Spring Festival, is officially celebrating for 7 days today. It is widely accepted as a traditional holiday and hard to categorize as religious. However, some weak influences of Taoism and Buddhism are seen during the festival. In determining this holiday, the cycles of the moon are taken as a basis just like in the religious holidays of Muslims, but the dates and durations are different. Namely, China's Spring holiday is celebrated as 23 days in total in the past, starting on the 23rd day of the last month of the lunar year and ending on the 15th day of the first month of the lunar year. However, today, officially, according to the lunar calendar, it starts from the last day of the last month of the year and ends at the end of the 6th day of the first month of the year, that is, it is celebrating as 7 days. In this frame, the Asian New Year Holiday effect can be defined as the observation of different returns around Chinese New Year (in a few transaction days right before and after the holiday) compare to the other days of the year.

In the study of Wong et al (1990) with data from 1970-1985, the study shows that there is a significant and positive Chinese New Year effect on the Malaysian stock market returns. The effect is observed on a monthly basis (for the last month and the first month of the lunar calendar).

In the research of Chan et al. (1996) working with daily stock returns to determine the impact of cultural and other public holidays on the stock exchanges of 4 Asian countries (Singapore, Malaysia, Thailand and India), there is a positive and significant Chinese New Year effect on Singapore and Malaysia stock returns. In the study, the effect of Chinese New Year is analyzed for 3 transaction days before and 3 transaction days after the holiday.

In the study of Ahmad and Hussain (2001) using the Singapore stock market returns between 1986-1996, it is shows that there is no significant effect before the Chinese New Year, but the daily stock returns after the Chinese New Year are significantly higher than they are at other days of the year. In the study, the effect of Chinese New Year is analyzed for 7 transaction days before and 7 transaction days after the holiday.

In Yuan and Gupta's (2014) research on stock exchanges in major Asian countries such as Taiwan, Japan, Hong Kong, Malaysia, China and South Korea in order to determine whether they have a Chinese New Year holiday effect by using daily data between September 1999 and March 2002, it is shows that the stock returns are significantly higher before the holidays. In the study, the effect of the Chinese New Year holiday is analyzed for 3 transaction days before and 3 transaction days after the holiday.

In a study of Abidin, Banchit, Sun and Tian (2015) with data from South Korea, New Zealand, Singapore, Hong Kong, Taiwan, Japan, Malaysia exchanges between 1992-2011 to determine whether there is a Chinese New Year effect on the Asia-Pacific stock exchanges, there is a significant positive effect before the holiday in Singapore, Hong Kong, Taiwan, Japan and Malaysia, and no significant Chinese New Year effect in New Zealand and South Korea.

In many other studies in the literature (Len et al., 1992; Brown et al., 2002; Cao, Premachandea, Bhabra, and Tang, 2009, cited by Abidin et al., 2015), the stock

market returns in the days near the Chinese New Year are significantly higher than the ones on other days of the year.

When we summarize the findings on the Asian New Year effect, we see a completely positive effect in all studies. They can be listed as positive pre- and post-holiday effect (Wong et al., 1990; Chan et al., 1996), positive pre- or post-holiday effect (Len et al., 1992; Brown et al., 2002; Cao et al., 2009, cited by Abidin et al., 2015), positive post-holiday effect (Ahmad and Hussain, 2001), positive pre-holiday effect (Yuan and Gupta, 2014; Abidin et al., 2015).

2.3.2.3. Islamic Religious Holiday Effect

Religious holidays in Muslim countries are determined according to the 354-days Hijri Calendar (Lunar calendar). 354.3 days (354 days 8 hours 48 minutes 34.68 seconds) are the total duration to complete the full 1-year cycle of the moon around the sun. The names of months are different in Hijri Calendar. Ramadan month is the 9^{th} month in Hijri Calendar. After the end of Ramadan month, a feast named Ramadan Feast is celebrating for 3 days. 69 days after the end of Ramadan month or 66 days after the Ramadan Feast, Sacrifice Feast is celebrating for 4 days. Sacrifice Feast start at 10^{th} day of Zilhicce month which is 12^{th} and last month of Hijri Calendar. These durations are determining by Islam religion and stable as 3 days for Ramadan Feast and 4 days for Sacrifice Feast. However, as we mentioned before, these religious holidays can be longer than 4 days when combine with a single weekend holiday before or after them even 9 days if they are combined with both weekend holidays before or after them. This situation may vary from country to country. In our study, an average religious holiday is found to be 6.2 days (min.:3, max.10 days) in the 21 years (01.01.1999-31.12.2019) examined in Turkey. In this frame, the Islamic religious holiday effect can be defined as the observation of different returns around Islamic religious holidays (in a few transaction days right before and after the holiday) compare to other days of the year.

In the research of Wong et al (1990) with data from 1970-1985, there is a significant and negative effect after the Ramadan Feast on Malaysia stock market returns, where the official religion is Islam. However, in the study, the comparison of the data of Ramadan, which is the 9th month of Hijri calendar, and the data of Shawwal (10th month of Hijri calendar) which starts after the month of Ramadan and includes at least 3 days of Ramadan Feast, are made. In other words, it should be kept in mind that the results may be due to the high pre-Ramadan returns, since the data before and after the Ramadan feast are not comparing with the data in the remaining times of the year. Nevertheless, the relevant study points to a significantly lower return when compare to the previous month in the whole Shawwal month after the Ramadan holiday. Chan et al. (1996) also shows this finding in their work. They make inferences that they have the same result (i.e. that Ramadan holiday has a significant negative post effect on Malaysian stock market returns) when they narrow the dataset to 1974-1985 in their studies that they work with daily data to determine the effect of cultural and other public holidays on the stock market returns. However, they also conclude that this significant effect disappears between 1986-1995 and that they do not have a significant result with expanded dataset for the 21-year the dataset between 1974-1995.

In the study of Oğuzsoy and Güven (2004) in order to determine the impact on religious days (Holidays of Ramadan Feast and Sacrifice Feast) of stock market returns in Turkey by using BIST 30 and BIST 100-day index returns in the 12 years covering the years 1988-1999, analyzes non-cumulative returns of 3 days before the holiday for pre-holiday effect and 2 days after the holiday for post-holiday effect. In the study, it is shows that the daily average returns of the Bist100 index are only positive for the 2nd transaction day (pre2nd) before the holiday (8.1 times higher than the average return on normal days). In addition, in the study, the returns perform 3.2 times that of normal days on the last transaction day before the holiday (pre1st), and 2.9 times that of normal days on the first day after the holiday (post1st) but they are not significant. It is also shows that the 3rd transaction day before the holiday is almost the same as the normal days in a negative direction, and that there

is a little more than half of the normal days on the 2nd transaction day after the holiday, and that these returns do not differ significantly from normal days. Therefore, in the related study, it is seen that the significant effects of religious holidays in Turkey between 1988-1999 before the holiday is only on the 2nd day and in a positive direction.

In the study of Białkowski et al. (2012) to determine the effect of Ramadan on stock returns in 14 Islamic countries (Bahrain, Egypt, Indonesia, Jordan, Kuwait, Malaysia, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Tunisia, Turkey and United Arab Emirates) with a population of Muslim people more than 50% for the period 1989-2007 by using Panel Data analysis, it is shows that the average returns during the entire month of Ramadan before the Ramadan holiday increasing significantly and performs 9 times positively when comparing to the other days of the year. It is also showed that this increase continues its effect for 8-9 transaction days following the Ramadan holiday, also that daily stock volatility decreased during the month of Ramadan then increased for 14 business days after the end of the Ramadan holiday. In the study, it is finding that the effect of Ramadan feast holiday on stock market return is positive and significant for a dataset containing all 14 countries for 21-22 transaction days before and 8-9 transaction days after the holiday. Furthermore, when the effect is analyzes in a country basis in the study, it is significant only for Saudi Arabia and the UAE, while not significant for other countries including Turkey.

In the study of Majeed et al. (2015) in the 13 years covering 2001-2012, using simple regression (OLS) and ARIMA analysis to determine the effect of religious days (Ramadan month, Ramadan feast, Sacrifice feast, Eid-Melad-un-Nabi and Ashura) on the Pakistan stock exchange, using the data which is the average return of 5 transaction days before religious days and the average return of 5 transaction days after religious days. In the study, only the pre-effects of Ramadan Feast ($p<0.01$), Ashura ($p<0.10$) and Ramadan month ($p<0.10$) are significant on stock return, and these effects are in a positive direction.

In the research of Elyanti (2016) in the 5 years covering the years 2010-2014, using one-sample and paired t-test to determine whether Ramadan Feast has an impact on Indonesia stock exchange returns 10 days before and 10 days after the holidays, significant negative impact on the 3rd and 9th transaction days after the holidays for 2010, significant negative impact on the 5th transaction day after the holidays for 2011, significant positive effect on the 9th day after the holidays for 2013, significant negative effect on the 1st transaction day after the holidays for 2014, significant negative effect on the 5th transaction day before the holiday for the whole dataset covering the years 2010-2014 while there is no significant pre- or post-holiday effect for 2012. Therefore, in the study, it is shows that negative (1st, 3rd, 5th and 9th days) and positive (9th days) effects for the days after the holidays, and that there is a significant return on 5th day before the holiday for the dataset covering all the years, and that the pre and/or post effect analyzes on a day-by-cumulative basis. It can be inferred that the significant effect, which is mostly negative after the holidays, it is disappear for the whole dataset regarding to post-effects and the significant negative pre-effect on the whole dataset is only on the 5th day before the holiday.

