ANKARA YILDIRIM BEYAZIT UNIVERSITY THE
INSTITUTE OF SOCIAL SCIENCES
THE DEPARTMENT OF BANKING AND FINANCE

EVALUATION OF STOCK MARKET REACTION TO THE INCLUSION OF FIRMS in 2016 ISE SUSTAINABILITY INDEX

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BELMA ARSLAN

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ABSTRACT

EVALUATION OF STOCK MARKET REACTION TO THE INCLUSION OF FIRMS in 2016 ISE SUSTAINABILITY INDEX

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This thesis examines the stock market reaction to the inclusion of firms in 2016 Istanbul Stock Exchange Sustainability Index (ISESI). For that purpose, two types of econometric analysis applied. First analysis is an event study methodology. Daily stock returns used for the event study analysis which was started at 4 November 2014 to 29 April 2016. Event date is announcement date at the same time 4 November 2015. As an event window (+2, -2) and (+5, -5) windows are chosen. Cumulative Abnormal Returns (CAR) in this event windows except (+2, -2) event window two firms are not significant. Second analysis is Ordinary Least Square (OLS). We use a dummy variable to measure effect of inclusion sustainability index. As a result of the regression, we obtain two kinds of equations. These are full model and reduced model. We use general to specific approach and considered omitted variable bias to obtain the reduced equations. OLS results indicate that stock returns are affected from oil prices, interest rates, exchange rate and money supply. Also, results point out that one day deferred stock price is effective in the stock price changes. In relation to the transition to the sustainability index, the results which are obtained from OLS equations in this study point out that inclusion to the sustainability index does not affect stock prices substantially.

Keywords: ISESI, Sustainability, Sustainability Index, Event study, OLS, Efficient Market

ÖZET

FİRMALARIN 2016 BİST SÜRDÜRÜLEBİLİRLİK ENDEKSİNE GİRMESİNE, HİSSE SENEDİ PİYASASININ VERDİĞİ TEPKİNİN DEĞERLENDİRİLMESİ

Arslan, Belma
Master, Bankacılık ve Finans Bölümü
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Bu tez, firmaların 2016 Borsa İstanbul Sürdürülebilirlik Endeksi(BİSTSE)'ne girmesine, hisse senedi piyasasının verdiği tepkiyi araştırmaktadır. Bu amaçla, iki çeşit ekonometrik analiz yapılmıştır. İlk analiz olay çalışması yöntemidir. Bu analiz için, 4 Kasım 2014 ten 29 Nisan 2016 ya kadar ki günlük hisse senedi getirileri kullanılmıştır. Olay günü, aynı zamanda ilan edilme tarihi olan 4 Kasım 2015'tir. Olay penceresi olarak (+2, -2) ve (+5, -5) pencereleri seçilmiştir. (+2, -2) penceresindeki 2 firma hariç, toplam olağandışı getiriler istatiksel olarak anlamlı değildir. İkinci analiz olarak Sıradan En Küçük Kareler (SEKK) kullanılmıştır. Endekse girmenin etkisini ölçmek için bir kukla değişken kullandık ve iki tür denklem elde ettik. Bunlar tam model ve indirgenmiş modeldir. İndirenmiş denklemi elde etmek için ihmal edilmiş değişkenin yanlılığı yöntemi kullanılmıştır. SEKK sonucu gösteriyor ki, hisse senedi getirileri, petrol fiyatlarından, faiz oranlarından, döviz kurundan ve para arzından etkilenmektedir. Ek olarak, sonuçlar gösteriyor ki bir gün gecikmeli hisse senedi fiyatları ilgili hisse senedinin fiyat değişiminde etkilidir. SEKK' den elde edilen sonuçlara göre, endekse girmek hisse senedi fiyatlarında çok fazla etki yapmamıştır.

Anahtar Kelimeler: BISTSE, Sürdürülebilirlik, Sürdürülebilirlik Endeksi, Olay Çalışması, SEKK, Etkin Market Hipotezi

DEDICATION

TO MY FAMILY and CHILDREN

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LIST OF ABBREVIATIONS

AD	Announcement Day
APT	Arbitrage Pricing Theory
AR	Abnormal Return
CAPM	Capital Asset Pricing Model
CAR	Cumulative Abnormal Return
CBRT	Central Bank Republic of Turkey
CSR	Corporate Social Responsibility
DJSIW	Dow Jones Sustainability World Index
DSI	Domini 400 Social Index
EDDS	Electronic Data Delivery System
EIRIS	Ethical Investment Research Services Limited
GLS	Generalized Least Squares
ISE	Istanbul Stock Exchange
ISESI	Istanbul Stock Exchange Sustainability Index
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Square
SRI	Social Responsible Investment
WLS	Weighted Least Square

1. INTRODUCTION

Following 2008-2009 crisis, short-termism on financial markets has become widespread. Funds, previously investing in stocks have started to trade in short-term. They are also enlarged their international investments. The dominance of the short-termism flow on financial markets has made difficult for investors and firms to focus on the long-term indicators of economy. Since sustainability index is a long-term economic indicator, financial investors have not considered sustainability index sufficiently. The aim of this study is to increase awareness about sustainability and its relationship with financial markets. For this purpose, general sustainability and financial sustainability are explained in detail. The terms of social responsible investment (SRI) and corporate social responsibility (CSR) are explained. Historical development of sustainability investigated for Turkey and some of major developed countries. In order to understand the importance of sustainability in terms of investors, this study tries to evaluate stock market reaction to the inclusion of firms in 2016 ISE Sustainability Index by using Ordinary Least Square (OLS) and Event Study methodologies. In this study, long term refers to a period rather than cointegration or equilibrium relationship. In econometrics, long term relationship is investigated by cointegration methods such as Engle-Granger and Johansen methods. Our variables are stationary in terms of unit root concept which will be explained later in the text. The short-term concept adopted in event study methodology also refers to a couple of days where inclusion of sustainability has an effect on. Therefore, the study uses Ordinary Least Square (OLS) regression as the first analysis with dummy variables and the event study methodology to measure the short-term effect of inclusion in the Sustainability Index.

In the literature generally studies (Curran and Moran (2006), Oberndorfer et.al (2013)) use event study to measure the effect of inclusion of sustainability indexes. Event study methodology is a good way of explaining daily effect. Again, in the literature this method was used to explain effects of stock splits or mergers. This method is based on the efficient market hypothesis. According to the hypothesis, efficient capital markets are fully and instantaneously reflected all available and relevant information. Fama (1970) has defined three types of efficiency. One can refer to the Bodie, Kane and Marcus (2013, Ch.8) for a detailed information on random walk theory and efficient market hypothesis. Fist one is weak-form efficiency; this form means that historical prices or returns are not enough to achieving excess returns. Second one is semi-strong form efficiency; with the publicly available information no investors can earn excess return. And the last one is strong-form efficiency; this form says that anyone can earn excess return using any information if it is publicly available or not.

The concept of financial sustainability is a new term for the world. Following 1990s, this topic started to attract peoples' attention. Financially sustainable companies began to be appreciated by the investors. For the future of our world, sustainable firms are essential and people should be aware of this issue. Investors should not be focus on short term gains and should be encourage the firms to make sustainable investment. The concept of sustainability, not only consists of environmental issues but also, it contains human rights, supply chain, banking criteria, countering bribery, saving biodiversity, health and safety and board of practice. As a whole, this concept is beneficial for human beings and for the future of our world.

2. LITERATURE REVIEW

Sustainability is one of the important concepts that is used in variety of areas, such as environment, economy and finance. In the sustainable development plan, priority given to the environmental factors when an input transform to output at the scarce resource of economy. Therefore, sustainable development adds additional costs to companies at the production process. However, these costs are positively perceived by consumers and other parties. In recent years, this interaction and dynamic have widely examined in the financial markets. For example;

Oberndorfer, Schmidt, Wagner and Ziegler (2013) investigate effects of the including German firms in the Dow Jones Sustainability World Index (DJSI World) and Dow Jones STOXX Sustainability Index (DJSI STOXX) on the performance of the stocks from 1999 to 2002 by using daily stock returns. To obtain healthier results, they apply a short-term event study approach based on a modern asset pricing model of Fama and French (1993) three factor model which explains excess return better than one factor model. Additionally, they use t-GARCH (1, 1) model. Paper has two hypothesis to test. One is inclusion in a sustainability stock index has a negative or positive effect on the stock performance on the short term and second is the positive or negative short-term effect of inclusion sustainability index on the stock performance is stronger for the DJSI World or for the DJSI STOXX. Results indicate that inclusion a sustainability stock index has a negative impact on stock performance. German stock market penalized the sustainable firms. Inclusion a sustainability stock index negatively assessed by investors and they think that being in a sustainability index leads to an unproductive additional costs. In terms of second hypothesis; involved in DJSI World that is a world-wide index has more reputation than involved in DJSI STOXX.

Berhelot, Coulmont and Serret (2012) aim to determine whether independent sustainability reports about Canadian firms listed in the Toronto Stock Exchange take into account by capital markets or not. Study uses 146 convenient firms which are listed on the TSX composite index and apply weighted least square (WLS) method to avoid scale effect of variables. Model belongs to Ohlsen (1995) this study is an empirical version of it. Analysis results indicate that publishing a sustainability reports makes a good sense for investor. Also, study indicates that companies need a financial incentive to spend money on sustainability reports.

Renneboog, Horst and Zhang (2008) review social responsible investment (SRI) and corporate social responsibility (CSR). Authors claim that SRI has been made a great progress in the last ten years around the world reflecting the rising awareness of investors to social, environmental, ethical and corporate governance subjects. They focus a main question; is a companies' purpose is to maximize shareholder value or social value. In order to understand that they examine the SRI and CSR in detail by SRI screening and firm level analysis. Also, study mentions the background of SRI and CSR in UK, Continental Europe and outside the Europe. The study presents at the portfolio level analysis segment, SRI screens, portfolio constraints and market efficiencies. In addition, they show that SRI performances with the evidence from the US, UK and the international size. Last but not least, authors finalize their study with very valuable recommendations. One is examining the incentive structures in the SRI industry and the second one is conducting additional an investigation to understand the impact of SRI on financial instutions.

Aygun (2017) researches about the financial performance of companies before and after the inclusion ISE Sustainability Index from 2013 to 2015 years. For that purpose, financial ratios (liquidity ratios, operating ratios, financial structure ratios, profitability ratios, market ratios) have been calculated from the data which was obtained from Public Disclosure Platform and annual activity reports. The 11 of 15 companies which were included Sustainability Index in 2014 were evaluated in this paper. Because of the differences in their balance sheet, banking sector companies were excluded from the study. Wilcoxon signal test was applied to data, to understand the difference between the 2013-2015 years. As a result of this analysis, significant changes were observed in financial leverage, equity capital/total asset, market value/book value and earning per share indicators after these stocks had been included.

Ahern (2009) makes a benchmark study. For example; Brown and Warner (1985) chose samples randomly but Ahern chose samples in a controlled manner. Specifically, samples are chosen from the highest and lowest parts of the market equity, prior returns, book-to-market and earning to price ratios. He makes a challenge among the eight prediction methods. These are characteristic-based benchmark model, market model, Fama and French 3 factor and Carhart 4 factor model and 4 statistical models. To determine which model has the least mean bias and robustness and the designation of the tests with different data sets. Also, this study investigates the effect of using post-event and pre-event term to estimate the parameters. The data set includes daily returns from 1965 to 2003. Study results indicate that OLS market model and t-test couple gives wrong rejection rates if there is not abnormal return for the grouped securities. Also, the power of t-test related abnormal return is lower in comparison with non-parametric tests. One of the consequence of the study is using multifactor models or basic models does not matter in terms of forecast error bias. When using post-event date for the random event dates, reduces the specification error. The final inference of the study is that; making a generalization is inappropriate between random sample Brown and Warner and non-random sample for the event studies.

Curran and Morran (2006) investigate if corporate social performance (CSP) is affected by the reputation of sustainability performance. Event study methodology is used to examine the relationship between positive and negative announcement and stock performance. Inclusion or deletion from FTS4Good UK index is seen as good or bad performance and share prices of a company. Seven different analyze methods are used and only one is statistically significant. The paper tested three different hypothesis. Market model is used for the event study, normal performance estimation and t-statistic is used for the significance. Results indicate that being included or deleted from FTS4Good UK is not make a significant difference.

Ziegler and Schröder (2009) make an empirical study. They examine determinant of being included Dow Jones Sustainability World Index (DJSI World) and Dow Jones Stoxx Sustainability index (DJSI Stoxx) for the Europeans firms. The data that was used by study, starts from 1999 to 2001 for the DJSI World and from 2001 to 2004 for the DJSI Stoxx. Totally, they use 253 companies' data from 16 different countries. Panel probit models are used to estimate equations. They use time dummies and country dummies to measure different effects. Results indicate that there is an effect of firm size which was determined by sales and a negative effect of financial health, determined by a criteria that was specified sales and total assets.

Corrado and Zivney (1992) examine the sign tests power that was used in financial event studies. The study compares the two event study procedures, these are parametric t-test and non-parametric rank test. To make a comparison, the estimation period determined 250-days, 100-days, 50-days, and 39-days. The data that was used in this study is daily return data for the 600 companies and from July 1962 to December 1986. The results indicate that at the situation of no abnormal performance and variation rise, sign test is better than t-test. As a consequence of intensive investigations authors found that sign test and t-test are overshadowed rank test. Rank test is preferable compared to other tests.

Cheung (2010) analyzes the consequence of being included or being excluded from the Dow Jones Sustainability World Index. Time span is 2002-2008 years. The study uses standard event study methodology which has a lot of advantages. Firstly, event study provides a direct answer to if investors value inclusion or exclusion question. Secondly, event study provides a multidimensional evaluation. For example, risk and asset returns are some of these dimensions. Thirdly, event study provides to check one more dimension that is liquidity. We can check how liquidity affected by events. Finally, by chancing event window length, we can control long and short-term effect of the event. Study uses characteristic-based benchmark model in order to calculate expected returns. Two sets of event dates are used in this study. These are announcement dates and change dates. The estimation periods are t= -16 to t= -250 and t= 0 to t= 60 observations. And event windows are determined different time spans to capture different effects. Some of them are +-1 AD, +-2 AD, +-3 AD and +-1CD, +-2 CD. Results indicate that in the (AD-2, AD+2) event window, sign test show that there is a significant positive return. And the cumulative abnormal return is significant and negative on the chancing day only. When we look at liquidity results; we can see a sharp decrease on the trading volume at first 5 trading days after the event. Terminally, in order to find systematic risk changes, Chow test is performed by the study. As a result of this test, a significant change cannot be found.

As a result of economic analyzes, it is assumed that an increase in government regulations may bring additional costs to the firms, which may adversely affect the production volume and profitability. The sustainability index that has discussed in this study may also add some additional costs to the firm by applying quality standards and some regulations. But these costs should be evaluated in terms of long and short term. Bearing these fixed costs effects the firm's balance sheet and financial appearance negatively in the short term. But if the companies achieve these standards and being included to the sustainability index, it brings some positive results with along such as stability and sustainability in the long run. That makes companies stronger against the crisis. The power of the company is majored by financial statements and ratios obtained from balance sheets and income tables. Therefore, analyzing the determinants of financial ratios of companies is crucial. There are many studies in the literature about the relationship between financial ratios and profitability, financial ratios and firm value. For illustration;

Kurtaran et al. (2015) research whether a relationship between financial ratios (current ratio, acid-test ratio, inventory turnover, accounts receivables turnover, equity turnover, operating profit margin, net profit margin, return on asset, return on equity, debt to equity ratio and interest coverage ratio) and firm value (stock price value). They use 45 firms that has listed in ISE-100 index from 2008 to 2012. Multiple regression analysis is applied to data. Results indicate that, there is a significant and positive relationship between acid-test ratio, return on asset and firm value. Additionally, there is significant negative relationship between current ratio and firm value. There is no significant relationship between other financial ration and firm value.

Uluyol and Turk (2013) examine whether there is a relationship between financial ratios which is used in the financial statement analysis and firm value. Study uses 56 production firms' data traded on ISE from 2004 to 2010. Panel data analysis applied to data and two different models created. Both models use firm value as an independent variable and first models' dependent variables are current ratio, equity weight ratio, inventory turnover, net profit margin, earning per share ratio. Second model use liquidity ratio, short term debt/total debt ratio, equity turnover ratio, profit capital ratio, price earnings ratio as dependent variables. The result of model 1 indicate that current ratio and net profit margin make a significant and positive effect in firm value. One unit change in current ratio makes 0,029 % increase in stock price and again one unit change in net profit margin makes 1, 13% increase in firm value. It can be inferred from the model that the most effective ratio in firm value is net profit margin. Additionally, second model indicates that liquidity ratio and profit capital ratio have a significant and positive impact in firm value. One unit change in liquidity ratio conveys 0,025% increase in firm value and one unit change in profit capital ratio conveys 1,16% increase in firm value. In conclusion, both models indicate that profitability ratios are the most important component for the firm value.

Asiri and Hameed (2014) investigate how financial ratios explain the firms' value. For that purpose, they use 44 local companies listed on the Bahrain stock exchange from 1995 to 2013. The study uses stepwise regression analysis. In order to test differences same analysis applied for the size, growth and sector based. Dependent variable is price to earnings ratio or market to book ratio and independent variables are debt to total asset ratio, total asset turnover, return on asset, return on equity, financial leverage, current ratio, times interest earned ratio, Tobins' Q ratio, market risk. This paper tests four hypothesis by four different models. One is general model with whole market to explain relationship between financial ratios and firm value. Second is developed to measure size and growth effect and the third is again general model applied each sector separately to test sector or industry effect. These sectors are bank, investment, insurance, service, industrial (manufacturing) and tourism. And the last one is lag effect. Results indicate that the best ratio for the measure firm value is market to book ratio. Bahrain market consider mainly the profitability of the firm and financial leverage. Also, a positive relationship found between market risk and firm value. In terms of growth, results indicate that the smaller the firm, the more investors value the firm. When results viewed from the sectoral aspect, almost all sectors are same except manufacturing sector. Additionally, tourism is the only sector that takes into account the inventory turnover. Generally, investors are interested in the level of profitability in the form of return on asset and financial leverage of the firms regardless of which sector that firm operates in.

