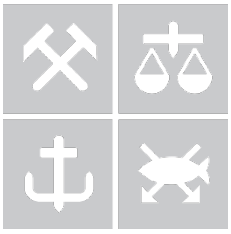
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SUBJECT: FIN11 - TRADING AND MARKET MICROSTRUCTURE

ASSIGNMENT: TERM PAPER

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Executive summary

Terrorist attacks have severe economic consequences and this paper seeks to determine if it is possible to profit as a trader on these increasingly frequent events. Over a two-year period, giving 14 triggering events, we have backtested a strategy where we over 8 days shorted the biggest airline of the attacked country and went long an airline sector ETF, JETS, to hedge sector specific risk.

The first part of this paper goes in depth on the rationale for our strategy and discusses the important factors for it to succeed. Then, the conditions for the simulation are presented. It has been placed large emphasis on keeping it realistic and we will comment on this process.
After that, our main focus turns to analysing and reflecting upon the back-testing results. The strategy yielded 38,10 % return before transaction costs. This paper shows that these costs are of great importance and that this strategy could be profitable despite slow reaction. Lastly, we look at how the insight from this report could add value to portfolio managers and other market participants.

1. Introduction

According to The Institute of Economics and Peace, a part of the U.S department of Homeland Security, 2015 was the worst year for terrorism in OECD since this institute started monitoring terrorism in 2000. Of the 35 OECD countries, 21 were exposed to an attack in 2015, and the report sees no sign of revision of the negative trend.

2. Literature review

2.1 Market impact of terrorist attacks

A terrorist attack raises the uncertainty among market participants along with a perception of greater risk. Immediately after the 9/11 attack, risk was repriced as uncertainty lead to higher volatility and thereby boosting risk premiums (Saxton, 2002). This induced investors to move out of riskier securities into safer, more liquid short-term assets. This shows that terrorist attacks can have severe impact on the financial markets, creating profitable trading opportunities from these movments.

In a study of 77 terrorists attacks, Chesney et al. (2010) found that 55 of these had negative impact on at least one of FTSE All World, MSCI Europe, S&P 500 and SMI. Furthermore, a selection of 61 attacks in the same study showed that the insurance and airline sector had the

highest susceptibility to such events. This conclusion aligns with several other studies indicating that airline, travel, tourism and insurance are among the most sensitive to terrorism related events (Chesney et al, 2010). Their results regarding the airline sector are shown below in table 1, documenting statistically significant abnormal negative return, using .05 significance, in 33 % of the cases on the event day and 25 % of the cases the following 6 days. Moreover, this market response harmonises with what you should expect given that these events scares tourists away from the country, thus hurting the airlines. It is a clear negative correlation between the size of a country's tourism industry to GDP and terrorism (The Institute for Economics and Peace, 2016).

	Negative impact of terrorist attacks				
	AR'	AR''	CAR'	CAR''	Number of events
MSCI Europe Airlines	5	20	8	15	61
	AR: abnormal return, CAR: Cumulative abnormal return for the 6 days following the attack. One mark corresponde two .10 significance The level and two marks two .05 or .01.				

Table 1 - Statistically significant abnormal negative return in study by Chesney et al. (2010)

Going deeper into the effect of terror attacks on airlines, in a group of thirteen US and non-US airlines studied by Drakos, the average fall after the 9/11 attack was respectively 53% and 30%, and US airline stocks used longer time to regain their pre 9/11 levels. Furthermore, the beta had a statistically significant increase in nine of these companies following the attack, with the specific risk component almost doubling. It can be interpreted from this that the specific risk increased more for US airlines than non-US, meaning that US-airlines underperformed against foreign peers (Drakos, 2004).

2.2 News traders

When trading based on the occurrence of terrorist attacks, one shows similar traits as a news trader. "News traders collect and act upon new information about instrumental value. They try to predict how fundamental values will respond to given the information" (Harris, 2003). To be successful one must therefore act quickly, before the value changing information gets reflected in the market prices.

Trader type	Most skilled at estimating	Information speciality	Typical trading speed
Value traders	Total value	All available information	Slow
News traders	Changes in value	News	Fast on public Information slow on private information
Information-oriented technical traders	Systematic valuation mistakes	Statistical anomalies	Fast
Arbitrageurs	Relative values	Relative factor prices	Fast

Table 2 – Trader types (Harris, 2003)

2.3 Market efficiency

If one shall be able to act with sufficient speed to make a profit from such events, markets cannot be strong-form efficient, incorporating accurately the negative effects of terrorist attacks.

Eugene Fama's efficient market hypothesis claims that information gets incorporated in market prices immediately given three conditions. Firstly, a sufficient number of traders must have access to the information. Thus their actions will quickly lead the market's price discovery towards fundamental value. Secondly, the market participants must have the same view on the implication of current information on today's prices and distribution of future prices. This is required for the participants aggregated interpretation to converge around the fundamental value. Thirdly, there must be minimal transaction costs in trading, so that traders with information about fundamental value of securities are not deterred from providing this (Fama, 1969).

Moreover, Fama separates the efficiency of markets into three forms. Markets are weak-form efficient if prices reflect all information in previous prices so that markets follows a random walk process. They are semi-strong efficient if current prices reflect "all obviously publicly available information", so that no one can predict future prices based only on public information. Lastly, markets are strong-form efficient if prices reflect all private and public information immediately after it is available. Strong-form efficiency means that market prices will reflect the effects of a terrorist attack straight after its occurrence.

Most empirical studies conclude that markets are weak-form efficient (Harris 2003). One possible explanation for the inefficiency is opposing views on the effects of current information on fundamental value, breaking Fama's second requirement for efficient markets. This suggest it could be possible to trade profitable on confusing events, like terrorist attacks.

On the other hand, empirical findings propose that some of the inefficiency could be explained by being to costly to trade on, breaking Famas' s minimal transaction costs requisite.

2.4 Transaction costs

This suggests that even though the market are not properly incorporating the negative effects of a terrorist attack, transaction costs could make it unprofitable to trade upon the inefficiency. Transaction costs includes all costs related to trading and are most important for traders who trade frequently or large volumes. They include explicit-, implicit, and missed trading opportunity costs (Harris, 2003).

Important explicit costs are brokerage fees, interest on borrowed share or capital and cost of resources devoted to developing and implementing trading strategies. Implicit costs are for example paying the bid/ask spread and the cost of price impact. The missed trade opportunity cost is the cost of failing to fill an order or not having the order filled in a timely manner. Liquidity is also critical in keeping the all parts of the transaction costs low.

2.5 Liquidity

There are three dimensions of liquidity: (i) immediacy, which refers to how quickly trades of a given size can be arranged at a given cost, (ii) width, the cost of doing a trade at a given size, and, (iii) depth refers to the size of a trade that can be arranged at a given cost (Harris, 2003). Sufficient liquidity in all of these dimensions will be critical not only in keeping transaction costs low, but also for the ability to implement the terror trading strategy. If the trade cannot be executed quickly, the value of the news disappears. Too high width will result in significant market impact, eliminating the profit in the deal. Low depth reduces the potential for profit.

2.6 Risks associated with event driven trading

There are mainly four types of risk that needs to be addressed when developing a trading strategy (Harris, 2003). Implementation risk is the risk associated with the uncertainty in price when executing an order. An event may occur where an order on either side is not fulfilled, or if there is a sudden change in price. Basis risk refers to the risk that the offsetting investments in a hedging strategy will not experience a price change in an entirely opposite direction of one another. This imperfection might cause excess gains or losses in a hedging strategy. Model risk is when the financial model used to measure a firm's market risk or value transactions fails to do so. Carrying cost risk refers to the fact that a hedge portfolio proves to

be costlier to carry than first expected. When there is both a long and a short position in the portfolio there will be cost of carrying on both positions. The opportunity cost of capital, equal to the market interest rate, for the long position and the risk of a dividend pay-out for the short position.

3. Strategy and methodology

Based on the insight from the literature review, we will try profiting from terrorist attacks by taking a short position in the stock of the largest listed airline company of the attacked country (from now on "the local company") when evidence arises that a terrorist attack has occurred. To reduce the sector specific risk we will at the same time take an equally sized long position in US Global Jets ETF (JETS). An ETF (Exchange traded fund) is a publicly noted fund that makes it possible to get exposure to a diversified group of stock in the same way as trading regular stocks. We will then hold these two positions for 8 trading days, which includes the day of the attack.

When there are no events to trade upon, the capital will be invested in risk-free assets. If two attacks overlap we will open a new position for the latter attack, doubling allocated capital.

3.1 Short candidates

3.1.1 OECD

We limit our study to attacks that has happened in the OECD area for three reasons. Firstly, trading in these countries are more relevant as their markets in general are more developed. Secondly, monitoring and acting upon news will be critical in the implementation. We assume the news flow is more accurate and rapid in these countries. Thirdly, terror attacks in the western world are more rare, and, thus, have historically caused a greater attention and shock (Northeastern, 2016).