In the research of Hinawati (2016) in the 6 years covering the years 2009-2014, using an independent t-test to determine whether Ramadan Feast has an impact on Jakarta Islamic Index returns one week before and after holidays, and it is shows that negative effect before the holiday and a significant positive effect after the holiday. In the study, the holiday effect is comparing with the weekly average returns on a weekly average basis to include the days of the last transaction week before the holiday for pre-effect and to include the days of the first transaction week after the holiday for post-effect.

In the research of Ali, Akhter and Ashraf (2017) to determine the effect of religious days (Ramadan month, Ramadan Feast, Sacrifice Feast, Eid-Melad-un-Nabi and Ashura) in 4 Asian stock markets (Turkey, Saudi Arabia, Bahrain and Pakistan), where Muslims constitute more than 90% of the population, in the 15 years covering

2001-2014, in which pre-and post-effects are taken as 1 transaction day and using panel data analysis, it is shows that Ramadan month, Ramadan Feast and Sacrifice Feast has a significant pre and post-effect on the stock returns and the direction of this effect is positive in the models that are free from day-of-the-week and turn-of-the-year effects and the direction of the effect is positive. However, only the Ramadan feast holiday has a significant and positive effect on stock returns on the final model, which is free from day-of-the-week and turn-of-the-year effects.

In their research conducted by Al-Khazali et al. (2017) in 14 Islamic countries to determine the effect of Ramadan and Ramadan Feast on stock returns, daily stock returns of 10-year period between 2006-2015 and 7 transaction days after the feast are used for the effect after the Ramadan feast. In the study, it is found that the average stock returns of 7 days after the Ramadan holiday are significantly higher in 4 countries (UAE's Dubai and Abu Dhabi stock exchanges, Oman, Qatar and Tunisian stock exchanges) compared to other days of the year. In 10 countries (Bahrain, Egypt, Indonesia, Jordan, Kuwait, Malaysia, Morocco, Pakistan, Saudi Arabia and Turkey in the stock market), there is no significant difference for the post-holiday effect regarding Ramadan Feast. Al-Khazali et al. (2017) state that in Islamic countries, new clothes for feast, food, drinks and gifts are bought for the guests who will come to the feast celebration, just before the Ramadan feast holiday. Therefore, they state that investors are able to allocate less time and capital to stock market investments, and therefore their stock returns and volatility may decrease before the religious holidays. In addition, these researchers state that after the Ramadan feast holiday, investors focused on stock markets and stock exchange returns and volatility could increase after the holiday.

In the research of Sitorus (2019) in Indonesia and S. Arabia stock exchanges in order to determine the effect of Ramadan feast holiday on stock market index prices, daily average returns and volatility for 10 days before the holiday and 10 days after the holiday in the 5 years covering the years 2014-2018, the results show that the stock returns after the Ramadan feast holiday decreases significantly compare to

the ones before the holiday. Since only 10 transaction days before the holiday and 10 transaction days after the holiday are comparing with each other in the relevant study, there is no such attempt as comparing the stock returns before or after the holidays with other days of the year. Nevertheless, the findings in the study can be partially interpreted as higher returns before religious holidays and/or lower returns after religious holidays. In addition, it can be considered that the 5-year data window analyzes in the research is not sufficient so that the results of the study shows that the data must be analyze for a wider period in order to be free of random effects.

When we summarize the findings on Islamic religious holidays' effect, we see positive pre- and post-holiday effect for Ramadan Feast (Białkowski et al., 2012; Ali et al., 2017), a positive pre-holiday effect for Ramadan Feast (Oğuzsoy and Güven, 2004; Majeed et al., 2015), a negative pre-holiday effect for Ramadan Feast (Elyanti, 2016; Hinawati, 2016), a positive post-holiday effect for Ramadan Feast (Hinawati, 2016; Al-Khazali et al., 2017), a negative post-holiday effect for Ramadan Feast (Wong et al., 1990; Sitorus, 2019), no pre- or post-holiday effect for Ramadan Feast (Chan et al., 1996), no post-holiday effect for Ramadan Feast (Al-Khazali et al., 2017), positive pre- and post-holiday effect for Sacrifice Feast (Ali et al., 2017), no pre- or post-holiday effect for Sacrifice Feast (Oğuzsoy and Güven, 2004; Majeed et al., 2015).

2.3.2.4. Past Researches on Holiday Effect Covering All Official Holidays

Apart from the before-mentioned studies searching different holiday effect on stock returns, there are also studies covering the effects of all official holidays. As these studies cannot be grouped in the before-mentioned classifications, it will be better to summarize them under such a separate title.

In the study of Lakonishok and Smidt (1988) with the 90-year DJI data, the returns one day before and after the official holidays in the United States of America (USA)

are analyzed and there are significantly positive returns for the last transaction day before the holidays. In the mentioned study, it is determined that the returns for the first transaction days after the holidays do not differ significantly until 1952, but are significantly higher between 1952-1986. The study shows that the pre-holiday effect has become permanent over time, although other calendar effects do not show continuity in terms of different returns in normal days.

In the study of Pettengill (1989) with average returns of New York Stock Exchange between 1962-1986, it is shows that the average stock returns are significantly higher on the last transaction day before the holidays. In the related study, one of findings that the average return is significantly higher on the first transaction day after the holidays if the day is the last day before the closing of the week (Friday).

In another study of Ariel (1990) with the average returns of DJI between 1963-1982, and in which the market returns are analyzes before the holidays, it is shows that stock prices increase before the holidays, and positive returns are significantly higher especially in the last hour of the day before the holiday. In the study, the average return of stocks on the days before the holidays is 0.528%, and the average return on the days after the holidays is 0.059%. According to these results, the average of the pre-holiday return is 9 times higher than the average post-holiday return. This is a strong proof of the existence of a holiday anomaly. Ariel (1990) also find that these high returns are in the session the day before the holiday and peak in the last hour.

Between 1971 and 1987, Agrawal and Tandon (1994) find that pre-holiday returns are large and significantly positive in 11 of the 18 countries exchanges. These returns are higher than the average daily returns in these countries.

In the study of Kim and Park (1994) with average return data of NYSE, AMEX and NASDAQ in the USA between 1963-1986, and in the UK and Japan between 1972-

1987, the higher returns are found on the last transaction day before official holidays.

In the study conducted by Menue and Pardo (2004) with average returns of stocks traded on Spain's SSE stock exchange between 1990-2000 (also those trading on the stock exchanges in NYSE in ABD and FSE in Germany), the results show that the high returns on the last transaction day before official holidays.

In the study of Dodd and Gakhovich (2011) with average returns of the CEE countries (totally 14 countries) between 1991 and 2010, the results shows that average returns are significantly higher on last transaction day before official holidays ($p<0.01$) and on first transaction day after official holidays ($p<0.05$) for data belong to all countries. In the study, while the effect before the holiday decrease over time, effect after holiday persistent over time. In the study, where pre- and post-holiday effect is analyzes only for one day and on a country basis. Consequently, there are significant high returns in Croatia, Estonia, Hungary and Russia for pre-holiday effect and in Estonia, Poland and Romania for post-holiday effect.

In studies (Özmen, 1997; Bildik, 2000; Çinko, 2006) carried out on the stock market in Turkey, the similar results appear in parallel with the studies in international markets.

Özmen (1997) determines the average return of two days before the holiday as 0.4411% and the average return of the two days after the holiday as 0.0315% in his study for 37 public holidays in the period of January 1988-June 1996. According to these results, the returns before the holidays are 14 times higher than the returns after the holidays. In addition, Özmen (1997) find that the return of two days after the holidays is 5.5 times higher than the returns of normal days. According to these results, it is revealed that the holiday effect appear in the stock exchanges of other countries is also appear in the ISE.

Bildik (2000) analyzes that the presence of the holiday effect in the ISE in the period 1988-1998. He uses a data which is the last 5 transaction days before the holiday and 5 transaction days after the holiday in his study by considering 56 holiday periods. The returns are high and positive on the 2nd and 3rd transaction days, and negative on the 4th and 5th transaction days before the holidays; positive and high in the 2nd, 3rd and 5th transaction days, and negative in the 1st and 4th transaction days after the holidays. The researcher states that, together with the high returns before the holiday, specific decreases and rises before and after the holidays will allow them to gain additional earnings if they are taken into account by the investors. As possible causes of this effect in ISE, investors refrain shows from trading due to settlement time, close markets, and re-adjusting their portfolios and securities stocks just before the markets close due to holiday.

In the study of Çinko (2006), the ISE 100 index returns between October 8, 1990 and November 16, 2005 where the returns are calculated by taking the logarithmic differences of day closings, the data set is divided into two as the period when the swap period is one day and two days. In the study, the claim that the returns of the pre-holiday period are higher than after the holiday and no difference between the returns of the two days before the holiday and the two days after the holiday. The pre-holiday return is also compared with the returns of normal days and there is no difference between the returns.

