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AVIATION ACCIDENTS AND STOCK MARKET REACTION: EVIDENCE FROM BORSA ISTANBUL

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Abstract

Behavioral finance literature shows that a variety of mood variables affect the stock prices. Aviation accidents are uncommon that generally cause a high number of casualties. Therefore, they have a strong social repercussion in the country. This negative sentiment driven by bad mood might affect the investment decisions of investors. This study examines the effect of aviation accidents on Borsa Istanbul Index and Borsa Istanbul Transportation Index. Turkish aviation companies had only 5 serious accidents from 1990 to 2013. On the contrary to the previous findings, it is found that the aviation disasters do not have any effect on the stock market.

Keywords: Mood Variable, Aviation Accidents, Borsa Istanbul, Behavioral Finance

1. Introduction

While economic events, such as stock splits, earnings announcements, mergers and acquisitions, affect the value of financial assets, recently literature shows that even economically-neutral events also correlate to variation of asset returns. Those events such as weather, soccer, lunar cycles, lead to a change on the mood of investors which might affect their financing decisions. According to Edmans *et al.* (2007), three conditions must be met in order to reasonably analyze the effects of a mood variable on stock returns. First, the variable must affect mood. Second, the effect must be widespread in the society so that moods of enough number of investors are affected. Finally, the mood variable must affect the people in the same way in a country.

Weather is commonly used as a mood variable in the literature. For example, Saunders (1993) examines the relationship between local New York City weather and daily changes in indexes of listed stocks in New York. It is shown that there is a significant relationship between the level of cloud-cover in New York City and stock prices. Hirshleifer and Shumway (2003) investigate whether morning sunshine at a country's leading stock exchange affects market index stock returns that day at 26 stock exchanges. Sunshine is strongly significantly correlated with daily stock returns. When sunshine is controlled, other weather conditions such as rain and snow are unrelated to returns. Many subsequent studies follow Saunders (1993) and Hirshleifer and Shumway (2003) by proving supportive and opposite evidences. Schmittman *et al.* (2014) explore the impact of weather on trading by individual investors. Purchases relative to sales ratio are significantly higher on days with good weather and retail investors generally trade more on bad weather days. Kamstra *et al.* (2000) use sleep disruptions following daylight-savings time changes as the mood variable. In international markets, the average Friday-to-Monday return on daylight-savings weekends is markedly lower than expected, with a magnitude 200 to 500 percent larger than the average negative return for other weekends of the year. Kamstra *et*

al. (2003) provide international evidence that stock market returns vary seasonally with the length of the day which is called as SAD (seasonal affective disorder) effect. Stock returns are significantly related to the amount of daylight through the fall and winter. Yuan *et al.* (2006) examine the relation between lunar phases and stock market returns of 48 countries. They document that stock returns are lower on the days around a full moon than on the days around a new moon. Floros and Tan (2013) also document the existence of new moon and full moon effects in some international stock markets. Lepori (2009) examines the relationship between air pollution and stock returns in Italy. It is found that air pollution in the surrounding area of the trading floor negatively affects the returns. Equity returns are 0.2% lower when particulate matter is one standard deviation higher. However, this negative effect vanishes in the period with the computerized system in the stock market. Moreover, the relation between air pollution and stock returns has also been covered by Levy and Yagil (2011) for USA as well as Levy and Yagil (2013) for Canada, China, Netherlands and Australia.

Boido and Fasano (2007), Bernile and Lyandres (2011), Demir and Danis (2011), Demir and Rigoni (2015), Stadtmann (2006) argue that mood of fan investors is affected from their favorite team's performance. Therefore, it is found that the stock prices of soccer clubs are related with the performance of those clubs. Edmans *et al.* (2007) show that losses of national soccer teams cause a strong negative stock market reaction, which rises with the importance of games. There is a significant but small loss effect for international basketball, rugby, and cricket. There is no win effect for any sports. Fung *et al.* (2015) examine the impact of international soccer matches on the Turkish stock market using firm level and sorted portfolio. Using the Edmans *et al.* (2007) estimation method, a significant negative loss effect is found. However, this effect is rejected once spatial and temporal effects are modeled explicitly. Moreover, Eker *et al.* (2007) and Demir *et al.* (2015) show that exchange rates in Turkey are associated with the performance of Turkish national team and three big clubs of Turkey. Berument and Yucel (2005) show that international wins of Fenerbahce significantly increase the productivity of workers in Turkey by affecting their moods positively. Al-Hajieh *et al.* (2011) and Bialkowski *et al.* (2012) show that average returns are higher during Ramadan compared to rest of the year for different countries with a significant Muslim population.