Birgili and Duzer (2010) examine whether a relationship between financial statement analysis ratios and firm value. Authors collect 21 ratios under the 5 main topics. These are liquidity situation, financial structure, effective use of assets, profitability status and market performance. They use ISE100 firms' data's that are reachable 58 from 2001 to 2006. Panel data analysis applied the data, fixed effects and random effects compared. There is not a significant difference between fixed and random panel data analysis. Results indicate that 16 of 21 ratios make significant impact in firm value and 10 of them are positive 6 of them are negative. While liquidity situation, financial structure and market performance ratios are completely significant, 40% of profitability status and 60% of effective use of assets ratios are significant.

Omran (2004) investigates the relationship between common financial ratios and stock returns. The sample contains 46 Egyptian firms' that are listed on the International Finance Corporation (IFC) global index monthly data from 1996 to 2000. Since IFC select stocks on the basis of market size, trading activity and sector representation this sample gives robust results. The study is used common financial ratios as independent variables and stock returns of the Egyptian firms as the dependent variable. Three models are used, first one is multiple regression model based on a linear relationship second is bivariate model to determine the most appropriate form as a non-linear analysis and the third one is multivariate model as a non-linear analysis. Both linear and non-linear models indicate that ROE is the most important ratio for the investors. The literary contribution of this article is supports the results with non-linear models. Author thinks that non-linear models are key factors to understand stock behavior of markets.

As well as firm value, brand value is also very important for investor. Brand is defined as an *''asset which does not have physical existence and the value of which cannot be determined accurately unless it becomes the subject of a specific business transaction of sale and acquisition'' by* (Seetharaman et al., 2001). Another definition of brand is a name or a symbol- and its associated tangible and emotional attributes – that is intended to identify the goods or services of one seller to differentiate them those of competitors (Seetharaman et al., 2001). A product is defined as something that has produced in factory. There are a lot of differences between a brand and product. For example; a product can be outdated but a successful brand is immortal. And a product can be copied but a brand is unique. Correspondingly, we can say being a brand is very important for the companies and the image of a brand is too. Being a member of sustainability indexes is a reputation for the firms.

3. FINANCIAL SUSTAINABILITY

Sustainability gets more attraction during the last 30 years. When people notice that the generous resources of our world are not unlimited, they try to find way of sustainable world. This attention makes people sensitive about sustainability. When they are investing, they begin to curios about if the companies' sustainability performance is enough to reach threshold values of being a member of a sustainability index. The popular trend of investing is taking into account not only financially satisfying but also ethically and socially wellbeing. Actually, the main debate is that, whether investor take into account the sustainability performance while determining expense of the company (Hussain, 2015). If the answer is yes, the purpose of these sustainability indexes reach their goals.

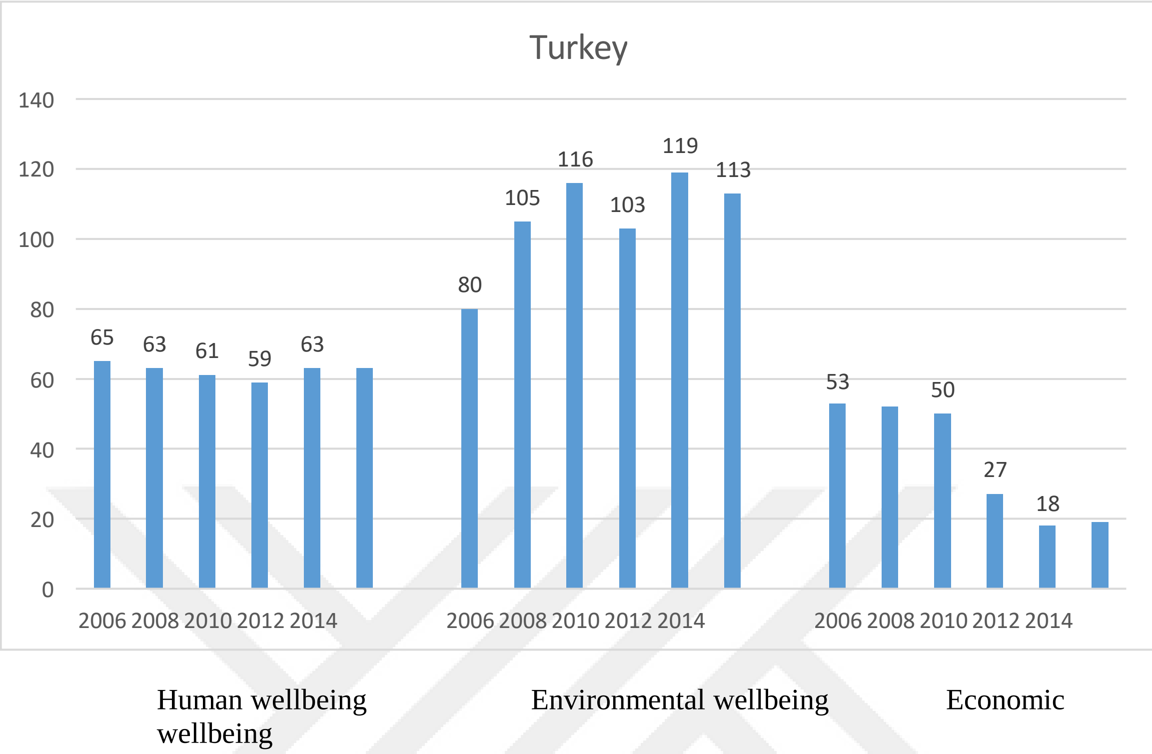
The overall definition of corporate sustainability is "a business approach that creates long-term shareholder value by embracing opportunities and managing risks deriving from economic, environmental and social developments. Corporate sustainability leaders achieve a long-term shareholder value by gearing their strategies and management to harness the market's potential for sustainability products and services while at the same time successfully reducing and avoiding sustainability costs and risks" (SAM Sustainable Asset Management).

While maximizing sustainabilityperformance and financial performance two main methods are available. One is negative screening and other one is positive screening. At the negative screening method, some industries completely excluded from the indexes. However, positive screening method is much more developed in comparison with negative screening. The purpose of this perspective creating a long-term value by applying ethical and social strategies.

3.1. Sustainability Index in the World

Domini 400 Social Index (DSI) was the first sustainability index known. It was launched by North American rating agency KLD in 1990 and it has covered only domestic companies of U.S markets. It takes into account only environmental, social and governance factors. Dow Jones Sustainability World Index (DJSWI) launched on September 1999, this is the first global sustainability index. In terms of corporate sustainability DJSWI is Pioneer. The index is internationally acknowledged because of its gauze and unbiased structure. Index, approved by international investment authority (Cheung, 2010). Up to the period of 2000s generally developed countries launched social and sustainability indexes. Following 2000s, sustainability gains more and more attraction all around the world. Countries have begun to invite independent research companies to their countries for the evaluation of their companies. Robecosam, EIRIS and Sustainable Society Index are some of these research companies. These independent research companies make ranking lists for the countries all over the world. For example; Sustainable society index firm evaluates countries in terms of human wellbeing, environment wellbeing and economic wellbeing. Correspondingly, they make a ranking among 156 countries and the Figure 1 given below, indicates the rankings of Turkey in respect to human wellbeing, environment wellbeing and economic wellbeing. This company makes this assessment every 2 years since 2006. As it is seen in the graph Turkey have made great progress in terms of economic wellbeing. In 2006, Turkey rose from the 53rd place to the 19th place in the year of 2016. From the view point of economic development, Turkey has shown an upward trend. On the other hand, environmental wellbeing ranking of Turkey has shown a downward trend. While it was at the 80th place in 2006, in the year of 2016 it is ranking drops 113th place. When we look at the situation in terms of human wellbeing, the level of Turkey remains constant. From 2006 to 2016 there is not a dramatically change in this area.

Figure 3.1. Sustainability Ranking of Turkey



Source: http://www.ssfindex.com/results/ranking-all-countries/

3.2. Sustainability Index in Turkey

The Istanbul Stock Exchange (ISE) set up on December 26, 1985. The operations are started on January 3, 1986. After 29 years establishing, in other words at November 4, 2014 ISE sustainability index was launched. The number of companies whose shares was traded in ISE are 416 as of 2015 and the 29 of them are located in the ISE Sustainability index. On the way to becoming a global market, sustainability is a very important tool for the Istanbul Stock Exchange. ISE, enter into an agreement with Ethical Investment Research Services Limited (EIRIS) Company to calculate sustainability index. For this purpose, EIRIS Company evaluate firms with their publicly available information. The company assessments are approved internationally. EIRIS evaluate the firms at main 9 headings, these are climate change, human rights, supply chain management, banking criteria, biodiversity, countering bribery, board practice, environment and health and safety. In 2014, ISE 30 firms were evaluated and the 15 of them are exceed the threshold value. In 2015, ISE 50 firms are evaluated and the 29 of them are included to the sustainability index. Companies subject to appraisal companies for the ISE Sustainability Index are given in the Table 1 below. Number of evaluated firms are 63. Here are the 50 of them are belongs to ISE 50 and the other 13 companies are volunteer for the assessment.

Table 3.1. Evaluated Companies for 2016 ISE Sustainability Index

EVALUATED COMPANIES for 2016 ISE SUSTAINABILITY INDEX					
Symbol	***Company Name***	***Symbol***	***Company Name***	***Symbol***	***Company Name***
ADEL	ADEL KALEMCILIK	**ENKAI**	ENKA INSAAT	**SAHOL**	SABANCI HOLDING
AFYON	AFYON CİMENTO	**EREGL**	EREGLI DEMIR CELIK	**SAFGY**	SAF GMYO
AKBNK	AKBANK	**FROTO**	FORD OTOSAN	**SISE**	SISE CAM
AKSEN	AKSA ENERJİ	**GARAN**	GARANTI BANKASI	**HALKB**	T..HALK BANKASI
ALGYO	ALARKOGMYO	**GLYHO**	GLOBAL YAT. HOLDING	**TSKB**	T.S.K.B.
ALBRK	ALABARAKA TURK	**GOLTS**	GOLTAS CIMENTO	**TATGD**	TAT GIDA
ALCTL	ALCATEL LUCENT TELETAS	**GOZDE**	GOZDE GIRISIM	**TAVHL**	TAV HAVALIMANLARI
AEFES	ANADOLU EFES	**GUBRF**	GUBRE FABRIK.	**TKFEN**	TEKFEN HOLDING
ARCLK	ARCELIK	**ISCTR**	IS BANKASI	**TOASO**	TOFAS OTO FAB.
ASELS	ASELSAN	**ISGYO**	IS GMYO	**TRKCM**	TRAKYA CAM
BAGFS	BAGFAS	**KRDMD**	KARDEMIR	**TUPRS**	TUPRAS
BJKAS	BESIKTAS FUTBOL YAT.	**KCHOL**	KOC HOLDING	**THYAO**	TURK HAVA YOLLARI
BIMAS	BIM MAGAZALAR	**KONYA**	KONYA CIMENTO	**TTKOM**	TURK TELEKOM
BIZIM	BIZIM MAGAZALARI	**KORDS**	KORDSA GLOBAL	**TTRAK**	TURK TRAKTOR
BRISA	BRISA	**KOZAL**	KOZA ALTIN	**TCEL**	TURKCELL
CCOLA	COCA COLA ICECEK	**KOZAA**	KOZA MADENCILIK	**ULKER**	ULKER BISKUVI
DOHOL	DOGAN HOLDING	**MGROS**	MIGROS TICARET	**VAKBN**	VAKIFLAR BANKASI
DOAS	DOGUS OTOMOTIV	**NETAS**	NETAS TELEKOM	**VESTL**	VESTEL
ECILC	ECZACIBASI ILAC	**OTKAR**	OTOKAR	**VESBE**	VESTEL BEYAZ ESYA
EGEEN	EGE ENDUSTRI	**PGSUS**	PEGASUS	**YKBNK**	YAPI VE KREDI BANK.
EKGYO	EMLAK KONUT GMYO	**PETKM**	PETKIM	**ZOREN**	ZORLU ENERJI

Source: http://www.borsaistanbul.com/en/indices/bist-stock-indices/bist-sustainability-index

Of the 63 firms, 29 were included the sustainability index by exceeding threshold value. But, EIRIS Company does not explain the evaluated firms' grades. Only says firms have a right to inclusion or not. As a result of evaluation procedures, the firms which are entitled to sustainability index are given below with table 2. Firms are given in alphabetical order.

Table 3.2. Included Firms for 2016 ISESI

Thicker sembol	**Company Full Name**
AEFES	Anadolu Efes Biracılık ve Malt Sanayi A.S
AKBNK	Akbank A.S
AKSEN	Aksa Enerji Uretim A.S
ARCLK	Arçelik A.S
ASELS	Aselsan Elektronik Sanayi ve Ticaret A.S
BRISA	Brisa Bridgestone Sabancı Lastik San. ve Tic. A.S
CCOLA	Coca-Cola Icecek A.S
DOAS	Dogus Otomotiv Servis ve Ticaret A.S
EREGL	Ereğli Demir ve Celik T.A.S
FROTO	Ford Otomotiv Sanayi A.S
GARAN	T.Garanti Bankası A.S
ISCTR	T.İs Bankası A.S
KCHOL	Koç Holding A.S
MGROS	Migros Turk T.A.S
OTKAR	Otokar Otomotiv ve Savunma Sanayi A.S
PETKIM	Petkim Petro-Kimya Holding A.S
SAFGYO	Saf Gayrimenkul Yatırım Ortaklığı A.S
SAHOL	Hacı Omer Sabancı Holding A.S
TAVHL	Tav Havalimanları Holding A.S
TCELL	Turkcell Iletisim Hizmetleri A.S
THYAO	Turk Hava Yolları A.O
TOASA	Tofas Turk Otomobil Fabrikası A.S
TSKB	Turkiye Sınai Kalkınma Bankası
TTKOM	Turk Telekomunikasyon A.S
TUPRS	Tupras- Turkiye Petrol Rafinerileri A.S
ULKER	Ulker Biskuvi Sanayi A.S
VAKBNK	Turkiye Vakıflar Bankası T.A.O
VESTL	Vestel Elektronik Sanayi ve Ticaret A.S
YKBNK	Yapı ve Kredi Bankası A.S

Source: http://www.borsaistanbul.com/en/indices/bist-stock-indices/bist-sustainability-index

3.3. EIRIS Company Research Criteria

While the basic criteria and information included in the sustainability index explaining below benefited from the "ISE Sustainability Index Research Methodology (2015)" as a fundamental resource.

EIRIS evaluates companies under 10 main headings. These are environment, biodiversity, climate change, board practice, countering bribery, human rights, supply chain, health safety, corporate loans and retail banking.

3.3.1. Environment

EIRIS has divided the risk groups into three; that environment's exposure by the business activities. But, when they are preparing the table financials, manufacturers, retailers and leisure are not classified any of risk group.

Table 3.3. Sectoral Risk Groups in terms of Environment

HIGH	MEDIUM	LOW
• Agriculture • Air transport • Airports • Building materials • Chemicals and pharmaceuticals • Construction • Fast food chains • Food, beverages and tobacco • Forestry and paper • Major systems engineering • Mining& metals • Oil and gas • Pest control • Power generation • Road distribution and shipping • Super markets • Vehicle manufacture • Waste • Water	• DIY & building supplies • Electronic and electrical equipment • Energy and fuel distribution • Engineering and machinery • Hotels, catering and facilities management • Ports • Printing& newspaper publishing • Property developer • Public transport • Vehicle hire	• Consumer/mortgage finance • Information technology • Media • Property investors • Research & development • Support services • Telecoms • Wholesale distribution

Source: ISE sustainable index research methodology, (December 2015).

When EIRIS assessing companies in terms of environment policy, environmental management systems and environmental reporting they use a grading scale consist of 5 sections. These are inadequate, weak, moderate, good and exception.

3.3.2. Biodiversity

Biodiversity plays an important role in sustaining ecosystems and human life. With no definite scientific definition, biodiversity generally considered at three different levels. These are genetic diversity, species diversity and ecosystem diversity. (Pullin, 2002). Despite increasing public awareness about the importance of biodiversity, it faces many threats caused by people (Wilson, 1992). Because of all these reasons EIRIS has added biodiversity to the evaluation criteria. High-risk business activities for biodiversity listed below.

Table 3.4. Sectoral Risk Groups in terms of Biodiversity

High-risk	**Medium risk**
• Building materials &quarrying • Construction • Power generators • Energy & fuel distribution • Food, beverages & tobacco • Forestry & paper • Mining & metals • Oil & gas • Ports • Road distribution & shipping • Water • Airports	• Air transport • Chemicals & pharmaceuticals • DIY & building supplies • Fast food chains • Public transport • Supermarkets • Property developers

Source: ISE sustainable index research methodology, (December 2015)

EIRIS divided into two part the firms when they assess the biodiversity risk. High impact and medium impact. The companies whose business activities are effect biodiversity directly in the high impact group and the indirectly effected companies are in the medium impact group.

When they assess the companies in terms of biodiversity they use a grading scale which is consist of 5 sections. These are no policy or inadequate, basic, moderate and good.

3.3.3. Climate Change

According to The United Nations frame work convention on climate change (2002); definition of climate change is in addition to the natural climate change observed in a comparable time period, a change in the climate as a result of human activities directly or indirectly distorting the composition of the global atmosphere. Over the past 50 years, human activities have been the dominant detectable influence on climate change. The second part of the climate change definition goes in to the work area of EIRIS.