When we summarize the findings on all official holidays' effect, we see positive pre- and/or post-holiday effect in most of the studies. The results are positive pre- and post-holiday effect (Lakonishok and Smidt, 1988; Pettengill, 1989; Özmen, 1997; Dodd and Gakhovich, 2011), positive pre-holiday effect (Ariel, 1990; Agrawal and Tandon, 1994; Kim and Park, 1994; Bildik, 2000; Menue and Pardo, 2004), negative pre-holiday effect (Bildik, 2000), no pre-holiday effect (Agrawal and Tandon, 1994; Çinko, 2006), positive post-holiday effect (Bildik, 2000), negative post-holiday effect (Bildik, 2000), no post-holiday effect (Lakonishok and Smidt, 1988; Pettengill, 1989; Çinko, 2006).

CHAPTER THREE

MOTIVATIONS AND HYPOTHESES OF RESEARCH

In this Chapter, the motivations and hypotheses of this research will be presented.

3.1.Motivations of Research

There are many studies on holiday effect on stock market returns in domestic and foreign literature. The findings on Islamic religious holidays' effect show positive pre- and/or post-holiday effect for religious holidays (mostly for Ramadan feast). In these studies, positive pre- and post-holiday effect for Ramadan Feast (Białkowski et al., 2012; Ali et al., 2017), positive pre-holiday effect for Ramadan Feast (Oğuzsoy and Güven, 2004; Majeed et al., 2015), negative pre-holiday effect for Ramadan Feast (Elyanti, 2016; Hinawati, 2016), positive post-holiday effect for Ramadan Feast (Hinawati, 2016; Al-Khazali et al., 2017), negative post-holiday effect for Ramadan Feast (Wong et al., 1990; Sitorus, 2019), no pre- or post-holiday effect for Ramadan Feast (Chan et al., 1996), no post-holiday effect for Ramadan Feast (Al-Khazali et al., 2017), positive pre- and post-holiday effect for Sacrifice Feast (Ali et al., 2017), no pre- or post-holiday effect for Sacrifice Feast (Oğuzsoy and Güven, 2004; Majeed et al., 2015). However, it is seen that almost every study uses different methodological approaches and analysis techniques. In some studies, the effect is analyzing only before or after the holiday, while both before and after the holiday in some studies. In many studies, while different series of datasets for different holiday types and countries, very few studies are based on the single series of dataset. In these studies, there is also no consensus on how many days should be use to examine the impact before and/or after the holiday and whether the impact should be analyzed cumulatively for a group of days or together for pre- and post-holiday or separately for each day. When it comes to the effects of religious holidays on stock market returns, this approach differences continues, and in these

studies, analyzes mostly on the basis of religious days, not on religious holidays, but they are mostly focuses on Ramadan month (not on the feasts of Ramadan and Sacrifice which are quite long-lasting holidays and have different structure as they are holiday, not holy day as Ramadan month is) in almost all of these studies. A single previous study (Oğuzsoy and Güven, 2004), which analyzes the effects of Ramadan and Sacrifice holidays on stock returns in a single dataset. In this study, the data between 1988 and 1999, 3 transaction days before the holiday and 2 transaction days after the holiday are analyzes, the analysis is not on a cumulative basis, pre and post effects are analyzed separately. Therefore, there is no study that accepts Ramadan and Sacrifice holidays as a single dataset and analyzes these 4 days before and after these religious holidays as cumulative (not on a daily basis) as well as no study investigating pre- and post-effects in each model together. These reasons have been the main source of motivation in conducting such a study.

3.2.Hypotheses and Expected Results

In line with the results in the literature, due to the positive effect of behavioral finance approach in the last transaction days before and next first transaction days after the long and religious holidays such as the feast of Ramadan and Sacrifice, it should be expected that average return rates on the stock exchange are higher in the transaction days before and after the religious holidays as well as a higher percentage of positive returns than the returns in normal days. However, it should be taken into consideration that individuals may need cash for their holiday expenses before long holidays, that individuals may be less likely to keep their savings in investment instruments for long-term investments especially in developing and undeveloped countries. As in the study of Al-Khazali et al. (2017) and mentioned before, in Islamic countries, new clothes for feast, food, drinks and gifts are buying for the guests who will come to the feast celebration, just before the Ramadan feast holiday. Therefore, they state that investors are able to allocate less time and capital to stock market investments, and therefore their stock returns and volatility may decrease before the religious holidays. This might be valid for

most of the individual and religious persons but not for the professional fund managers. In addition, these researchers state that after the Ramadan feast holiday, investors focus on stock markets and stock exchange returns and volatility can increase after the holiday. For this reason, the individual investors in Muslim countries can convert all or some of its investments to cash before the holidays (specifically 1 day before the religious holidays) and they can evaluate all or part of the existing cash in its investment instruments after the holidays. This may have an undeniable effect in cases where individual investors make up the majority of the trading volume. As a matter of fact, it is seen that individual investors are dominant in the transaction volume of BIST. According to the data in "BIST Trends Report" published by Central Securities Depository (CSD) of Turkey and Turkish Investor Relations Society (TUYID) at the end of each quarter since 2012, foreign investors had 30% and domestic investors had 70% share in the transaction volume in the whole of BIST in 2018. At the end of December 2019, almost all (99.2 percent) of domestic investors in Borsa Istanbul are individual investors. In the report of the same name at the end of 2019, individual investors constitute the same proportion (99.5 percent) of the domestic investor, while individual investors hold 50% of the portfolio value and constitute 81 percent of the annual transaction volume. Looking back at the transaction volume share of domestic/foreign investors in the fourth quarter reports, it is reported as 75/25 percent in 2017 and 2016, 78/22 percent in 2015, 80/20 percent in 2014 and 2013, and 82/18 percent in 2012 (CSD of Turkey and TUYID, 2012-2019). Therefore, when we assume that the behavioral tendencies in the study of Bouri et al (2017) are valid for individual and religious investors and that the 8-year period covering the years 2012-2019 reflects the last 20-year period of the ISE, it is understand that domestic individual investors constitute approximately 3/4 of the transaction volume of the BIST, so that the psychological behavior of the individual investor can significantly affect the Bist index prices and daily returns. Thus, holiday spending of the investors in Turkey may cause them to leave the stock exchange 1 day before long holidays, spend some of their cash during the holiday, and re-evaluate their remaining cash as an investment in the stock market. Thus, the stock market investors will have to earn

more income than they spend during the holiday in order to create positive returns both on the last transaction day before long holidays and the first transaction day after long holidays, which does not seem very likely. Consequently, the possible combined effect of the above-mentioned situations may be an increase in Bist returns before and after religious holiday except a decrease in the last transaction day before holidays.

Accordingly, the research's hypothesis is as follows:

H1: The daily average rates of return in the stock market is significantly negative before and positive after the religious holidays in Turkey.

CHAPTER FOUR

DATA AND SAMPLE DESCRIPTIONS

The dataset of the research will be the daily average return data of the BIST 100 index. BIST 100 Index - also called as Borsa Istanbul 100 Index or XU100:IND or ISE 100 Index- is using as the main index for the Borsa Istanbul Stock Market. It consists of 100 shares selected among companies trading in BIST Star and includes shares including in BIST 30 and BIST 50 Indices (Borsa Istanbul, 2020).

In the calculation of daily average returns of the stock market, the daily closing prices of the ISE, taken from Bloomberg Terminal (2020), between the dates 01.01.1999-31.12.2019. In order to calculate the daily average return for the relevant day, as shown in Equation 1, the natural logarithmic value (ln value) of the closing price of *t-1*. The day is subtracting from the natural logarithmic value (ln value) of the closing price of the *t.* day.

$$R_t = [\ln(PI_t/PI_{t-1})] = \ln(PI_t) - \ln(PI_{t-1}) \qquad \text{(Equation 1)}$$

Here;
R_t: Daily Average Return for Day t
$\ln(PI_t)$: Natural logarithm value (ln = loge) of the Price Index (Closing Price) for Day t
$\ln(PI_{t-1})$: Natural logarithm value (ln = loge) of the Price Index (Closing Price) for Day t-1 (one day before the Day t)

Using the natural logarithm of the data is important in terms of minimizing the changing variance (heteroscedasticity) problem, helping to prevent serial correlation and facilitating the coefficient estimation.

In order to determine the last transaction day before and the first transaction day after the Ramadan and Sacrifice Holidays, the information about the dates of the relevant religious holidays for the period of 1999-2019 are taken from the List of Religious Days on the website of The General Directorate of Religious Services of Presidency of Religious Affairs of Turkish Republic (2020). In the daily historical data taken from Bloomberg Terminal (2020), successive dates that include these dates and become definite as the official holiday interval for the stock exchange are marked as the last transaction day before the holiday and the first transaction day after the holiday.

Descriptives of all daily average return data is given in Table 3.1 and Figure 3.1.

Table 4.1. Descriptives of all daily average return data

The table represents the descriptive statistics of all daily average return data between **01.01.1999-31.12.2019** and includes **5258** observations in total.