Kaplanski and Levy (2010) argue that negative sentiment driven by bad mood and anxiety affects investment decisions. Based on this, they use aviation disasters as the mood variable and analyze the impact of those disasters on stock prices. A significant negative event effect with an average market loss of more than \$60 billion per aviation disaster is found. The effect is largest for the accidents of American airline companies. Moreover, a reversal effect after two days is also documented. In the short run (2 days), the anxiety following the aviation accident rises and demand for risky assets decreases. But then anxiety subsides, or when sophisticated investors exploit the effect, a reversal in the stock market occurs. While the literature considers many variables as the mood variable, only Kaplanski and Levy (2010) examines the impact of aviation disasters on stock market. This paper aims to analyze this effect in an emerging market, namely Borsa Istanbul, Turkey. On the contrary to Kaplanski and Levy (2010), it is found that the aviation disasters do not have any impact on the stock market.

The remainder of this paper is organized as follows: Section 2 presents the data and methodology. Section 3 states the main findings. The last section concludes the paper.

2. Data and Methodology

The data for Borsa Istanbul (formerly known as Istanbul Stock Exchange) Index is collected from the official website of Borsa Istanbul. I use BIST100 Index which is a value weighted index composed of the largest 100 company stocks. The aviation accidents data are collected and cross-checked from various websites such as The Aviation Safety Network of the Flight Safety Foundation database (<http://aviation-safety.net/>), <http://www.planecrashinfo.com/> and Turkish newspapers. Table 1 shows the list of aviation accidents, the date of event, and casualties.

Table 1. Details for Aviation Accidents in Turkey

Company	Date	Location	Dead	Injured
Turkish Airlines	29 Dec 1994	Near Van, Turkey	57	19
Turkish Airlines	07 Apr 1999	Near Ceyhan, Turkey	6	0
Turkish Airlines	08 Jan 2003	Diyarbakir, Turkey	75	4
Atlasjet	30 Nov 2007	Isparta, Turkey	57	-
Turkish Airlines	25 Feb 2009	Amsterdam, the Netherlands	9	84

As seen from Table 1, Turkish companies experienced limited number of accidents. There were no passengers on board and all the 6 crew members died in the accident on the accident on 7 April 1999 in Ceyhan. It was a flight to Jeddah to pick up Turkish pilgrims. Likewise, on 25 February 2009, only 9 people died while there were 128 passengers and seven crew members on board. Although the number of casualties is relatively low in those accidents, I included them in the dataset but in a further analysis, accidents only with a serious number of casualties will be considered.

The daily returns are computed as the difference in the natural logarithm of the BIST100 index for each of the consecutive trading days. In line with Kaplanski and Levy (2010) and Fung et al. (2015) and I run the following regression:

$$R_t = a + \beta_1 \text{Ramadan}_t + \beta_2 R_{t-1} + \beta_3 R_{t-2} + \beta_4 \sum_{i=1}^4 D_t + \beta_5 \text{MSCI}_t + \beta_6 \text{January}_t + \beta_7 \sum_{i=1}^3 AA_{it} \quad (1)$$

where R_t is the daily return of BIST100 and AA_i ($i = 1,2,3$) stands for possible effect and reversal effect variables (Kaplanski and Levy, 2010). The impact of aviation disasters on stock market can be observed on the days following the accident. R_{t-1} and R_{t-2} are lagged returns, the dummy variable, Ramadan takes the value of one throughout the duration of the holy month and zero otherwise. MSCI_t is the return of the MSCI World Index. January dummy variable is used to control for the January effect. D_t , $i = 1,2,3,4$, are dummy variables for the days of the week: Monday, Tuesday, Wednesday, and Thursday, respectively. To avoid dummy trap, Friday is excluded. The same model is performed for BIST Transportation Index in which the accidents might directly affect the stock prices of companies. Dataset for Borsa Istanbul Index covers 5,983 trading days from January 1990 to December 2013 while the data set for Transportation Index is from 1997 to 2013.

