ERASMUS UNIVERSITY ROTTERDAM
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The Impact of Terrorism on the Turkish Lira

Author: Justin Andrew Tjon Joek Tjien
Student number: 447616
Thesis supervisor: Dr. Jan Lemmen
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PREFACE AND ACKNOWLEDGEMENTS

I would like to take this opportunity to thank each person who has been a part of my academic career. My success would not possible without the love and support from friends, family, professors, and other individuals. Special thanks to my thesis supervisor Dr. Lemmen who has guided me through this process. In terms of this topic, terrorism is one of the biggest current events in our modern day. It is having a huge impact on our way of living, and many other things. This is the main reason that motivated me to conduct a study on terrorism and its impact on foreign exchange rates.

ABSTRACT

This study employs the Autoregressive Distributed Lag Model Long-Run Form and Bounds Test and the ARDL Error Correction Form model to examine the long-run and the short-run impact of terrorist attacks on the Euro/Turkish Lira dating from 2006 to 2016. Specifically, this paper will look at different datasets of attacks, comparing the short-run and the long-run coefficients. The datasets comprised of attacks where only people were injured, attacks where there was at least one fatality, attacks that happened in bigger cities, other parts of Turkey, attacks that included people that are targeting the terrorists such as the police, the military, and the government, and lastly attacks that included civilians, businesses, private properties, and educational institutions. This study also wanted to test in how many of the cases per type of attack, did the exchange rate converge to long-run equilibrium in the week following the attack.

Attacks in general did not seem to have a long run relationship with the Euro/Turkish Lira. However, the results were distinctive when testing for different types of attacks. The Euro/Turkish Lira corrected at a speed of adjustment (∅) of 0.6% of the time to long- run equilibrium in the week after an attack happened in general between 2006 and 2016. Terrorist events that ended up in fatalities did not have a bigger impact in the long run, since the coefficient for fatalities was insignificant. This also means that it cannot be said that a smaller amount of the exchange rate corrected back after there was a fatality compared to when there were injured victims. Similarly, a comparison was done with attacks that happened in either Istanbul, Ankara, Izmir, Gaziantep and Adana, and when it happened in other parts of Turkey. Attacks in a more populated location such as Ankara, Istanbul, Izmir, Adana, and Gaziantep appreciated the exchange rate by 0.018 more, hence a bigger depreciation of the Turkish Lira, compared to when an attack happened in other parts of Turkey. Furthermore, the Euro/Turkish Lira corrected at a speed (∅) of 0.2% of the time in the week after attacks that happened in the bigger cities compared to when attacks that happened in other parts of Turkey.

When an attack included the police, the military, or the government, the Euro/Turkish Lira appreciated in the long run with 0.003. However, when an attack included civilians, businesses, private properties, and educational institutions, the coefficient came out statistically insignificant. This signifies that a comparison could neither be done for the long run or the short run. Hence, this result is inconclusive.

Keywords: Terrorism, Turkish Lira, Euro, ARDL Long-Run Form and Bounds Test Model, Error Correction Form, short-run impact, long-run impact, currency devaluation

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1. Introduction

In the last decade, terrorism has become a hot topic and with that a major concern for many countries. The main reason is because of the impact that it can have. Past research has looked at terrorism's influence on stock markets, prices of commodities, foreign direct investment, and the cost of debt. However, there is still a gap in the literature on terrorism's impact on the foreign exchange market. The main purpose of this paper is to prove that an attack can lead to a devaluation of the Turkish Lira against the Euro. With that, it will compare different types of attacks with one another to see if there is a difference in impact on the exchange rate. To measure this impact, this paper will employ an Autoregressive Distributed Lag Model Long-Run Form and Bounds Test and the ARDL Error Correction Form model to examine the long-run and the short-run impact of different types of attacks on the exchange rate. There are a couple of reasons why Turkey has been chosen for this case study. Turkey has been subjected to a significant amount of terrorist attacks in the last 11 years. Also, Turkey is considered as an emerging economy and is not as established as other advanced economies. This increases the probability that a bigger impact can be seen in the empirical results.

1.1 U.S. financial market reaction to September 11, 2001

It was not until the 9/11 terrorist attack that experts started to conduct studies on the impact that terrorism has on financial markets. On this unforgettable day, four planes were hijacked by members of the terrorist group Al-Qaida. Two planes crashed into the World Trade Center located in New York, one plane crashed in the Pentagon, and the last plane was brought down because of the heroic efforts of the passengers. After this event, experts did an analysis on how it impacted financial markets in the United States. Most of the focus went to the stock market. However, little was written on the impact on the US Dollar. It was only logical that this was going to have a major impact on the stock market. According to Davis (2007), in order to make sure that the markets do not crash, the New York Stock Exchange (NYSE) and the National Association of Securities Dealers Automated Quotations (NASDAQ) did not allow any trades to be done until 6 days afterwards. This was the longest shut down of the stock market in the history of the United States since 1933 (Davis, 2007). Aside of the fact that financial markets would have been chaotic, a lot of trading, brokerage, and other financial firms were in the WTC towers and were unable to conduct business.

When the markets opened again, the overall market declined by 684 points (Davis, 2007). This was equivalent to a 7.1% decline, which turned into a record loss in stock exchange history for one trading day. NYSE by itself, experienced their biggest loss in the history of the exchange. With that, the Dow Jones also saw a decline of 1,370 points, and the S&P 500 index decreased by 11.6%. It has been estimated that about $1.4 trillion in equity value was lost in the next five trading days after the attacks

(Davis, 2007). Three sectors experienced major losses when trading resumed. These three sectors were the airline sector, insurance sector, and financial sector. Davis (2007) argues that there was a major stock sell-off within the airline industry. American Airlines and United Airlines saw their stocks drop significantly more than others. This is logical since it was these companies' planes that were used to carry out these attacks. American Airlines' stock declined from a $29.70 per share to $18.00 a share. United Airlines' stock price decreased by 42% (Davis, 2007).

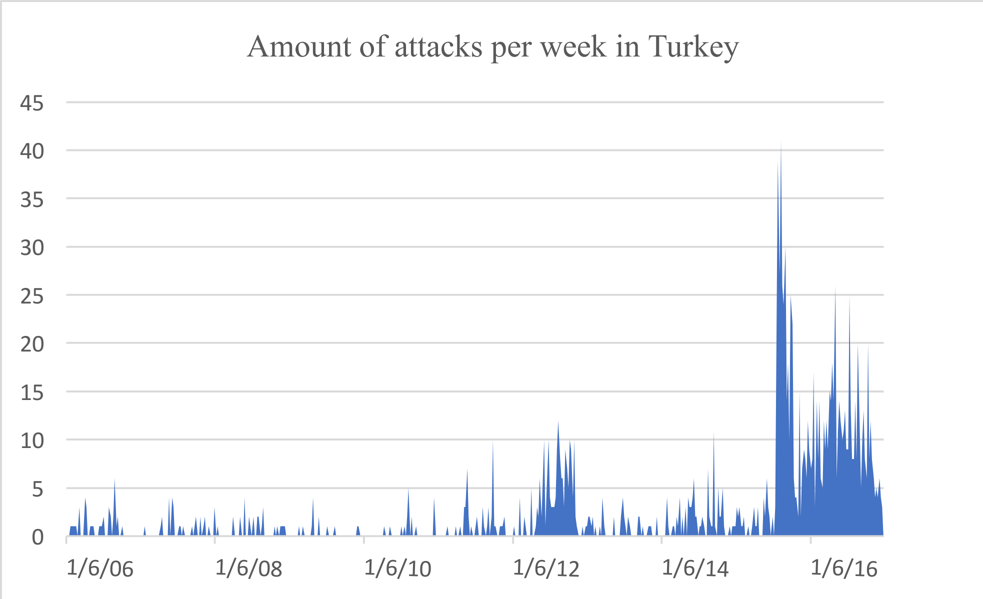
The insurance sector also experienced a major sell-off. Davis (2007) states that insurance firms had to pay out around $40.2 billion in claims relating to the terrorist attacks on September 11. Consequently, most insurance firms stopped providing coverage for terrorist attacks (Davis, 2007). Since some financial institutions were also located in the twin towers, their stock price was going to experience the same fate as the other sectors mentioned above. Investment bank powerhouses Merrill Lynch and Morgan Stanley saw an 11.5% and a 13% drop in their stock price when trading resumed on September 17 (Davis, 2007). Compared to the stock market, the foreign exchange market is not able to close after such an incident. This market trades 24 hours a day as a result of different time zones around the world. Currency is always needed to pay for international trade, and it is also seen as a global necessity for central banks. In other words, currencies need to be available around the clock to be able to conduct business.