3.1.2 Biggest local airline

By only taking into consideration the airline with the highest relative exposure to the country should face the largest fall in share price, we should ideally go short in the airline with the highest earnings exposure, as part of total earnings, in the market of the attacked country. However, these numbers are not public information.

Therefore, we will go short in the biggest listed local airline, measured in market cap, assuming they will have a relatively big exposure to their home market. This could be done in

two ways: (1) directly, e.g. shorting Turkish Airlines if Turkey is hit, or (2) indirectly, shorting Lufthansa, which owns 45 % of the largest Belgian airline, Brussels Airlines, if Belgium is attacked. International firms do usually have a strong position in their home market as international exposure typically comes after success at home. We choose to short the *biggest* national company, in terms of market cap, because bigger companies usually have higher liquidity and more ease of borrowing shares. Consequently, it will reduce trading costs and make strategy implementation easier. Appendix 1 shows the short-candidates for each country. No listed airline company means that we find no sufficient short candidate to trade on an attack in that country.

3.2 Hedging component - JETS

3.2.1 Reducing sector specific risk

Our hypothesis is that a terror attack will have a significantly strong negative effect on local airlines. However, terrorism is only a fraction of the factors an airline's share price reacts to. Economic growth, currency movements, wages, the oil price and weather are some of the other elements. This means even though terror in fact has a negative effect in the local airline, the stock could rise because other factors are positive.

To try isolating the terror effect, we will therefore want an equally sized long position in a diversified group of other airlines. Due to this position, should for example the loss occurring from a positive effect in the shorted company's share price from a lower oil price, be more or less neutralized by a gain in our long position. Consequently, the effects of factors besides terrorism are reduced and we achieve a more pure play on local airlines underperforming because of terror. Nevertheless, our positions will still be prone to other idiosyncratic risk.

3.2.2 The ETF – JETS

We have chosen to go long in JETS to hedge our short position. JETS is a global airline sector ETF and consist of 25 companies with the largest position weighting 13,7 %. The whole portfolio is shown in appendix 2.

The position does not perfectly isolate the terror effect and has some weakness for its purpose. 83 % of the portfolio is US stocks, giving undesired geographical exposure. It does also contain aircraft manufactures and terminal services companies. Another complication is that some of our short candidates are part of the ETF. Consequently, we may end up sitting both long and short in the same company, eroding some of the return.

Nonetheless, JETS should to a large extent neutralize the airline specific sector risk in our short position and it has the advantage of low transaction costs. Building our own diversified airline portfolio would result in many transactions and high accumulated transaction cost. At the same time, few other traded products gives a diversified airline sector exposure.

3.3 Holding period

When deciding our holding period we place specific emphasis on two matters. Firstly, the terror effect on the local airlines fundamental value and increased risk should in large part be reflected in the share price when we close our positions. On the other hand, we want the trade to isolate the terror effect as much as possible and to exit before the development becomes more of a random walk and a result of other company specific matters. In addition, other traders might find it interesting to short the local airline company. In this respect we are keen to close our position before a potential "short squeeze" occurs.

Going back to the results in the article by Chesney et al., a 7-day holding period seems to be aligned with the above-mentioned considerations. At the same time, a study by Chen et al. (2004) concluded that cumulative abnormal returns post catastrophic events, regardless of the perpetrator, lasted for eleven days. Therefore, we have opted for 8-day holding period, including the day of the initiation of the strategy.

3.4 Triggering criteria – "evidence of terror attack"

An important aspect of the strategy is when to trade. It can be difficult to distinguish between terrorist and non-terrorist attacks. Therefore we need specific criteria to know when to trade. The strictness of this rule is a trade-off between knowing for certainty if an event is a terror attack, avoiding trading on non-terror events, and the risk of missing attacks or trading slowly so the market is already reflecting the event when we trade. Our trading rule can be decomposed into three: (1) a violent assault, (2) estimates of 10 or more deaths, and (3) a civilian context. If a reliable news source says an event meets all of these we will trade.

In the case of a miss-trade, a trade on evidence of terror attack that proves to not be such an event, we will close our positions immediately after the miss-trade is confirmed.

Triggering Criteria Trading	
1	A *violent assault*
2	A minimum estimate of *10 deaths*
3	A *civilian* (non-military) action

Table 3 – Triggering criteria's

4. Implementation

4.1 Time frame

We will simulate the strategy over the last two years, 30.09.2014-30.09.2016. Given the high occurrence of terrorist attacks the last years this should give sufficient observations to draw a conclusion upon. Distribution of news has also changed, both in terms of speed and number of channels. As the news flow are critical for our strategy, this supports that a shorter timeframe will give results that are more up to date and transferable.

4.2 News discovery

When running a simulation on past events two problems arise: (i) news may have been altered, and (ii) a thorough investigation of all previous news flow is time consuming. We will therefore make a simplification and base our simulation on the registered terror attacks in the Global Terrorism Database. This exposes us to selection bias. However, it is considered very unlikely that events will meet our rigorous triggering criteria's without being a registered terror incident in the database. Consequently, it is assumed that this simplification will have none, and if so little, implication on the result of the simulation.

4.3 Simulation prices

Market prices tend to move rapidly in the case of terror attacks. To make the simulation realistic, it is critical that used prices would have been possible in the real market. We will take positions on the first available price after the attack of the open, mid or close price, and close our positions at the close price on the last day of our holding period. We are therefore not assuming that we will be able to trade immediately when the attack happens and if the market is closed or gets suspended we will have to wait until the market opens before we trade. Moreover, liquidity is greater in the opening- and closing action, making it more realistic that we will achieve these prices and mitigating the plausible price impact.

4.4 Transaction costs

Our most dominant transaction costs will be related to commission, borrowing of shares, and liquidity.

JETS has an expense ratio of 0.6 % and financial services usually have a set price for a small percentage of total trade. However there is no set price for shorting, i.e. borrowing stock, from a counterpart, usually a financial institution. The fees for shorting depend on liquidity and market cap. Norwegian industry insiders say it ranges from 0.5-20 % depending on the company, but narrows it to 6-10 % for the type of companies we are looking at (Mamre-Johansen, 2016). That being said, dramatic circumstances like a terrorist attack could raise the short selling cost significantly.

Moreover, the cost of trading is also depending on the size of the trade. One will impact the market price by trading more than 3-4 % of a stock's daily trading volume (Schanke, 2016). We have deliberately chosen short candidates with a minimum of liquidity, but big trades will increase the transaction cost.

In this analysis we will use 8,3% percentage point as the estimated costs, entailing shorting selling fee 800 bps and commission 30 bps (including ETF trading expense of 2 bps), if not else is noted.

4.5 Return computation and performance evaluation

The yield of a trading strategy, must be evaluated in the light of it risk (Pardo, 2008). Therefore we chose to risk-adjust our returns, and use the sharpe-ratio as performance evaluation. The return is computed by the usage of the formula:

$$Sharpe\ Ratio = \frac{R_p - R_f}{\sigma_p}$$

R_p is the return of the trading strategy, R_f the rate of a risk free investment, and σ_p the standard deviation of our trading strategy. The sharpe ratio is the average return earned in excess of the risk-free rate per unit of volatility or total risk. (Investopedia, 2016)

We will evaluate our trading strategy first by calculating the nominal return, and then by correcting for our estimated transaction costs.

Using the three-month U.S. government bond at t=0, we can approximate the risk-free return of 0.49 % annually. Due to the fact that our trading strategy tries to turn a profit in volatile times (Drakos, 2004), our strategy's return would have to substantially exceed the risk-free rate to be deemed profitable.

5. Analysis and reflections

In this section we will seek to analyse our trading results, and assess whether our trading strategy proved to be successful.