Climate change's risk exposure according to the business activities shown by the table below. The assessment of climate change investigated at one heading named climate change management responses. They use a grading scale which was consist of 5 sections. These are no evidence, limited, intermediate, good and advanced.

Table 3.5. Sectoral Risk Groups in terms of Climate Change

Very High	High	Medium
• Agriculture • Air transport • Cement production • Coal mining • Electricity generation from fossil fuel • Metals • Mining • Oil & gas	• Aircraft manufacture • Automobile manufacture • Commercial buildings • Commodity chemicals • Delivery services • Food producers • Other building materials • Other construction • Residential buildings road distributions &shipping • Specialty chemicals • Supermarkets • Waste .Water	• Beverages • Consumer electric • Defense • Forestry • Other vehicle manufacture • Paper • Pharmaceuticals • Property developers • Public transport • Tobacco

Source: ISE sustainable index research methodology, (December 2015)

3.3.4. Board Practice

Board practicing has a same word meaning with corporate governance. The phrase board practice describes the framework of rules, relationships, systems and processes within and by which authority is exercised and controlled within corporations. It comprises the mechanisms by which companies, and those in control, are held to account (Owen, 2003).

Boarding practice assessment is made by a 4section grading board. The criteria are none, one, some and all.

3.3.5. Countering Bribery

Table 3.6. Bribery Risk Groups

High	**Medium**	**Low**
A company operates in:	***A company operates in:***	***A company does not operate in:***
A high-risk business activity and One or more high risk countries and With government contracts or licensing	A high-risk business activity OR One or more high-risk countries OR In a high-risk business activity and in one or more high-risk countries without government contracts	A high-risk business activity and/or One more high-risk countries

Source: ISE sustainable index research methodology, (December 2015).

Table 3.7. High-Risk Business Activities for Bribery

High-risk sector/activity:	**Exceptions to these sectors/activity**
Public Works/Construction and Associated Engineering	N / A
Defense Producers and Contractors	Subcontractors and dual use companies
Oil and Gas	Oil equipment and services companies
Mining	N / A
Energy and Utilities	N / A
Property Development	Companies not involved in property development
Global Hotel Chains and Major Gaming Operators	Companies with no gambling activity, or not involved property development
Telecommunications	Producers of phone equipment, instrument and switching equipment, small retail outlets, etc.
IT and Related Activities	N / A
Pharmaceuticals	Companies involved in R&D and Biotechnology only
Steel	Companies involved in steel stockholding only
Chemicals	N / A

Source: ISE sustainable index research methodology, (December 2015).

Here are the countries of concern for bribery:

Afghanistan, Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bangladesh, Belarus, Belize, Benin, Bolivia, Bosnia-Herzegovina, Brazil, Bulgaria, Burkina Faso, Burma, Burundi, Cambodia, Cameroon, Central African Republic, Chad, China, Colombia, Comoros, Congo (Brazzaville), Congo D.R. (formerly Zaire), Cook Islands, Cote D'Ivoire, Djibouti, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Ethiopia, Fiji, Gabon, Gambia, Georgia, Ghana, Greece, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, India, Indonesia, Iran, Iraq, Jamaica, Kazakhstan, Kenya, Kiribati, Kosovo, Kyrgyzstan, Laos, Lebanon, Lesotho, Liberia, Libya, Macedonia, Madagascar, Malawi, Maldives, Mali, Marshall Islands, Mauritania, Mexico, Micronesia, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Nepal, New Caledonia, Nicaragua, Niger, Nigeria, Niue, North Korea, Pakistan, Palestinian Authority, Panama, Papua New Guinea, Palau, Paraguay, Peru, Philippines, Romania, Russia, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Sierra Leone, Solomon Islands, Somalia, Sri Lanka, South Sudan, Sudan, Suriname, Swaziland, Syria, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkmenistan, Tuvalu, Uganda, Ukraine, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe (ISE sustainable index research methodology, December 2015).

3.3.6. Human Rights

When EIRIS evaluate the companies in terms of human rights they divided this topic in 4 parts. These are human rights risk, human rights policy, human rights system and human right reporting. When they are defining firms as a large presence or a small presence they use one of these indicators; number of employees, GBP annual turnover and GBP assets. On this basis;

Large presence
- => 1000 employees
- or
- =>100m annual turnover
- =>100m assets

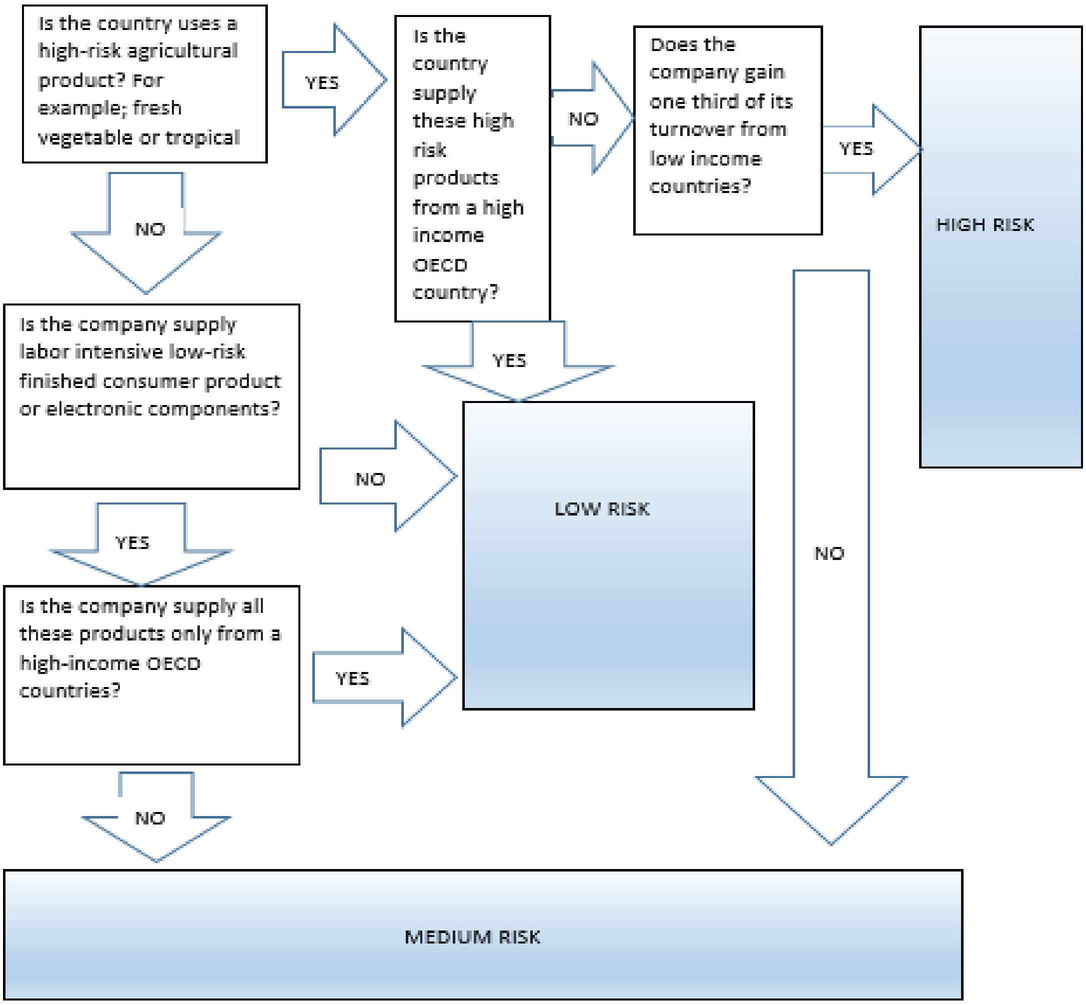
Small presence
- <1000 employees
- or
- <100m annual turnover
- or
- <100m assets

EIRIS lists the high risk countries in human rights respect; Afghanistan, Algeria, Azerbaijan (with Nagorno-Karabakh), Bahrain, Belarus, Burma/Myanmar, Burundi, Cameroon, Central African Republic, Chad, China, Colombia, Congo (DR), Cuba, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Haiti, Iran, Iraq, Kazakhstan, Laos, Libya, Nigeria, North Korea, Pakistan (with Kashmir), Russia, Saudi Arabia, Somalia, South Sudan, Sri Lanka, Sudan, Swaziland, Syria, Tajikistan, Turkmenistan, Uganda, Uzbekistan, Vietnam, Yemen, Zimbabwe. (ISE Sustainability Index Research Methodology, December 2015) Also the Oil&Gas and Mining companies are included the high-risk category if they are served in a non- OECD countries.

When EIRIS evaluates the companies in the sense of human rights policy, human rights system and human rights reporting they use a 5-segmented grading scale. The scale consists of these parts; no evidence, limited, intermediate, good and advanced.

3.3.7. Supply Chain

Figure 3.2. Supply Chain



Source: ISE sustainable index research methodology, (December 2015)

Firms are evaluated as having high potential risk of supply chain labor standard problems if they use high-risk products belongs to high-risk countries on large scales.

High-risk products that is mentioned above are defined in Table 3.8.

Table 3.8. High-Risk Products in terms of Supply Chain

Agricultural crops	Consumer products	Electronic equipment
• Cane sugar • Coffee • Tea • Cocoa • Tropical fruit • Fresh vegetables • Tobacco • Flowers	• Clothing • Footwear • Accessories • Toys	• Tv • Computer • Hi-fi • Mobile • Office printer • Office photocopiers • Power tool

Source: ISE Sustainable Index research methodology, (December 2015

Furthermore; high risk countries again mentioned above are defined as non-high-income OECD countries. These high-income OECD countries are; Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Korean Rep, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, UK, US. Although some other countries are also high-income they are still in high risk group. Because they are not members of OECD. These non-OECD high income countries are Andorra, Aruba, Bahamas, Bahrain, Barbados, Bermuda, Brunei, Cayman Islands, Channel Islands, Cyprus, Faeroe Islands, French Polynesia, Greenland, Guam, Hong Kong, Isle of Man, Israel, Kuwait, Liechtenstein, Macao, Malta, Monaca, Netherlands Antilles, New Caledonia, Puerto Rico, Qatar, San Marino, Singapore, Slovenia, Taiwan, United Arab Emirates, Virgin Islands.

EIRIS evaluates the companies in terms of supply chain management at three main topics, these are supply chain policy, supply chain system and supply chain reporting. They use a 4section grading board that contains no evidence, limited, intermediate, good and advanced.

3.3.8. Health and Safety

When firms are assessed in respect to health and safety EIRIS uses a grading scale which consist of 3 evaluation criteria that are little or no evidence, some and clear. Companies should provide evidence that about health and safety. Such as, companies should indicate that they have a senior person responsible for health and safety issues or companies disclose that they have health and safety's performance data.

3.3.9. Banking Criteria

Banking criteria divided in two main headings as corporate loans and retail banking. Both of them are going to be explained below as two paragraphs.

Companies should satisfy one of these conditions in order to be assess by EIRIS in terms of corporate loans. One is total outstanding corporate loan financing exposure should be more than 5% of total financial assets within the last two financial reporting terms or total outstanding corporate loan financing exposure should be greater than EUR 20 billion within the last two reporting terms. The companies which are provided one of these conditions are evaluated based on a grading scale that consists of 5 criteria. These are no evidence, limited, low intermediate, intermediate and good. When EIRIS was making an assessment, they examine corporate loans in terms of policy, system and reporting. Finally, they found a final score for corporate loans.

In addition to corporate loans criteria EIRIS assess firms with regards to retail banking and as a result of these assessments they put together a final banking criteria score.

4. EMPIRICAL ANALYSIS

In this part of the study data and the two methodologies will be explained in detailed. In the data section, features of the data that we use will be explained. Methodology section consists of two parts. One is event study methodology and the other is OLS methodology.

4.1. Data

The stock market data which is used for the event study is taken from Yahoo finance. Other variables, money supply data, exchange rate date and oil prices datas are taken from The Central Bank of the Republic of Turkey (CRBT) Electronic Data Delivery System (EDDS). The sample includes 29 firms and they are all included ISE Sustainability Index in 2016. Daily stock returns are calculated from the daily share prices from 3 November 2014 to 29 April 2016. The formula that was used to calculate daily returns is shown below;

$$R_{jt} = \ln(P_{jt} / P_{jt-1}) \qquad \textbf{(1)}$$

Here is the explanations of the terms;

R_{jt} = the return of company *j* at day *t*

P_{jt} = the share price of company *j* at day *t*

P_{jt-1} = the before day share price of company j at day t

The market variable that is used in analysis is ISE100. The explanations of the company names are provided in Table 4.1. Also, in this study, instead of company full names or symbols we use abbreviations. They are also shown at the Table 4.1.

Table 4.1. Company Name and Abbreviations

Code	Thicker Symbol	Company Full name	Sector
S_1	AEFES	Anadolu Efes Biracılık ve Malt Sanayi A.S	Beverage
S_2	AKBNK	Akbank A.S	Financial
S_3	AKSEN	Aksa Enerji Uretim A.S	Energy
S_4	ARCLK	Arçelik A.S	Industrial
S_5	ASELS	Aselsan Elektronik Sanayi ve Ticaret A.S	Industrial
S_6	BRISA	Brisa Bridgestone Sabancı Lastik San. ve Tic. A.S	Industrial
S_7	CCOLA	Coca-Cola Icecek A.S	Beverage
S_8	DOAS	Dogus Otomotiv Servis ve Ticaret A.S	Automotive
S_9	EREGL	Ereğli Demir ve Celik T.A.S	Industrial
S_{10}	FROTO	Ford Otomotiv Sanayi A.S	Automotive
S_{11}	GARAN	T.Garanti Bankası A.S	Financial
S_{12}	ISCTR	T.İs Bankası A.S	Financial
S_{13}	KCHOL	Koc Holding A.S	Multiple
S_{14}	MGROS	Migros Turk T.A.S	Basic materials
S_{15}	OTKAR	Otokar Otomotiv ve Savunma Sanayi A.S	Automotive
S_{16}	PETKIM	Petkim Petro-Kimya Holding A.S	Energy
S_{17}	SAFGYO	Saf Gayrimenkul Yatırım Ortaklığı A.S	Construction
S_{18}	SAHOL	Hacı Omer Sabancı Holding A.S	Multiple
S_{19}	TAVHL	Tav Havalimanları Holding A.S	Transportation
S_{20}	TCELL	Turkcell Iletisim Hizmetleri A.S	Telecommunication
S_{21}	THYAO	Turk Hava Yolları A.O	Transportation
S_{22}	TOASA	Tofas Turk Otomobil Fabrikası A.S	Automotive
S_{23}	TSKB	Turkiye Sınai Kalkınma Bankası	Financial
S_{24}	TTKOM	Turk Telekomunikasyon A.S	Telecommunication
S_{25}	TUPRS	Tupras- Turkiye Petrol Rafinerileri A.S	Gas and Oil
S_{26}	ULKER	Ulker Biskuvi Sanayi A.S	Food
S_{27}	VAKBNK	Turkiye Vakıflar Bankası T.A.O	Financial
S_{28}	VESTL	Vestel Elektronik Sanayi ve Ticaret A.S	Industrial
S_{29}	YKBNK	Yapı ve Kredi Bankası A.S	Financial

Source: ISE

In this part of the study, some descriptive statistics of the companies which are subject to research are given at the Table 4.2. The last column of the table indicates sectors of the companies that are included to sustainability index. Also, it shows the weights in percent. According to the table 4.2, the most sustainable firms are belong to the respectively banking sector, industrial sector and automotive industry sector. Furthermore, gas and oil, food, construction and general retailer sectors are represented by one for each company.

Table 4.2. Distribution of Sectors Percentage in Sustainability Index

Sector	Quantity	Percentage
Automotive industry	4	14%
Beverage	2	7%
Banking sector	6	21%
Energy	2	7%
Industrial	5	17%
General retailer	1	3%
Construction	1	3%
Multiple	2	7%
Transportation	2	7%
Telecommunication	2	7%
Food	1	3%
Gas and oil	1	3%
TOTAL	**29**	**100%**

Source: ISE

4.2. Methodology

In this study, there are two methods adopted to investigate the effect of stock market price reaction to the inclusion of firms in 2016 ISE Sustainability Index. In this section, initially event study methodology explained latter regression methodology will be presented.

4.2.1. Event Study Methodology

Event study is a method to measure effects of events on stock prices. The event study methodology is based on an assumption that financial market is sufficiently efficient to interpret the effect of a new information on expected future returns of the companies (Dasgupta et al.,1998:12). Definition of efficient capital market is the market that stock prices fully and instantaneously reflected all available and relevant information. Fama (1970) has defined three types of efficiency. Fist one is weak-form efficiency; this form means that historical prices or returns are not enough to achieving excess returns. Second one is semi-strong form efficiency; with the publicly available information no investors can earn excess return. And the last one is strong-form efficiency; this form says that anyone can earn excess return using any information if it is publicly available or not.

A typical event study tries to examine return behavior for a defined group of firms experiencing a common type of event such as an announcement or stock split (Kothari and Warner, 2006). The event mentioned in the last sentence might take place at different times (announcement) or it might be clustered at a particular time (a regulation, index inclusion).

Here is the steps of event study; first step is the identification of events and definition of the event window. For this study, event date is November 3, 2015 and the event windows are chosen (+2, -2) and (+5, -5) following Cheung (2010). Curran and Morran (2006) point out that defining event window before and after period is necessary to capture all effects of announcement in case of any leak or latecomers situations. Secondly, determine a criteria to select the companies which include in the analysis. For example, in our study the companies are determined by the Sustainability Index. The criteria is whether companies included ISE Sustainability Index or not. If it is included, the company attach to our sample set. Third, prediction of a "normal" return during the estimation window when an event does not occur. The estimation window can be before the event or after the event. Only necessity is that estimation window has to be far away the event day since do not affected by the event. But, Ahern (2009) claims that using post-event data to estimate normal performance reduces the specification error. Forth, estimation of the abnormal return within the event window, where computed by subtracting the predicted return from the actual return (Campbell et al, 1997). To predict unexpected (abnormal) return or normal (expected) return, there are several methods. Some of the common used models are single index model (Constant Mean Return Model), market model, capital asset pricing model (CAPM), arbitrage pricing theory (APT). Within these models we benefitted from market model. The last step is testing if abnormal return is statistically significant.