1.2 Terrorism in Turkey

In the last decade, the country of Turkey has been plagued with terrorist attacks. There have been about 1480 attacks in Turkey in the last decade (Global Terrorism Database). These attacks have been primarily carried out by PKK (Kurdish separatists), and ISIS, and by the now dismantled Al-Qaida. The Kurdistan Workers' Party, also known as the Kurds or PKK, is a group that was formed in the 1970's (BBC, 2016). This group started with attacks in 1984 against the Turkish government. The main goal was to gain independence from the Turkish state. According to the BBC (2016), this conflict is responsible for the death of more than 40,000 human beings. This party is still at war with the Turkish government, even though a ceasefire was signed in 2015. The Islamic State of Iraq and Syria, also known as ISIS, is a terrorist group that is carrying out attacks across the world. Currently, it is occupying less territory. But up until recently, ISIS was occupying a great amount of territory within in Iraq and Syria. This group is known for its attacks carried out in Paris and Nice, Germany, and many other places.

Figure 1: Weekly Attacks in Turkey

This figure illustrates weekly terrorist attacks ranging from 2006 to 2016. This data was taken from the Global Terrorism Data Base.

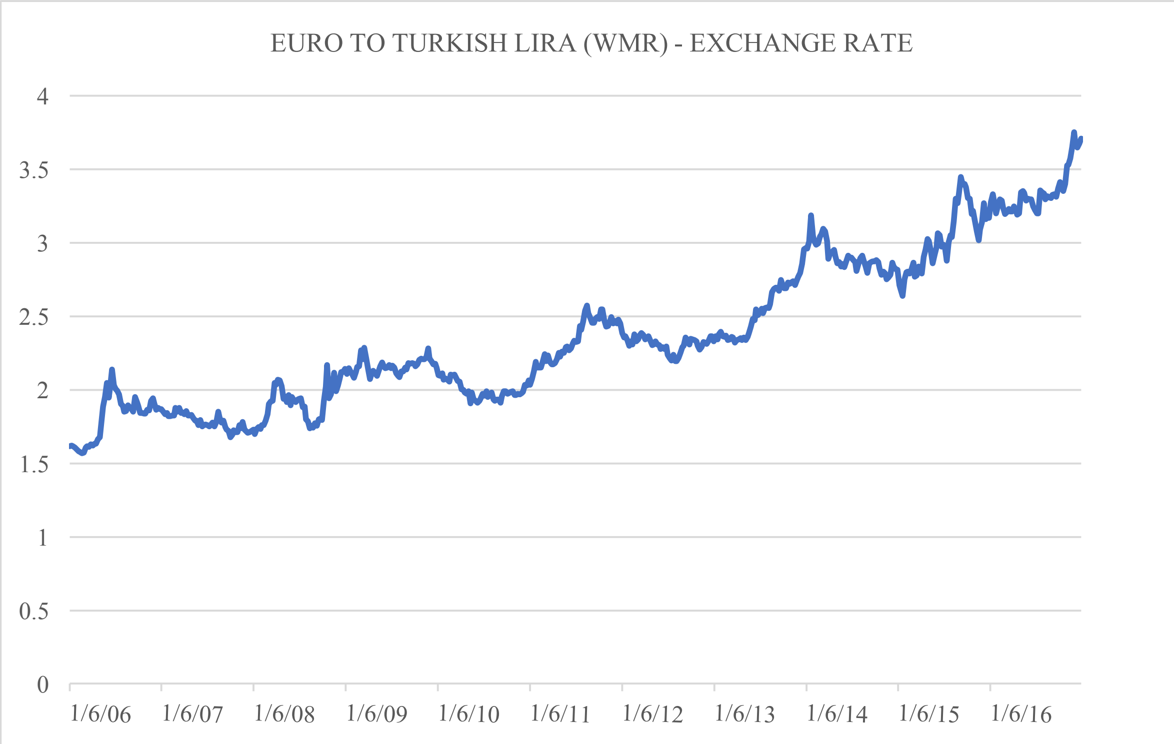


1.3 Turkish Lira

The Turkish Lira has seen a significant devaluation over the past decade. According to Blitz (2017), the Turkish Lira has reached an all-time low in 2017, which forced the central bank to step in and take measures to stop its decline. This author also states that this devaluation was mostly due to political risk, inflation, and deteriorating US relations (Blitz, 2017). Inflation currently stands at 10.26% (trade economics, 2018). With that, Turkey experienced a military coup involving a group of soldiers that wanted to take over the country from President Erdogan. The country is currently involved with the war in Syria, which also created a geopolitical risk. And lastly, its relations with the United States have taken a huge hit because of both countries suspending visa applications. In 2017, the Turkish Lira lost 11.4 percent of its value over a period of two months. The graphs below show the trend of the exchange rate between the Euro against the Turkish Lira over the last 11 years. This upward trend is a sign of a devaluation of the Turkish Lira as 1 euro is worth more Turkish Liras over time.

Figure 2: Euro to Turkish Lira

This figure illustrates weekly closing Euro to Turkish Lira ranging from 2006 to 2016. This data was collected from Datastream[1].

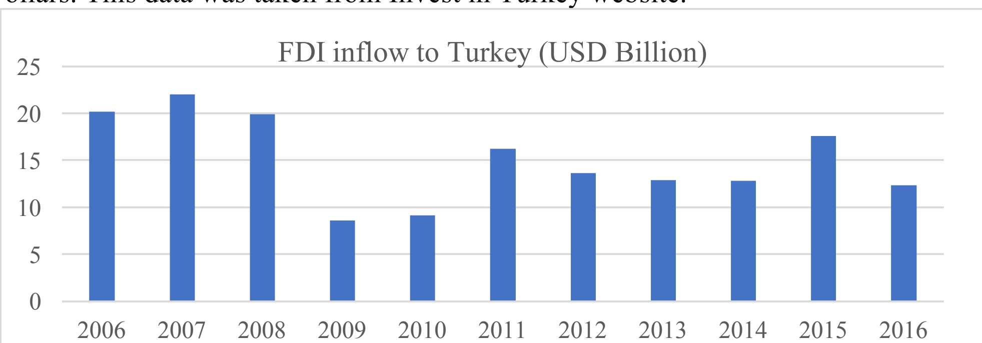


Foreign Direct Investment

One of the factors that can influence an exchange rate is net foreign direct investment, which is the difference between the in and outflow of money (Patel et al., 2014). Foreign direct investment in Turkey has seen a significant drop in the past decade. Compared to 2006 when the country received 20 billion in FDI, Turkey received 12 billion in FDI in 2016, which is an 8 billion US dollars drop. According to FDI in Turkey (2016), net equity investments went down from 10,128 million in 2012 to 6,277 million US dollars.

Figure 3: FDI into Turkey

This figure illustrates the total amount of foreign direct investment into Turkey from 2006 to 2016 in US Dollars. This data was taken from Invest in Turkey website.



[1] As this study only looked at terrorist attacks from 2006 to 2016, it was only fitting that the exchange rate data starts at 2006 and ends at2016.

The table below shows the amount of foreign direct investment inflow from different continents over the last 5 years[2]. Specifically, looking at the inflow from the continents using the currencies included in this study, it is evident that there is less foreign direct investment coming from these continents currently compared to before. European investors with access to capital in Euros have invested about 3 billion dollars less in Turkey compared to 5 years ago. One of the main reasons why the Euro/Turkish Lira was chosen for this study is because most of the foreign direct investment is coming from Europe.

Table 1: Geographic Breakdown (FDI Inflow into Turkey)
This figure illustrates the geographical break down of foreign direct investment into Turkey from 2012 to 2016 in US Dollars. This data was taken from Invest in Turkey website.