5.1 Overall results

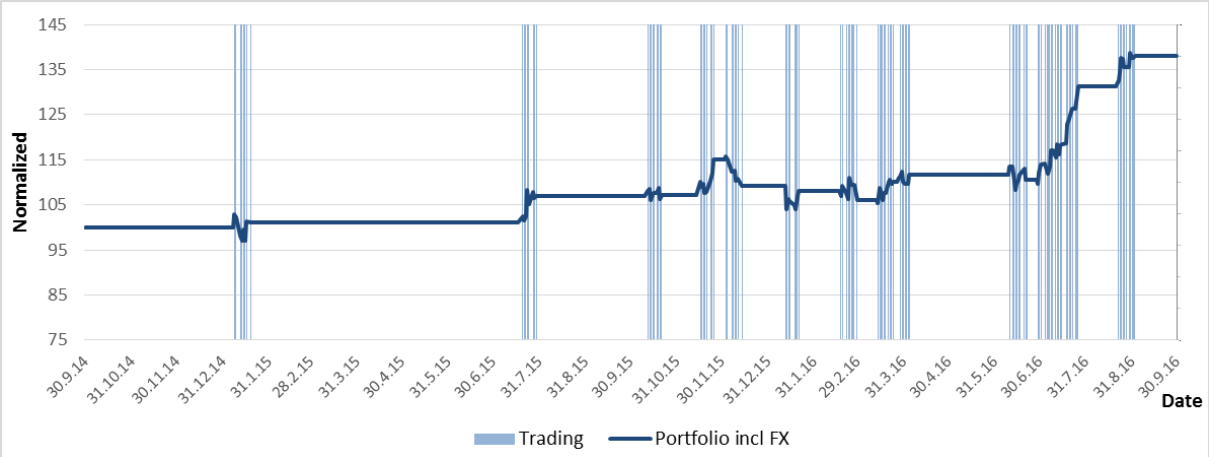
	Strategy	MSCI World	Airline Index
Total Return	29,8%	5,7%	19,9%
Annualized	13,9%	2,8%	9,5%
Volatility	34,2 %	15,2 %	28,5%
Sharpe ratio*	0,81	0,24	0,63

* 3 months USD Govt bond

Table 4 – Results from simulation

Backtesting our trading strategy resulted in 14 triggering events. No positions were open at expiry. The strategy delivered 38,1 % excluding transaction and opportunity cost. After accounting for these, the strategy yielded a total of 29,8 %, for the entire two year period. Risk-adjusted the strategy outperformed the industry and the global stock markets, achieving a sharpe-ratio of 0,81, versus 0,63 and 0,24. The short and forex contribution will give a sharpe-ratio of 0,41, on par with the industry, thereby highlighting the diversification advantages of using the ETF hedge component.

Our trades are illustrated in the graph 1 below, depicting our trading portfolio progress from 100 and triggering events.



Graph 1 – Portfolio development and trigger events

5.1.1 Total return

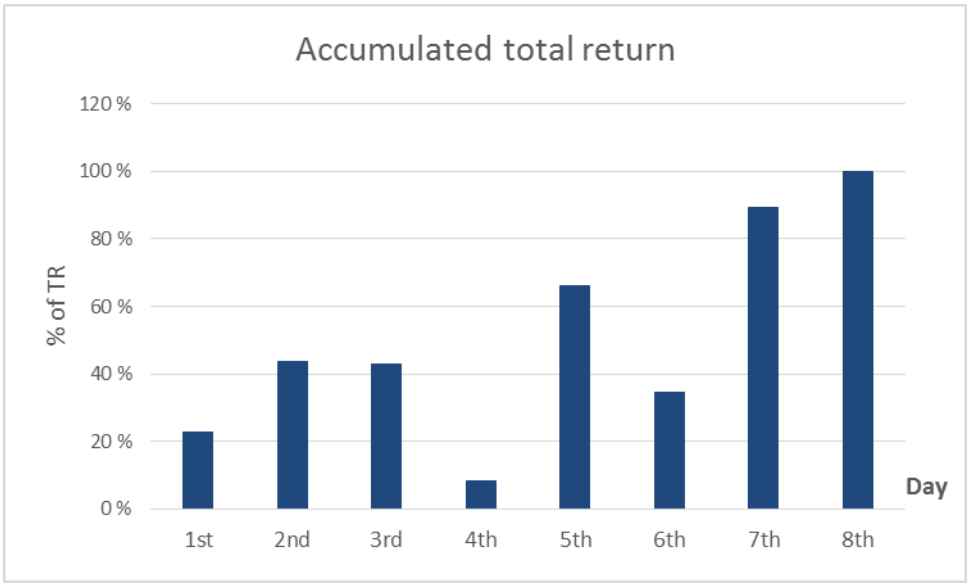
The total return (TR) from trading is listed in the table below. Dividing the simulation in half, we achieved a positive TR in both periods. Our success rate was 100 % in the first period and 58% in the second. Looking at the TR per event over the periods, they diverge by approximately 0,8 percentage points. This suggests the events in the first period contributed, on average, more. However, due to the increase in triggering events in the latter period, the second period delivered a proportionally larger share of TR. A layout of all our trades with its contribution can be found in the Appendix.

Period	Realized TR	Excl. FX	Excl. Transaction costs	Triggering events	Success rate*	TR pr event
30.9.2014-30.9.2014	5,7 %	2,5 %	6,8 %	2	100 %	2,83 %
30.9.2015-30.9.2016	24,1 %	22,7 %	31,3 %	12	58 %	2,01 %
Total period	29,8 %	25,2 %	38,1 %	14	64 %	2,13 %

* in USD; * excluding FX

Table 5 – Total return

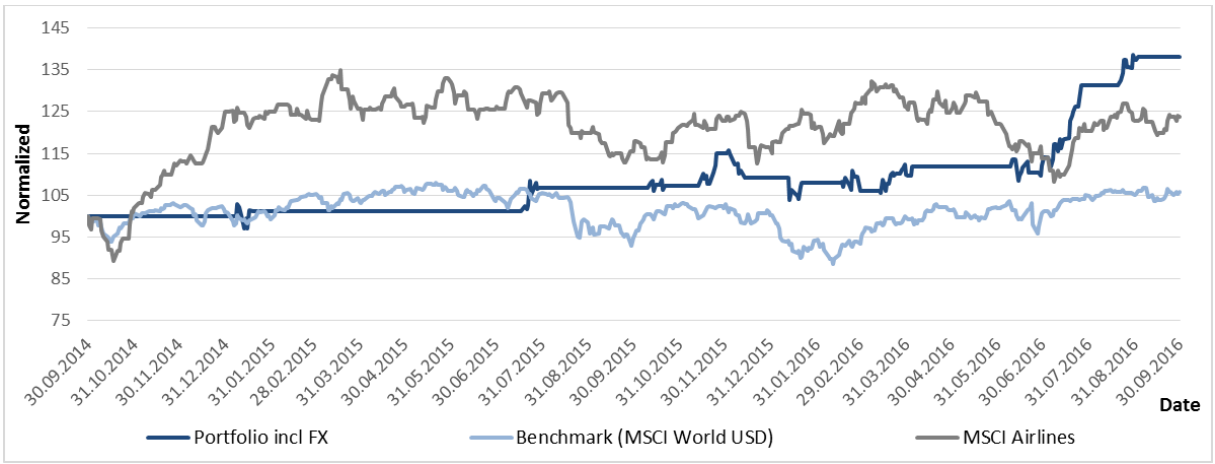
Graph 2 displays that 45% of the return is achieved during the first two trading days. However, it would still be profitable to enter two days after an initial attack, demonstrating that timing is important but not vital. Furthermore, the volatility is expected to be higher than average the days following an attack.



Graph 2 – Accumulated total return by number of days

5.1.2 Cumulative return

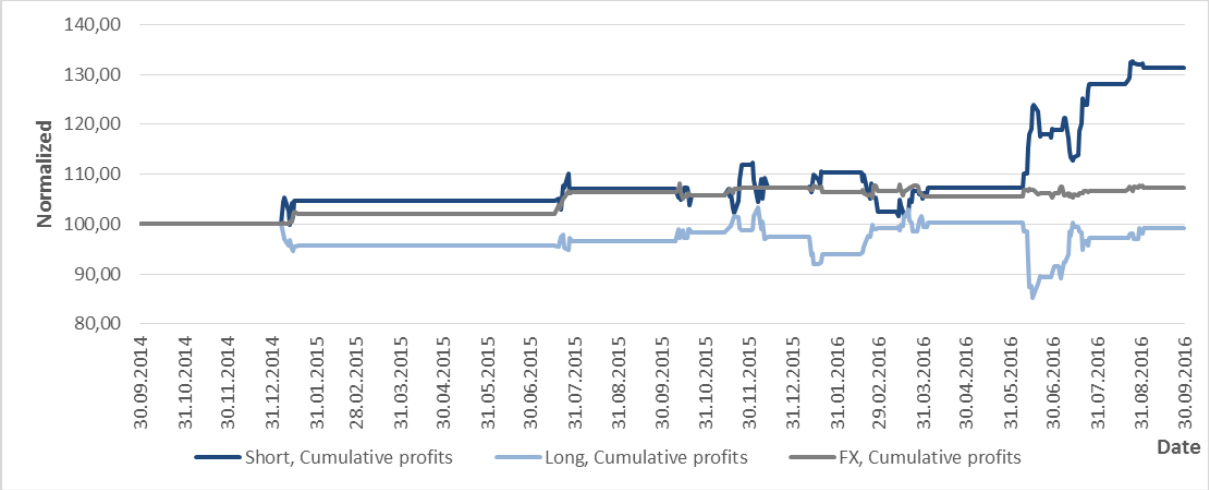
The cumulative returns from our trading showed a slight dip in the first half of 2016, before it picked up towards the end., as shown in graph 3 The strategy did not manage to keep up with the Airline index (MSCI Airline) when it surged. However, when several events rattled the airline companies towards the summer this year, our cumulative returns escalated. This indicates that the portfolio's does not follow underlying market movements.