Here are some models for measuring normal performance. These approaches can be collected under two main headings; statistical and economic. First group depends on statistical assumptions and not related to economic arguments. On the contrary, second group models follow economic arguments such as investor behavior of asset returns, not only on statistical assumptions. The advantage of economic models is not the absence of statistical assumptions and accurate calculations under the economic restrictions. According to Mackinlay (1997) key statistical models are; constant mean return model, market model, factor model and market-adjusted return model. The economic models are Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT).

In this part of the study some statistical models will be explained in detail. These statistical models are; Constant mean return model, Market model, Factor model and Market-adjusted mean return model.

Constant mean return model is the simplest model to calculate normal return however it has similar consequences in comparison with other sophisticated models (Mackinlay, 1997). It is assumed that the distribution of the data is normal. This statistical model can be convenient for both daily and monthly data.

$$R_{it} = \mu_i + \zeta_{it} \tag{2}$$

$$E(\zeta_{it}) = 0 \tag{3}$$

$$\text{var}(\zeta_{it}) = \sigma^2_{\zeta_i} \tag{4}$$

R_{it} = return on security *i*, at time period *t*

μ_i = mean return for asset *i*

ζ_{it} = disturbance term for security *i*, at time period *t*

Market model is a one factor model. Factor here indicates explanatory variables. This model has some improvements in comparison with the constant mean return model. Using market model is beneficial in respect to R^2 of the regression. Here is the R^2 is a type of measurement tool that indicates how much of the fluctuation is explained by the estimated equation. The higher the R^2 the grater is the variance reduction of the bnormal return and the higher is the earnings (As claimed Mackinlay, 1997). Equation of the model is given by (5). Here β indicates the sensitivity of individual stock return to overall market return. ε's are residuals which are normally distributed and constant variance. Because it has several advantages over other three methods. First, it is easier to adopt event study methodology by it.

Second it is easier to apply and gives similar results compared to others. Third, it provides more realistic results for a developing country.

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad \textbf{(5)}$$

$$E(\varepsilon_{it} = 0) \quad \textbf{(6)}$$

$$\mathrm{var}(\varepsilon_{it}) = \sigma^2_{\varepsilon_i} \quad \textbf{(7)}$$

R_{it} = return on security *i*, at time period *t*

α_i = constant for security *i*

β_i = coefficient of market for security *i*

R_{mt} = return on market, at time *t*

ε_{it} = disturbance term for security *i*, at time period *t*

In the most general sense of statistical model is a factor model. Factor models are reducing the variance of the abnormal return by explaining majority of the variation in the normal return. Applying multifactor model for event studies provide limited gains. Marginal explanatory power of additional factors is small and therefore, reduce the variance of abnormal return very little. Using factor models are beneficial in that situations; if all members of sample have same characteristics. For illustration; all members of the sample are belong to the same industry. An example equation indicated below for the Fama and

French (1993) three factor model.

$$r_{it} - r_{ft} = \alpha_i + \beta_{i1}(r_{mt} - r_{ft}) + \beta_{i2}SMB_t + \beta_{i3}HML_t + \varepsilon_{it} \quad \textbf{(8)}$$

$$E(\varepsilon_{it})=0 \quad \textbf{(9)}$$

$$var(\varepsilon_{it})=\sigma^2_{\varepsilon_i} \quad \textbf{(10)}$$

SMB_t =size factor

HML_t =value factor in day *t*

ε_{it} = disturbance term

α_i, β_{i1}, β_{i2}, β_{i3} = unknown and must be estimated

Market- adjusted mean return model is a type of restricted market model; α equal to zero and β equal to one. To use this model data availability is essential. This model can be used in underpricing of initial public offering studies.

In order to measure the normal performance of a stock there are two economic approaches. One is capital asset pricing model and the other is arbitrage pricing theory. Both of them are explained in detail below.

Capital asset pricing model (CAPM) was developed by Sharpe (1963, 1964) and Treynor (1961) simultaneously and then further developments were made respectively Mossin (1966), Lintner (1965, 1969) and Black (1972). CAPM can be seen a special form of APT (arbitrage pricing theory). CAPM has some assumptions about investors and the opportunity set;

1- Investors are the individuals who does not like risk and expect maximum return. If there are two portfolios that have different expected returns and the others all same, they choose high return portfolios.

2- Investors are price takers and all of them are some expectations about returns that have joint normal distribution.

3- There is a risk-free rate that investors can borrow and lend unlimited

4- All assets are divisible and the quantities of them are fixed. That means if an investor wants to buy a very small percentage of an asset; that can be possible.

5- The asset markets are transparent and all investors can reach the information simultaneously. Also reaching information is costless for all of them.

6- The market is perfect. That means there are no taxes, regulations, restrictions or transaction cost.

May be not all these assumptions are realistic but they are the simplifications that allow the development of CAPM. CAPM is very useful for financial decision making since it measures and prices risk. Also, these assumptions provide that focusing on pricing assets if all investors invest on the same way. CAPM makes evaluations with risk and return diagrams since all investors have homogeneous expectations. In the diagrams risk free rate and efficient frontier are evaluated together. One more important difference of CAPM is that; investors can buy risk free and risky assets together. On the contrary, in the Markowitz model investment choices are comprise of all risky assets.

Capital asset pricing model (CAPM) is shown below.

$$E(R_{it}) = R_{ft} + \beta_i \left[E(R_{mt}) - R_{ft} \right] \quad \textbf{(11)}$$

Where;

$E(R_{it})$ = expected or normal return on share i for time t

R_{ft} =risk free rate of interest

$E(R_{mt})$ =expected return on the stock market

β_i = β of the security i

Arbitrage is the simultaneous purchase and sale of an asset in order to profit price differences. Arbitrage opportunity exists if only the market is inefficient. Arbitrage Pricing Theory (APT) was developed by Ross [1976]. APT is similar to CAPM in terms of being equilibrium Asset pricing model but it is more general than CAPM since APT uses a lot of factor to explain the equilibrium return on risk assets. CAPM can be seen as a special form of APT when we saw market rate of return as a single relevant factor. Like CAPM, APT is derived under the usual assumptions of competitive and transparent capital markets. APT assumes that returns on securities affected by industrywide and market wide factors. The equation shown below assumes that the rate of return on a security is a linear function of *k* factors.

$$R_i = E(R_i) + b_i F_i + ... + b_{ik} F_i + \varepsilon_i \qquad \textbf{(12)}$$

Investors have homogeneous beliefs that the random returns for the set of assets being considered are determined by the *k*-factor model. To apply APT theory, number of assets in the portfolio –n-, should be much larger than the number of factor -k-. Also, the noise term ε_i must be unsystematic risk component and it must be independent of all factors and all error terms for other assets.

To apply event study methodology for computer programs, we have several alternatives. The basic one is excel program. Since it will be so primitive and we allow to save space because of having so many stock prices we rather preferred to use Stata program. The description of Stata codes are developed by Princeton University that huddles a simple event study steps together at its own web site. These steps firstly shown below as general titles then STATA codes and explanations will be enlarged. For to use this Stata codes, we initially should clean the data and calculate the event window. Second, we should estimate the normal performance of stock prices. Third step is calculating abnormal and cumulative abnormal returns. Forth, we should test the coefficients with a specific statistical level. Finally, for to conduct broad analysis we should test the null hypothesis across all events.

In this section, we presented the Stata codes from Princeton University's web page as their original forms without changing codes and variable names. Before starting title explanations, here are the variables that we defined. This study has only one event because of that there is one data file. Generally, event studies which have more event dates for each company have two different data files. One is event dates and the other one is stock data set. In the event dates file, there are two variables, one is company id (*company_id*) and the other is date of event (*event_date*). In the stock data file, there are four variables, company id (*company_id*), date of event (*event_date*), stock return (ret) and return of market (*market_return*). Because of each company has only one event, in this study event dates data file and stock return data file are being merged. Here is only one data file in our study.

Data Cleaning, Event and Estimation Windows Calculation Procedure with Stata: Perchance there is more observations for some companies than necessary and also it is possible that not enough observations for some companies. To overcome this problem, a new variable is

defined namely "*dif*". This variable will count the number of days starting from observation to event date. Here are two alternative methodologies to calculate the days: one is trading days and the other is calendar days.

For the number of trading days:

sort company_id date

by company_id: gen datenum=_n

by company_id: gen target=datenum if

date==event_date egen td=min(target),

by(company_id)

drop target

gen dif=datenum-td

For the number of calendar days:

gen dif=date-event_date

As it is given above, calculating trading days is harder than the calculating calendar days. For trading days; first a new variable should be defined that counts the number of days within per "*company_id*". Then which observation occurs on the event day is determined. Again, a new variable is defined to count event date's number of observations within that "*company_id*". Terminally, take the difference between two new variables as named "*dif*". This variable will count the number of days from first day of the observations to event date.

Proceed to the next step, there must be minimum number of observations before and after the event date. To provide minimum number of observation before the event window for the estimation window. For example, in this study 2 days and 5 days before and after the event date (that will make a total of 5 days for the 2 days event window and 11 days for the 5 days event window) and therefore estimation window will be 250 days. But 2 days event window and 30 days estimation window are shown below. The numbers may be changed according to your preferences in your analysis.

by company_id: gen event_window=1 if dif>=-2 & dif<=2

egen count_event_obs=count(event_window), by(company_id)

by company_id: gen estimation_window=1 if dif<-30 & dif>=-

60 egen count_est_obs=count(estimation_window),

by(company_id) replace event_window=0 if event_window==.

replace estimation_window=0 if estimation_window==.

The way of determining the event and estimation windows are the same. A new variable is defined that equals to 1, if the observation is within the specified days. Then, another variable is defined which counts the number of observations within each "*company_id*", and has a 1 assigned to it. At the end, we define a dummy variable that replaces all the missing values with zeros. By this way, we determine the companies that have insufficient number of observations.

tab company_id if count_event_obs<5

tab company_id if count_est_obs<30

The code given above "tab" provides a list which consist of "*company_id'* 'that does not have enough observation within estimation and event windows. To delete these companies we can use the following commands:

```
drop if count_event_obs < 5

drop if count_est_obs < 30
```

Before deleting any observation, we save the data. And now "*count_event_obs*" and "*count_est_obs*" variables can be dropped, because they are not necessary any longer.

Estimating normal return: In this part of the study, we start our analysis in deeper. Initially, a method is necessary to estimate normal performance. In order to do this, we will make a regression for each company that consist of the data in the estimation window and save the alphas and betas. Here, the alpha is the intercept term and the beta is the coefficient of the independent variable. These saved regression equations will be used later to predict normal performance during the event window. We chose market model to estimate normal performance.

```
set more off /* this command just keeps stata from pausing after each screen of output */

gen predicted_return=.

egen id=group(company_id)

/* for multiple event dates, use: egen id = group(group_id) */

forvalues i=1(1)N { /*note: replace N with the highest value of id */

l id company_id if id==`i' & dif==0

reg ret market_return if id==`i' &

estimation_window==1 predict p if id==`i'

replace predicted_return = p if id==`i' &

event_window==1 drop p}
```

Here, a variable was created named "*dif*" that numbers the companies from 1 to how many there are. "N" is the number of company-event couple which have complete data. In this study N is 29. This process repeats for each company, a regression is estimated in the estimation window than, this estimated equation is used to predict a "normal return" in the event window.

Abnormal and Cumulative Abnormal Returns: Now, the abnormal returns and cumulative abnormal returns can be calculated for our data. The daily abnormal return is calculated by subtracting the estimated normal return from the actual return for per day in the event window. Cumulative abnormal return is obtained by summing the abnormal returns over the event window.

sort id date

gen abnormal_return=ret-predicted_return if event_window==1

by id: egen cumulative_abnormal_return=sum(abnormal_return)

In this way, the abnormal return for each company in the event window is calculated simply. And then cumulative abnormal returns calculated by summing the abnormal returns for each company in our sample.

Testing for Significance: In this section, test statistics will be computed, in order to control if the average abnormal return for each stock is statistically different from zero.

TEST= ((ΣAR)/N) / (AR_SD/sqrt(N))

Here, AR is the abnormal return and AR_SD is the abnormal return standard deviation. If the value of test is larger than 1.96 than the average abnormal return for that stock is significant at the 5% level 1.96 value comes from standard normal distribution with standard deviation of 1 and mean of 0. 95% of the distribution is between ±1.96. Also, at the 1% level, 2.3263 and at the 10% level, 1.6449 are the critical values.

sort id date

by id: egen ar_sd = sd(abnormal_return)

gen test =(1/sqrt(number of days in event window))

** (cumulative_abnormal_return /ar_sd)*

list company_id cumulative_abnormal_return test if dif==0

Here the hypothesis is test by z-stat which is assumed to have a standard normal distribution where mean is zero and variance is one. Since observations have different mean and variances, standardizing them by the following will be beneficial.

$$Z = \frac{x - \mu}{\sigma} \tag{13}$$

Statistical tables allow us to see the proportion of distribution lying between certain Z values. For instance; if we want to calculate the area of normal distribution where $-1.96 \leq Z \leq 1.96$ 1.96 we will get a value of 0.95. Therefore, the right and left tails of distribution will have a sum of value 0.05. We benefitted from “=NORM.S.DIST” function in Excel to construct following Z table.

Table 4.3. Z Table

z-values	0.0000	0.0100	0.0200	0.0300	0.0400	0.0500	0.0600	0.0700	0.0800	0.0900
0.0000	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1000	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2000	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3000	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4000	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5000	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6000	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7000	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8000	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9000	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0000	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1000	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2000	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3000	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4000	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5000	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6000	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7000	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8000	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9000	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0000	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1000	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2000	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3000	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4000	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5000	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6000	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7000	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8000	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9000	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0000	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1000	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2000	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3000	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4000	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

To make following Cumulative distribution function we use the formula “NORMS. S. DIST (A3+B2,TRUE)” and for the probability density function we benefited from “NORMS.S.DIST(A3+B2, FALSE) “ commands.

Figure 4.1. Cumulative Distribution Function

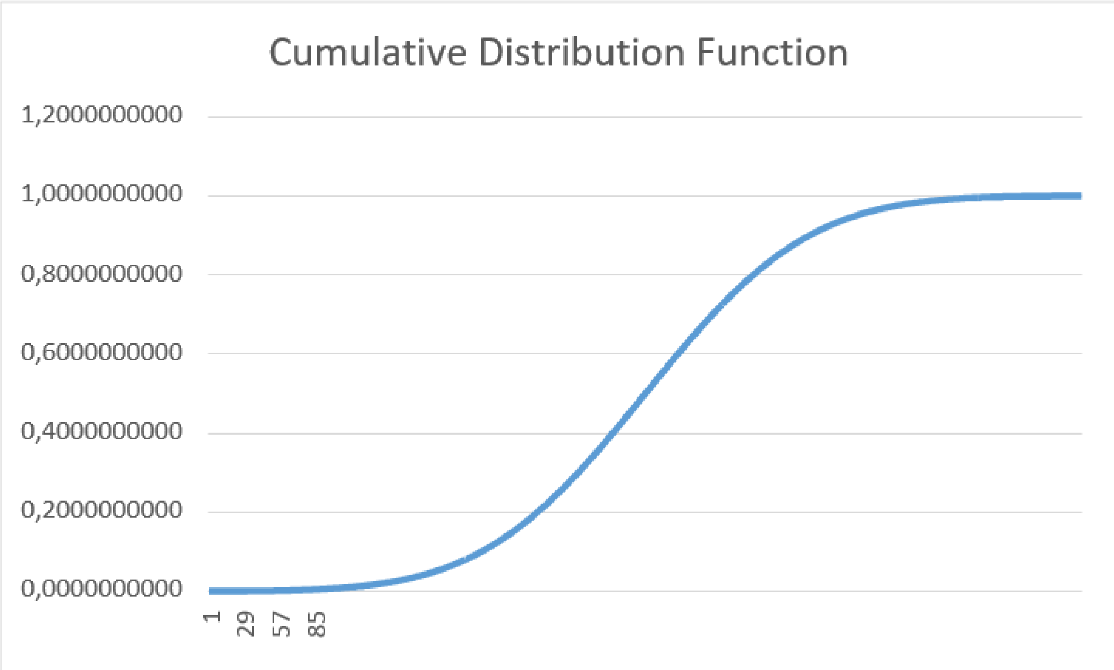
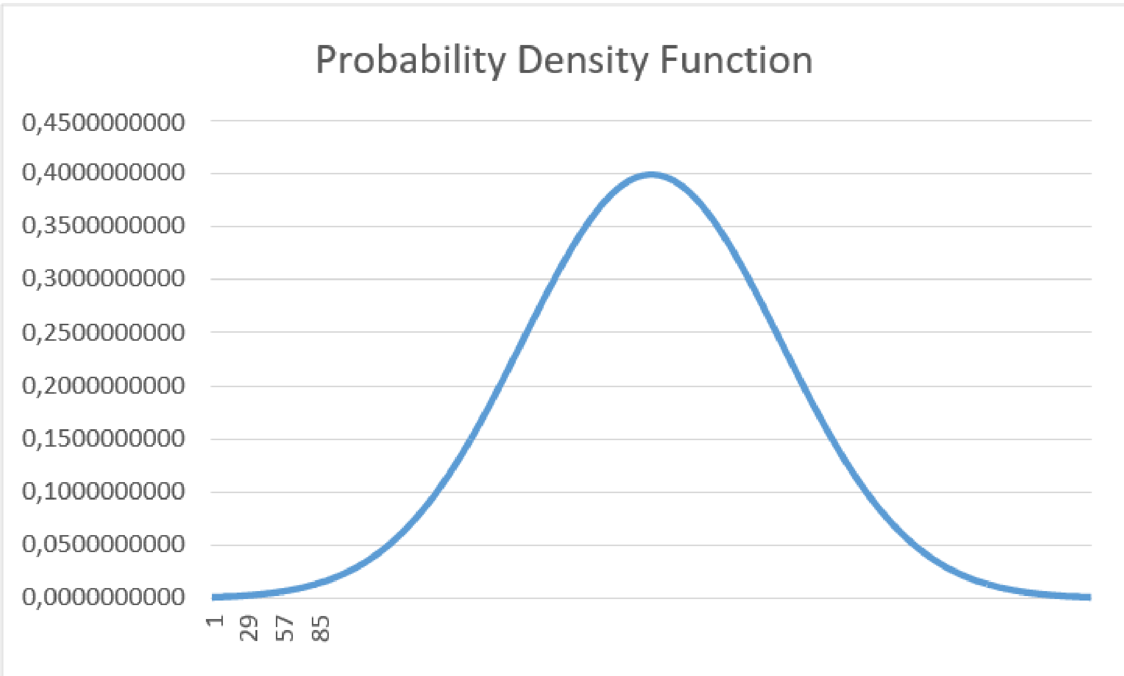


Figure 4.2. Probability Density Function



Finally, the code below is puts the output in a readable excel spredsheet for the stata 12+ types.

export excel company_id event_date cumulative_abnormal_return test using "stats.xls" if dif==0, firstrow(variables) replace

Testing across all events: Along with the looking at the average abnormal return for each company, here is an alternative choice for the ones who wants to calculate the cumulative abnormal return for all companies treated as a group. The null hypothesis is CAR=0. Rejecting null hypothesis with a p value less than zero indicating non-zero CAR across all companies.

reg cumulative_abnormal_return if dif==0, robust

The *p*-value on the constant from this regression will give you if cumulative abnormal return across all companies are different from zero. This test is preferable to a *t*-test. Because of its robustness. The test allows you to use better standard errors.