	FDI Inflow (USD Millions)				
Year	**2012**	**2013**	**2014**	**2015**	**2016**
Geographic Break down					
Europe	**7927**	**6424**	**6369**	**7980**	**4391**
Developed Europe	7305	5296	5328	7014	3777
EFTA countries	592	234	318	208	354
Other European countries	30	894	723	758	260
Africa	**0**	**221**	**42**	**0**	**0**
North Africa	0	0	0	0	0
Other African countries	0	221	42	0	0
America	**491**	**343**	**334**	**1630**	**458**
North America	471	342	334	1619	456
Central America	16	1	0	6	2
South America	4	0	0	5	0
Asia	**2337**	**2899**	**1886**	**2464**	**2008**
Near and Middle Eastern countries	1593	2286	1336	1317	1253
Arabian Gulf countries	940	880	364	460	446
Other Near and Middle Eastern countries	653	1406	954	850	804
Other Asian countries	744	613	550	1147	755
Oceania and polar regions	6	3	0	0	24
Unclassified	0	0	0	0	5
Total	**10761**	**9890**	**8631**	**12074**	**6886**

1.5 Trade Balance

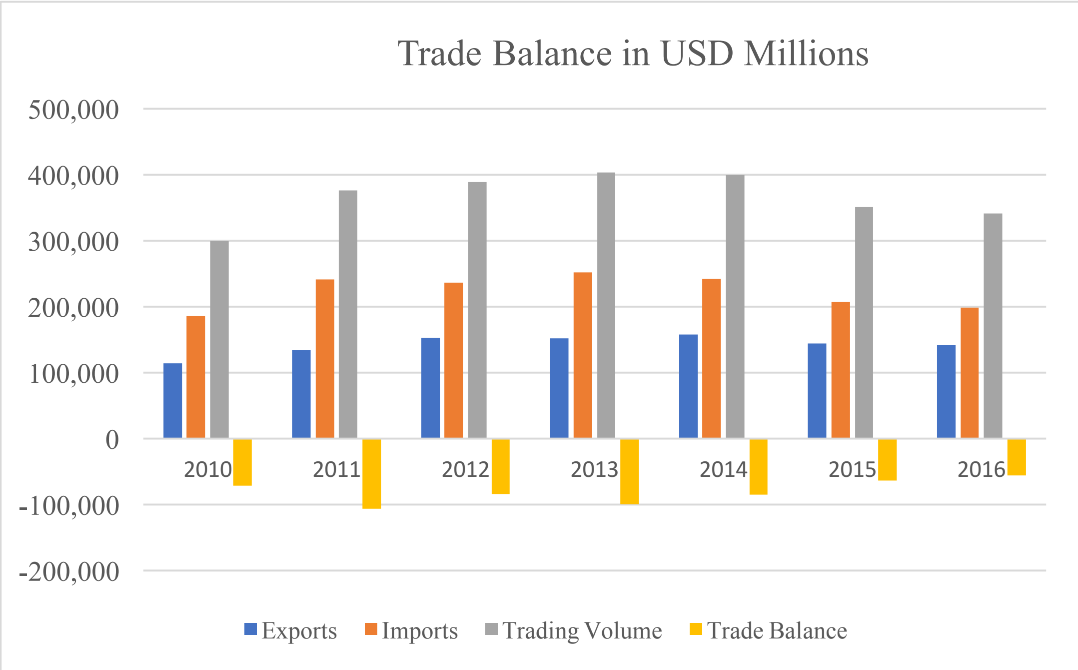
Not only can foreign direct investments influence the exchange rate, but so can a country's trade balance. According to the Observatory & Economic Complexity (2016), Turkey ranks 25th on the list of largest export economies in the world. The figure below shows Turkey's trade balance over a

[2] Foreign direct investment data was only available up to 2016.

period of 20 years. It can be concluded that Turkey has run a trade deficit for a long time, which shows that the demand for the Turkish Lira is less compared to other currencies, which causes the less demanded currency to devalue. According to the OEC (2016), Turkey's mostly exported goods are: cars ($8.32b), gold ($8.25b), delivery trucks ($4.57B), auto parts ($3.8b), and jewelry ($3.75b). Its top imports are cars ($9.8B), refined petroleum ($7.34B), gold ($6.45B) and vehicle parts ($5.09B) (OEC, 2016). Turkey's biggest export locations are Germany ($14B), U.K. ($11.7B), Iraq ($7.64B), and The United States ($6.62B). Its biggest import partners are Germany ($24.9B), China ($16.7B), Russia ($24.9B), Italy ($10.6B), and the United States ($9.4B).

Figure 4: Trade Balance of Turkey

This figure illustrates the trade balance of Turkey from 2010 to 2016 in US Dollars. This data was taken from Invest in Turkey website. http://www.invest.gov.tr/en-US/investmentguide/investorsguide/Pages/InternationalTrade.aspx

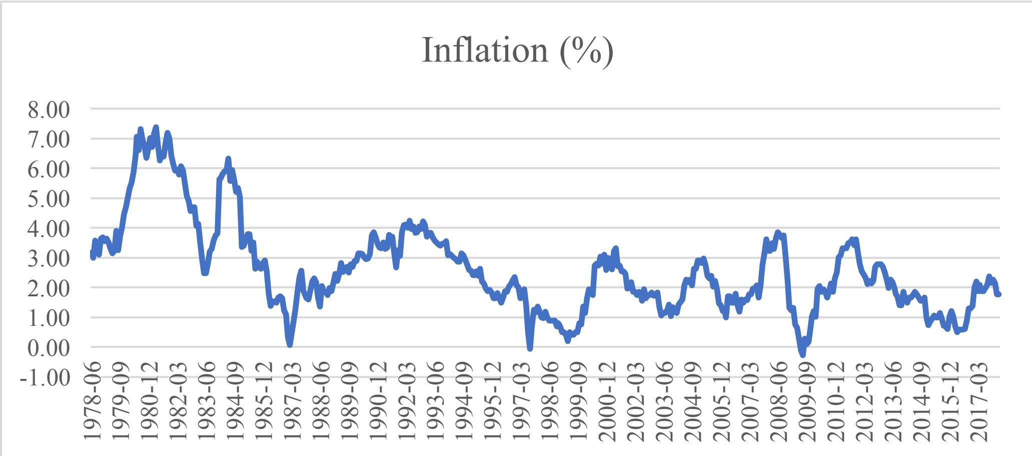


1.6 Turkey's Inflation Report

The inflation rate was at an all-time high of 138.71 percent in May of 1980 and an all-time low of 4.01 percent in June of 1968 (Carvalho, 2018). In February of 2018, inflation was recorded at 1.76%. Looking at the time frame used for this study, inflation has fluctuated between 0 and 4%. This also puts pressure on the exchange rate. Compared to July 2017, it is now at a 7-month low at 10.26%. Some of the industries that currently are at high inflationary levels are: cafés and restaurants (11.42%). housing (10.18%), clothing (12.63%), and transportation (16,02%) (Carvalho, 2018).

Figure 5: Turkey's Inflation rate from 1978 to 2018

This figure shows Turkey's inflation rate from 1978 to 2018, taken from trading economics.



The rest of the paper is organized as follows: section 2 talks about the past literature with regards to terrorism's impact on different areas, section 3 explains the theoretical framework for both terrorism and the exchange rate, section 4 describes the methodology that will be used in this paper, section 5 talks about the data collection process and the type of data, Section 6 will show the empirical results, and lastly sections 7 will conclude the results and discuss the limitations to this study.

2. Literature Review

In the past, different authors have written about terrorism and the effects it can have on financial markets. Most of them have written about the stock market and how it responds to attacks. Others have written about how these attacks affect oil prices (Blomberg et al., 2009), foreign direct investment (Enders et al., 1996), cost of debt (Procasky et al., 2016), cross border mergers and acquisitions (Ouyang et al.,2016), difference in abnormal returns between large cap and small cap stocks (Kollias et al., 2011), and the tourism industry (Madanoglu et al.,2010). However, little has been written about the impact on exchange rates. With that most studies have employed other models such as the event-study methodology, GARCH modelling, or a simple OLS regression to measure the influence. It is for this reason that this paper wanted to introduce a new methodology within the literature, which is the Autoregressive Distributed Lag Model.