Graph 3 – Portfolio vs. MSCI World vs. MSCI Airlines

The graph beneath shows the cumulative returns decomposed into three: the (1) the short contribution, (2) the long contribution, and (3) the returns generated from the currency exposure. Currency impacted results with approximately 7%. However, due to the scope of

this paper we have chosen to not seek to explain these movements and we will exclude these effect going forward.



Graph 4 – Accumulated return: Long, short and nett.

Moreover, the long exposure contributed negatively. By entering the market in the wake of a terrorist attack, the non-local airlines have historically suffered, alas, to a smaller extent (Carter et al., 2001). Therefore, one could have expected its contribution to be negative.

It becomes apparent that the short positions are our main reason for our positive cumulative results, which suggest our hypothesis is right. It follows that the market discriminate between companies in the wake of terrorist attacks, and heavily penalizing the largest player dependent on the affected area.

5.1.3 Success rate

We have defined positions that yield a positive return, excluding forex, at closure as a successful trade. Consistency in the performance of a trading strategy is one of the most fundamental characteristics of a trading model. Within our total of 14 positions, approximately 64% were successful. The success rate in the first period, one year after the initiation, were 100%, the last period delivered a success rate of 58%. Furthermore, the average net return was 4,50% for our successful and -3,04% for our unsuccessful trades.

5.1.4 Events

The table below displays the 14 triggering events during our simulation, as well as their isolated cumulative return. The column, *Long*, shows how our ETF portfolio performed in the wake of each event.

Event	Date	No. of Deaths	Location	Cum. Short return	Cum. Short return (incl. FX)	Cum. Long return	Net
Nice attack	14.07.2016	87	Nice, FRA	13,54 %	14,93 %	-2,89 %	10,65 %
Atatürk Airport attack	28.06.2016	45	Istanbul, TUR	-4,37 %	-6,15 %	11,26 %	6,88 %
Paris attacks	13.11.2015	92	Paris, FRA	5,90 %	7,38 %	0,48 %	6,38 %
Ankara bombing, March 2016	13.03.2016	37	Ankara, TUR	3,18 %	3,41 %	1,69 %	4,87 %
Gaziantep bombing	20.08.2016	54	Gaziantep, TUR	2,64 %	2,94 %	2,08 %	4,72 %
Suruç bombing	20.07.2015	34	Suruc, TUR	2,35 %	5,83 %	0,98 %	3,33 %
Orlando nightclub shooting	12.06.2016	49	Orland, US	7,64 %	7,64 %	-4,81 %	2,82 %
Ankara bombings, Oct 2015	10.10.2015	105	Ankara, TUR	-1,26 %	-1,45 %	1,81 %	0,55 %
Île-de-France attacks	07.01.2015	12	Paris, FRA	4,59 %	6,70 %	-4,35 %	0,24 %
Istanbul bombing, Jan 2016	12.01.2016	13	Istanbul, TUR	2,68 %	1,89 %	-3,60 %	-0,92 %
Ankara bombings, Feb 2016	17.02.2016	30	Ankara, TUR	-7,20 %	-6,91 %	5,46 %	-1,74 %
Brussels bombings	22.03.2016	32	Brussels, BEL	-0,91 %	-2,02 %	-1,31 %	-2,21 %
Istanbul Bombing, June 2016	06.09.2016	11	Istanbul, TUR	2,12 %	2,76 %	-6,94 %	-4,82 %
San Bernardino attack	02.12.2015	16	San Bernardino, US	-4,17 %	-4,17 %	-1,35 %	-5,52 %

Table 6 – Overview of trigger events

The top three largest contributions of ours shorts were the "Nice attack", "Atatürk Airport attack", and "Paris attacks". Terror is likely to impact the heavy vacation traffic to France during the summer season. To illustrate the scale, the French Riviera, has over 10 millions visitors every year, with the majority arriving during the summer months (World Bank, 2016). Moreover, Paris saw a drop of 20% in tourism in the immediate aftermath of the November 13th attack (Harvest Exchange, 2016).

Furthermore, a common factor for the top net contributors is the large number of victims, supported by table 7's correlation analysis between deaths and TR. This can indicate that the emotional repercussions and fear in the aftermath of the attacks are reflected in the price movements of the local company.

Correlation to intraday return	
	Coefficient of correlation
Determinant	No. of deaths
Intraday Return (%)	-0,096
P-value	-0,015
R-sqrt	0,3987

Table 7 – Correlation deaths and net return

On a company specific basis, more indebted and illiquid firms are more likely to have experience higher volatility (Carter and Simkins, 2001) due to (i) the return of equity are more prone to changes in the top line, and (ii) the probability of not meeting future obligations increases when the cash flow from ticket sales decreases. As the table below displays, Air France is thus more vulnerable to terror events than the other companies.

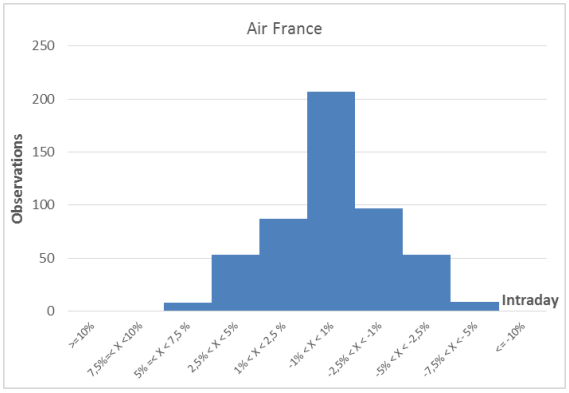
	Air France	Lufthansa	Delta Air	Turkish Airlines	Industry Average
Equity ratio	-2,1%	15,6%	18,4%	29,1%	27,5%
Current ratio	61,8%	73,7%	53,0%	79,2%	80,0%

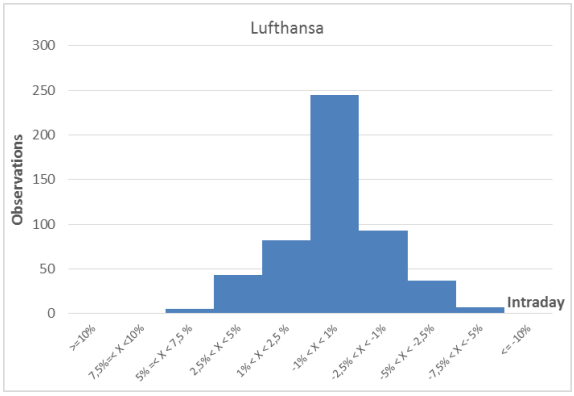
Table 8 – Average indebtness and illiquidity for simulation timeframe

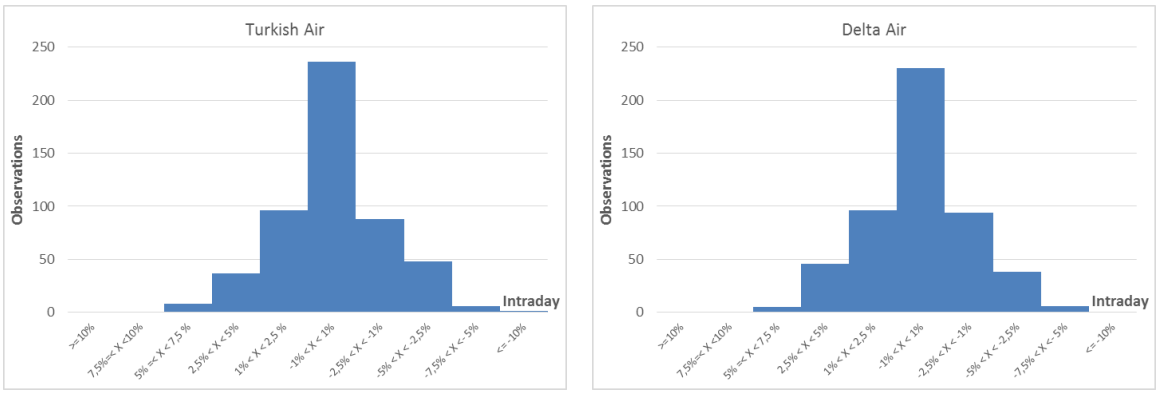
Looking at the worst performers, it seems a bit surprising that both the "Brussels bombings" and "San Bernadino" is in the bottom, as both intuitively should affect the airport traffic. A plausible explanations is that (i) Brussel and Belgium is not a top tourist destination, and (ii) Lufthansa, who owns 45 % of Brussel Airlines, are well diversified and therefore the investor sentiments did not assess Lufthansa to be heavily dependent on the revenue from Brussels.