Descriptives	**All Daily Average Returns**
Mean	0.0007
Median	0.0008
Min.	-0.1998
Max.	0.1777
St. Deviation	0.0217
Kurtosis	10.9514
Skewness	0.1495
Sum	3.7852
Count	5258

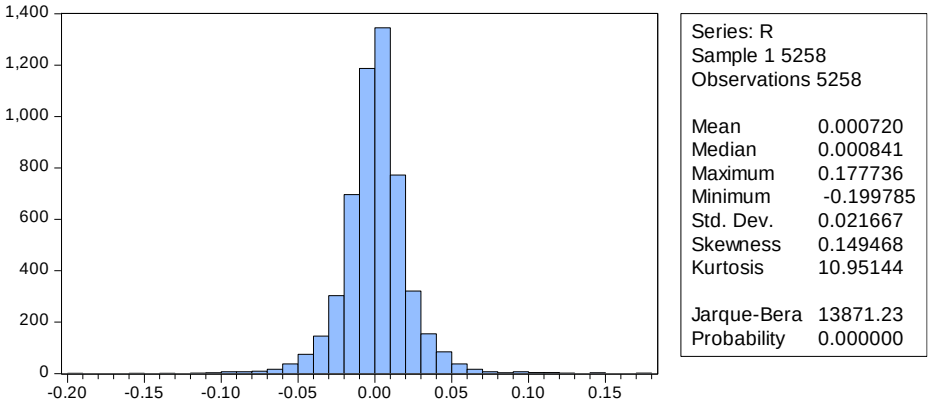

Figure 4.1. Histogram graph of the natural logarithm of average returns of BIST 100 Index

As seen in Table 4.1 and Figure 4.1, the mean of the daily average return of BIST 100 Index is 0.000720 (i.e. %0.072) in the time interval of 21 years (1999-2019). The minimum value is -0.1998 (i.e. %19.98 lost) while the maximum value is 0.1777 (i.e. %17.77 profit). The Kurtosis value is 10.9514 which indicates that the tails of series are heavier than a normal distribution (valid in the case that the value>3). When looking at the histogram graph of the series given in Figure 4.1, the wider tail (leptokurtic) feature which is another feature related to finance series is seen. The histogram reveals that the skewness of the average return series is close to zero, but the kurtosis is very high, so the series shows wider tails. Jarque-Bera statistic shows that the basic hypothesis established as "H0: There is no deviation from normality" for $p>0.05$ will be reject since the probability value is seen in Figure 4.1 is 0.000000 ($p<0.01$). In other words, as can be easily understand from the Jarque-Bera test statistic value, it is seen that the residues standardized are not normally distributed at the level of $p<0.01$ significance.

Table 4.2. Descriptives of daily average return data for pre- and post-holiday days in case of separate effects of the days

The table represents the descriptive statistics of daily average return data for pre- and post-holiday days in case of separate effects of the days between **01.01.1999-31.12.2019** and includes **44 observations** in each pre- or post-day.

	Pre4th	**Pre3rd**	**Pre2nd**	**Pre1st**	**Post1st**	**Post2nd**	**Post3rd**	**Post4th**
Mean	0.0008	0.0010	0.0052	-0.0013	0.0021	0.0054	0.0031	0.0025
Median	-0.0432	0.3368	0.3639	0.0759	0.3115	0.6297	0.0095	0.3090
Min.	-0.0426	-0.0861	-0.0442	-0.0765	-0.0955	-0.0901	-0.0421	-0.0362
Max.	0.1410	0.0331	0.0676	0.0308	0.0908	0.0410	0.1098	0.0557
St. Deviation	0.0267	0.0214	0.0216	0.0167	0.0308	0.0231	0.0271	0.0209
Kurtosis	17.7279	5.2440	1.6012	8.9734	2.0333	5.7449	5.0682	0.5568
Skewness	3.3924	-1.5614	0.4881	-2.1916	-0.2352	-1.6240	1.6618	0.6155
Sum	0.0363	0.0428	0.2297	-0.0559	0.0927	0.2375	0.1365	0.1080
Count	44	44	44	44	44	44	44	44

When the days before the holidays are evaluate within themselves (Table 4.2), it is shows that the days with the highest average returns (Mean) are the 2nd days before the holidays (0.0052) while the minimum average return (-0.0013) is negative and in 1st days. It is also show that the highest standard deviation occurred on the 4th days (0.0267). The minimum value of the average return (-0.0861) is observed in 3rd days before the holidays while the maximum value of the average return (0.1410) is on the 4th days before the holidays (Table 4.2).

When the days after the holidays are evaluate within themselves (Table 4.2), it is shows that the days with the highest average returns (Mean) are the 2nd days after the holidays (0.0054) while the minimum average return (0.0021) is also positive and in 1st days. It is also show that the highest standard deviation occurred on the 1st days (0.0308). The minimum value of the average return (-0.0955) is observed in 1st days while the maximum value of the average return (0.1098) is on the 3rd days (Table 4.2).

When the pre-holiday and post-holiday days are compared within themselves, it is shows that the returns on the 2nd days are higher both before and after the holiday, and the average returns on the 2nd days before and after the holidays are close to each other. It is also showed that the returns on the 1st days are the lowest ones both before and after the holiday (Table 4.2).

The descriptives of daily average return data for pre- and post-holiday days in case of cumulative effects of the days towards holiday are given in Table 4.3. Cumulative effect means the effect of the returns together. The mean of cumulative returns can be shown as follows:

Pre4= (Pre4rd+Pre3rd+Pre2nd+Pre1st)/4

Pre3= (Pre3rd+Pre2nd+Pre1st)/3

Pre2= (Pre2nd+Pre1st)/2

Pre1= (Pre1st)/1

Post1= (Post1st)/1

Post2= (Post1st+Post2nd)/2

Post3= (Post1st+ Post2nd+Post3rd)/3

Post4= (Post1st+Post2nd +Post3rd+Post4rd)/4

That is, the arithmetical mean of daily returns given in the previous Table (Table 4.2) gives the mean values in this table (Table 4.3). For example, Pre2 is calculated as the sum of Pre2nd and Pre1st by dividing it by 2, i.e., [(0.0052)+(-0.0013)]/2=0.040/2=0.020. However, in the cumulative effect models, the mean of cumulative returns cannot be use as they include more than one day but daily returns use together as the all data in the series should represent just one day. Otherwise, they will represent more than one daily return together which cannot be use with other daily returns (the returns of ordinary days including just one-day return). For example; the cumulative effect of 2 days before the holiday are represents by Pre2 but in the models Pre2nd and Pre1st use together in the same series.

Table 4.3. Descriptives of daily average return data for pre- and post-holiday days in case of cumulative effects of the days towards holiday

This table represents the descriptive statistics of daily average return data for pre- and post-holiday days in case of cumulative effects of the days between **01.01.1999-31.12.2019** and includes **44*n** observations in each pre- or post-day. Here n is the number of cumulative days before or after the holiday.

	Pre4	**Pre3**	**Pre2**	**Pre1**	**Post1**	**Post2**	**Post3**	**Post4**
Mean	0.0014	0.0016	0.0020	-0.0013	0.0021	0.0038	0.0035	0.0033
Median	0.0017	0.0023	0.0020	0.0008	0.0031	0.0052	0.0024	0.0024
Min.	-0.0861	-0.0861	-0.0765	-0.0765	-0.0955	-0.0955	-0.0955	-0.0955
Max.	0.1410	0.0676	0.0676	0.0308	0.0908	0.0908	0.1098	0.1098
St. Deviation	0.0218	0.0201	0.0195	0.0167	0.0308	0.0271	0.0270	0.0256
Kurtosis	11.0826	4.4724	4.1609	8.9734	2.0333	3.0392	3.4432	3.3193
Skewness	1.0251	-0.7417	-0.2198	-2.1916	-0.2352	-0.7018	0.0670	0.1496
Sum	0.2530	0.2167	0.1739	-0.0559	0.0927	0.3302	0.4666	0.5746
Count	176	132	88	44	44	88	132	176

When the days before the holidays (pre-holiday days) are evaluate within themselves (Table 4.3), it is shows that the days with the highest daily average returns (Mean) are the $1^{st}+2^{nd}$ days (i.e., Pre2) before the holidays (0.0020) while the minimum daily average return (-0.0013) is negative and in 1st days (i.e., Pre1). It is shows that the highest standard deviation occurred on the $1^{st}+2^{nd}+3^{rd}+4^{th}$ days (0.0218) (i.e., Pre4). The minimum value of the daily average return (-0.0861) is seen in $1^{st}+2^{nd}+3^{rd}$ days (i.e., Pre3). while the maximum value of the daily average return (0.1410) is on the$1^{st}+2^{nd}+3^{rd}+4^{th}$ days (i.e., Pre4) (Table 4.3).

When the days after the holidays (post-holiday days) are evaluate within themselves (Table 4.3), it is shows that the days with the highest daily average returns (Mean) are the 1^{st}+2^{nd} days after the holidays (0.0038) (i.e., Post2) while the minimum daily average return (0.0021) is also positive and in 1st days (i.e., Post1). It is also show that the highest standard deviation occurred on the 1^{st} days (0.0308) (i.e., Post1). The minimum value of the daily average return (-0.0955) is seen in 1^{st} days (i.e., Post1) while the maximum value of the daily average return (0.1098) is on the1^{st}+2^{nd}+3^{rd} days (i.e., Post3) (Table 4.3).