2.1 Reaction to frequency of news on exchange rates

As stated above, the exchange rate can be affected by factors such as inflation, trade balance, and geopolitical events. For these reasons investors are constantly monitoring the news about what is going on in the country where they have invested their money. Eddelbüttel et al. (1998) did a study on the impact that news has on foreign exchange rates. Specifically, this paper investigated the impact of general and currency-specific news on the German Mark and the US Dollar (Eddelbüttel et al., 1998). The reason why these authors chose de-seasonalized intraday exchange rates was an idea taken from

Anderson and Bollerslev in which they controlled for calendar effects such as regional holidays, daylight savings time, data gaps, and lunch breaks (Eddelbüttel et al., 1998). The data set, also defined as hfdf93, included every bid and ask quote for the following exchange rates: US Dollar and German Mark. With that, the data also comprised of the three-month interest rate for these currencies as well as money market headline news taken from the Reuters screen AAMM (Eddelbüttel et al., 1998). As a result, the authors decided to also include these interest rates in their methodology as an explanatory variable for the exchange rates. After running the analysis, the paper concluded that the frequency of the news did explain the movement of the exchange rates. However, the interest rates movement had to no impact on the exchange rate.

2.2 Foreign Exchange market's reaction to the type of news

Not only can the frequency of news influence the exchange rate, but investors each react to a specific news differently than others. These types of news included either political or economic news, and if the news is good or bad. Prast et al. (2004), did a study on investors reaction to news, in this case political and economic news, and if the news is positive or negative. They did a case study on the euro-dollar exchange rate. Daily euro-dollar exchange rates from April 1, 2000 to September 22, 2000 were regressed on political and economic news coming from the United States and the Euro zone (Prast et al., 2004). The authors concluded that there is a difference in reaction of investors depending if the news is coming from the United States or the Euro zone. Also, according to Prast et al. (2004), investors tend to react among them differently to good and bad news. If there is positive news coming from the EU zone, the euro will increase in value and hence the euro-dollar exchange will appreciate. However, on a day where the Federal Reserve publishes positive news on the dollar or about economic fundamentals in the United States, the dollar will appreciate and as a result the euro-dollar exchange rate will depreciate.

2.3 Investor's reaction to unexpected news

A terrorist attack can be considered as unexpected news. There is no way to predict when a terrorist attack is going to happen. On the contrary, if the Federal Reserve is having a meeting, an investor can most likely have an idea about the news that is coming out of that meeting, and invest accordingly. Erzurumlu et al. (2014) did a study on investor's reaction to unexpected news on the Indian stock exchange, also known as Mumbai Stock Exchange, and the exchange rate between the U.S dollar and the Indian rupee. The authors used a time span from 1987 to 2012 with a data consisting of daily closing values of the stock exchange and the exchange rate. From those daily closing values, a cumulative abnormal return (CAR) was calculated over a 30-day period.

Their main hypothesis was to check and see if the empirical results hold according to the Uncertain Information Hypothesis. This hypothesis states that after an unfavorable event, stock prices will drop below fundamental values. However, after more clarifications on the uncertainty, prices will move back to equilibrium (Erzurumlu et al., 2014). According to Erzurumlu et al. (2014), the empirical results showed a strong increase in volatility when there is a case of unexpected news for both the stock exchange and foreign exchange market. With that, the cumulative abnormal returns results illustrate a positive change in stock prices after good or bad news, which is consistent with the Uncertain Information hypothesis. On the other hand, when it came to the foreign exchange market, exchange rates went up when there is bad news and changes where barely positive and not significant after unexpected good news.

2.4 Natural Disasters and change in government structure's impact

Natural disasters have also been used as a case study for their impact on the exchange rate. Strobl et al. (2017) looked at how natural disasters can have an impact on the exchange rate for small island developing states (SIDS). Countries the authors considered SIDS do not have a good enough economic structure, and islands that are heavily reliant on industries such as agricultural exports and tourism to survive. Most of islands used in the sample are located in the Caribbean. With that, the data set consisted of countries that have a fixed and flexible exchange rate regime. What the study ends up revealing is that there is an impact on the exchange rate caused by tropical cyclones. However, this result is different for the type of exchange rates regime. Specifically, a flexible rate will experience a depreciation when a natural disaster happens. For fixed exchange regime, natural disasters have little to no impact on the real exchange rate for SIDS countries.

Just like natural disasters, a change in a country's political situation can also have an impact on the exchange rate. When a new political party comes to power or when uncertainty arises within the government, the exchange rate may see some volatile changes. Cosset et al. (1985) examined the reaction of the exchange rate to change in a country's political environment. The author looked at 20 political situations for developed nations, and analyzed the impact by looking at the daily and weekly responses of the exchange rate around announcement date of the political news. The study illustrates that the foreign exchange market tends to react badly to unfavorable news than to positive news, which is logical. If a country is not politically stable, it will experience a different investment climate. Investors will start to cash-in their investments as a result of the instability.

2.5 Terrorism's impact on the stock market

There have already been some studies done on terrorism's impact on financial markets. Most studies were influenced by the September 11, 2001 attacks. This was one if not the biggest of attacks that has ever happened in the world of terrorism. The impact was so big that other international markets received shocks from this event. Charles et al. (2006) investigated the impact the September 11 attacks had on other financial markets around the world. They did this by employing an outlier detection methodology. This methodology is a perfect fit for extraordinary and infrequently occurring events, which was the case for 9/11. After looking at 10 daily stocks market indexes, the empirical results show that 9/11 caused a large permanent and temporary shock depending on the index.

Hanan et al. (2012) wrote a paper on the impact of natural disasters, terrorism, and political news on the Karachi Stock Exchange (KSE-100) index. Hanan et al. (2012) implemented an event study by looking at 21 different news events. Specifically, they looked at 9 terrorism events, 10 political events, and 2 natural disasters (Hanan et al., 2012). The conclusion that the authors wanted to know is if there is a statistical relationship and effect of these events on the KSE-100 index by looking at an event window of 11 days. Looking specifically at the terrorism effect, the empirical results show that the stock exchange went down a maximum 340 points, and a minimum of 24 points. It is enough to conclude that there is impact caused by terrorism.

Karolyi et al. (2006) looked at terror related incidents dating from 1995 to 2002 where publicly traded companies located around the world were the target. A total of 75 incidents were looked at. With that, these authors also wanted to test and see if an attack on a firm involving human capital, like for example kidnappings, will have a negative stock price reaction. Lastly, they wanted to compare firms located in richer and more democratic countries with companies located in less democratic and poorer countries to see which one experienced a larger negative return. Karolyi et al. (2006) employed an event-study methodology using an estimation window of 224 days to 11 days prior to the event. The initial results illustrate that targeted firms experience a 2.2 % drop in stock price that is significant at the 5% level during the event window. On the day of the attack itself, stock prices on average fell about 0.83% at the 1% level. With that there were no other significant abnormal returns when looking at 10 days prior to the attack to 10 days after the attack. According to Karolyi et al. (2006), this conclusion means that there is no short-run reversal of the reaction to the event. Which means that it is more of a long-term permanent impact than a short-term temporary impact. This is an interesting conclusion because it begs the question, will this conclusion hold as well for exchange rates? This is one of the reasons why this case study on the Turkish Lira will look at both the short-term and the long-term effect caused by terrorism.

Attacks including a kidnapping of a firm's executive resulted in an average stock price drop of 1.12%. This percentage was much higher compared to when firms received property damaged. Thinking about it, this makes sense. Executives are put in this position as a result of their contribution to firm. The success of a firm is reliant on their knowledge, expertise, and experience. Investors also firmly believe in that. If an executive gets kidnapped or killed, doubts will start to creep into an investor's mind.

Lastly, attacks that occur on firms located in richer and more democratic countries such as the United States experienced on average a stock price drop of 0.96% after an attack, which was significantly higher compared to firms located in poorer and less democratic countries. One would expect this last result to be the complete opposite. A country that is poorer and less democratic, most of the time is considered unstable and more volatile.