Another plausible explanation is that our trading strategy entails us to trade on the first available open, mid, or close provided. As the Brussels attacks happened in the morning Lufthansa opened down, but climbed during the day. Thus, a positive contribution could only be achieved if you were exposed prior to the news.

Furthermore, looking at a distribution of the daily return of each airline company within the two-year period, not all generated abnormal intraday fluctuations. Terror-related events following our criteria, occur more frequently in Turkey. As terror events occur more often, the fear effect might decline, and thus the abnormality of it.







Graph 5 – Distribution of intraday returns

The "San Bernardino Attack" occurred at the Inland Regional Centre, centre that providing services for people with disabilities. Therefore, a plausible rationale is that the effects on travel to California were believed to be neglectable for Delta Airlines.

Lastly, we are still exposed to other company-specific risk. This could provide further explanations to the both successful and unsuccessful short positions.

5.2 The impact of transaction costs

As transaction costs from executing trades can have significant impact on returns it is important to test the strategy's strength by analysing the effects of reliable and realistic trading costs

5.2.1 Transaction costs

We have assumed a conservative estimate of the transaction costs in order to avoid overestimating the achievable returns. It should be noted that institutional investors are probably paying lower fees. The table below shows TR with and without commission costs and ETF-related expensed for both periods. It illustrates that the conservative estimate of commission costs reduces TR by 4,20% over both periods.

Period	Realized TR excl. Commission and ETF costs	Realized TR incl. Commission and ETF costs
30.9.2014-30.9.2015	6.85%	6.05%
30.9.2015-30.9.2016	31.25%	30.45%
Total period	38.10%	36.50%

Table 9 – Total return with/without commission

5.2.2 Commission and fees

In order to execute the strategy, both brokerage commission and lending fees must be incorporated. These costs will impact the final profitability, and should be considered carefully. When short selling a stock, it is necessary to pay a lending fee to a third-party player. Many factors affect lending fees, such as the general financial state of a company, shareowner sentiments, and exogenous events. We have for analytical purposes (and the extreme nature of terror events), assumed a conservative lending cost rate of 8%. This incorporates some of the potential liquidity cost when shorting.

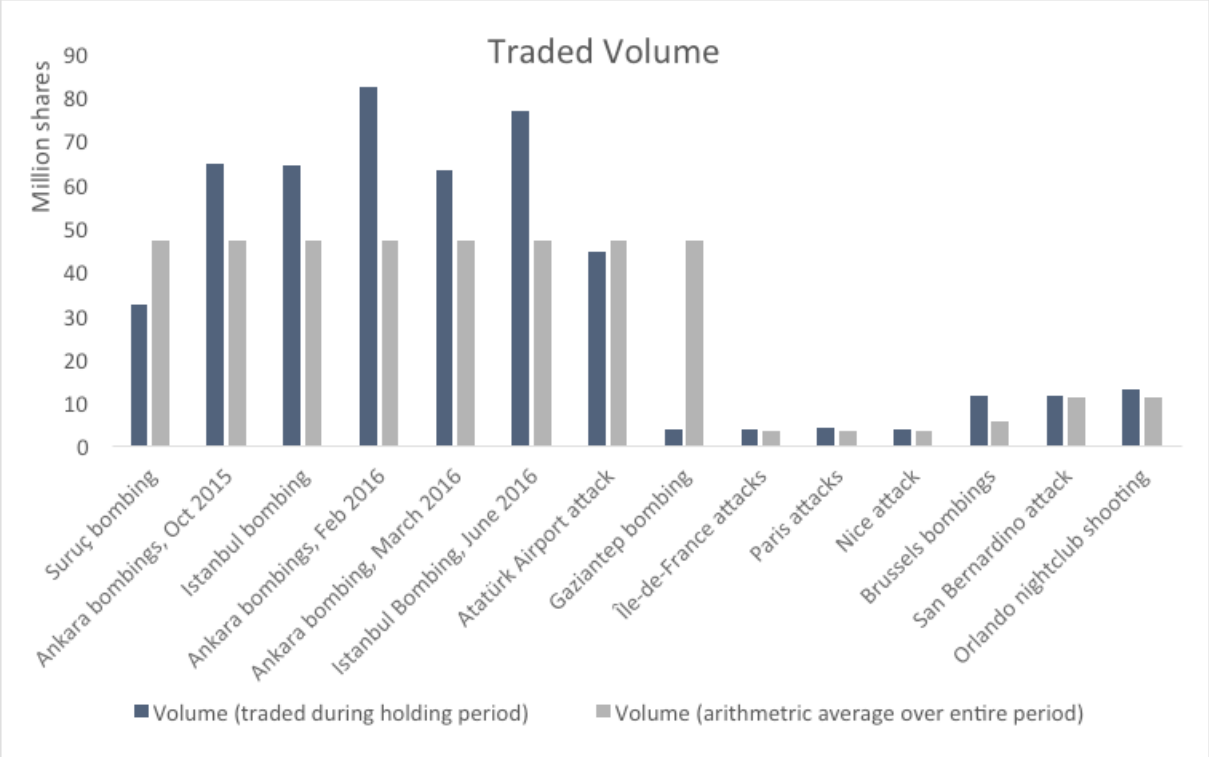
Sensitivity to increased fees and commission		Brokerage Commission (bps)						
		20	30	40	50	60	70	80
Short selling fee (bps)	200	35.90%	35.80%	35.70%	35.60%	35.50%	35.40%	35.30%
	300	34.90%	34.80%	34.70%	34.60%	34.50%	34.40%	34.30%
	400	33.90%	33.80%	33.70%	33.60%	33.50%	33.40%	33.30%
	500	32.90%	32.80%	32.70%	32.60%	32.50%	32.40%	32.30%
	600	31.90%	31.80%	31.70%	31.60%	31.50%	31.40%	31.30%
	700	30.90%	30.80%	30.70%	30.60%	30.50%	30.40%	30.30%
	800	29.90%	29.80%	29.70%	29.60%	29.50%	29.40%	29.30%
	900	28.90%	28.80%	28.70%	28.60%	28.50%	28.40%	28.30%
	1000	27.90%	27.80%	27.70%	27.60%	27.50%	27.40%	27.30%
	1100	26.90%	26.80%	26.70%	26.60%	26.50%	26.40%	26.30%
	1200	25.90%	25.80%	25.70%	25.60%	25.50%	25.40%	25.30%
	1300	24.90%	24.80%	24.70%	24.60%	24.50%	24.40%	24.30%
	1400	23.90%	23.80%	23.70%	23.60%	23.50%	23.40%	23.30%
	1500	22.90%	22.80%	22.70%	22.60%	22.50%	22.40%	22.30%
	1600	21.90%	21.80%	21.70%	21.60%	21.50%	21.40%	21.30%
	1700	20.90%	20.80%	20.70%	20.60%	20.50%	20.40%	20.30%
	1800	19.90%	19.80%	19.70%	19.60%	19.50%	19.40%	19.30%
	1900	18.90%	18.80%	18.70%	18.60%	18.50%	18.40%	18.30%
	2000	17.90%	17.80%	17.70%	17.60%	17.50%	17.40%	17.30%

Table 10 - Sensitivity analysis transaction costs

From table 10 it is clear that the total returns are sensitive to variations in commission and lending fees. However, the figure demonstrates that the strategy will yield positive returns, even with high costs.

The quantitative analysis of volume traded (for each shorted company) is comparing volume traded over the holding period (8d) with volume traded over the entire period (24 months). In line with expectations, we usually observe higher volumes during our respective holding

periods for most of the companies. Moreover, as graph 6 illustrates, concerns about liquidity are present, especially in regards to Air France and the three French events.



Graph 6 – Traded volume

Finally, the total volume traded in any of the stocks will limit the potential for absolute gains. Any particular trader can only "capture" some of the traded volume in a stock on a given day. It would be extremely difficult to execute more than 20% of the traded volume in any given stock. Thus, this will naturally put a limit on the maximum profit a trader can squeeze out of the strategy.