When the pre-holiday and post-holiday days are comparing within themselves, it is shows that the daily average returns on the 2^{nd} days are higher both before and after the holiday, and the daily average returns on the 2^{nd} days after the holidays (0.0038) is almost as twice as the average returns on the 2^{nd} days before the holidays (0.0020). It is also show that the returns on the 1^{st} days are the lowest ones both before and after holiday (Table 4.3).

There are two religious holidays in every year in Turkey. According to Lunar calendar, the duration of holidays is 3 days for Ramadan Feasts and 4 days for Sacrifice feast. However, when they combine with weekend holidays, it ranges from 3 to 10 for Ramadan Feasts and from 4 to 10 days for Sacrifice feast. The average length of these religious holidays is found to be 6.2 days in the 21 years (01.01.1999-31.12.2019) in Turkey.

CHAPTER FIVE

METHODOLOGY

5.1.Empirical Methodology

5.1.1. Non-parametric Tests

The Non-parametric test can be applied for determining if there is a holiday effect or not. In the non-parametric chi-square test; the ratio of the number of positive returns to the number of all returns in the transaction days before and after the long holidays use for determining the holiday effect.

The ratio of the number of positive returns to the number of all returns on the last transaction day before the long holidays calculate as shown in Equation 2:

$$\text{PreHoliday Effect as Percentage} = \frac{\text{PreHoliday Positive Returns}}{\text{PreHoliday All Returns}} \qquad \text{(Equation 2)}$$

The ratio of the number of positive returns to the number of all returns on the first transaction day after the long holidays calculate as shown in Equation 3:

$$\text{PostHoliday Effect as Percentage} = \frac{\text{PostHoliday Positive Returns}}{\text{PostHoliday All Returns}} \qquad \text{(Equation 3)}$$

In the chi-square test, the path proposes in the studies of Ariel (1990) and Dodd and Gakhovich (2011) is applied. Accordingly, X^2 statistics will be calculate as shown in Equation 4 to test whether the positive return rate before or after long holidays is significantly different from the positive return rate in all days.

$$X^2 = \frac{2(O-E)^2}{2} \qquad \text{(Equation 4)}$$

Here;

O: Observed value of positive returns before or after holidays.

E: Expected value of positive returns before or after holidays.

5.1.2. Parametric Tests

Parametric tests in variance are divided into two as linear models and nonlinear tests. The most well-known linear model is a multivariate regression model with OLS. Symmetrically effective models are ARCH, GARCH, ARCH-M, GARCH-M models while the most using and known asymmetric models are TARCH and EGARCH models.

5.1.2.1. Multivariate Regression Model

Regression analysis is the explanation of the relationship between two or more variables one of which determine as dependent and the others as independent by using a mathematical function (Büyüköztürk, Bökeoğlu and Köklü, 2009). In this analysis technique, when a variable use as the prediction variable, it is called simple regression and if more than one variable use as the prediction variable, it is called multiple or multivariate regression analysis. With regression analysis, it is determining whether there is a relationship between dependent and independent variables, not whether there is a relationship between variables (Nakip, 2003).

In the multiple regression model, there is more than one factor affecting the dependent variable. For the multiple regression model, the main regression model express as follows (Çınar, 2018):

$$Y_t = \alpha_0 + \alpha_1 X_{t1} + \alpha_2 X_{t2} + \alpha_3 X_{t3} + \alpha_4 X_{t4} + \cdots . + \alpha_k X_{tk} + u_t \qquad \text{(Equation 5)}$$

In the above equation, more than one time-dependent variable (Xt_1, Xt_2, Xt_3, Xt_4, ….Xt_k) is using to estimate the time dependent Y_t variable. Yt is estimated by assuming that these variables are factors affecting Yt. The ordinary least squares (OLS) method is commonly use to estimate the error term.

In equation 5, $\alpha_0 + \alpha_1 X_{t1} + \alpha_2 X_{t2} + \alpha_3 X_{t3} + \alpha_4 X_{t4} + \cdots . + \alpha_k X_{tk}$ indicates the systematic part, and u_t shows the stochastic part. The deterministic part in the equation shows the conditional expected value, that is, the estimate relationship. In multiple regression, although the regression function defines by the population, it is mostly not measure by the population. However, the sample can be estimate from the regression function. Minimizing the sum of the squares of error terms is the main goal of the OLS estimator. In order to determine whether the sum of squares of error terms is minimum, partial derivative is taken according to each parameter and equalized to zero. The quadratic derivative of the function must be greater than zero (Çınar, 2018).

In the classical linear regression model, the effectiveness of Ordinary Least Squares (OLS) estimators require that the variance of error terms be constant. Also, there should be no relationship between error terms. In the case of varying variance, the Gauss-Markov assumptions are no longer valid, thus the Best Linear Unbiased Estimators (BLUE) cannot be obtain within the framework of the OLS. There may be more effective estimators than OLS (e.g. Generalized Least Squares (GLS)). Although in financial data, the returns and log returns are stable over time, the variance cluster (volatility) is seen. It is seen that financial asset prices are generally not stable, while asset returns are stable and do not show autocorrelation. Financial asset returns tend to be leptokurtic. These return distributions have more skewness than the normal distribution and have wider tails. This indicates that the probability of financial time series to vary greatly is higher than the normal distribution. Another phenomenon frequently seen in financial asset returns is the volatility cluster. It is seen that big changes in return series follow big changes and small changes follow small changes. Essentially, the cases of wider tail (leptokurtic) and

volatility cluster are interrelated. Finally, market participants act differently in the face of good and bad news in financial markets. Bad news creates more volatility than good news. Therefore, the direction of the change in financial asset prices has an asymmetrical effect on volatility (Songül, 2010). In these cases, the effect is estimated using non-linear models such as ARCH family models (Engle, 1982).

5.1.2.2. GARCH Model

Nonlinear models in variance are divided into two as symmetrical and asymmetrical. Symmetrically effective models are ARCH, GARCH, ARCH-M, GARCH-M models while the most known asymmetric models are TARCH and EGARCH models.

Bollerslev (1986) introduce that the Generalized AutoRegressive Conditional Heteroskedasticity (GARCH) model by modeling conditional variance as an AutoRegressive Moving Average (ARMA) process, unlike the ARCH model. The GARCH model is the model that emerged with the development of the ARCH model. Unlike the ARCH model, it is created by adding the conditional variance's past values as a descriptive variable to the ARCH model structure plus the conditional variance equation values. The delay in the model is shown as ‘p’ for ARCH and ‘q’ for GARCH. GARCH model is preferred to ARCH model in terms of parameter stability (Bollerslev, 1986).

The GARCH model is express as follows:

$$h_t = \alpha_0 + \alpha_1 u_{t-1}^2 + \alpha_2 u_{t-2}^2 + \cdots + \alpha_p u_{t-p}^2 + \beta_1 h_{t-1} + \beta_2 h_{t-2} + \cdots + \beta_q h_{t-q}$$

Then as;

$$h_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i u_{t-i}^2 + \sum_{j=1}^{q} \beta_j h_{t-j} \qquad \text{(Equation 6)}$$

There are some conditions in this model as in the ARCH model. These conditions are as follows:

- $\alpha_0 > 1$
- $0 < \alpha_i < 1$
- $0 < \beta_j < 1$

It is necessary to fulfill the above restrictions and ensure the stationarity. The stationarity condition is given in the formula below:

$$\sum_{i=1}^{p} \alpha_i + \sum_{j=1}^{q} \beta_j < 1 \qquad \text{(Equation 7)}$$

In this equation, p and q show the GARCH order. This is express as GARCH (p, q). Here, while the 'p' in parentheses indicate how many autoregressive delays use; 'q' indicates how many lags use in the moving averages of the variables. The model is estimated by using the most likelihood method.

The most basic one is the GARCH (1,1) model and it is proposed by Bollerslev (1986). The GARCH (1,1) model is shown as follows:

$$\sigma^2 = \omega + \alpha_1 u_{t-1}^2 + \beta_1 \sigma_{t-1}^2 \qquad \text{(Equation 8)}$$

Here σ^2 indicates unconditional variance. The importance of unconditional variance is that it gives us the value that corresponds to risk. In this equation, ω shows the autonomous parameter, the part express as $\alpha_1 u_{t-1}^2$ shows the ARCH part, and the part express as $\beta_1 \sigma_{t-1}^2$ shows the estimates of variability in the past periods. u_t is the unexplainable part and also called as shock news or innovation. On the other hand, u_{t-1} refers to short-term shocks.

When $u_{t-1} > 1$, there will be positive, good news; while $u_{t-1} < 1$, there will be negative, bad news. While α_1 shows the effect of new shocks on volatility, the value of $\alpha_1 + \beta_1$ indicates the permanence of volatility. The closer this value is to 1, the more permanent it is. The closer this value is to 0, the more temporary it is (Bollerslev, 1986).