There was also a comparison done by Kollias et al. (2011) between large capitalization stocks and small capitalization stocks to see if there is a difference between the impact in both markets. These authors took the London Stock Exchange, representing the large capitalization market, and the Athens Stock Exchange, representing the small capitalization market. According to Kollias et al. (2011), the main reason why England was chosen as a case study for the impact on large cap stocks, is because the LSE is one of the largest exchanges in world. The LSE has a market capitalization of over $ 3,500 billion and consists of 1,800 listed companies. Compared to LSE, the Athens Stock Exchange has about 4% of LSE's capitalization. Also, the ASE experiences much less trading activity. There were two types of methodologies used to measure the impact. One of these was an event study, that looked at the abnormal returns on the day of the event, cumulative abnormal returns for 6 days after the event has happened, and cumulative returns for 11 days after the event has happened. The second methodology was a conditional volatility movement test.

This paper concluded for both the LSE and the ASE, that there was not a clear pattern to be seen in terms of the impact. The effect itself varied per terrorist attack. So, the impact did not differ between the two types of markets. This is a strange conclusion, because one would think that a market that has a lot of trading activity would see a bigger impact than a market that is known to have little or much less trading activity. There were cases however where there was an impact. Specifically, in the U.K there was a significant market reaction with the attempted assassination of the Prime Minister in 1984 (Kollias et al. 2011). These authors also argue a similar conclusion for the ASE in that the impact is also related to a specific event.

2.6 Terrorism's impact in advanced and emerging markets

Past literature has done research on the impact of terrorism in different types of economies. One being and advanced economy, and the other one being an emerging economy. Eldor et al. (2004) took Israel as a case study to measure the impact of terrorism on the stock market and the foreign exchange market. Israel's economy is considered, according to the International Monetary Fund, as an advanced economy. The data sample was distinguished between attacks based on the location, the type of attack, the target, the number of casualties, and the number of attacks on a single day (Eldor et al., 2004). Using daily time series data from 1990 till 2003, this paper analyzed the effect that Palestinian terror attacks have on stock prices and exchange rates in Israel. The authors wanted answers to four questions: Did the terror at all affect the stock market and currency market? If so, does the impact hold for all types of attacks? Is the effect permanent or transitory?, and Does the market sensitivity to terror diminish over time? The analysis concluded that suicide attacks had a more enduring impact on both the stock market and the foreign exchange market. With that, the numbers of victims also had a more permanent effect on both markets. However, the location had no effect on neither of the markets. This last conclusion is a bit strange, considering that one would think that the location of attack should have an impact. Taking Israel as an example, there should be difference in impact when an attack happens in a city like Tel Aviv compared to a smaller and not so popular city. Lastly, the market sensitivity does not diminish over time. This conclusion shows that investors do not grow accustomed to attacks.

Kollias et al. (2011) employed an event study methodology and GARCH family models to measure the influence of the London and Madrid Bombings on different equity sectors within the country. In addition, they also wanted to see how long it takes for the market to rebound. The abnormal returns for Spanish general indices for the event date, 6-day window, and 11-day window, were all negative. On average, all general indices took around 16 days to rebound after the terrorist attack. Similar to Spain, all indices in England experienced negative abnormal returns for all event windows. However, it took on average 1 day for the market to rebound in London. This means that the impact was bigger in Spain compared to London. One reason for this is that the terrorist threat took longer to be neutralized in Spain compared to London at the time. Another reason was that the Bank of England and the Financial Services Authority had a back-up plan in case England would ever be attacked in order for trading to continue as normal as possible (Kollias et al., 2011).

Emerging markets have also been used as case studies in order to see how much of an impact terrorism can have in these types of economies. Qaiser et al. (2012) did a study to see how the stock market and the foreign exchange market reacts to attacks in Pakistan. A data sample of attacks ranging from 2007 till 2010 was used to conduct the study, seeing that Pakistan experienced the more attacks during this period. The methodology that was used was a simple multiple regression model (OLS). After regressing these variables, it can be concluded that terrorism does have a negative impact on the Pakistani economy. The result for the FOREX market shows that terrorism will devalue the local currency, which will see an increase in domestic prices. However, the impact was less yet significant for the Karachi stock exchange. It is Qaiser et al.'s (2012) believe that the stock exchange is more sensitive to other factors such as stock earnings, tax policy, and other external shocks.

2.7 Terrorism and the cost of debt

Procasky et al. (2016) did an analysis on how cost of debt of a country can be affected by a terrorist attack. Through an OLS regression model, they wanted to see what happens to a country's credit rating when an attack occurs. At first, the authors included both developing nations and developed nations in one sample. The second hypothesis that they wanted to test was to see what the difference is between the credit rating reaction in developed nations compared to developing nations. It was there expectation that developing nations will see a much larger drop in sovereign credit rating compared to developed nations. With that, the authors made sure to control for other variables that also influence a sovereign credit rating by including variables such as inflation, GDP per capita, Total reserve to GDP per capita, Log of Export of goods and services, and corruption (Procasky et al., 2016).

The empirical results show that if a country increases on the global terrorism index by one unit, its sovereign credit rating will decrease by -0.24. This result justifies the first hypothesis that there is a correlation between terrorism and cost of debt. However, according to Procasky et al. (2016), the low R-square proves that even though there is a correlation, terrorism is not the main driver that influences a countries' credit rating. Also, the impact was much more noted in developing nations then developed nations.

2.8 Foreign Direct Investment

Fighting terrorism will most of the time lead to an opportunity cost for the government. If a country is constantly a target for terrorism, eventually the government needs to spend money to deal with the threat. This spending is an opportunity cost because it is capital that could have been used to improve the country's economic structure in order to attract foreign direct investment. Investors always consider the risks when making an investment. If the terrorist attack is specifically aimed at that foreign investment or their personnel, these risks will increase. Or if terrorists target specific infrastructure sights such as airports, the investment risk will increase and would probably lead to investors divesting their money. Enders et al. (1996) conducted a study on the impact that terrorism can have on net foreign direct investment for countries in Spain and Greece. These authors wanted to investigate to see if through fear and intimidation Spain and Greece would see a major change in the inflow of capital by looking at data since the mid-1970.

Enders et al. (1996) chose these two countries as they are considered two smaller Economic Union nations. Smaller countries most of the time do not have the capital to fight terrorism, which makes them more vulnerable to attacks. On the contrary, bigger nations do have the resources to remove the threat of terrorism. As a result, investors are likely to not divest their money from bigger nations if an attack happens compared to smaller nations. Not only that, but the authors also believe that larger nations have a more diversified pool of investors that invest in their countries, which minimizes the probability that net foreign direct investment would take a huge hit. In addition, larger nations have an overall bigger size of net foreign direct investment. Even if money flows out, larger nations will still have a big amount left. By employing a time-series methodology that quantified the influence that attacks have on net foreign direct investment, it can be concluded from the empirical results that terrorism has a persistent negative effect on net foreign direct investment for both Spain and Greece. Looking at Spain, foreign direct investment decreased by 13.5 % in a year with a lot of attacks. For Greece, foreign direct investment decreased annually 11.9% in a year filled with attacks.

A similar study was done by Kinyanjui (2014) on the impact of terrorism on foreign direct investment in Kenya between 2010 and 2012. Just like Spain and Greece, Kenya has also experienced a great amount of terrorist attacks. Two attacks that stood out was the 1998 bombings of the US Embassy, and the attack on the Westgate mall that left 67 people dead (Kinyanyui, 2014). The author used a multiple regression model to measure the impact on foreign direct investment with the dependent variable being foreign direct investment and the amount of terrorist attacks being the independent variable. The results show that terrorism has a negative influence on NFDI in Kenya.

Abadie et al. (2007) also looked at foreign direct investment and how it differs between open and more integrated economies compared to economies that are not so open and integrated. Using a standard endogenous model to measure the risk that terrorism poses on foreign direct investment, the authors concluded that if a country's economy is worldly integrated, investors will start to move their money elsewhere as a result of terrorism. One standard deviation increase in the amount of attacks will lead to a 5% decrease in Net Foreign Direct investment as a percentage of Gross Domestic product (Abdie et al., 2007). This explains why terrorists most of the time attack countries that have a more open and integrated economy.