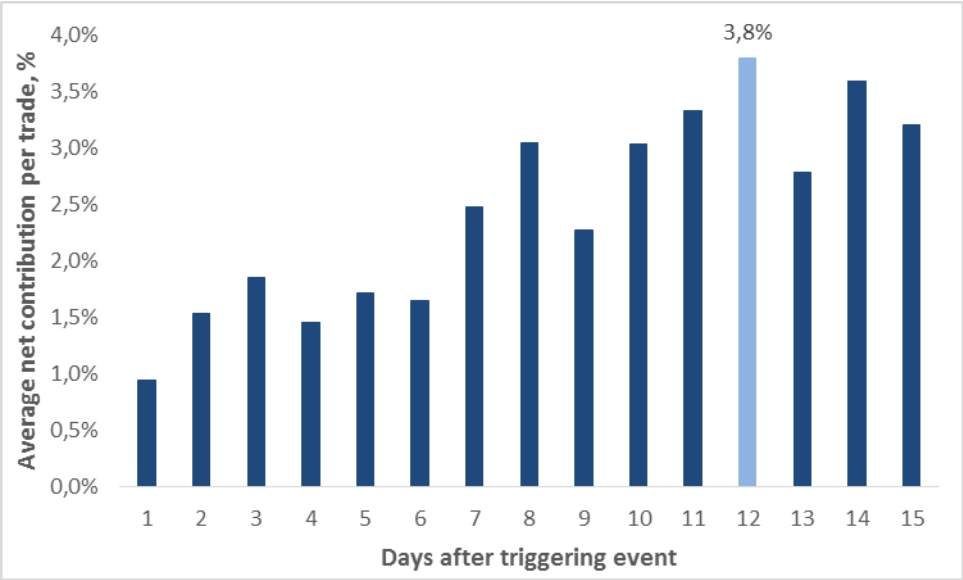
5.2.3 Opportunity cost

The final cost to consider for assessing the trading strategy is the opportunity cost. As with any financial investment, one should compare the return with the risk free placement. We use the three-month US Treasury Bill because it is commonly considered the benchmark for a risk free interest rate (Bloomberg, 2015). The profit from a risk free position is very limited in the current low yield market. Therefore the opportunity cost does not make the case for a strong competitor to placement in our trading strategy.

5.3 Sensitivity analysis of trigger values

In addition to transaction costs and fees, the returns from our strategy also show sensitivity to the choice of trigger values. Our strategy has two components in terms of triggering values: (1) trigger to initiate, assault, number of estimated deaths and civil situation, and (2) trigger to closure, holding period.

As the graph 7 depicts, our findings is in accordance with the aforementioned research. The average net contribution per trade for the 14 events peaked 12 trading days after initiation.



Graph 7 – Optimal holding period analysis

By limiting the maximum holding period in our analysis to three weeks (15 trading days), we avoid problems with (i) already being short prior to a sequential attack in the same country, and (ii) the likelihood of being exposed to other risk increases when the holding period continues, e.g. oil price fluctuations.

The table below illustrates how our total return, success rate, and sharpe-ratio would react when changing our trading rule of minimum deaths. As shown, the optimal trading rule would be a parameter of 30 in our simulation. However, in terms of success rate we would have achieved 100 % successful trades, with a holding period of 1 + 7 days, by increasing the value to 35. This highlights the limitations of using deaths as a proxy to the financial repercussions of the event, and which performance metrics to use in evaluation. Moreover, by implementing a trigger of 50 or more, the sharpe ratio falls in line with MSCI Airline.

Trigger Value	Total Return incl costs	# event	TR (%) pr. event	Success rate (net)	Sharpe-ratio
50	17,9 %	4	4,5 %	100 %	0,6
40	23,9 %	6	4,0 %	100 %	0,74
35	28,7 %	8	3,6 %	100 %	0,90
30	36,2 %	10	3,6 %	80 %	1,06
14	28,9 %	11	2,6 %	73 %	0,84
13	27,3 %	12	2,3 %	67 %	0,77
12	28,9 %	13	2,2 %	69 %	0,78
11	29,8 %	14	2,1 %	64 %	0,81
10	29,8 %	14	2,1 %	64 %	0,81
9	28,3 %	15	1,9 %	60 %	0,79
8	28,3 %	15	1,9 %	60 %	0,79
7	3,2 %	17	0,2 %	53 %	0,05
6	-8,0 %	20	-0,4 %	45 %	-

Table 11 – Profit sensitivity to deaths

5.6 Reflections

As the trading strategy proved to be profitable it is desirable to understand why these opportunities arose, and if it is plausible that they will reappear. This leads to three interesting points for discussion: (1) the underlying assumptions of the ability to trade, (2) the efficiency of the markets, and (3) the implications for an investor.

5.6.1 Ability to trade

The big question is whether one can obtain reliable intel quickly enough to profit from it. The rapid news flow makes this process easier. However, the competition amongst traders and algorithmic robots will more likely decrease the likelihood of achieving superior risk-adjusted returns.

We assumed that we would have been able to trade on the relatively quickly post terror attack, and achieve the presupposed prices used in our model. Our findings do indeed indicate that the liquidity increases in the wake of the events, and thus, increases the likelihood of execution. Moreover, the findings in this report clearly indicate that the negative momentum continues for some days, diminishing the importance of execution straight after the event.

However, some attention should be given to the exit of our positions. There will always be risk associated with holding short positions, especially large ones. It could take considerable time and be expensive to cover large short positions.

5.6.2 Efficiency in the pricing of terror

In capital markets, the assumption that prices reflect the fundamental value of the asset is integral for the efficient market hypothesis. However, as our trading simulations indicate one can earn a risk-adjusted abnormal return initiating trading after the event.

The inefficient market hypothesis contend that market forces sometimes drive asset prices above or below their intrinsic value (Investopedia, 2016). Terror events have arguably a heavier emotional component than regular news, and the terror events in its nature are often complex and incomprehensible in the first days after the event. Thus, the complexity may lead to mispricing and thus opportunity to earn superior risk-adjusted returns. In the two last years, the stock markets seemed to in general underestimate the scale of an event - not only reflected in the risk-adjusted returns of our trading strategy, but also from the fact that companies had to issue profit-warnings as the markets held to high expectations, and thereby, not fully adjusting the scale of the attacks (Wall & Beilfuss, 2016). In other words, it might seems that the market fails to converge towards the same opinion about the impact of terrorist attacks for the stocks, breaking one of Fama's condition for efficient markets.

Moreover, our sensitivity analysis shows that the sharpe-ratio is prone to changes in the transaction costs. This could seem to violate Fama´s assumption of neglectable transaction costs. With sufficient amount of the lending cost, the sharpe ratio achieved is not superior to the being invested in the general stock market (MSCI World). Thus, one can argue that the abnormal risk-adjusted returns are only available on paper, but not in practice.

The random walk theory states that stock prices take a random and unpredictable path. Thus, it is impossible to outperform the market without taking additional risk. Investors underestimate the probability that a track record was generated by pure chance (Heuer, Merkle, & Weber, 2014). Terror attacks are of uncertain nature, and thus the risk in the wake of an attack increases. Therefore, the random walk theory and weak-form efficient markets can help to explain the abnormal returns. That either (a) the model do not adequately incorporate the risks, or (b) that the abnormal returns are solely luck.

5.6.3 Implications for investor/portfolio manager

Firstly, in an environment with increasing frequency of terror attacks it is even more important to complement airline positions with a diversified portfolio to avoid sever portfolio losses from terror attacks.

Secondly, portfolio managers with a wide mandate and investors can use this strategy to boost return. This strategy will function as a secondary, stand-by strategy, for funds that possess powerful resources and strong connections with prime brokers, who can quickly provide borrowing of shares.

And lastly, if one is long the local airline company and events that appears terror related occurs, especially if media reports more than 30 death, one should immediately close the position and alternatively buy the stock again after some days.

6 Conclusion

In conclusion, this paper shows that satisfying risk-adjusted return might be achievable through exposure to terror-idiosyncratic risk in the largest local airline company in the attacked country. The return from an event will be affected by the financial situation of the shorted company, the scale of the attack, and the country it occurs in.

The paper concludes that the implementation is important due to timing and achieved fees. Furthermore, the rarity of events and its complex, volatile nature are found to be important factors that can explain the achieved return. Therefore, as terror becomes more frequent, it could be more difficult to profit from our trading strategy in the future.

The forex fluctuations are not elaborated on, and outside the scope of this paper. However, as it contributes 7% to cumulative return, it deserves broader attention in future research.