The event study described above by Stata codes provided us an analysis for to judge if there is non-normal return during a couple of days. However one to search for the effects of inclusion in ISE Sustainability Index on stock market return by a linear methodology

Ordinary Least Square (OLS) is one of the widely used reliable methods in finance. Next section describes the methodology of a multivariate regression. One can refer to Rawlings, Pantula and Dickey (1998) for a theoretical discussion of OLS methodology.

4.2.2. OLS Regression Methodology

To estimate parameters of equations there are several methods in the econometrics literature. Some of them are: Method of Moments (Hansen; 1982), Method of Maximum likelihood, Method of Ordinary Least Square and Weighted least square (WLS). In this study, Ordinary Least Square (OLS) estimation method is used following Şahin(2014). Because the least square estimator has lowest variance amongst all linear unbiased estimators and is known as the best linear unbiased estimator. Furthermore, as Gujarati (2009) says; to estimate the population regression function on the basis of the sample regression function accurately two general methods are available. They are Ordinary Least Square model and Maximum

Likelihood model. Among regression analysis Ordinary Least Square is widespread. One of the main reasons of this, Ordinary Least Square is mathematically much simpler than the method of Maximum Likelihood and both methods generally give approximate reasons (Gujurati; 2014).

Mathematically derivation of Ordinary Least Square coefficient estimator is showed below.

$$y_t = \alpha + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_n x_n + \varepsilon \tag{14}$$

y : dependent variable

t : observation number α: constant term

x_n : independent variable

β_n : regression coefficients

ε : disturbance term

$$\hat{y}_{t=}\hat{\alpha} + \hat{\beta}_1 X + \hat{u} \tag{15}$$

The equation above is the estimated version of first equation. RSS (residual sum of squares) minimized. RSS denoted by L.

$$L = \sum_{t=1}^{T} (y_t - \hat{y}_t)^2 = \sum_{t=1}^{T} (y_t - \hat{\alpha} - \hat{\beta} x)^2 \tag{16}$$

$E(u) = 0$ and $Cov(x,u) = E(xu) = 0$

$E(y - \alpha - \beta_1 x) = 0$

$E[x(y - \alpha - \beta_1 x)] = 0$

To minimize L and find the values of α and β give the line closest the data. First derivations are set to zero.

Weighted Least Square (WLS): If heteroscedasticity is detected using one of Breusch-Pagan test or White test. One way of keep up with heteroscedasticity is using heteroscedasticity robust statistics after ordinary least square (OLS). Before the development of heteroscedasticity robust statistics, the form of heteroscedasticity should be determined by weighted least square (WLS) If the form of variance is correctly specified (as a function of independent variables), using weighted least square(WLS) is more efficient than using ordinary least square (OLS). Also using weighted least square (WLS) is leads to new *t* and *F* statistics and new *t* and *F* distributions.

In this paragraph, we will discuss the using wrong form of WLS. When the heteroscedasticity is known up to multiplicative constant.

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots\ldots + \beta_k x_k + u \tag{17}$$

$$Var(uIx) = \sigma^2 h(x) \tag{18}$$

Let x denote all explanatory variables in the equation (17) and assume that h(x) is represents the all explanatory variable that causes heteroscedasticity problem. Variance is always positive and as a result of that h(x) is positive too. We can write $\sigma^2 = Var(u\ Ix) = \sigma^2 h(x) = \sigma^2 h$. We use i indicial notation in order to representing all independent variables. Now we take the original equation (19) that has heteroscedasticity problems to estimate the β_j and transform in to an equation that has homoscedastic errors.

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \ldots.. + \beta_k x_{ik} + u_i \tag{19}$$

Since h_i is just a function of $x_i, u_i I\sqrt{h_i}$ has a zero expected value conditional on x_i. Since $Var(u_i Ix_i) = E(u_i^2 Ix_i) = \sigma^2 h_i$, the variance of $u_i I\sqrt{h_i}$ (conditional on x_i) is σ^2. We can divide the equation (3) $\sqrt{h_i}$ to obtain

$$y_i = \beta_0 x_{i0} + \beta_1 x_{i1} + \ldots.. + \beta_k x_{ik} + u_i \tag{20}$$

Here $x_{i0}^{*} = 1/\sqrt{h_i}$. Other starred variables symbolize corresponding original variables divided by $\sqrt{h_i}$. Equation (4) is linear. Further u_i^{*} has a zero mean and a constant variance (σ^2), conditional on x_i^{*}. This statement means that if the untransformed equation satisfies four of Gauss-Markov assumptions, equation (20) satisfies all five of Gauss- Markov assumptions. Also, if u_i has a normal distribution u_i^{*} has a normal distribution with σ^2 variance. If the original model satisfies all assumptions of classical linear model except homoscedasticity assumption, the transformed model satisfies all assumptions of classical linear model.(Gujurati; 2013)

As we know OLS satisfies all Gauss-Markov assumptions and appealing properties (is blue) we should estimate the parameters in equation (20) by Ordinary Least Square. These parameters $\beta_0^{*}, \beta_1^{*}, \ldots\ldots, \beta_k^{*}$ are different from the OLS estimators. The β_j^{*} are illustrations of Generalized Least Squares (GLS). Like that situations, GLS estimators are used to explain heteroskedasticity in the errors. GLS is a very detailed topic and we do not mention it extensively.

Because of being best linear unbiased estimators of β_j by obtained GLS is more efficient than the OLS estimator β_j obtained from the original model. Fundamentally, OLS analysis can be used after the variables transformed. But you should recapture that interpretations should be done in the light of untransformed model. (Gujurati; 2009)

To adjust heteroscedasticity, Generalized Least Square (GLS) estimator named Weighted Least Square (WLS). This name derived from the β_j^{*} minimize the weighted sum of residuals that each squared residual is weighted by 1/ $\sqrt{h_i}$. Although OLS gives equal weight to each observation WLS gives less weight to observations with a higher error variance. From a mathematical point of view WLS estimators are the values of the β_j^{*} that make

$$\sum_{i=1}^{n} (y_i - b_0 - b_1 x_{i1} - b_2 x_{i2} - \ldots\ldots - b_k x_{ik})^2 / h_i \qquad \textbf{(21)}$$

as small as possible. WLS estimator can be defined for any set of weights. OLS is a specific situation that that gives same weight to all observations. GLS gives each squared residual by inverse of the conditional variance of ui given xi.

Actually, the estimated model can be written in the usual way. The standard errors and estimates will be different from OLS but the evaluation of these estimates standard errors and test statistics are same.

5. RESULTS

5.1. Event Study Results

Event study analyze is applied to our data. Our sample includes 29 firms' daily returns from 3 November 2014 to 29 April 2016. Event date is taken as 3 November 2015. Estimation periods are (-2, -253) for the (+- 2) event window and (-5, -253) for the (+-5) event window.

For to obtain cumulative abnormal returns we followed several steps. Initially, we regressed company return on market return by following equation.

$$\text{Return} = \text{constant} + b_0 * \text{market return} + \varepsilon_x \quad \textbf{(22)}$$

Table 5.1. Event Study Results

	(+5,-5)				**(+2,-2)**			
Company name	**Constant**	**β0**	**Adj R2**	**F-statistic**	**constant**	**β0**	**Adj R2**	**F-statistic**
AEFES	-0.0001	0,7261	0,212	66,39	-0.0000	0.7206	0.2099	66.90
	[0.0012]	[0.0881]		[0.0000]	[0.011]	[0.0881]		[0.0000]
AKBNK	-0.0000	1.4124	0.8251	1147.31	-0.0021	2.1407	0.4115	175.09
	[0.0005]	[0.0416]		[0.0000]	[0.0022]	[0.1618]		[0.0000]
AKSEN	0.0005	-0.1338	0.0031	1.76	-0.0019	0.7795	0.0444	12.58
	[0.0013]	[0.1008]		[0.1857]	[0.0030]	[0.2198]		[0.0005]
ARCLK	0.0009	0.6247	0.2724	91.97	0.0138	-3.9851	0.0571	16.08
	[0.0008]	[0.0651]		[0.0000]	[0.0137]	[0.9938]		[0.0001]
ASELS	0.0018	-0.0631	-0.0022	0.46	-0.0012	0.9050	0.0589	16.57
	[0.0012]	[0.0928]		[0.4972]	[0.0030]	[0.2223]		[0.0001]
BRISA	0.0000	0.8999	0.3520	132.97	-0.0004	1.0446	0.4021	168.49
	[0.0010]	[0.0780]		[0.0000]	[0.0011]	[0.0804]		[0.0000]
CCOLA	-0.0010	0.7224	0.3173	113.92	0.01795	-5.9430	0.0609	17.14
	[0.0009]	[0.0677]		[0.0000]	[0.0198]	[1.4255]		[0.0000]
DOAS	0.0008	1.1207	0.2548	84.10	-0.0016	2.0588	0.2338	77.00
	[0.0016]	[0.1222]		[0.0000]	[0.002]	[0.2346]		[0.0000]
EREGL	-0.0000	0.7387	0.3024	106.33	-0.0023	1.5559	0.2152	69.26

Table 5.1. (cont'd)

	[0.0009]	[0.0716]		[0.0000]	[0.0025]	[0.1869]		[0.0000]
FROTO	0.0009	0.7159	0.2691	90.46	0.0200	-5.9421	0.0613	17.26
	[0.0010]	[0.0752]		[0.0000]	[0.0198]	[1.4302]		[0.0000]
GARAN	-0.0008	-0.2002	0.0045	2.10	-0.0040	0.9772	0.0407	11.57
	[0.0018]	[0.1381]		[0.1486]	[0.0039]	[0.2873]		[0.0008]
ISCTR	-0.0001	1.3642	0.7431	703.80	0.0027	0.34015	0.0051	2.28
	[0.0006]	[0.0514]		[0.0000]	[0.0031]	[0.2252]		[0.1322]
KCHOL	0.0007	-0.0058	-0.0041	0.01	0.0047	-1.3261	0.0735	20.75
	[0.0009]	[0.0740]		[0.9366]	[0.0040]	[0.2910]		[0.0000]
MGROS	-0.0006	0.8291	0.4170	174.79	0.0011	0.2433	0.0078	2.95
	[0.0008]	[0.0627]		[0.0000]	[0.0019]	[0.1416]		[0.0869]
OTKAR	0.0015	0.8752	0.1855	56.35	0.0088	-1.7563	0.0320	9.23
	[0.0016]	[0.1166]		[0.0000]	[0.0079]	[0.5781]		[0.0026]
PETKI M	0.0008	0.6685	0.3711	144.38	-0.0027	1.8940	0.1665	50.72
	[0.0007]	[0.0556]		[0.0000]	[0.0036]	[0.2659]		[0.0000]
SAFGYO	-0.0003	0.5091	0.1249	35.68	-0.0029836	1.4075	0.1514	45.43
	[0.0011]	[0.0852]		[0.0000]	[0.0028]	[0.2088]		[0.0000]
SAHOL	-0.0001	1.0469	0.6394	431.96	0.0453411	-14,8575	0.0671	18.92
	[0.0006]	[0.0503]		[0.0000]	[0.0472]	[3.4160]		[0.0000]
TAVHL	0.0013	0.4483	0.1129	31.91	0.0037301	-0.4445	0.0142	4.58
	[0.0010]	[0.0793]		[0.0000]	[0.0028]	[0.2078]		[0.0334]
TCELL	0.0001	0.7062	0.3473	130.28	-0.0007	1.1001	0.3048	110.16
	[0.0008]	[0.0618]		[0.0000]	[0.0014]	[0.1048]		[0.0000]
THYAO	0.0006	1.0665	0.4539	203.00	-0.0004	1.4506	0.4205	181.69
	[0.0010]	[0.0748]		[0.0000]	[0.0014]	[0.1076]		[0.0000]
TOASA	0.0015	0.7039	0.2141	67.18	0.0047	-0.3970	0.0061	2.53
	[0.0011]	[0.0858]		[0.0000]	[0.0034]	[0.2494]		[0.0334]
TSKB	-0.0007	-0.0036	-0.0041	0.00	-0.0046	1.1959	0.0693	19.54
	[0.0010]	[0.0806]		[0.9639]	[0.0037]	[0.2705]		[0.0000]
TTKOM	0.0002	0.6966	0.2987	104.52	0.01627	-4.9015	0.0625	16.53
	[0.0009]	[0.0681]		[0.0000]	[0.0168]	[1.2054]		[0.0001]
TUPRS	0.0021	0.7360	0.3098	110.10	0.0238	-6.8968	0.0664	17.65
	[0.0021]	[0.0009]		[0.0000]	[0.0228]	[1.6417]		[0.0000]
ULKER	0.0009	0.59575	0.1766	53.10	-0.0018	1.5692	0.1683	50.19
	[0.0010]	[0.0817]		[0.0000]	[0.0030]	[0.2214]		[0.0000]
VAKBNK	-0.0003	1.430427	0.7576	760.42	-0.0029	2.3383	0.3527	135.13
	[0.0006]	[0.0518]		[0.0000]	[0.0028]	[0.2011]		[0.0000]
VESTL	-0.0006	1.458034	0.2530	83.32	0.0015	0.6538	0.0315	8.08
	[0.0021]	[0.1597]		[0.0000]	[0.0032]	[0.2300]		[0.0049]
YKBNK	-0.0010	1.2290	0.2530	83.32	-0.0020	1.5811	0.5796	344.36
	[0.0005]	[0.0389]		[0.0000]	[0.0012]	[0.0852]		[0.0000]

We use the coefficients obtained from previous equations to calculate abnormal returns and cumulative abnormal returns. The results of the cumulative abnormal return are presented in Table 5.2 Panel A of table provides results for (+5,-5) window and Panel B provides results for (+2,-2) window. We explained how to obtain cumulative abnormal returns from abnormal returns in detail previously by also providing Stata codes. According to Panel A cumulative abnormal return of 15 out of 29 companies are non-significantly negative and 14 companies are non-significantly positive. Therefore, we reject the null hypothesis of cumulative abnormal return is equal to zero for all the companies between (+5, -5) window. Besides *t*-statistics for the overall cumulative abnormal return for all companies indicate rejection of null hypothesis of zero cumulative abnormal return across all companies. Panel b of table x provides results for (+2, -2) window. The companies GARAN and ULKER are only two firms which have significantly negative cumulative abnormal returns. The other 11 companies have negative non-significant cumulative abnormal returns and rest of the 16 firms have non-significantly cumulative abnormal return coefficients. Table 5.2 provides results for cumulative abnormal return across all companies. Again, Panel A is for (+5, -5) window and Panel B is for (+2, -2) window. The results in Panel A indicate that cumulative abnormal return across all companies is non-significant. Therefore, we fail to reject null hypothesis. However, for shorter event window we reject the null hypothesis (panel B).