5.1.2.3. EGARCH Model

The Exponential GARCH (EGARCH) model shows the presence of leverage effect. The leverage effect is defined by Black (1976) as negative news affect and increase the volatility more than positive news. The existence of this effect is not allowed in symmetrical models. Because there is an asymmetric effect, that is, the reactions to positive and negative news are not in the same direction.

EGARCH model is developed by Nelson (1991) to explain the asymmetric volatility structure exist in financial markets. In this model, conditional variance can change not only depending on the magnitude but also the sign of the shock expose.

EGARCH model express as follows:

$$\mathrm{Ln}(h_t) = \omega + \alpha \left| \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} \right| + \gamma \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} + \beta \mathrm{Ln}(h_{t-1}) \qquad \text{(Equation 9)}$$

In this model, the parameter α shows the threshold value.

If $\frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} > 0$, the effect of shocks on conditional variance is as $\alpha + \gamma$.

If $\frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} < 0$, the effect of shocks on conditional variance is as $\alpha - \gamma$ (Nelson, 1991).

5.1.3. Diagnostic Tests

Apart from non-parametric and parametric test, some diagnostic test should be done for many purposes. First of all, the unit root test (ADF - Augmented Dickey-Fuller Test) can be conduct if the dataset is stationary or not (Dickey and Fuller, 1979; Harris, 1995; Ertek, 1996). Although the results of this test for average return series show if the dataset is stationary or not, in order to be sure or to have a double-check, a Heteroskedasticity Test (ARCH LM Test) to find whether there has been an ARCH effect or not can be run. If ADF test shows there is no unit root, it will mean that the dataset is stationary for the time interval, then GARCH and EGARCH models will be able to be estimate (Tarı, 2005; Sümer, 2013; Gümüş, 2019). Similarly, if ARCH LM Test shows that there is heteroscedasticity, it will mean there is an ARCH effect so that ARCH family models such as GARCH, EGARCH, etc. can be run (Songül, 2010). Jarque-Bera (JB) test which is based on OLS residues conduct if the residues are normally distributed or not. If they are normally distributed, it is accepted as the sign of the symmetry, otherwise asymmetry (Gümüş, 2019; Çil, 2020).

5.2.Specified Models

For Multivariate Regression Analysis of the impact before and after the holiday through daily average rates of return, the following equation (Equation 10) will be estimate using a dummy variable[1] regression, as in the studies of Cao, Premachandra, Bharba and Tang (2009) and Dodd and Gakhovich (2011):

[1] Variables have properties that can normally be measured (quantitative). But in practice, qualitative variables that cannot be measured should also be included such as gender, education, day, month, etc... When we show the dummy variable with D, it gives us a certain feature. D=1 indicates that the given feature has an effect and D=0 indicates that it has no effect. In order to show a certain feature, the D parameter added to the model takes the value 1 in the desired state and 0 in the undesirable situation. Namely; when added to a model to explain Monday, it gets 1 for Monday and 0 for other days. In terms of gender, if the characteristics of women are desired, the woman gets the value of 1 and man takes the value of 0. Briefly, the purpose of adding dummy variable is to make properties that cannot be measured in the model measurable. The following model is intended to look at the

$$R_t = \propto_0 + \propto_{PRE} D_{PRE} + \propto_{POST} D_{POST} \quad \text{(Equation 10)}$$

Here;

D_{PRE}: Dummy variable (it takes the value of 1 for the transaction days before the holiday and the value of 0 for the other days).

D_{POST}: Dummy variable (it takes the value of 1 for the transaction days after the holiday and the value of 0 for the other days).

R_t : Average return on day t

$\propto_0$: gives the average return for other days

$\propto_{PRE}$: Coefficient of average return on the transaction days before the holiday

$\propto_{POST}$: Coefficient of average return on the transaction days after the holiday

However, in order to detect a cumulative effect, including 4 transaction days before and after the holidays, the Equation 10 will be use as in Equation 11:

$$R_t = \propto_0 + \propto_{PREi} D_{PREi} + \propto_{POSTj} D_{POSTj} \quad \text{(Equation 11)}$$

where;

i = indicates the number of transaction days to be examined before the holiday and will take the value 1, 2, 3, 4. So $1 \leq i \leq 4$.

j = indicates the number of transaction days to be examined after the holiday and will take the value 1, 2, 3, 4. So $1 \leq j \leq 4$.

D_{PREi}: Dummy variable (it takes the value of 1 for *i* transaction days before the holiday and the value of 0 for the other days. *i* shows that how many days will take

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impact on the working days of the week (5 working days from Monday to Friday). This model is created as follows:

$Y_t = \alpha_0 + \alpha_1 D_1 + \alpha_2 D_2 + \alpha_3 D_3 + \alpha_4 D_4 + u_t$

Here 1 indicates Mondays, 2 indicates Tuesdays, 3 indicates Wednesdays, 4 indicates Thursdays. D_1, D_2, D_3 and D_4 dummy variables represents the days from Mondays to Thursdays, respectively and it takes 1 for the day it represented and 0 for the other days. Thus, α values gives the averages in the days it represented. α_0 values capture the average value on Fridays for which no dummy variable is included. In other words, α_0 values are for the rest of the working days which do not have a dummy in the equation (Gümüş, 2019).

the value of 1 before holidays and will range between 1 and 4. For example for *i*=3, three days before holiday will take the value of 1 while the rest will be zero).
$D_{POST\,j}$: Dummy variable (it takes the value of 1 for *j* transaction days after the holiday and the value of 0 for the other days. *j* shows that how many days will take the value of 1 after holidays and will range between 1 and 4. For example for *j*=4, four days after holiday will take the value of 1 while the rest will be zero).
R_t : Average return on day t
$\propto_0$: gives the average return for other days
$\propto_{PREi}$: Coefficient of average return on *i* transaction days before the holiday
$\propto_{POST\,j}$: Coefficient of average return on *j* transaction days after the holiday

The models specified by Equation 11, where the pre and post effects of religious holidays are searching in the same models, estimated by Ordinary Least Squares (OLS). Standard errors are calculated using Newey-West's correction.

As Engle (1982) states, the volatility effect in the return series should be addressed in order to analyze the anomalies of the holiday effect in the financial time series. In the ARCH model he developed, volatility varies over time in financial series. Returns are less volatile when the market is stagnant and more volatile during times of financial crisis. This volatility situation in financial markets cannot be handle with the simple regression model. Therefore, in this study, the effect of religious holidays on the returns by including 4 days before and 4 days after religious holidays analyzes with GARCH and EGARCH models as in the study of Chancharat et al. (2018).

The following general model pattern (Equation 12) for GARCH and EGARCH models is use to investigate the effects of the days before or after the holidays:

$$R_t = \beta_0 + \beta_1 D + \varepsilon_t \qquad \text{(Equation 12)}$$

In GARCH models, the pre and post cumulative effect will be analyzed. In this frame, the models will include 4 transaction days before and after the holidays for

pre and post effects together but including two cumulative dummy variables for each model (one for pre, one for post dummies). In this case, the Equation 12 transform into the ones given in Equation 12.1:

$$R_t = \beta_0 + \beta_{1_{PRE_i}} D_{PRE_i} + \beta_{2_{POST_j}} D_{POST_j} + \varepsilon_t \qquad \text{(Equation 12.1)}$$

where;

i = indicates the transaction days to examine before the holiday and can take the value of 4 maximum, i.e. 1, 2, 3, 4. So $1 \leq i \leq 4$. However, as cumulative effect 1 means 1 day, 2 means 2 days, 3 means 3 days, 4 means 4 days before holiday.

j = indicates the number of transaction days to examine after the holiday and can take the value of 4 maximum, i.e. 1, 2, 3, 4. So $1 \leq j \leq 4$. However, as cumulative effect 1 means 1 day, 2 means 2 days, 3 means 3 days, 4 means 4 days after the holiday.

The "Maximum Likelihood" method is use to estimate the parameters of GARCH and EGARCH models. GARCH (1.1) and EGARCH (1.1) are the most commonly known models for estimating volatility in practice. In addition, these models are considered sufficient to explain volatility characteristics of the econometric and financial time series (Hansen and Lunde, 2005).

The variance equation for GARCH (1,1) model is as follows (Equation 13) (Chancharat et al., 2018):

$$h_t = \omega + \alpha \varepsilon_{t-1}^2 + \beta h_{t-1} + \delta_{1_{PRE_i}} D_{PRE_i} + \delta_{2_{POST_j}} D_{POST_j} \qquad \text{(Equation 13)}$$

For EGARCH (1,1) model, variance equation can be written as follows (Equation 14) (Chancharat et al., 2018):

$$\ln(h_t) = \omega + \alpha \left| \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} \right| + \gamma \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} + \beta \ln(h_{t-1}) + \delta_{1_{PRE_i}} D_{PRE_i} + \delta_{2_{POST_j}} D_{POST_j} \qquad \text{(Equation 14)}$$

Here;

α: refers to the extent that the magnitude of a shock to the variance affects future volatility in average return (ARCH term).

γ: gives an insight into how the sign of the shock has an influence on the future volatility of average return (leverage effect term).

β: gives an insight into the persistence of past volatility and how past volatility helps to predict volatility in the future (GARCH term).

CHAPTER SIX

EMPIRICAL FINDINGS

In this Chapter, the empirical findings of the research will be presented.