7 Appendix

Attacked country	Short candidate	M.cap (mUSD)
Australia	Qantas Group	4 239
Austria	Lufthansa	6 204
Belgium	Lufthansa*	6 204
Canada	Air Canada	2 931
Chile	LATAM Airlines Group	4 740
Denmark	Scandinavian Airlines	536
Finland	Finnair	522
France	Air France-KLM	1 598
Germany	Lufthansa	6 204
Greece	Aegean Airlines	468
Hungary	Wizz Air	1 315
Iceland	Icelandair Group	1 005
Ireland	Ryanair	18 921
Israël	El Al	1 367
Japan	All Nippon Airways	9 608
Korea	Korean Air Lines	1 832
Mexico	Aeroméxico	1 293
Netherlands	Air France-KLM	1 598
New Zealand	Air New Zealand	1 665
Norway	Norwegian Air Shuttle	1 235
Spain	International Airlines Group	11 974
Sweden	Scandinavian Airlines	536
Switzerland	Lufthansa	6 204
Turkey	Turkish Airlines	1 945
United Kingdom	International Airlines Group	11 974
United States	Delta Air Lines	37 195
Czech Republic	No listed airline company	
Estonia	No listed airline company	
Italy	No listed airline company	
Latvia	No listed airline company	
Luxembourg	No listed airline company	
Poland	No listed airline company	
Portugal	No listed airline company	
Slovak Republic	No listed airline company	
Slovenia	No listed airline company	
As of 17th of December 2016.		
Source: Yahoo Finance		

Appendix 1 – Short candidates

% of Net Assets	Company	Ticker
13,79	UNITED CONTL HLDGS INC	UAL
12,88	SOUTHWEST AIRLS CO	LUV
12,77	DELTA AIR LINES INC DEL	DAL
12,42	AMERICAN AIRLS GROUP INC	AAL
4,57	SPIRIT AIRLS INC	SAVE
4,35	JETBLUE AIRWAYS CORP	JBLU
4,11	ALASKA AIR GROUP INC	ALK
3,78	HAWAIIAN HOLDINGS INC	HA
3,10	SKYWEST INC	SKYW
2,94	ALLEGIANT TRAVEL CO	ALGT
2,80	BOEING CO	BA
2,68	GENERAL DYNAMICS CORP	GD
1,12	AIR CANADA	AC CN
0,96	DEUTSCHE LUFTHANSA	LHA GR
0,89	RYANAIR HLDGS PLC	RYAAY
0,89	INTL CONS AIRLINE	IAG LN
0,86	AIR NEW ZEALAND	AIR NZ
0,86	DART GROUP	DTG LN
0,86	WIZZ AIR HLDGS PLC	WIZZ LN
0,85	AIR FRANCE-KLM	AF FP
0,83	CHORUS AVIATION IN VTG & VARIABLE VTG SH	CHR CN
0,80	QANTAS AIRWAYS	QAN AU
0,80	JAPAN AIRLINES CO	9201 JP
0,79	WESTJET AIRLINES LTD	WJA CN
0,78	TAV HAVALIMANLARI	TAVHL TI
0,78	EASYJET	EZJ LN
0,76	SATS LTD	S58 SP
0,72	GRUPO AEROMEXICO S	AEROMEX * MM
0,69	CONTROLADORA VUELA CIA DE AVIA SPON AD	VLRS
0,66	SAS AB	SAS SS
0,65	CELEBI HAVA SERVIS	CLEBI TI
0,62	EL AL ISRAEL AIRLI	ELAL IT

Appendix 2 – Holding U.S. Global JETS ETF

							SHORT TRADE			ETF		FX	
Date	Local time	Type	Dead	Injured	City	Country	Buy PX	Close PX	Closing date	Buy PX	Close PX	Buy PX	Close PX
07.01.2015	12:00	Hostage Taking (Barricade Incident),Armed Assault	12	12	Paris	France	7,84	7,44	19.01.2015	24,398	23,2674	0,8478	0,861
20.07.2015	18:31	Bombing/Explosion	34	101	Suruc	Turkey	9,11	8,86	29.07.2015	23,2625	23,49	2,6985	2,7664
10.10.2015	19:31	Bombing/Explosion	105	245	Ankara	Turkey	8,43	8,43	21.10.2015	24,8775	24,27	29,268	2,895
13.11.2015	20:31	Hostage Taking (Kidnapping),Bombing/Explosion,Armed Assault	92	101	Paris	France	6,49	6,103	25.11.2015	24,88	24,77	0,9282	0,941
02.12.2015	21:31	Bombing/Explosion,Armed Assault	16	17	San Bernardino	United States	48,42	50,18	14.12.2015	25,25	24,91	N/A	N/A
12.01.2016	22:31	Suicide bomber	13	9	Istanbul	Turkey	7,28	7,06	21.01.2016	23,2569	22,42	3,034	3,0125
17.02.2016	23:31	Suicide car bombing	30	61	Ankara	Turkey	6,82	7,32	29.02.2016	23,025	24,15	2,9566	2,9657
13.03.2016	00:31	Car bombing, shooting	37	125	Ankara	Turkey	7,85	7,51	23.03.2016	24,83	25,25	2,8706	2,876
22.03.2016	01:31	Bombing, shooting	32	340	Brussels and Zaventem	Belgium	13,81	13,91	04.04.2016	25,33	25,25	0,8915	0,878
07.06.2016	02:31	Bombing	11	36	Istanbul	Turkey	6,03	5,92	21.06.2016	23,4853	22,02	2,8928	2,9099
12.06.2016	03:31	Shooting	49	53	Orlando	United States	41,59	38,55	22.06.2016	22,42	21,96	N/A	N/A
28.06.2016	04:31	Suicide bombings, shooting	45	239	Istanbul	Turkey	5,78	6,03	14.07.2016	20,945	23,5	2,89	2,8782
14.07.2016	05:31	Vechuliar assault, shooting	87	434	Nice	France	5,95	5,215	26.07.2016	23,32	22,82	0,9062	0,913
20.08.2016	06:31	Suicide bombing	54	66	Gaziantep	Turkey	5,32	5,18	02.09.2016	22,3	22,75	2,9292	2,951

Appendix 3 – All trigger events with trade contribution to accumulated return

		Île-de-France attacks					Suruc Bombing					Ankara bomings, Oct 2015				
		Local	Return	Index	FX	TR	Local	Return	Index	FX	TR	Local	Return	Index	FX	TR
	1st	-4,53 %	4,53 %	-1,79 %	0,38 %	3,12 %	-0,55 %	0,55 %	-0,14 %	0,86 %	1,27 %	1,66 %	-1,66 %	2,55 %	0,53 %	0,00 %
	2nd	-0,82 %	0,82 %	-1,32 %	-0,40 %	-0,90 %	1,66 %	-1,66 %	1,12 %	-0,52 %	-1,06 %	-1,75 %	1,75 %	-1,93 %	1,08 %	1,43 %
	3rd	2,63 %	-2,63 %	-1,25 %	0,08 %	-3,80 %	0,54 %	-0,54 %	0,98 %	0,84 %	1,27 %	2,02 %	-2,02 %	0,49 %	-1,51 %	0,91 %
	4th	2,72 %	-2,72 %	1,11 %	0,51 %	-1,10 %	-4,75 %	4,75 %	0,46 %	0,99 %	6,21 %	-0,70 %	0,70 %	1,22 %	-1,19 %	-3,04 %
	5th	-4,35 %	4,35 %	-1,71 %	-0,14 %	2,50 %	0,34 %	-0,34 %	-2,77 %	0,15 %	-2,96 %	-1,52 %	1,52 %	-1,57 %	0,43 %	0,73 %
	6th	2,61 %	-2,61 %	-0,47 %	1,36 %	-1,72 %	-2,49 %	2,49 %	-0,43 %	1,23 %	3,28 %	0,95 %	-0,95 %	1,72 %	0,50 %	0,38 %
	7th	-3,13 %	3,13 %	0,96 %	0,60 %	4,69 %	3,59 %	-3,59 %	2,43 %	-0,40 %	-1,57 %	2,24 %	-2,24 %	0,12 %	-0,18 %	1,26 %
	8th	0,03 %	-0,03 %	0,07 %	-0,38 %	-0,34 %	-0,89 %	0,89 %	-0,59 %	0,22 %	0,52 %	-1,74 %	1,74 %	-0,72 %	0,17 %	-2,30 %
Aritmetric	TR	-4,84 %	4,84 %	-4,39 %	2,01 %	2,46 %	-2,55 %	2,55 %	1,06 %	3,36 %	6,97 %	1,16 %	-1,16 %	1,89 %	-0,16 %	-0,62 %
Geometric		-5,07 %	4,59 %	-4,35 %	2,01 %	2,20 %	-2,75 %	2,35 %	0,98 %	3,40 %	6,88 %	1,06 %	-1,26 %	1,81 %	-0,19 %	-0,72 %