Table 5.2. Cumulative Abnormal Returns

Symbol of the Firm	**Name of the Firm**	**Sector**	**Panel A (+5,-5)**	**Panel B (+2,-2)**
			CAR	**CAR**
AEFES	Anadolu Efes Biracılık ve Malt Sanayi A.S	Beverage	-0.0566	-0.0315
			[-0.9578]	[-0.6269]
AKBNK	Akbank A.S	Financial	0.0070	-0.0402
			[0.2207]	[-0.9927]
AKSEN	Aksa Enerji Uretim A.S	Energy	0.0098	-0.0998
			[0.1227]	[-1.4222]
ARCLK	Arçelik A.S	Industrial	-0.0134	0.2234
			[-0.1994]	[0.8612]
ASELS	Aselsan Elektronik Sanayi ve Ticaret A.S	Industrial	-0.0174	-0.01876
			[-0.2734]	[-0.2369]
BRISA	Brisa Bridgestone Sabancı Lastik San. ve Tic. A.S	Industrial	0.01720	-0.0132
			[0.4896]	[-1.6530]
CCOLA	Coca-Cola Icecek A.S	Beverage	0.0370	0.3127
			[0.5935]	[0.7942]
DOAS	Dogus Otomotiv Servis ve Ticaret A.S	Automotive	0.0473	-0.0064
			[1.2200]	[-0.0808]
EREGL	Eregli Demir ve Celik T.A.S	Industrial	-0.0304	-0.0696
			[-0.4279]	[-0.8014]

Table 5.2. (cont'd)

FROTO	Ford Otomotiv Sanayi A.S	Automotive	-0.0144	0.2550
			[-0.3194]	[0.7124]
GARAN	T.Garanti Bankası A.S	Financial	0.1326	**-0.0888***
			[0.9610]	[-1.7203]
ISCTR	T.İs Bankası A.S	Financial	-0.0119	0.0405
			[-0.4347]	[0.5549]
KCHOL	Koç Holding A.S	Multiple	0.0475	0.0863
			[1.1604]	[1.2460]
MGROS	Migros Turk T.A.S	Basic Materials	0.0459	0.0989
			[0.6530]	[1.1415]
OTKAR	Otokar Otomotiv ve Savunma Sanayi A.S	Automotive	-0.0083	0.0951
			[-0.2033]	[0.7001]
PETKM	Petkim Petro-Kimya Holding A.S	Energy	0.0329	-0.0127
			[1.2588]	[-0.2020]
SAFGY	Saf Gayrimenkul Yatırım Ortaklığı A.S	Construction	-0.0025	-0.0417
			[-0.0868]	[-0.7709]
SAHOL	Hacı Ömer Sabancı Holding A.S	Multiple	-0.0120	0.6461
			[-0.3573]	[0.7136]
TAVHL	Tav Havalimanları Holding A.S	Transportation	-0.0457	0.0098
			[-1.0720]	[0.1287]
TCELL	Turkcell Iletisim Hizmetleri A.S	Telecommunication	-0.0029	-0.0361
			[-0.0665]	[-0.6460]
THYAO	Turk Hava Yolları A.O	Transportation	0.0464	0.0340
			[1.4424]	[1.1092]
TOASO	Tofas Turk Otomobil fabrikası A.S	Automotive	0.0295	0.0413
			[0.4525]	[0.4248]
TSKB	Turkiye Sınai kalkınma bankası	Financial	-0.0186	-0.0580
			[-0.2884]	[-0.8215]
TTKOM	Turk Telekomunikasyon A.S	Telecommunication	-0.0363	0.2461
			[-0.8229]	[0.7814]
TUPRS	Tupras- TUrkiye Petrol Rafinerileri A.S	Gas and Oil	-0.0375	0.2753
			[-0.6932]	[0.6907]
ULKER	Ülker Biskuvi Sanayi A.S	Food	-0.0400	- **0.1083*****
			[-0.8563]	[-3.3524]
VAKBN	Turkiye Vakiflar Bankasi T.A.O	Financial	0.0591	0.0080
			[1.3063]	[0.3468]
VESTL	Vestel Elektronik Sanayi ve Ticaret A.S	Industrial	0.0548	0.1365
			[0.3330]	[0.7544]
YKBNK	Yapı ve Kredi Bankası A.S	Financial	0.0475	0.0297
			[1.1193]	[1.2674]

Note: z-test statistics are provided in brackets.
***, ** and * Significance at the 1%, 5%, and 10% levels respectively.

5.2. OLS Results

When we assess full model results, changes in oil prices makes positive and statistically significant increase in the stock prices of S_3, S_5, S_{14},S_{19},S_{23},S_{25} companies, negatively and statistically significant effects S_{15},S_{21} companies stock prices. It has seen that automotive industry and aviation industry negatively affected. Increase in interest rate conveys a drop in

S_1's stock price and conveys a rise in S_{15}'s stock price. Exchange rate fluctuations affected positively S_{26} and S_{28} while S_4, S_5, S_{24} affected negatively. Monetary expansion affected S_{16} positively and S_6, S_{11}, S_{15}, S_{17} negatively. Changes in ISE100 makes positive effect in S_1, S_2, S_4, S_6, S_7,S_8,S_9,S_{10},S_{12},S_{14},S_{15},S_{16},S_{18},S_{19},S_{20},S_{21},S_{22},S_{24},S_{25},S_{26},S_{27},S_{28},S_{29} and negative effect for company S_3. Changes in previous day stock price increases S_1, S_7, S_{14}'s stock price and decreases S_4, S_{12}, S_{19}, S_{21}'s stock price. These results are mostly consistent by Sahin (2014). OLS full model results are given at table 5.3.

Table 5.3. OLS Results (FULL)

OLS (FULL)						
	S1	**S2**	**S3**	**S4**	**S5**	**S6**
C	15.0397*	-1.9897	-3.7566	7.1701*	-6.8982	0.5366
	[0.0465]	[0.5842]	[0.6529]	[0.0221]	[0.3807]	[0.9283]
DLOIL	0.0299	0.0238	0.0966	-0.0271	0.0942	-0.0610
	[0.5578]	[0.3298]	[0.0848]	[0.4903]	[0.0743]	[0.1273]
INT	-1.3977*	0.1850	0.3477	-0.6534	0.6584	-0.0523
	[0.0461]	[0.5833]	[0.6536]	[0.2303]	[0.3671]	[0.9247]
DLEXC	0.0038	-0.0429	-0.0121	-0.3272**	-0.3010*	-0.0061
	[0.9795]	[0.5767]	[0.9405]	[0.0042]	[0.0471]	[0.9609]
DLNM	-0.0012	0.0038	-0.0114	0.0013	0.0032	-0.0124
	[0.8858]	[0.3577]	[0.2302]	[0.8503]	[0.7269]	[0.0709]
DLNISE	0.7121***	1.4017***	-0.2236*	0.6737***	-0.0433	0.8950***
	[0.0000]	[0.0000]	[0.0225]	[0.0000]	[0.6826]	[0.0000]
DLNS(-1)	0.1319	-0.0450	0.0066	-0.1851	-0.0314	-0.0739
	[0.0266]	[0.1390]	[0.9180]	[0.0016]	[0.6759]	[0.1486]
DUMAB1	-14.1066	4.7146	7.6343	-11.6171	9.3282	9.5014
	[0.2657]	[0.4403]	[0.5870]	[0.2393]	[0.4807]	[0.3443]
DLOIL*DUMAB1	0.0397	-0.0306	-0.0446	0.0104	-0.0924	0.0475
	[0.6191]	[0.4250]	[0.6128]	[0.8673]	[0.2678]	[0.4519]
INT*DUMAB1	1.3054	-0.4357	-0.7036	1.0806	-0.8644	-0.8861
	[0.2699]	[0.4449]	[0.5917]	[0.2409]	[0.4838]	[0.3447]
DLEXC*DUMAB1	0.1243	0.1710	-0.1804	0.2856	0.5538	-0.2086
	[0.7028]	[0.3149]	[0.6147]	[0.2621]	[0.1032]	[0.4320]
DLNM*DUMAB1	-0.0046	-0.0009	0.0142	0.0038	0.0078	0.0006
	[0.7136]	[0.8876]	[0.3092]	[0.7016]	[0.5538]	[0.9492]
DLNISE*DUMAB1	0.0597	-0.1803	0.3802	0.3401	0.0936	-0.0484
	[0.7105]	[0.0201]	[0.0317]	[0.0064]	[0.6168]	[0.7032]
DLNS(-1)*DUMAB1	-0.2600*	0.0453	-0.0613	0.1360	-0.0095	0.0669
	[0.0106]	[0.4303]	[0.6008]	[0.1198]	[0.9417]	[0.4977]
R-squared	0.2603	0.8174	0.0332	0.3819	0.0322	0.4338
Adjusted R-squared	0.2325	0.8106	-0.0031	0.3587	-0.0041	0.4125
S.E. of regression	1.8461	0.8901	2.0449	1.4361	1.9273	1.4621
Sum squared resid	1179.2580	274.1046	1446.7930	713.5829	1285.2650	739.6802
Log likelihood	-724.3944	-461.7509	-761.1980	-633.9729	-739.8888	-640.4384
F-statistic	9.3647	119.1547	0.9150	16.4436	0.8863	20.3921
Prob (F-statistic)	0.0000	0.0000	0.5375	0.0000	0.5679	0.0000
Mean dependent var.	-0.0303	0.0333	0.0119	0.1064	0.1767	0.0052
S.D. dependent var.	2.1073	2.0449	2.0417	1.7932	1.9234	1.9076
Akaike info criterion	4.1022	2.6431	4.3067	3.5998	4.1883	3.6358
Schwarz criterion	4.2533	2.7942	4.4578	3.7510	4.3394	3.7869

Table 5.3. (cont'd)

Hannan-Quinn criter.	4.1623	2.7032	4.3667	3.6599	4.2484	3.6959
Durbin-Watson stat.	2.0361	2.1871	2.0179	2.0761	2.0323	2.1925
	S7	**S8**	**S9**	**S10**	**S11**	**S12**
C	-7.3963	13.8049	0.0115	0.4844	2.9833	-0.5475
	[0.2493]	[0.1432]	[0.9985]	[0.9387]	[0.7975]	[0.8904]
DLOIL	0.0615	-0.0630	0.0389	0.0407	-0.0030	-0.0241
	[0.1523]	[0.3181]	[0.3564]	[0.3347]	[0.9695]	[0.3666]
INT	0.6783	-1.2798	0.0014	-0.0363	-0.2896	0.0456
	[0.2547]	[0.1434]	[0.9981]	[0.9505]	[0.7884]	[0.9016]
DLEXC	0.0899	-0.0658	-0.1938	-0.0678	0.1635	0.0677
	[0.4869]	[0.7324]	[0.1207]	[0.5837]	[0.4631]	[0.4226]
DLNM	-0.0063	0.0090	-0.0108	0.0063	-0.0234	-0.0035
	[0.3868]	[0.4039]	[0.1349]	[0.3783]	[0.0791]	[0.4433]
DLNISE	0.7192***	1.2069***	0.6624***	0.7015***	-0.2105	1.3623***
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.1227]	[0.0000]
DLNS(-1)	0.1440	0.0414	-0.0672	-0.0601	-0.0321	-0.0542
	[0.0187]	[0.4383]	[0.2482]	[0.2897]	[0.6177]	[0.0954]
DUMAB1	13.5947	-7.8746	-2.6577	-6.1132	3.1478	3.8081
	[0.2079]	[0.6195]	[0.8020]	[0.5647]	[0.8719]	[0.5686]
DLOIL*DUMAB1	-0.0182	-0.0362	0.0186	0.0129	0.0084	0.0339
	[0.7875]	[0.7159]	[0.7795]	[0.8456]	[0.9453]	[0.4181]
INT*DUMAB1	-1.2583	0.7343	0.2539	0.5708	-0.2700	-0.3562
	[0.2117]	[0.6198]	[0.7974]	[0.5646]	[0.8822]	[0.5678]
DLEXC*DUMAB1	-0.1311	-0.1888	-0.1104	-0.0937	-0.5147	0.0486
	[0.6438]	[0.6523]	[0.6871]	[0.7310]	[0.3005]	[0.7870]
DLNM*DUMAB1	0.0079	-0.0055	-0.0027	-0.0076	0.0302	0.0014
	[0.4591]	[0.7277]	[0.7975]	[0.4733]	[0.1211]	[0.8352]
DLNISE*DUMAB1	0.0972	-0.1137	0.3565*	0.1340	0.2997	-0.1758*
	[0.4739]	[0.5692]	[0.0080]	[0.3156]	[0.2228]	[0.0369]
DLNS(-1)*DUMAB1	0.0392	-0.0055	0.1062	0.0212	0.0131	0.0442
	[0.6716]	[0.9611]	[0.2294]	[0.8287]	[0.9112]	[0.4732]
R-squared	0.3536	0.3281	0.3765	0.3305	0.0216	0.7822
Adjusted R-squared	0.3293	0.3029	0.3530	0.3053	-0.0151	0.7740
S.E. of regression	1.5715	2.3072	1.5439	1.5432	2.8438	0.9732
Sum squared resid	854.4572	1841.8580	824.6965	824.0320	2798.1890	327.6854
Log likelihood	-666.4031	-804.6545	-660.0219	-659.8768	-879.9301	-493.8889
F-statistic	14.5602	12.9972	16.0695	13.1364	0.5879	95.5594
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000	0.8639	0.0000
Mean dependent var	-0.0458	0.0625	0.0423	0.0852	-0.0226	-0.0305
S.D. dependent var	1.9189	2.7633	1.9194	1.8516	2.8225	2.0469
Akaike info criterion	3.7800	4.5481	3.7446	3.7438	4.9663	2.8216
Schwarz criterion	3.9311	4.6992	3.8957	3.8949	5.1174	2.9727
Hannan-Quinn criter.	3.8401	4.6082	3.8047	3.8039	5.0264	2.8817
Durbin-Watson stat	2.0590	1.9449	2.0270	2.0093	2.0180	2.1293
	S14	**S15**	**S16**	**S17**	**S18**	**S19**
C	7.3872	-15.7238	2.4678	-8.3059	-2.1679	-2.5286
	[0.1645]	[0.0725]	[0.6394]	[0.3130]	[0.6243]	[0.7144]
DLOIL	0.0607	-0.1397	0.0305	0.0241	0.0165	0.0179
	[0.0915]	[0.0168]	[0.3881]	[0.6601]	[0.5718]	[0.6982]
INT	-0.6909	1.4671	-0.2185	0.7711	0.1999	0.2471
	[0.1610]	[0.0708]	[0.6547]	[0.3126]	[0.6164]	[0.6999]
DLEXC	0.0813	0.0150	-0.0811	0.1225	-0.0527	-0.0702
	[0.4741]	[0.9301]	[0.4408]	[0.4358]	[0.5442]	[0.5958]
DLNM	-0.0031	-0.0192	0.0130	-0.0167	0.0052	0.0059

Table 5.3. (cont'd)

	[0.6042]	[0.0538]	[0.0303]	[0.0751]	[0.2891]	[0.4549]
DLNISE	0.9132****	0.8659***	0.7078***	-0.0404	1.0366***	0.4814***
	[0.0000]	[0.0000]	[0.0000]	[0.6734]	[0.0000]	[0.0000]
DLNS(-1)	0.0900	0.0237	-0.0696	-0.0193	-0.0513	-0.1189
	[0.0880]	[0.6560]	[0.2327]	[0.7650]	[0.2219]	[0.0582]
DUMAB1	-0.0630	13.6063	5.9885	5.6926	2.6241	0.9079
	[0.9944]	[0.3528]	[0.4992]	[0.8557]	[0.7165]	[0.9377]
DLOIL*DUMAB1	-0.0130	0.1263	-0.0731	-0.1077	-0.0082	0.0376
	[0.8166]	[0.1694]	[0.1893]	[0.2300]	[0.8576]	[0.6061]
INT*DUMAB1	0.0060	-1.2487	-0.5509	-0.5239	-0.2362	-0.1194
	[0.9943]	[0.3610]	[0.5054]	[0.2097]	[0.7262]	[0.9123]
DLEXC*DUMAB1	-0.1739	-0.4039	0.3346	-0.1848	-0.1792	-0.1276
	[0.4715]	[0.2949]	[0.1432]	[0.8575]	[0.3659]	[0.6678]
DLNM*DUMAB1	-0.0134	0.0151	-0.0233*	0.0190	0.0001	0.0034
	[0.1337]	[0.2969]	[0.0084]	[0.2097]	[0.9918]	[0.7698]
DLNISE*DUMAB1	0.0619	-0.3520	-0.0476	0.2391	-0.0468	0.2597
	[0.5808]	[0.0556]	[0.6694]	[0.1830]	[0.6069]	[0.0772]
DLNS(-1)*DUMAB1	-0.1279	-0.0214	0.0847	-0.0939	0.0839	0.2001
	[0.1307]	[0.8716]	[0.3448]	[0.4224]	[0.2534]	[0.0434]
R-squared	0.5284	0.2343	0.3683	0.0252	0.6487	0.2153
Adjusted R-squared	0.5107	0.2056	0.3446	-0.0130	0.6355	0.1858
S.E. of regression	1.2954	2.1262	1.2895	2.0076	1.0529	1.6916
Sum squared resid	580.5980	1564.2080	575.3743	1334.1360	383.5987	990.0297
Log likelihood	-596.8497	-775.2434	-595.2229	-722.8392	-522.2466	-692.9114
F-statistic	29.8181	8.1457	15.5195	0.6594	49.1521	7.3023
Prob(F-statistic)	0.0000	0.0000	0.0000	0.8023	0.0000	0.0000
Mean dependent var	-0.0290	0.1598	0.1540	0.0298	0.0254	-0.0082
S.D. dependent var	1.8518	2.3855	1.5929	1.9947	1.7441	1.8747
Akaike info criterion	3.3936	4.3847	3.3846	4.2715	2.9791	3.9273
Schwarz criterion	3.5447	4.5358	3.5357	4.4275	3.1303	4.0784
Hannan-Quinn criter.	3.4537	4.4448	3.4447	4.3336	3.0392	3.9874
Durbin-Watson stat	2.0234	2.0612	1.9655	1.9786	2.2561	2.0209
	S20	**S21**	**S22**	**S23**	**S24**	**S25**
C	5.2532	-3.0974	4.5947	-3.5600	-3.1241	-7.2606
	[0.3243]	[0.5786]	[0.5123]	[0.6307]	[0.5824]	[0.2178]
DLOIL	-0.0468	-0.1972***	0.0586	0.0933	-0.0114	0.0922*
	[0.1916]	[0.0000]	[0.2122]	[0.0602]	[0.7659]	[0.0208]
INT	-0.4881	0.2888	-0.4094	0.3214	0.2911	0.6936
	[0.3235]	[0.5766]	[0.5291]	[0.6399]	[0.5808]	[0.2044]
DLEXC	-0.0171	-0.0887	-0.1262	-0.0819	-0.2958	-0.0657
	[0.8720]	[0.4126]	[0.3617]	[0.5625]	[0.0094]	[0.5652]
DLNM	-0.0001	0.0059	0.0105	-0.0106	0.0030	0.0004
	[0.9893]	[0.3508]	[0.1882]	[0.2110]	[0.6440]	[0.9571]
DLNISE	0.6889***	1.1488***	0.7329***	-0.0489	0.7102***	0.6805***
	[0.0000]	[0.0000]	[0.0000]	[0.5726]	[0.0000]	[0.0000]
DLNS(-1)	0.0078	-0.1553***	-0.0542	-0.1033	-0.0424	0.0199
	[0.8884]	[0.0003]	[0.3485]	[0.1410]	[0.4341]	[0.7118]
DUMAB1	-5.9189	-2.4054	-16.7740	3.4433	-4.6649	8.0077
	[0.5084]	[0.7973]	[0.1552]	[0.7820]	[0.6263]	[0.4185]
DLOIL*DUMAB1	0.0869	0.1251	-0.0335	-0.0275	0.0848	-0.1174
	[0.1258]	[0.0327]	[0.6511]	[0.7251]	[0.1588]	[0.0600]
INT*DUMAB1	0.5496	0.2018	1.5594	-0.3185	0.4416	-0.7642
	[0.5106]	[0.8174]	[0.1569]	[0.7839]	[0.6214]	[.4082]
DLEXC*DUMAB1	0.0290	0.1907	-0.0614	-0.1093	0.2512	0.2889
	[0.9008]	[0.4368]	[0.8405]	[0.7354]	[0.3353]	[0.2530]
DLNM*DUMAB1	0.0009	0.0055	-0.0084	0.0052	0.0069	0.0015
	[0.9168]	[0.5506]	[0.4751]	[0.6744]	[0.4693]	[0.8778]
DLNISE*DUMAB1	0.3061*	0.1116	0.2748	0.2085	0.1230	0.2283
	[0.0068]	[0.3420]	[0.0644]	[0.1853]	[0.3066]	[0.0671]
DLNS(-1)*DUMAB1	-0.0341	0.1082	-0.0097	-0.0430	0.0023	-0.0934