3. Findings

The regression estimates are presented in Table 2. The first two columns show the impact of aviation disasters on Borsa Istanbul. On the contrary to Kaplanski and Levy (2010), it is found that the aviation disasters do not have any impact on the stock market. Even the coefficient estimate for the first trading day following the accident is positive but statistically insignificant. It is assumed that aviation accidents affect people's mood and increase their anxiety. As a result, the investment in risky assets is negatively affected. However, for the case of Turkey, no effect is documented. The third and fourth columns in Table 2 show the effect of aviation accidents on the Borsa Istanbul Transportation Index. Although the coefficient estimates are negatively, they are not statistically significant. The aviation accidents do not affect the stock prices of companies in the transportation index.

Table 2. The Impact of Aviation Accidents on Stock Market Returns

	All-aviation accidents (BIST100)	Aviation accidents with more than 50 deaths (BIST100)	All-aviation accidents (BIST Transportation Index)	Aviation accidents with more than 50 deaths (BIST100 Transportation Index)
Monday	-0.00327** (0.00134)	-0.00323** (0.00134)	-0.00326* (0.0014)	-0.00326** (0.0014)
Tuesday	-0.0042*** (0.00134)	-0.004145*** (0.00134)	-0.00141 (0.00138)	-0.00138 (0.00138)
Wednesday	-0.00303** (0.00134)	-0.00297** (0.00134)	-0.00183 (0.00138)	-0.00183 (0.00138)
Thursday	-0.00122 (0.00134)	-0.0012 (0.00134)	-0.00139 (0.00139)	-0.00137 (0.00138)
Ramadan	0.00114 (0.0015)	0.00115 (0.00152)	0.00464*** (0.00156)	0.0047*** (0.00156)
January	0.00312** (0.00154)	0.00313** (0.00154)	0.00152 (0.0016)	0.00143 (0.00161)
MSCI (Rworld)	0.6437*** (0.04433)	0.644056*** (0.04434)	-	-
R _{t-1}	-0.1251*** (0.0127)	-0.12498*** (0.0127)	0.0344*** (0.0128)	0.0341*** (0.01281)
R _{t-2}	0.0017 (0.0127)	0.00162 (0.01272)	0.05904*** (0.01282)	0.05871*** (0.01282)
1st Day (Post aviation acc.)	0.00697 (0.01462)	0.00686 (0.0189)	-0.01593 (0.01425)	-0.00338 (0.02016)
2nd Day (Post aviation acc.)	-0.01445 (0.0146)	-0.00772 (0.019)	-0.0030 (0.01425)	0.0102 (0.02016)
3rd Day (Post aviation acc.)	-0.0216 (0.01463)	-0.0242 (0.0189)	-0.00662 (0.01425)	0.0073 (0.02016)
Constant	0.00344*** (0.00096)	0.0034*** (0.00097)	0.0019** (0.001)	0.0019** (0.001)
Observations	5983	5983	4240	4240
R ²	0.052	0.051	0.01	0.01

Notes: ***, **, * represent statistical significance at the 1%, 5%, and 10% level, respectively. Standard errors are given in parenthesis.

For all regression estimates, a Monday effect is documented in line with the literature. The coefficient of Monday is statistically significant and negative. The coefficient estimates for Tuesday and Wednesday are statistically significant and negative in the first and second columns. The literature shows that the average returns during Ramadan month are higher compared to rest of the year (Bialkowski *et al.* 2012). It is found that there is the Ramadan effect in the transportation index of Borsa Istanbul. The coefficient for Ramadan is around 0.0047 in the third and fourth columns. The January effect is also found for Borsa Istanbul which means that the January returns are significantly higher than returns during the rest of the year. World Index which is to control for global market movements has a highly significant and positive effect on Borsa Istanbul.

4. Conclusion

Behavioral finance literature shows that a variety of mood variables affects the stock prices. Aviation accidents are uncommon that generally cause a high number of casualties. Those events appear in the news frequently and they have a strong social repercussion in the country. The anxiety in the society increases, which makes people more pessimistic. This negative sentiment driven by bad mood might affect the investment decisions of investors. This study examines the effect of aviation accidents on Borsa Istanbul Index and Borsa Istanbul Transportation Index. Turkish aviation companies had only 5 serious accidents from 1990 to 2013. On the contrary to the previous findings, it is found that the aviation disasters do not have any effect on the stock market.

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