Paris Attacks					San Bernardino attack					Istanbul Bombing, Jan 2016				
Local	Return	Index	FX	TR	Local	Return	Index	FX	TR	Local	Return	Index	FX	TR
-1,31 %	1,31 %	0,92 %	0,82 %	3,05 %	-0,41 %	0,41 %	0,20 %	0 %	0,61 %	0,00 %	-0,14 %	-0,10 %	-0,06 %	-0,30 %
1,41 %	-1,41 %	0,21 %	0,41 %	-0,79 %	3,24 %	-3,24 %	2,61 %	0 %	-0,63 %	0,96 %	-0,96 %	-3,80 %	-0,25 %	-5,01 %
-0,49 %	0,49 %	0,23 %	-0,16 %	0,56 %	4,02 %	-4,02 %	1,73 %	0 %	-2,28 %	-1,91 %	1,91 %	0,49 %	-0,11 %	2,29 %
2,85 %	-2,85 %	1,32 %	-0,69 %	-2,22 %	-2,92 %	2,92 %	-2,92 %	0 %	0,00 %	-1,39 %	1,39 %	-2,18 %	0,78 %	-0,01 %
0,77 %	-0,77 %	0,51 %	0,83 %	0,57 %	-1,51 %	1,51 %	-1,44 %	0 %	0,07 %	0,85 %	-0,85 %	0,00 %	-0,36 %	-1,20 %
-2,42 %	2,42 %	-0,12 %	0,10 %	2,40 %	3,58 %	-3,58 %	1,58 %	0 %	-1,99 %	0,98 %	-0,98 %	0,22 %	0,13 %	-0,62 %
-3,86 %	3,86 %	-2,16 %	-0,06 %	1,63 %	-3,90 %	3,90 %	-3,43 %	0 %	0,47 %	-2,49 %	2,49 %	0,14 %	0,06 %	2,69 %
-2,88 %	2,88 %	-0,40 %	0,17 %	2,65 %	1,83 %	-1,83 %	0,48 %	0 %	-1,34 %	0,14 %	-0,14 %	1,68 %	-0,97 %	0,57 %
-5,94 %	5,94 %	0,52 %	1,40 %	7,86 %	3,91 %	-3,91 %	-1,18 %	0,00 %	-5,09 %	-2,86 %	2,72 %	-3,55 %	-0,76 %	-1,59 %
-5,96 %	5,90 %	0,48 %	1,40 %	8,01 %	3,63 %	-4,17 %	-1,35 %	0,00 %	-5,02 %	-2,89 %	2,68 %	-3,60 %	-0,77 %	-1,78 %

Ankara Bombing, Feb 2016					Ankara Bombing, March 2016					Brussels bomings				
Local	Return	Index	FX	TR	Local	Return	Index	FX	TR	Local	Return	Index	FX	TR
1,61 %	-1,61 %	0,30 %	0,41 %	-0,90 %	0,76 %	-0,76 %	0,08 %	0,04 %	-0,64 %	2,35 %	-2,35 %	-1,06 %	0,21 %	-3,20 %
-1,15 %	1,15 %	1,18 %	-0,58 %	1,75 %	-3,16 %	3,16 %	-0,60 %	0,97 %	3,52 %	1,31 %	-1,31 %	-0,24 %	0,33 %	-1,22 %
3,50 %	-3,50 %	2,24 %	-0,50 %	-1,76 %	1,17 %	-1,17 %	1,09 %	-1,01 %	-1,10 %	-2,10 %	2,10 %	-1,74 %	0,06 %	0,41 %
0,99 %	-0,99 %	-0,30 %	0,24 %	-1,05 %	1,16 %	-1,16 %	-0,12 %	-0,96 %	-2,24 %	0,64 %	-0,64 %	2,28 %	-0,86 %	0,78 %
-3,07 %	3,07 %	1,39 %	-0,24 %	4,23 %	0,89 %	-0,89 %	1,92 %	0,92 %	1,95 %	-0,28 %	0,28 %	0,76 %	-0,41 %	0,64 %
2,31 %	-2,31 %	1,17 %	-0,31 %	-1,45 %	0,00 %	0,00 %	0,63 %	-0,20 %	0,43 %	1,00 %	-1,00 %	-0,83 %	-0,37 %	-2,20 %
0,42 %	-0,42 %	-0,86 %	2,32 %	1,03 %	0,63 %	-0,63 %	-1,06 %	0,18 %	-1,51 %	-1,09 %	1,09 %	-1,30 %	-0,09 %	-0,30 %
2,66 %	-2,66 %	0,25 %	-0,99 %	-3,41 %	-4,77 %	4,77 %	-0,24 %	0,32 %	4,86 %	-1,00 %	1,00 %	0,88 %	0,01 %	1,89 %
7,27 %	-7,27 %	5,37 %	0,34 %	-1,56 %	-3,31 %	3,31 %	1,71 %	0,25 %	5,27 %	0,83 %	-0,83 %	-1,25 %	-1,13 %	-3,21 %
7,33 %	-7,20 %	5,46 %	0,31 %	-1,75 %	-3,44 %	3,18 %	1,69 %	0,23 %	5,16 %	0,76 %	-0,91 %	-1,31 %	-1,13 %	-3,27 %

Istanbul Bombing, June 2016					Orlando Nightclub Shooting					Atatürk Airport attack				
Local	Return	Index	FX	TR	Local	Return	Index	FX	TR	Local	Return	Index	FX	TR
-2,64 %	2,64 %	-1,66 %	1,29 %	2,27 %	-2,49 %	2,49 %	-3,03 %	0,00 %	-0,55 %	0,52 %	-0,52 %	0,95 %	-0,25 %	0,19 %
-2,20 %	2,20 %	0,00 %	-0,32 %	1,89 %	-3,60 %	3,60 %	-2,77 %	0,00 %	0,83 %	-1,55 %	1,55 %	1,37 %	-0,43 %	2,49 %
1,39 %	-1,39 %	-3,03 %	0,52 %	-3,90 %	-0,56 %	0,56 %	0,09 %	0,00 %	0,65 %	0,17 %	-0,17 %	1,02 %	0,84 %	1,68 %
-0,51 %	0,51 %	-2,77 %	-0,34 %	-2,60 %	-2,24 %	2,24 %	-1,38 %	0,00 %	0,86 %	-1,92 %	1,92 %	1,71 %	-1,54 %	2,09 %
-1,37 %	1,37 %	0,09 %	0,18 %	1,64 %	-0,03 %	0,03 %	0,33 %	0,00 %	0,35 %	3,38 %	-3,38 %	4,99 %	0,43 %	2,04 %
-0,35 %	0,35 %	-1,38 %	-0,10 %	-1,13 %	0,21 %	-0,21 %	1,35 %	0,00 %	1,14 %	2,07 %	-2,07 %	-0,99 %	-0,61 %	-3,67 %
0,87 %	-0,87 %	0,33 %	-0,72 %	-1,27 %	1,52 %	-1,52 %	0,86 %	0,00 %	-0,66 %	1,18 %	-1,18 %	2,62 %	0,44 %	1,88 %
2,60 %	-2,60 %	1,35 %	0,12 %	-1,13 %	-0,31 %	0,31 %	-0,27 %	0,00 %	0,04 %	0,50 %	-0,50 %	-0,81 %	-0,74 %	-2,05 %
-2,22 %	2,22 %	-7,07 %	0,63 %	-4,22 %	-7,49 %	7,49 %	-4,82 %	0,00 %	2,67 %	4,35 %	-4,35 %	10,86 %	-1,85 %	4,66 %
-2,31 %	2,12 %	-6,94 %	0,62 %	-4,32 %	-7,34 %	7,64 %	-4,81 %	0,00 %	2,68 %	4,33 %	-4,37 %	11,26 %	-1,86 %	4,56 %

Nice attack					Gaziantep bombing				
Local	Return	Index	FX	TR	Local	Return	Index	FX	TR
-0,62 %	0,62 %	-0,81 %	0,77 %	0,58 %	-0,75 %	0,75 %	0,00 %	0,22 %	0,97 %
-0,37 %	0,37 %	-0,05 %	-0,36 %	-0,04 %	-0,38 %	0,38 %	0,72 %	0,38 %	1,48 %
-4,13 %	4,13 %	-0,76 %	0,50 %	3,86 %	-2,28 %	2,28 %	0,11 %	-0,05 %	2,35 %
-1,35 %	1,35 %	-0,35 %	0,06 %	1,06 %	-0,19 %	0,19 %	-0,07 %	-0,57 %	-0,44 %
-4,11 %	4,11 %	-3,43 %	-0,11 %	0,57 %	0,39 %	-0,39 %	-1,16 %	0,64 %	-0,91 %
0,88 %	-0,88 %	1,75 %	0,45 %	1,32 %	0,19 %	-0,19 %	0,18 %	-0,10 %	-0,11 %
-2,32 %	2,32 %	-0,93 %	-0,16 %	1,22 %	-0,19 %	0,19 %	1,10 %	0,10 %	1,39 %
-0,89 %	0,89 %	1,74 %	0,09 %	2,72 %	0,58 %	-0,58 %	1,20 %	-0,32 %	0,29 %
-12,91 %	12,91 %	-2,83 %	1,22 %	11,30 %	-2,63 %	2,63 %	2,08 %	0,30 %	5,01 %
-12,31 %	13,54 %	-2,89 %	1,22 %	11,81 %	-2,63 %	2,64 %	2,08 %	0,29 %	5,08 %

Appendix 4 – Contribution to TR for all trades broken down to short, long and FX vs. Index

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