Table 5.3. (cont'd)

	[0.6950]	[0.1554]	[0.9176]	[0.6942]	[0.9805]	[0.3131]
R-squared	0.4279	0.5955	0.3270	0.0487	0.3795	0.3689
Adjusted R-squared	0.4064	0.5804	0.3017	0.0129	0.3562	0.3452
S.E. of regression	1.3032	1.3577	1.7181	1.8112	1.3921	1.4422
Sum squared resid	587.5970	637.7716	1021.3080	1134.9940	670.5522	719.6714
Log likelihood	-599.0066	-613.7556	-698.5102	-717.5081	-622.7774	-635.5022
F-statistic	19.9082	39.1904	12.9301	1.3612	16.2758	15.5572
Prob(F-statistic)	0.0000	0.0000	0.0000	0.1762	0.0000	0.0000
Mean dependent var	0.0072	-0.0479	0.1436	-0.0959	0.0127	0.1438
S.D. dependent var	1.6915	2.0958	2.0560	1.8230	1.7349	1.7823
Akaike info criterion	3.4056	3.4875	3.9584	4.0639	3.5377	3.6083
Schwarz criterion	3.5567	3.6387	4.1095	4.2151	3.6888	3.7595
Hannan-Quinn criter.	3.4657	3.5476	4.0185	4.1240	3.5977	3.6684
Durbin-Watson stat	1.9419	2.0514	2.1042	2.0562	2.1810	2.0251

	S26	**S27**	**S28**	**S29**
C	-3.3693	-1.4064	10.1560	0.1629
	[0.6136]	[0.7565]	[0.4027]	[0.9661]
DLOIL	-0.0013	-0.0440	-0.0044	0.0072
	[0.9773]	[0.1478]	[0.9570]	[0.7796]
INT	0.3148	0.1272	-0.9539	-0.0244
	[0.6111]	[0.7623]	[0.3969]	[0.9453]
DLEXC	0.2510	0.0998	0.6589	0.0652
	[0.0553]	[0.2977]	[0.0076]	[0.4252]
DLNM	0.0069	-0.0002	0.0075	0.0014
	[0.3673]	[0.9710]	[0.5890]	[0.7495]
DLNISE	0.6182***	1.4852***	1.5923***	1.2681***
	[0.0000]	[0.0000]	[0.0000]	[0.0000]
DLNS(-1)	0.0680	0.0522	0.0779	0.0140
	[0.2363]	[0.1285]	[0.1255]	[0.6906]
DUMAB1	12.3203	2.4124	17.7526	2.6963
	[0.2727]	[0.7516]	[0.3862]	[0.6760]
DLOIL*DUMAB1	0.0683	0.0039	-0.0134	-0.0010
	[0.3311]	[0.9357]	[0.9169]	[0.9807]
INT*DUMAB1	-1.1478	-0.2193	-1.6430	-0.2379
	[0.2736]	[0.7579]	[0.3902]	[0.6928]
DLEXC*DUMAB1	-0.4139	-0.0482	-0.7459	0.1149
	[0.1533]	[0.8153]	[0.1619]	[0.5143]
DLNM*DUMAB1	-0.0153	0.0022	-0.0276	-0.0039
	[0.1720]	[0.7770]	[0.1758]	[0.5463]
DLNISE*DUMAB1	-0.0169	-0.1633	-0.6563	-0.2289
	[0.9049]	[0.0894]	[0.0112]	[0.0051]
DLNS(-1)*DUMAB1	0.1218	-0.0945	-0.2186	-0.0166
	[0.2418]	[0.1323]	[0.0861]	[0.7912]
R-squared	0.2551	0.7619	0.3248	0.7619

Table 5.3. (cont'd)

Adjusted R-squared	0.2271	0.7530	0.2994	0.7530
S.E. of regression	1.6336	1.1113	2.9730	0.9405
Sum squared resid	923.3883	427.2701	3058.1950	306.0534
Log likelihood	-680.3681	-541.6541	-895.9236	-481.5959
F-statistic	9.1151	85.1722	12.8005	85.1836
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000
Mean dependent var	0.0686	0.0148	0.0242	-0.0282
S.D. dependent var	1.8582	2.2358	3.5518	1.8924
Akaike info criterion	3.8576	3.0870	5.0551	2.7533
Schwarz criterion	4.0087	3.2381	5.2063	2.9044
Hannan-Quinn criter.	3.9177	3.1471	5.1152	2.8134
Durbin-Watson stat	2.0376	2.1884	2.0587	2.0863

Note: *p*-values are provided in brackets.
***, ** and * Significance at the 1%, 5%, and 10% levels respectively

After including the sustainability stock index; raise in oil prices makes negative effect on S_{25}. Increasing interest rate and Exchange rate does not make any significant effect for the post-term and pre-term on any firm. Monetary expansion only makes detractive effect on S_{16} at the second term (after inclusion the index). Raise in ISE100 general index makes positive effect on S_3,S_4,S_9,S_{19},S_{20},S_{22},S_{25} and makes negative effect on S_2,S_{12},S_{15},S_{27},S_{28},S_{29}. One day deferred stock price effect is positive on S_{19} and negative on S_1, S_{28}.. OLS reduced model results are given at table 5.4.

In the reduced model; the increase in oil price makes a positive effect for the stock price of S_{14}, S_{23}, S_{25} companies and leads to decline for the stock price of S_{15}, S_{21} companies for whole period. The negatively affected two companies are transportation firms.

Table 5.4. OLS Results (REDUCED)

	OLS (REDUCED)						
	S1	S2	S3	S4	S5	S6	S7
C	9.7822	0.0121	0.0413	0.1197	0.1952*	-0.0016	-0.0621
	[0.0883]	[0.7875]	[0.6930]	[0.1069]	[0.0489]	[0.9826]	[0.4395]
DLOIL			0.0670		0.0512		
			[0.1036]		[0.1773]		
INT	-0.9143						
	[0.0869]						
DLEXC				-0.2584*	-0.1790		
				[0.0098]	[0.1729]		
DLNM						-0.0133*	
						[0.0067]	
DLNISE	0.7531***	1.4047***	-0.1827	0.6515***		0.8793***	0.7677***
	[0.0000]	[0.0000]	[0.0514]	[0.0000]		[0.0000]	[0.0000]
DLNS(-1)	0.1387*			-0.1275**			0.1493**
	[0.0137]			[0.0025]			[0.0005]
DUMAB1							
DLOIL* DUMAB1							
INT* DUMAB1							
DLEXC* DUMAB1							
DLNM* DUMAB1							
DLNISE* DUMAB1			0.3443*	0.3382**			
			[0.0388]	[0.0040]			
DLNS (-1)*DUMAB1	-0.2648*	-0.1946*					
	[0.0070]	[0.0064]					
R-squared	0.2533	0.8166	0.0215	0.3664	0.0102	0.4202	0.3329
Adjusted R-squared	0.2450	0.8156	0.0137	0.3595	0.0048	0.4171	0.3293
S.E. of regression	1.8285	0.8688	2.0229	1.4259	1.9052	1.4548	1.5538
Sum squared resid	1193.5460	281.5675	1522.2270	752.2987	1353.852 0	785.1503	898.1478
Log likelihood	-729.5960	-479.1481	-796.4089	-662.6408	-774.3714	-669.3658	-695.8661
F-statistic	30.2823	830.2067	2.7299	53.4801	1.9132	134.4357	92.8160
Prob (F-statistic)	0.0000	0.0000	0.0438	0.0000	0.1491	0.0000	0.0000
Mean dependent var	-0.0359	0.0346	0.0305	0.1040	0.1757	0.0157	-0.0585
S.D. dependent var	2.1043	2.0232	2.0368	1.7817	1.9098	1.9054	1.8973
Akaike info criterion	4.0585	2.5646	4.2575	3.5608	4.1350	3.5955	3.7273
Schwarz criterion	4.1123	2.5960	4.2993	3.6131	4.1663	3.6270	3.7587
Hannan-Quinn criter.	4.0799	2.5771	4.2741	3.5815	4.1474	3.6080	3.7398
Durbin-Watson stat	2.0147	2.2508	2.0394	2.0749	2.0983	2.2783	2.1022
	S8	S9	S10	S11	S12	S14	S15

Table 5.4. (cont'd)

C	0.0881	0.0073	0.0800	-0.0225	-0.0356	-0.0302	-9.7782
	[0.4626]	[0.9288]	[0.3140]	[0.8762]	[0.4773]	[0.6595]	[0.1348]
DLOIL						0.0680*	-0.0839
						[0.0119]	[0.0597]
INT							0.9230
							[0.1293]
DLEXC							
DLNM				-0.0092			-0.0125
				[0.3258]			[0.0817]
DLNISE	1.0904***	0.8274***	0.7407***		1.3712***	0.9138***	0.8649***
	[0.0000]	[0.0000]	[0.0000]		[0.0000]	[0.0000]	[0.0000]
DLNS(-1)					-0.0544*	0.0102	
					[0.0272]	[0.7841]	
DUMAB1							
DLOIL*DUMAB1							
INT*DUMAB1							
DLEXC*DUMAB1							
DLNM*DUMAB1							
DLNISE*DUMAB1					-0.1793*		-0.3087
					[0.0239]		[0.0800]
DLNS(-1)*DUMAB1		0.0570					
		[0.3794]					
R-squared	0.2896	0.3426	0.3000	0.0026	0.7768	0.4880	0.2188
Adjusted R-squared	0.2877	0.3391	0.2981	-0.0001	0.7750	0.4838	0.2078
S.E. of regression	2.3230	1.5714	1.5390	2.7976	0.9680	1.3217	2.1208
Sum squared resid	2018.1940	918.6300	885.8174	2911.5490	347.6360	648.0653	1596.7560
Log likelihood	- 849.4303	-700.0940	- 694.6222	-914.4415	-517.8950	- 634.6767	- 780.6135
F-statistic	152.4509	96.9407	160.2785	0.9681	430.3720	117.8593	19.8811
Prob(F-statistic)	0.0000	0.0000	0.0000	0.3258	0.0000	0.0000	0.0000
Mean dependent var	0.1067	0.0226	0.0927	-0.0238	-0.0139	-0.0254	0.1571
S.D. dependent var	2.7524	1.9330	1.8370	2.7975	2.0407	1.8396	2.3827
Akaike info criterion	4.5289	3.7498	3.7054	4.9008	2.7834	3.4063	4.3580
Schwarz criterion	4.5498	3.7813	3.7263	4.9217	2.8253	3.4482	4.4226
Hannan-Quinn criter.	4.5372	3.7623	3.7137	4.9091	2.8001	3.4229	4.3837
Durbin-Watson stat	1.8730	2.0790	2.1410	2.0378	2.1145	2.0539	2.0022
	S16	S17	S18	S19	S20	S21	S22
C	0.1326*	0.0115	-0.0091	-0.0024	0.0094	-0.0756	0.1381
	[0.0471]	[0.9135]	[0.8656]	[0.9784]	[0.8864]	[0.2884]	[0.1264]
DLOIL						-0.2003***	
						[0.0000]	
INT							
DLEXC							
DLNM	0.0125*	-0.0116					
	[0.0347]	[0.1051]					
DLNISE	0.6865***		1.0213***	0.4738***	0.6686***	1.1763***	0.7190***

Table 5.4. (cont'd)

	[0.0000]		[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
DLNS(-1)				-0.1047		- 0.1320***	
				[0.0850]		[0.0001]	
DUMAB1							
DLOIL*DUMAB1						0.1368*	
						[0.0145]	
INT*DUMAB1							
DLEXC*DUMAB1							
DLNM*DUMAB1	-0.0210*						
	[0.0148]						
DLNISE*DUMAB1				0.2937*			0.3019*
				[0.0352]			[0.0351]
DLNS(-1)*DUMAB1				0.1996*	0.3442**		
				[0.0385]	[0.0011]		
R-squared	0.3506	0.0073	0.6390	0.1942	0.4171	0.5803	0.2933
Adjusted R-squared	0.3453	0.0046	0.6380	0.1855	0.4140	0.5757	0.2895
S.E. of regression	1.2867	2.0032	1.0442	1.6894	1.2790	1.3732	1.7484
Sum squared resid	612.5380	1432.6420	407.7693	1056.0420	610.1461	697.6820	1140.1880
Log likelihood	- 622.9404	- 757.8185	- 548.7700	- 726.2315	- 624.5334	- 648.5090	- 742.0804
F-statistic	66.5847	2.6405	661.9509	22.2948	133.4569	127.8789	77.4070
Prob(F-statistic)	0.0000	0.1051	0.0000	0.0000	0.0000	0.0000	0.0000
Mean dependent var	0.1460	0.0103	0.0083	-0.0084	0.0235	-0.0265	0.1527
S.D. dependent var	1.5902	2.0078	1.7355	1.8720	1.6707	2.1082	2.0742
Akaike info criterion	3.3526	4.2330	2.9296	3.8999	3.3379	3.4854	3.9632
Schwarz criterion	3.3946	4.2546	2.9505	3.9523	3.3693	3.5377	3.9945
Hannan-Quinn criter.	3.3693	4.2416	2.9379	3.9207	3.3504	3.5062	3.9756
Durbin-Watson stat	2.0328	2.0580	2.2238	2.0232	1.9599	2.1672	2.2118
	S23	S24	S25	S26	S27	S28	S29
C	-0.0674	0.0337	0.1343	0.0680	-0.0099	-0.0597	-0.0318
	[0.4670]	[0.6384]	[0.0703]	[0.4249]	[0.8605]	[0.6975]	[0.8345]
DLOIL	0.0844*		0.0921*				
	[0.0182]		[0.0137]				
INT							
DLEXC		-0.2079*		0.1291		0.4061*	
		[0.0296]		[0.2539]		[0.0469]	
DLNM							
DLNISE		0.7576***	0.6711***	0.6262***	1.4779 ***	1.3950***	1.6035***
		[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
DLNS(-1)							
DUMAB1							

Table 5.4. (cont'd)

DLOIL* DUMAB1			-0.1079				
			[0.0704]				
INT*DUMAB1							
DLEXC*DUMAB1							
DLNM*DUMAB1							
DLNISE*DUMAB1			0.1977		-0.1878*		-0.6424*
			[0.1019]		[0.0361]		[0.0080]
DLNS(-1)*DUMAB1							
R-squared	0.0148	0.3610	0.3448	0.2151	0.7581	0.2979	0.3037
Adjusted R-squared	0.0122	0.3576	0.3377	0.2109	0.7568	0.2942	0.3000
S.E. of regression	1.7917	1.3845	1.4308	1.6435	1.0932	2.9630	2.9508
Sum squared resid	1200.6530	715.0118	759.4576	1007.4480	445.7854	3274.7560	3247.7110
Log likelihood	-751.7949	-654.3504	-665.6878	-718.8112	-565.5276	-940.4299	-938.8708
F-statistic	5.6248	105.3633	48.8084	51.1066	584.4729	79.1422	81.3543
Prob(F-statistic)	0.0182	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mean dependent var	-0.0804	0.0331	0.1342	0.0871	0.0139	-0.0094	-0.0094
S.D. dependent var	1.8027	1.7274	1.7581	1.8501	2.2168	3.5268	3.5268
Akaike info criterion	4.0095	3.4965	3.5675	3.8394	3.0241	5.0182	5.0100
Schwarz criterion	4.0304	3.5279	3.6197	3.8708	3.0554	5.0496	5.0413
Hannan-Quinn criter.	4.0178	3.5090	3.5882	3.8519	3.0365	5.0307	5.0224
Durbin-Watson stat	2.2502	2.2743	2.0172	1.8550	2.1394	1.9632	1.9755

Note: *p*-values are provided in brackets.