6.1.Results of Chi-Square Tests

Chi-square tests conduct to test whether there is a significant relationship between positive (*ReturnPos*) and negative (*ReturnNeg*) returns for pre-holiday and post-holiday returns. Table 6.1 and Table 6.2 show contingency tables and Pearson chi-square test results in the case of separate effects:

Table 6.1. Chi-square test for Positive-Negative Returns between pre-holiday days and normal days in case of separate effects

	pre1st	**pre2nd**	**pre3rd**	**pre4th**	**other**	**X-squared**	**df**	**p**
ReturnPos	23				2652	0,0001	1	0,9907
ReturnNeg	21				2430			
ReturnPos		28			2652	2,2932	1	0,1299
ReturnNeg		16			2430			
ReturnPos			28		2652	2,2932	1	0,1299
ReturnNeg			16		2430			
ReturnPos				21	2652	0,3472	1	0,5557
ReturnNeg				23	2430			
ReturnPos	23	28			2701	2,2701	2	0,3214
ReturnNeg	21	16			2469			
ReturnPos	23	28	28		2673	4,5791	3	0,2053
ReturnNeg	21	16	16		2453			
ReturnPos	23	28	28	21	2652	4,9265	4	0,2949
ReturnNeg	21	16	16	23	2430			

*p<0,10 **p<0,05 ***p<0,01

As can be seen in Table 6.1, Pearson chi-square test results indicate that there is no significant dependence of positive-negative returns between pre-holiday days and normal days in case of separate effects.

Table 6.2. Chi-square test for Positive-Negative Returns between post-holiday days and normal days in case of separate effects

	post1st	**post2nd**	**post3rd**	**post4th**	**other**	**X-squared**	**df**	**p**
ReturnPos	24				2652	0,0975	1	0,7549
ReturnNeg	20				2430			
ReturnPos		29			2652	3,2939	1	**0,0695***
ReturnNeg		15			2430			
ReturnPos			22		2652	0,0834	1	0,7727
ReturnNeg			22		2430			
ReturnPos				25	2652	0,3754	1	0,5401
ReturnNeg				19	2430			
ReturnPos	24	29			2652	3,3820	2	0,1843
ReturnNeg	20	15			2430			
ReturnPos	24	29	22		2652	3,4761	3	0,3239
ReturnNeg	20	15	22		2430			
ReturnPos	24	29	22	25	2652	3,8332	4	0,4291
ReturnNeg	20	15	22	19	2430			

*p<0,10 **p<0,05 ***p<0,01

As can be seen in Table 6.2, Pearson chi-square test results indicate that there is a significant ($p<0.10$) dependence of positive-negative returns just between post2nd holiday days and normal days in case of separate effects. That means the number of positive returns in 2^{nd} days after religious holidays is significantly higher than the number of positive returns in normal days ($p<0.10$).

Table 6.3 and Table 6.4 show contingency tables and Pearson chi-square test results in case of cumulative effects:

Table 6.3. Chi-square test for Positive-Negative Returns between pre-holiday days and normal days in case of cumulative effects

	pre1	**pre12**	**pre123**	**pre1234**	**other**	**X-squared**	**df**	**p**
ReturnPos	23				2652	0,0001	1	0,9907
ReturnNeg	21				2430			
ReturnPos		51			2652	1,1545	1	0,2826
ReturnNeg		37			2430			
ReturnPos			79		2652	3,0299	1	**0,0817***
ReturnNeg			53		2430			
ReturnPos				100	2652	1,4644	1	0,2262
ReturnNeg				76	2430			

*p<0,10 **p<0,05 ***p<0,01

As can be seen in Table 6.3, Pearson chi-square test results indicate that there is a significant (p<0.10) dependence of positive-negative returns just between pre123 holiday days and normal days in case of cumulative effects. That means the number of positive returns in pre123 days (i.e., $1^{st}+2^{nd}+3^{rd}$ days before religious holidays) is significantly higher than the number of positive returns in normal days (p<0.10).

Table 6.4. Chi-square test for Positive-Negative Returns between post-holiday days and normal days in case of cumulative effects

	post1	**post12**	**post123**	**post1234**	**other**	**X-squared**	**df**	**p**
ReturnPos	24				2652	0,0975	1	0,7549
ReturnNeg	20				2430			
ReturnPos		53			2652	2,2432	1	0,1342
ReturnNeg		35			2430			
ReturnPos			75		2652	1,1075	1	0,2926
ReturnNeg			57		2430			
ReturnPos				100	2652	1,4644	1	0,2262
ReturnNeg				76	2430			

*p<0,10 **p<0,05 ***p<0,01

As can be seen in Table 6.4, Pearson chi-square test results indicate that there is no significant dependence of positive-negative returns between post-holiday days and normal days in case of cumulative effects.

6.2.Results of Multivariate Regression Analysis

In the research, the different windows in order to able to to capture any possible effect of diffrent pre-post- periods are looked up. The results of multivariate regression analysis for pre- and post-holiday effect on daily average returns in models including pre and post cumulative effects of the days towards holiday together are given in Annex 2 (Summary table).

According to the results of multivariate regression analysis given in Annex 2 there is no statistically significant effect of pre and post holidays in all selected models (covering 4 days before and 4 days after the religious holidays). However, the models including post2, post3 and post4 days are very close to show a significant effect in p<0.10 level (p value ranges between 0.1093-0.1880).

6.3.Results of GARCH and EGARCH Models

Before estimating GARCH and EGARCH models, we need to test if the dataset of average returns is stationary or not. The unit root test (ADF test) is applied for this purpose. ADF test results for average return series are given in Table 6.5.

Table 6.5. Unit root test (ADF test) results for average return series

ADF test	1st difference	Critical values at %1 level	Critical values at %5 level	Critical values at %10 level	p[1]
No intercept and trend	-21.82464***	-2.565404	-1.940885	-1.616659	0.0000
With intercept only	-21.82286***	-3.431420	-2.861898	-2.567003	0.0000
With intercept and trend	-21.82264***	-3.959793	-3.410664	-3.127114	0.0000

*p<0,10 **p<0,05 ***p<0,01

[1] MacKinnon (1996) one-sided p-values.

Integrating order: I(1)

When comparing the first difference values of the series with the critical values at 1%, 5% and 10% levels for ADF tests in cases of (1) No intercept and trend, (2) With intercept only and (3) With intercept and trend in the first difference level

Table 6.5, we are able to reject the null hypothesis of non-stationarity of the dataset of average returns as the first difference values of the series are less than the critical values. Thus, we can accept that the dataset is stationary between 01.01.1999-31.12.2019 then estimate GARCH and EGARCH models.

Although the results of unit root test (ADF test) for average return series show that our dataset is stationary, in order to have a double-check, we need to run a Heteroskedasticity Test to find whether there has been an ARCH effect or not. In heteroskedasticity test for ARCH effect, the hypotheses are as follows:

H_0: There is no heteroscedasticity (which means there is no ARCH effect)
H_1: There is heteroscedasticity (which means there is an ARCH effect)

If the probability of Chi-Square (1) in Table 6.6 is greater than 5%, H_0 will be accepted, otherwise, H_1 will be accepted.

Table 6.6. Residual Diagnostics: Heteroskedasticity Test: ARCH

Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 2 5258
Included observations: 5257 after adjustments

	F-statistic	**Obs*R-squared**	**Prob. F(1,5255)**	**Prob. Chi-Square(1)**
	479.0264	439.1752	0.0000	***0.0000***

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.000334	2.05E-05	16.25980	0.0000
RESID^2(-1)	0.289032	0.013206	21.88667	0.0000

R-squared	0.083541	Mean dependent var	0.000469
Adjusted R-squared	0.083367	S.D. dependent var	0.001481
S.E. of regression	0.001418	Akaike info criterion	-10.27888
Sum squared resid	0.010565	Schwarz criterion	-10.27638
Log likelihood	27020.03	Hannan-Quinn criter.	-10.27800
F-statistic	479.0264	Durbin-Watson stat	2.116779
Prob(F-statistic)	0.000000		

As seen in Table 6.6, the value of Prob. Chi-Square(1) is 0.0000, that is $p<0.05$, so that H1 is accepted, that is there is an ARCH effect. Therefore, we can run ARCH family models such as GARCH, EGARCH, etc.

Regarding to pre- and post-holiday effect on average returns, GARCH (1,1) and EGARCH (1,1) model results are shown in Annex 3 and Annex 4, respectively.

According to the GARCH (1,1) models, there is no significant pre or post effect of religious holidays on daily average returns. It means that the pre-holiday and post-holiday average returns are not significantly different from the daily average returns in normal days ($p>0.10$) (Annex 3).

According to the EGARCH (1,1) models, there is significant post effects of religious holidays on average returns in post 1 ($p<0.10$) and post 2 ($p<0.05$) days. It means that the average returns in 1 and 2 days after the holiday are significantly different from the average returns in normal days (Annex 4). As the z values of β_2 are positive in these models (actually in all EGARCH models), we say that the average returns in post 1 days (in Models 1 and 14) and in post 2 days (in Models 5, 7, 9 and 15) are significantly higher than the ones in normal days. It is seen that the average returns for Post2, that is, 2 days after religious holidays, are significantly higher ($p <0.05$) in all models where Post2 is included with pre-holidays (i.e. Pre1+Post2, Pre2+Post2, Pre3+Post2, Pre4+Post2), than the average returns on normal days in all models. For Post1, this only makes sense in models included with Pre1 or Pre4, and this significance is at $p<0.10$ level.