2.9 Terrorism and the return on oil

Global oil prices are most of the time determined by supply and demand. Oil producing countries, which are mostly located in the Middle East, are the ones that can have the biggest impact on the oil price being that they control most of the supply. One thing that is a recurrence in the Middle East, is that there is always some type of war going on. Blomberg et al. (2009) wrote a paper on terrorism's impact on global oil prices across different supply constraints. The authors state that the impact will be much bigger if there are supply constraints, in other words when the demand either meets the supply or exceeds the supply of oil compared to when the supply exceeds the demand. Their sample was thus divided in years where there were supply constraints and another sample with years that did not have supply constraints. In years that there was a supply constraint along with terrorist attacks, oil firms increased their profit between 6 to 10 percent as a result of the increase in oil prices. On the other hand, when there was no supply constraint but the year did have terrorist attacks, oil prices did not fluctuate as much. Thus, oil firms did not see their profits go up. In fact, they either stayed the same or it had a negative impact. What is interesting about this conclusion is that terrorism can have positive impact depending if there are any supply constraints. Whereas terrorism has most of the time had a negative impact.

2.10 Mergers and Acquisition Activity's impact

Part of the past literature also includes the effect that terrorism has on cross-border merger and acquisition activities. Ouyang et al.'s (2016) article on M&A activity tries to explain a correlation between cross-border merger and acquisitions and terrorism activity. The questions that this study answers are: the impact of source and host country terrorism on bilateral M&A, if terrorism affects developing countries differently compared to developed nations, can good institutions !!! in developing nations handle the negative effect of terrorism, and lastly do terrorism incidents in one neighboring country affect other neighboring countries (Ouyang et al., 2016). According to the empirical results, terrorism does not influence either the source or the host of the bilateral M&As. With that, developing nations do see a bigger impact compared to developed nations in terms of M&A happening less with more terrorism activity happening in this country. However, good institutions located in developing nations can withstand the impact of terrorism. Lastly, the results show negative contagion to neighboring countries, especially countries that share the same border (Ouyang et. al, 2016). This again shows that developing nations do experience a bigger impact compared to developed nations.

2.11 Turkey

Turkey has been already used as a case study for terrorism. Even though all studies have been limited, there are a couple of areas that have been touched up on. These are: the tourism industry, economic growth, and the exchange rate. Öcal et al. (2010) conducted a study on the regional effects of terrorism on Turkey's economic growth. Using provisionally data dating from 1981 to 2007, which shows that most of the attacks happen in the Eastern and Southern parts of Turkey, the empirical results illustrate that terrorism affects economic growth across Turkey. However, the impact is bigger in the Eastern and Southern part compared to the Western part as a result of the East and the South being less developed. One industry that is most likely to be affected by terrorism is tourism. Just like investors, tourists look at the risks every time when visiting a country. If too many attacks happen, tourists are not going to feel safe. Hence, they will probably vacation in a different a place.

Madanoglu et al. (2010) looked at the impact that terrorism has had on publicly traded enterprises within the tourism and hospitality industry in countries such as Turkey, Spain, and Indonesia. Just like most papers, the authors employed the event study methodology. While considering that Turkey and Spain do not have a lot of publicly traded companies in the hospitality and tourism industry, it was still noted that an attack did result in a negative return on the stock price. With that, they also tested to see if publicly traded companies in neighboring countries would also see an impact because of the spillover effect. What the empirical results show is that for companies located in neighboring countries of the attack, most of their stock prices went up. The main justification for this is that tourists tend to cancel their trip in the targeted country and instead they will visit the neighboring country.

3. Theoretical Framework

3.1 Exchange Rate

The word "exchange rate" is best defined as "the price of one currency in terms of another currency (Economic times). There are several factors that can have an impact on the movement of the exchange rate. These factors are: inflation, interest rates, capital account balance, trade balance, debt of the country, Gross Domestic Product, investor's speculation, and geopolitical events (Patel et al., 2004). According to Patel et delete dot here al. put dot here (2004), inflation is one of the most important factors that influences the exchange rate. If the rate of inflation is higher in country A than country B, country A would see a decrease in their exports compared to country B, which puts a downward pressure on country A's currency. Gross Domestic Product (GDP) is best defined as the amount of all the finished goods and services that are generated in a country for a given period (Patel et al., 2004). It not only gives a snap shot of the current state of a country's economy, but it also illustrates a consolidation of the government's expenses, private consumption, spending by businesses, and the total number of goods exported. Sometimes, in order to achieve this growing GDP, governments need to increase spending to stimulate the economy. Countries become more attractive to foreign investors when they have a strong GDP or a growing GDP. As a result of a strong GDP, the local currency will start to increase more in value because more money is flowing in.

Patel et al. (2004) state that interest rates can also influence the exchange rate. If interest rates are rising in a country, investors are keen to invest in interest bearing assets at financial institutions located in this country. Just like when there is an increase in GDP, an increase in interest rates will result in an inflow of money into the country. Therefore, the demand for the local currency will go up, which will result in an appreciation. However, this will also mean that the prices for goods in this country will also go up, making it harder for business to sell their products. In addition, the borrowing cost in this country will increase.

Just like the stock market, the foreign exchange market can be influenced by speculators. Speculators are investors who invest based on the expectation that the price of the asset is going to go up or down. Speculators take more risk by investing based on an outlook prediction compared to other investors that make decisions based on economic fundamentals. Let us say that an investor speculates that a currency is going to increase. He or she will start to buy a lot of this currency, which pushes the price up. Same goes for when an investor has a bad feeling about a country for whatever reason, he or she will start to sell this currency, which pushes the currency down. However, other investors most of the time make investment decisions based on economic fundamentals. For example, employment data, which states how many people are employed and unemployed, gives investors a view of how a country's economy is doing. Most of the time, if unemployment decreases, the currency will appreciate and vice versa (Patel et. al, 2004).

A country's trade account balance can also influence the exchange rate. If a country is running a trade deficit, meaning that it is importing more than it is exporting, this may indicate that the import prices are much higher compared to the export prices. This means that there is more demand for a foreign good than a local good. As a result, the local currency will depreciate against the foreign currency. On the other hand, when a country is running a trade surplus, most of the time this will attract foreign investors, which will see an appreciation of the exchange rate (Patel et al., 2004). An increase in debt of a country can put a downward pressure on the value of the currency. In order to stimulate the domestic economy, the government needs to spend money on big public sector projects (Patel et al., 2004). In order to be able to finance these projects, bonds need to be issued. If a country can pay off their debt, investors will still find it attractive to invest in this country. Take a country like Venezuela, which is currently on the verge of economic collapse, is not a country where investors want to put their money in seeing its economic position.

Most of these factors mentioned above are related to the economic performance of a country. But other events such as politically related events can also have an impact on investor's confidence. A solid and stable government is in a better shape to see big projects through, which gives investors the peace of mind that their money is safe. One of the reasons why Turkey has become such a volatile country is because of its political situation. A couple of years ago, a group of soldiers staged a coup to overthrow president Erdogan. An event like that creates political unrest, which creates a bad sentiment for most investors on investing their money in Turkey. Not only that, also countries that have a coalition as a government structure can also be subjected to political risk. Not all countries can form a strong and stable coalition. A coalition of this sort cannot convey a sense of security for investors and therefore countries likes these will find it hard to attract foreign investors.

3.2 Terrorism

Terrorism has become one of the biggest concerns in today's world. It is affecting our way of life and our way of thinking. The concept of terrorism has been defined by many people in various ways. According to Chaliand et al. (2007), the U.S vice president's task force in 1986, defined terrorism as "the unlawful use of threat of violence against persons or property to further political and social objectives". The Office for the Protection of the Constitution of the Federal Republic of Germany quotes terrorism as "the enduringly conducted struggle for political goals, which… (is) intended to be achieved by means of assaults on the life and property of other persons………criminal acts" (Chaliand et al., 2007, p.14). Also, the British have their own legal definition, which states that "terrorism is the use of violence for political ends for the purpose of putting the public or any section of the public in fear" (Chaliand et al., 2007, p.14).