***, ** and * Significance at the 1%, 5%, and 10% levels respectively

The model contains two types of equations. First model (full model) has whole variables which are related to the stock price fluctuations. The second model (reduced model) is constructed by dropping statistically insignificant values and predict a new statistical equation. So general to specific approach was followed. These two equations adjusted R^2 values indicate that independent variables explain dependent variable adequately.

One of the OLS assumption is for constant variance of residuals over time. Therefore, for to test heteroscedasticity we should use several diagnostic statistics. We adopted ARC and White tests. The results indicate that there is no heteroscedasticity problem in the error terms. Besides Durbin Watson statistics allowed us to make an inference that there is no autocorrelation problem.

According to Schwartz criterion S_1, S_2, S_3, S_4, S_5, S_6, S_7, S_8, S_9, S_{10}, S_{11}, S_{12}, S_{14}, S_{15}, S_{16}, S_{17}, S_{18}, S_{19}, S_{20}, S_{21}, S_{22}, S_{23}, S_{29} companies choose full model and S_{24}, S_{25}, S_{26}, S_{27}, S_{28}, choose reduced model. Full model indicated below.

$$dlns = c + dloil + int + dlexc + dlnm + dlnbist + dlns(-1) + duma + dloil * duma + int * duma + dlexc * duma + dlnm * duma + dlnbist * duma + dlns(-1) * duma$$

The reduced models are company-specific. For each company has a different equation. Reduced equations indicated below.

For company S_1;

$$d \ln S_1 = c + \text{int} + d \ln bist + d \ln S_1(-1) + d \ln S_1(-1) * dumab1$$

$$d \ln S_1 = 9,7822 - 0,9143 \text{int} + 0,7531 d \ln bist + 0,1387 d \ln S_1(-1) - 0,2648 d \ln S_1(-1) * dumab1$$

For company S_2;

$$d \ln S_2 = c + d \ln bist + d \ln S_2(-1) * dumab1$$

$$d \ln S_2 = 0,0121 + 1,4047 d \ln bist - 0,1946 d \ln S_2(-1) * dumab1$$

For company S_3;

$$d \ln S_3 = c + dloil + d \ln bist + d \ln bist * dumaab1$$

$$d \ln S_3 = 0,0413 + 0,0670 dloil - 0,1827 d \ln bist + 0,3443 d \ln bist * dumaab1$$

For company S_4;

$$d \ln S_4 = c + dlexc + d \ln bist + d \ln S_4(-1) + d \ln bist * dumab1$$

$$d \ln S_4 = 0,1197 + 0,2584 dlexc + 0,6515 d \ln bist - 0,1275 d \ln S_4(-1) + 0,3382 d \ln bist * dumab1$$

For company S_5;

$$d \ln S_5 = c + dloil + dlexc$$

$$d \ln S_5 = 0{,}1952 + 0{,}0512 dloil - 0{,}1790 dlexc$$

For company S_6;

$$d \ln S_6 = c + d \ln m + d \ln bist$$

$$d \ln S_6 = -0{,}0016 - 0{,}0133 d \ln m + 0{,}8793 d \ln bist$$

For company S_7;

$$d \ln S_7 = c + d \ln bist + d \ln S_7(-1)$$

$$d \ln S_7 = -0{,}0621 + 0{,}7677 d \ln bist + 0{,}1493 d \ln S_7(-1)$$

For company S_8;

$$d \ln S_8 = c + d \ln bist$$

$$d \ln S_8 = 0{,}0881 + 1{,}0904 d \ln bist$$

For company S_9;

$$d \ln S_9 = c + d \ln bist + d \ln S_9(-1) * dumab1$$

$$d \ln S_9 = 0{,}0073 + 0{,}8274 d \ln bist + 0{,}0570 d \ln S_9(-1) * dumab1$$

For company S_{10};

$$d \ln S_{10} = c + d \ln bist$$

$$d \ln S_{10} = 0{,}0800 + 0{,}7407 d \ln bist$$

For company S_{11};

$$d \ln S_{11} = c + d \ln m$$

$$d \ln S_{11} = -0,0225 - 0,0092 d \ln m$$

For company S_{12};

$$d \ln S_{12} = c + d \ln bist + d \ln S_{12}(-1)$$

$$d \ln S_{12} = -0,0356 + 1,3712 d \ln bist - 0,0544 d \ln S_{12}(-1)$$

For company S_{13};

For company S_{14};

$$d \ln S_{14} = c + dloil + d \ln bist + d \ln S_{14}(-1)$$

$$d \ln S_{14} = -0,0302 + 0,0680 dloil + 0,9138 d \ln bist + 0,0102 d \ln S_{14}(-1)$$

For company S_{15};

$$d \ln S_{15} = c + dloil + \text{int} + d \ln m + d \ln bist + d \ln bist * dumab1$$

$$d \ln S_{15} = -9,7782 - 0,0839 dloil + 0,9230 \text{int} - 0,0125 d \ln m + 0,8649 d \ln bist - 0,3087 d \ln bist * dumab1$$

For company S_{16};

$$d \ln S_{16} = c + d \ln m + d \ln bist + d \ln m * dumab1$$

$$d \ln S_{16} = 0,1326 + 0,0125 d \ln m + 0,6865 d \ln bist - 0,0210 d \ln m * dumab1$$

For company S_{17};

$$d \ln S_{17} = c + d \ln m$$

$$d \ln S_{17} = 0,0115 - 0,0116 d \ln m$$

For company S_{18};

$$d \ln S_{18} = c + d \ln bist$$

$$d \ln S_{18} = -0,0091 + 1,0213 d \ln bist$$

For company S_{19};

$$d \ln S_{19} = c + d \ln bist + d \ln S_{19}(-1) + d \ln bist * dumab1 + d \ln S_{19}(-1) * dumab1$$

$$d \ln S_{19} = -0,0024 + 0,4738 d \ln bist - 1047 d \ln S_{19}(-1) + 0,2937 d \ln bist * dumab1 + 0,1996 d \ln S_{19}(-1) * dumab1$$

For company S_{20};

$$d \ln S_{20} = c + d \ln bist + d \ln S_{20}(-1) * dumab1$$

$$d \ln S_{20} = 0,0094 + 0,6686 d \ln bist + 0,3442 d \ln S_{20}(-1) * dumab1$$

For company S_{21};

$$d \ln S_{21} = c + dloil + d \ln bist + d \ln S_{21}(-1) + dloil * dumab1$$

$$d \ln S_{21} = -0,0756 - 0,2003 dloil + 1,1763 d \ln bist - 0,1320 d \ln S_{21}(-1) 0,1368 dloil * dumab1$$

For company S_{22};

$$d \ln S_{22} = c + d \ln bist + d \ln bist * dumab1$$

$$d \ln S_{22} = 0,1381 + 0,7190 d \ln bist + 0,3019 d \ln bist * dumab1$$

For company S_{23};

$$d \ln S_{23} = c + dloil$$

$$d \ln S_{23} = -0,0674 + dloil$$

For company S_{24};

$$d \ln S_{24} = c + dlexc + d \ln bist$$

$$d \ln S_{24} = 0,0337 - 0,2079 dlexc + 0,7576 d \ln bist$$

For company S_{25};

$$d \ln S_{25} = c + dloil + d \ln bist + dloil * dumab1 + d \ln bist * dumab1$$

$$d \ln S_{25} = 0,1343 + 0,0921 dloil + 0,6711 d \ln bist - 0,1079 dloil * dumab1 + 0,1977 d \ln bist * dumab1$$

For company S_{26};

$$d \ln S_{26} = c + dlexc$$

$$d \ln S_{26} = 0,0680 + dlexc$$

For company S_{27};

$$d \ln S_{27} = c + d \ln bist + d \ln bist * dumab1$$

$$d \ln S_{27} = -0,0099 + 1,4779 d \ln bist - 0,1878 d \ln bist * dumab1$$

For company S_{28};

$$d \ln S_{28} = c + dlexc + d \ln bist$$

$$d \ln S_{28} = -0,0597 + 0,4061 dlexc + 1,3950 d \ln bist$$

For company S_{29};

$$d \ln S_{29} = c + d \ln bist + d \ln bist * dumab1$$

$$d \ln S_{29} = -0,0318 + 1,6035 d \ln bist - 0,6424 d \ln bist * dumab1$$

5.3. Discussion, Conclusion and Suggestion for Further Researches

Macroeconomic variables significantly affect stock returns in emerging markets. In this study, as it is consistent with the economic theory, stock returns are affected by oil prices, interest rates, exchange rate and money supply. Also results point out that one day deferred stock price is effective in the stock price changes. Additionally, changes in the ISE100 which is adopted as a market return in this study affects stock returns. When monetary expansion affects positively stock prices, tight monetary policy conditions and changes in alternative currencies to the TL affects negatively. In relation to the transition to the sustainability index, the results which are obtained from OLS in this study point out that being included in the sustainability index does not affect stock prices significantly in most cases.

The results of event study analysis also support the results of the OLS analysis. At the (+5,-5) event window, there is not a significant cumulative abnormal return for any of the companies. At the (+2, -2) event window, although there is a significant positive effect at the cumulative abnormal returns across all companies, only two companies are effected significantly when we look at the firm basis. These companies' cumulative abnormal returns at the (+2, -2) window are negative. Oberndorf et al. (2013) find similar results. Correspondingly, being included in 2016 ISE sustainability index makes a short-term announcement effect but this effect is disappears in (+5, -5) event window. The findings that are obtained from the event study analysis are in the way with the aspect of Çıtak and Ersoy (2016), Curran and Morran (2006) and in the contrast way with the aspect of Berhelot et al.(2012) and Aygun (2017).

This study can be expanded in many ways. For illustration; in the future, number of companies that are included in ISE sustainability index will increase. Correspondingly, the study can be repeated with more event dates and more companies. Also, some of the companies are excluded from the index, with these two different event kinds an event study can be done. Both inclusion and exclusion can be evaluated at the same time.

REFERENCES

Ahern, K. R. (2009). Sample selection and event study estimation. *Journal of Empirical Finance*, *16*(3), 466-482.

Asiri, B. K., & Hameed, S. A. (2014). Financial Ratio and Firm's Value in the Bahrain Bourse. *Research Journal of Finance and Accounting*, *5*(7).

Aygun, S. (2017). Borsa İstanbul Sürdürülebilirlik Endeksinde Yer Alan Şirketlerin Finansal Performanslarının Değerlendirilmesine İlişkin Bir Araştırma (A Study on the Evaluation of Financial Performances of Companies in the Istanbul Stock Exchange Sustainability Index (ISESI))

Barth, M. E., Clement, M. B., Foster, G., & Kasznik, R. (1998). Brand values and capital market valuation. *Review of accounting studies*, *3*(1), 41-68.

Berthelot, S., Coulmont, M., & Serret, V. (2012). Do investors value sustainability reports? A Canadian study. *Corporate Social Responsibility and Environmental Management*, *19*(6), 355-363.

Birgil, E., & Düzer, M. (2010). Finansal Analizde Kullanilan Oranlar ve Firma Degeri Iliskisi: IMKB'de Bir Uygulama. *Muhasebe ve Finansman Dergisi*, (46).

Birleşmiş Milletler İklim Değişikliği Çerçeve Sözleşmesi. (2016, December 21). Retrieved from http://iklim.cob.gov.tr/iklim/AnaSayfa/BMIDCS.aspx?sflang=tr

BIST Sustainability Index (2015, January 07). Retrieved from http://www.borsaistanbul.com/en/indices/bist-stock-indices/bist-sustainability-index.

BIST Sustainability Index Research Methodology Report. (December 2015). Retrieved from http://www.borsaistanbul.com/en/indices/bist-stock-indices/bist-sustainability-index

Black, F. (1972). Capital market equilibrium with restricted borrowing. *The journal of business*, *45*(3), 444-455.

Bodie, Z, Kane, A and Marcus,AJ. (2013). Essentials of Investment, 9th Edition, USA,pp.234-265.

Çıtak, L., & Ersoy, E. (2016). Firmaların BIST Sürdürülebilirlik Endeksine Alınmasına Yatırımcı Tepkisi: Olay Çalışması ve Ortalama Testleri İle Bir Analiz (Investors' Reactions to the Inclusion of Firms in the Bist Sustainability Index: An Analysis by Event Study and Mean-Median Tests).

Copeland, T. E., Weston, J. F., & Shastri, K. (1983). *Financial theory and corporate policy* (Vol. 3). Reading, Mass.: Addison-Wesley.

Corrado, C. J., & Zivney, T. L. (1992). The specification and power of the sign test in event study hypothesis tests using daily stock returns. *Journal of Financial and Quantitative analysis*, *27*(03), 465-478.

Dasgupta, S., Laplante, B., & Mamingi, N. (1998). Capital market responses to environmental performance in developing countries.

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The journal of Finance*, *25*(2), 383-417.

Gujarati, D. (2014). *Econometrics by example*. Palgrave Macmillan.

Gujarati, D. N. (2009). *Basic econometrics*. Tata McGraw-Hill Education.

Hussain, N. (2015). Impact of Sustainability Performance on Financial Performance: An Empirical Study of Global Fortune (N100) Firms.

Justice Owen in the HIH Royal Commission, The Failure of HIH Insurance Volume 1: A Corporate Collapse and Its Lessons, Commonwealth of Australia, April 2003 at page xxxiv

Kamakura, W. A., & Russell, G. J. (1993). Measuring brand value with scanner data. *International journal of Research in Marketing*, *10*(1), 9-22.

Kerin, R. A., & Sethuraman, R. (1998). Exploring the brand value-shareholder value nexus for consumer goods companies. *Journal of the Academy of Marketing Science, 26*(4), 260-273.

Konar, S., & Cohen, M. A. (2001). Does the market value environmental performance?

Kothari, S. P., Lewellen, J., & Warner, J. B. (2006). Stock returns, aggregate earnings surprises, and behavioral finance. *Journal of Financial Economics*, *79*(3), 537-568.

Kurtaran, A., Kurtaran, A. T., Çelik, M. K., & Temizer, Z. (2015). Finansal oranlar ile firma değeri ilişkisi: Bist'te bir uygulama. *Global Journal of Economics and Business Studies*, (8), 35-45.

Lintner, J. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *The review of economics and statistics*, 13-37.

Lintner, J. (1969). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets: A reply. *The review of economics and statistics*, 222-224.

MacKinlay, A. C. (1997). Event studies in economics and finance. *Journal of economic literature*, *35*(1), 13-39.

Mossin, J. (1966). Equilibrium in a capital asset market. *Econometrica: Journal of the econometric society*, 768-783.

Oberndorfer, U., Schmidt, P., Wagner, M., & Ziegler, A. (2013). Does the stock market value the inclusion in a sustainability stock index? An event study analysis for German firms. *Journal of Environmental Economics and Management*, *66*(3), 497-509.

Omran, M., & Ragab, A. (2004). Linear versus non-linear relationships between financial ratios and stock returns: empirical evidence from Egyptian firms. *Review of Accounting and Finance*, *3*(2), 84-102.

Rawlings, O., Pentula, S., & Dickey, D. (1998) Applied Regression Analysis: A Research Tool. Springer Publications, USA.

Renneboog, L., Ter Horst, J., & Zhang, C. (2008). Socially responsible investments: Institutional aspects, performance, and investor behavior. *Journal of Banking & Finance*, *32*(9), 1723-1742.

Review of economics and statistics, *83*(2), 281-289.

Ross, S. A. (1976). The arbitrage theory of capital asset pricing. *Journal of economic theory*, *13*(3), 341-360.

Şahin, A (2014). Hisse Senedi Piyasası Fiyat Getirileri ve Petrol Fiyatları İlişkisi: Türkiye Üzerine Bir İnceleme, Artvin Çoruh üniversitesi Sosyal bilimler konferansı.

Schultz, D. E. (2002). The new brand value. *Marketing Management*, *11*(4), 8.

Seetharaman, A., Azlan Bin Mohd Nadzir, Z., & Gunalan, S. (2001). A conceptual study on brand valuation. *Journal of product & brand Management*, *10*(4), 243-256.

Sharpe, W. F. (1963). A simplified model for portfolio analysis. *Management science*, *9*(2), 277-293.

Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The journal of finance*, *19*(3), 425-442.

Treynor, J. L. (1961). Market value, time, and risk.

Uluyol, O., & Türk, V. E. (2013). Finansal Rasyolarin Firma Değerine etkisi: Borsa istanbul (bist)'da bir uygulama. *Journal of Economics & Administrative Sciences/Afyon Kocatepe Üniversitesi Iktisadi ve Idari Bilimler Fakültesi Dergisi*, *15*(2).

Wai Kong Cheung, A. (2011). Do stock investors value corporate sustainability? Evidence from an event study. *Journal of Business Ethics*, *99*(2), 145-165.

Wilson, D. S. (1992). Complex interactions in metacommunities, with implications for biodiversity and higher levels of selection. *Ecology*, *73*(6), 1984-2000.

Wood, B. C., & Pullin, A. S. (2002). Persistence of species in a fragmented urban landscape: the importance of dispersal ability and habitat availability for grassland butterflies. *Biodiversity and Conservation*, *11*(8), 1451-1468.

Wooldridge, J. M. (2015). *Introductory econometrics: A modern approach*. Nelson Education.

Ziegler, A. (2012). Is it beneficial to be included in a sustainability stock index? A panel data study for European firms. *Environmental and Resource Economics*, *52*(3), 301-325.

Ziegler, A., & Schröder, M. (2010). What determines the inclusion in a sustainability stock index?: A panel data analysis for European firms. *Ecological Economics*, *69*(4), 848-856.