The EGARCH (1,1) models (Models 1 and 14), where post1 effects are significant in $p<0.10$ level, show that the average returns for post1 (1^{st} transaction day after religious holidays) days are significantly 0.0027-0.0028 (%0.27-0.28) higher than the average returns in normal days ($p<0.10$). The EGARCH (1,1) models (Models 5, 7, 9 and 15), where post2 effects are significant in $p<0.05$ level, show that the average returns for post2 (2^{nd} transaction day after religious holidays) days are

significantly 0.0029-0.0031 (%0.29-0.31) higher than the average returns in normal days ($p<0.05$). Furthermore, when we compare the AIC and SIC values of GARCH and EGARCH models in Annex 3 and Annex 4, we see that the AIC and SIC values of EGARCH models are smaller than the ones of GARCH models. As the smaller AIC and SIC values indicates better models, it shows that EGARCH models are better than GARCH models.

When looking at the significance of terms α, γ and β, as the p values of ARCH terms (α) are 0.0000 in Models 1, 5, 7, 9, 14 and 15 (actually p values of α are less than 0.01 in all EGARCH models), we say that the size of the shocks significantly affects the future volatility of average returns. Similarly, as the p values of leverage effect terms (γ) are 0.0000 in Models 1, 5, 7, 9, 14 and 15 (actually p values of γ are less than 0.001 in all EGARCH models), we say that the sign of the shocks significantly affects the future volatility of average returns. Similarly, as the p values of GARCH terms (β) are 0.0000 in Models 1, 5, 7, 9, 14 and 15 (actually in all EGARCH models except Models 6 and 8), we say that the past volatility significantly helps to predict the future volatility of average returns.

When looking at the signs of terms α, γ and β, we see that ARCH terms (α) are positive in Models 1, 5, 7, 9, 14 and 15 (actually in all EGARCH models), which shows that there is a positive correlation between past variance and the current variance in absolute value. It means that if the magnitude of shock to the variance is bigger, the volatility is higher or if the magnitude of shock to the variance is smaller, the volatility is lower. The signs of leverage effect terms (γ) are negative in Models 1, 5, 7, 9, 14 and 15 (actually in all EGARCH models except Models 6 and 8), which shows that bad news increase the volatility more than good news – the evidence of leverage effect.

In none of the GARCH and EGARCH models, it is shown that average pre-holiday returns differ significantly compare to average returns on normal days. Therefore,

in both models, both the pre- and post-holiday average returns do not show any significant difference together.

CHAPTER SEVEN

CONCLUSION AND DISCUSSION

In this chapter, the results of this study, which is conduct to determine the effect of religious holidays on stock returns will be summarize and discuss with the findings, in similar past researches in literature.

In overall, according to the multivariate regression, GARCH (1, 1) and EGARCH (1, 1) models, there is no significant effect of religious holidays on average returns in the models including pre and post returns together in model basis. It means that the pre-holiday and post-holiday average returns are not significantly different from the average returns in normal days ($p>0.10$).

However, I document evidence that there are some significant partial differences in EGARCH (1, 1) models. According to the EGARCH (1, 1) models, there are significant positive post-holiday effects of religious holidays on average returns in post 1 ($p<0.10$) and post 2 ($p<0.05$) days even the model itself is not significant. We find no significant pre-holiday effect for all days (1, 2, 3 or 4 days) before religious holidays and no significant post-holiday effect for 3 or 4 days after religious holidays. Regarding to our findings which indicate significant positive post-holiday effects of religious holidays on average returns in post 1 ($p<0.10$) and post 2 ($p<0.05$) days, we see that high returns after long holidays are reported by many past researches (Wong et al., 1990; Len et al., 1992; Chan et al., 1996; Ahmad

and Hussain, 2001; Brown et al., 2002; Xueyu and Jia, 2002; Cao, Premachandea, Bhabra, and Tang, 2009; Dodd and Gakhovich, 2011; Hinawati, 2016; Ahmad Al-Smadi et al., 2017; Al-Khazali et al., 2017; Ali et al., 2017). However, as our model is not significant, that is our finding of partial significant positive post-holiday effects in post 1 and post 2 days shall not be regarded as significant. Thus, our finding is not supported by above mentioned previous researches.

The finding of no significant pre-holiday effect is supported by a few researches (Chan et al., 1996; Oğuzsoy and Güven, 2004; Majeed et al., 2015) which study the effects of long holidays such as Christmas Holiday, Asian New Year and Islamic Religious Holiday Effect (Feasts of Ramadan and Sacrifice). However, regarding long holiday effect on stock returns, it is seen that positive pre-holiday effect is seen in most of the studies (Lakonishok and Smidt, 1988; Wong et al., 1990; Len et al., 1992; Chan et al., 1996; Brown et al., 2002; Xueyu and Jia, 2002; Oğuzsoy and Güven, 2004; Cao, Premachandea, Bhabra, and Tang, 2009; Dodd and Gakhovich, 2011; Białkowski et al., 2012; Yuan and Gupta, 2014; Abidin et al., 2015; Majeed et al., 2015; Ahmad Al-Smadi et al., 2017; Ali et al., 2017) which do not support our finding.

In our study, in the 21-year Bist100 index covering the years 1999-2019, it is shown that the average daily returns for 2 days before (0.0052) and for 2 days after (0.0054) the religious holidays are approximately 7.5 times higher than the average daily return (0.0007) in other (normal) days in the case of non-cumulative daily return. Even if we can not see significant differences in the whole models (in cumulative or separate [non-cumulative] models), the high positive average returns in 2 days before and 2 days after the holiday are worth to be mentioned because the future researchers or traders may focus on these days and want to conduct further researches due to the reasons to be explained in below. This high return 2 days before the holiday is supported by the finding of Oğuzsoy and Güven (2004) in the Bist100 index, which covers the years 1988-1999 and is found 8.1 times higher return 2 days before the holiday compare to the ones in normal days. However, in

our research, since the analyzes calculate on a cumulative basis to include the days close to the holiday rather than on a daily basis, and also the average return on the last transaction day before the holiday (pre1st) is negative (-0.0013), the average return of the 2 days (pre2) just before the holiday decreases (0.0020). This may have prevented a significant effect in the days before the holiday, unlikely the one which in the work of Oğuzsoy and Güven (2004). On the other hand, in studies that do not examine the effect cumulatively, the random effect may be higher on the significant result for the day in which the effect exists. Also, the significant positive pre2nd effect in the study of Oğuzsoy and Güven (2004) relates only to Ramadan feast, and no significant effect seen for Sacrifice feast either before or after the holiday. However, in our study, both before and after the holiday, the effect analyzes cumulatively and together as well as the feasts of Ramadan and Sacrifice together in a single series of dataset. This suggests that if both religious holidays are handled together, the potential pre-effect of Ramadan feast might be disappearing due to the effect of Sacrifice feast. However, such a separate analysis of the religious holidays may also not exactly mirror the influence of religious holidays in Turkey, namely a generalization cannot be made regarding the effects of religious holidays. In any way, analyzing the feasts of Ramadan and Sacrifice separately can help investors create some investment strategies. In any case, as there may be only investors planning to create different investment strategies for the Ramadan feast or Sacrifice feast, it can be suggested to evaluate Ramadan and Sacrifice feasts separately in similar academic researches in the future.

In our study, it is show that the average cumulative returns 2, 3 and 4 days after religious holidays (0.0038, 0.0035 and 0.0033, respectively) are approximately 5 times higher compare to the one of normal days (0.0007). However, since each of the models we specified in our study pre- and post-effects together, the effect of these high positive returns within the same model might have been decreased and this might have prevented statistically significant results in particular in models including 3 and 4 days after the holiday. Here again, similar to the risk of random effects in taking the feasts of Ramadan and Sacrifice separately, a separate

examination of pre and post effects may increase the same risk of random effect. In any case, as there may be only investors planning to create different investment strategies for the days before and after religious holidays, it can be suggested to evaluate pre- and post-holiday effects separately in similar academic researches in the future.

In terms of being evaluated as an investment strategy, because of the fact that 2 times in the size, but negative returns (loss) seen in the last transaction day of the religious holiday in Turkey, compare to the return in normal transaction days, It may suggest that no stock should be purchase on the last transaction days before the holiday (especially on the last transaction day), and purchases should be made at the opening of the first transaction day after the holiday. Because the purchases made 4 days before the holidays yield an average of 1.98 times higher than the normal days for 4 days, and the purchases made 2 days before the holidays provide an average 2.71 times higher than the normal days for 2 days, but after the deduction of transition costs, it may not be attractive in terms of returns. If investors both individuals and funds purchase at the opening of the first transaction day after the holiday, an average of 4.55 times higher returns during 4 days can be achieved before deducting the transition costs. This may be the most attractive return strategy for the 4 transaction days before and 4 transaction days after the religious holidays in Turkey.

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