What all these three definitions have in common are: the objectives, which are most of the time political, the use of violence or criminal acts, the intention of showing fear in a target population. Through the years, there has been many examples of terrorism all around the world. But terrorism has not always been the same. There are a couple of years that stand out and are considered turning points within the history of terrorism. These years are: 1968, 1979, and 1983 (Chaliand et al., 2007). It was 1968 that in Latin America, terrorists started carrying out attacks in the form of guerilla warfare. This type of warfare is best defined as "a diffuse type of war, fought in relatively small formation, against a stronger enemy" (Chaliand et al., 2007). Specifically, it was the FARC guerrillas, also known as the Revolutionary Armed Forces of Colombia, which have been fighting the Colombian government for over 50 years with this same tactic. And it was only recently that they have declared a cease-fire. Around the same time, The United States was also involved in a conflict known as The Vietnam War. It was a war fought in Vietnam, Laos, and Cambodia between the North and South Vietnam from 1955 to 1975. This was also seen as an example of a guerrilla warfare. What makes guerrilla wars so hard to win, is the fact that it is not a war being fought man-to-man on a large territory. It's setting up traps for the enemy, ambushing them when they are not aware that it is coming, and fighting in small fractions.

1979 is considered a second turning in terrorism (Chaliand et al. (2007). It was in this year that terrorists turned to a new form of terrorism known as suicide bombings. People that were part of radical Shiite Islamism during the Iranian revelation, were the first ones to start using suicide bombs. This technique was also seen during the war between the Afghan mujahedeen soldiers against the soldiers of the Soviet Union. This ended with the withdrawal of the USSR troops from Afghanistan. A third turning point in terrorism came in 1983 as a result of a suicide bombing in Beirut, Lebanon. The terrorist group of Hezbollah carried out suicide bombings that killed 241 American Marines and 53 French troops (Chaliand et al., 2007). It was a big development for international terrorism not because of the technique used, but because the attacks were carried out against the west.

According to Chaliand et. al (2007), the last turning point was on 9/11, when 4 jet airlines were hijacked, under which 3 were flown into the World Trade Center and the Pentagon with a 4th one crashing near Pennsylvania. This was the first time in history that airplanes were used to conduct these attacks. The terrorist group, also known as Al-Qaida, carried out this attack that resulted in the death of over 3000 people. Even though the 9/11 was considered a last point of evolution in the history of terrorism, terrorism is a concept that is still developing and insurgents are finding new ways to carry out attacks. With that, a new group by the name of ISIS has been born since the fall of Al-Qaida. In our modern-time, one of their famous attacks happened in Paris on November 13th, 2015. These attacks involved mass shooting, suicide bombings, and hostage taking. Mass shootings have become a new form of carrying out attacks, which being used a lot as of late. Another form that was seen a lot in our modern time is the plowing of pedestrians with the use of vehicles. The attack in Nice on July 14th, 2016 is a good example of that of where an assailant used a cargo truck to run down pedestrians, killing around 80 people. A similar attack was carried out in Barcelona this year.

4. Hypotheses and Methodology

4.1 Hypotheses

Based on the literature review, it can be concluded that not a lot has been written about the impact that terrorism has on the foreign exchange market. To start with, this study looked at attacks in general, to see what the long run and the short run impact was on the Euro/Turkish Lira. With that, it also wanted to prove that there is a difference in impact depending on the type of attack.

The first hypothesis tests if terrorist attacks in general, without splitting the data sample, depreciated the Turkish Lira, and to see how long it took for the exchange rate to correct itself. Hypotheses with e, because it is plural: 2, 3, and 4 were tested by comparing the long-run impact of both samples included in the hypothesis with each other. The rationale behind the second hypothesis is to prove that attacks that included fatalities did have a bigger impact on the exchange rate compared to when attacks only resulted in only injured victims.

Location can play a major role in terrorist attacks. One would expect that if an attack happened in a highly populated part of the country, the impact would be bigger. Ankara, Istanbul, Izmir, Adana, Gaziantep are the biggest cities in Turkey by number of occupants. In addition, Ankara is the capital of Turkey and the government is also located there. Istanbul for example is another big city that contributes a lot to the Turkish economy. The tourism industry is really big here (Istanbul, 2018). Therefore, one of the data sets comprised of attacks that happened in these cities and another data set of attacks that happened in less populated parts of the country

The rationale behind the fourth hypothesis is that one would expect that if an attack happened where the intended target was either the police, military, or the government, could lead to a potentially overthrowing of the government by investors. This could result in bringing instability to the country. This study also measures the short-run impact in terms of how fast the exchange corrected itself after one week. That speed of adjustment will be compared when running the tests on different data sets. Hence, the rationale behind hypotheses 5 to 7.

The following hypotheses have been developed to illustrate the difference in impact:

H1: A terrorist attack in general leads to a devaluation of the Turkish Lira in the long run.

H2: A terrorist attack that included a fatality did depreciate the Turkish Lira more in the long run compared to when there were only injured victims.

H3: A terrorist attack that occurred in in either Istanbul, Ankara, Izmir, Gaziantep, Adana depreciated the Turkish Lira even more in the long run compared to when an attack happened in other parts of Turkey.

H4: A terrorist attack that included the police, the military, or the government, depreciated the Turkish Lira even more in the long run compared to when the intended target were businesses, private properties, means of transportation, airports, and educational institutions.

H5: The Euro/Turkish Lira corrected fewer times in the short run when there was a terrorist attack that included at least one fatality compared to when there were only injured victims.

H6: The Euro/Turkish Lira corrected fewer times in the short run when a terrorist attack occurred in either Istanbul, Ankara, Izmir, Gaziantep, Adana compared to when an attack happened in other parts of Turkey.

H7: The Euro/Turkish Lira corrected fewer times in the short run when a terrorist attack included the police, the military, or the government, compared to when the intended target were businesses, private properties, means of transportation, airports, and educational institutions.

4.2 Methodology

Murthy et al. (2016) used the autoregressive distributive lag model, also known as the ARDL model[3], in order to measure the short-run and the long-run impact of variables such as income (per capita real GDP), health care research and development expenditure, and age (the percentage of the population aged 65 years and older) have on the per capital real health care expenditure. The same method was used to conduct this study. The execution of the model was done in EVIEWS. Measuring the effect of terrorist attacks on the exchange rate is challenging because of the nature of the data measured. There are more effects on the exchange rate than just a possible terrorist attack and past values of the

[3] The ARDL model is better suited when you are conducting a study where each time series data is integrated of order 0 and 1, to determine if these two variables are cointegrated in the long-run.

exchange rate influence current and future values of the exchange rate. To control for this a model is used that factors in the time series and possible autoregressive nature of the data.

The following equation defines the ARDL Model that this paper will use:

$$EURTL_t = \alpha_0 + \sum_{i=0}^{n} \alpha_{1i}\, EURTL_{t-i} + \sum_{i=0}^{n} \alpha_{2i}\, TER_{t-i} + \alpha_3\, EURTL_{t-1} + \alpha_4 TER_{t-1} + \mu_t$$

These are the definitions of the coefficients included in the model:

- $\alpha_0 \Rightarrow$ Constant
- $\alpha_{1,2} \Rightarrow$ Short-run coefficients
- $\alpha_{3,4} \Rightarrow$ Long-run coefficients
- $\mu_t \Rightarrow$ Disturbance (white noise) term
- EURTL $\Rightarrow$ Euro/Turkish Lira
- TER $\Rightarrow$ Terrorist Attacks

It is important to determine the stability of the model by running a recursive estimate. If it shows that the graph lies between the boundaries, that would mean that the model is stable. A stable model makes it possible to do reliable predictions. It also proves the existence of corrections in the model. After proving the stability of the model, the next step would be to perform a bounds test to see if these two coefficients, α_3 & α_4, are statistically significant and if there is long-run cointegrated relationship between the two variables. Values exceeding the F-test of the restricted constant with no trend table created by Pesaran et al. (2001) indicate a long run relationship. Values below the range indicate proof of no such relationship. If the value lies between the upper bound and the lower bound level, then the study is inconclusive.

The final step is estimating the ARDL Error Correction Form in order find the error correction term. The ARDL Error Correction Form (ECF) is estimated as:

$$EURTL_t = \alpha_0 + \sum_{i=1}^{n} \alpha_1\, EURTL_{t-i} + \sum_{i=0}^{n} \alpha_2\, TER_{t-i} + \varnothing \text{ECM}_{t-1} + \varepsilon_t$$

where α_1 & α_2 are the short-term coefficients, while ∅ represents the speed of adjustment towards long-run equilibrium. Most of the time after running the Error Correction Form, a number between -1 and 1 will result for ∅. If ∅ is a negative number, means that the Euro/Turkish Lira will correct towards long-run equilibrium. On the other hand, if ∅ is positive, then the Euro/Turkish Lira will diverge from long-run equilibrium after an event has happened. In this case, the empirical results will determine in how many of the cases per type of attack did the exchange rate converge or diverge towards or from long-run equilibrium in the week after a terrorist attack occurred.

4.3 Data

The terrorist attacks data was taken from the Global Terrorism Data Base and comprised of weekly amount of attack data[4] in Turkey dating from the 6th of January, 2006 to December 31st, 2016. The weekly attacks were split into different data sets depending on if people injured or killed, the location of the attack, and the type of target. The first data set includes all types of attacks, which is a total of 693 attacks over a period of eleven years. The second data set comprises the 334 attacks where people were only injured during that period. The third data set contains 359 attacks where there was at least one fatality. The fourth data set includes 629 attacks that happened in smaller towns where less people live. The fifth data set comprises 64 attacks that happened either in Istanbul, Ankara, Izmir, Gaziantep, or Adana. The sixth data set includes 461 attacks where either the police, the military or the government were a target. And the last data set comprises of 232 attacks where local business, airports, private property, means of transportations, and educational institutions were the target. The total number of weeks that were observed for all samples is 573, for each of these weeks a value was inputted in the time series, being a "0" if no attacks happened that week or the number of attacks that week. The exchange rate data set comprises the [5]Weekly Euro/Turkish Lira closing exchange rates ranging from 2006 to 2016, available through Datastream.

[4] The decision to use weekly attacks was based on the fact that there were not enough daily attacks that synchronized with the exchange rate data between 2006 and 2016. In order to measure the impact more properly, it was better to look at attacks for each week. It was not possible to get data up until 2018 because those attacks are not published yet or not included in any database.

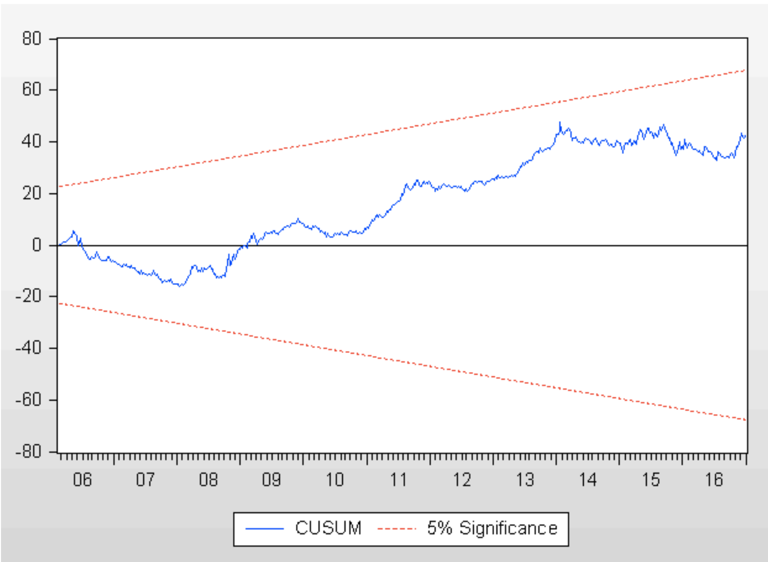
[5] The Euro was chosen because most of the foreign direct investment into Turkey comes from Europe. With that the Euro is one of the most liquid currencies. A week is considered from Monday to Friday, because currency trading happens between Monday and Friday. Therefore, weekend data were not included in the sample.

6. Empirical Results

In order to be able to apply the ARDL Model, all variables have been checked to make sure that neither are integrated at the second order[6]. A standard unit root test was done at level (and if not found stationary another test at first difference) for all variables based on the Schwarz criterion. Also, included in the equation for all the unit root tests is an intercept. Tables A1, A2, A3, A4, A5, A6, A7 and A8 located in the appendix, show the results of all the unit root tests. The results in these tables show that all types of attacks variables are I(0) and the exchange rate is I(1). With that a Breusch-Godfrey Serial Correlation LM Test was done to see if there was any autocorrelation between the variables included in each hypothesis. Tables A9, A10, A11, A12, A13, A14, and A15, located in the appendix, show the results which prove that for no hypotheses do the two variables have serial correlation. A CUSUM test was also conducted for each hypothesis in order check the stability of the model. This is represented by figure 7.

Figure 7: CUSUM Test

This figure illustrates a plot of the cumulative sum of squares of recursive residuals. The CUSUM Test is a stability diagnostic test conducted in EVIEWS to determine the stability of the model. The way to interpret the stability is based on the location of the blue graph. If the blue graph lies between the red boundaries, then the model is stable. If not, then the model is not stable. The variables used for this test were weekly attacks and weekly Turkish Lira/Euro exchange rates



6 In order to conduct the ARDL Model, two things are necessary. Both variables need to be stationary either at level or at first difference. In addition, both variables need to be continuous. An example of continuous variable can be daily stock prices or daily interest rates. In this case, the terrorist events data are not completely continuous, which does not make the ARDL model the ideal methodology. However, it not a possibility to make or obtain a continuous variable for terrorist attacks.

The first hypothesis that this study tested was if the number of terrorist attacks per week in general appreciated the Euro/Turkish Lira exchange rate, hence depreciated the Turkish Lira for every week there were attacks between 2006 and 2016. The estimation results in table A17, located in the appendix, illustrate that the coefficient of attacks in general is statistically significant. In addition, the Euro/Turkish Lira exchange rate in the week before also has a huge impact on the exchange rate of the current week.

Moving to the bounds test results in table 2, located in terrorist attacks in general appreciated the Euro/Turkish Lira by 0.002 on average in the week of the attack, meaning a depreciation of the Turkish Lira. The F-statistic in table A18, located in the appendix, lies between the boundaries at 0.05 significance, which also evidence that in general terrorist attacks and the Euro/Turkish Lira do not have a long run relationship.

Hence, the first hypothesis is rejected. With that, even if there was a long run relationship, terrorist attacks can only take partial credit for depreciating the Turkish Lira as the exchange rate from the week before played a big role in influencing the exchange rate of the following week. However, in order to isolate terrorist attacks as the only factor affecting the exchange rate, it needs to be assumed that all other factors affecting the exchange rate are constant. This is not a realistic assumption, but this is the only way. Most of the papers written in the past also conducted studies based on the same assumption[7].

Table 2: Long-run coefficients using ARDL (1,0) from EVIEWS 10 using attacks in general as the independent variable and the Euro/Lira as the dependent variable. The coefficient is interpreted as a number. If the probability is less than 0.05, the coefficient is statistically significant.

Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.014	0.009	1.483	0.138
EURTL(-1)*	-0.006	0.004	-1.331	0.184
TER**	0.002	0.001	2.779	0.006

Table 3: Error Correction taken from EVIEWS 10. The cointegration coefficient, which is represented as ∅ in the equation below, should determine how fast the Euro/ Turkish Lira corrected back to long-run equilibrium in

7 In order to test for robustness of the terrorism coefficient, other factors such as interest rates and inflation that affect the exchange were added to the model. Depending on which variables were added sometimes the terrorist attack coefficient came out statistically significant, sometimes it did not. This make it really hard to isolate this variable and make it take credit for the exchange rate movement.

the week after attacks happened. A negative sign in front of the coefficient means that the exchange rate will converge towards long-run equilibrium. If it shows a positive sign, it means the exchange rate will diverge from long-run equilibrium. With that, the coefficient should be read as a percentage. If the probability is less than 0.05, the coefficient is statistically significant.

$$EURTL_t = \alpha_0 + \sum_{i=1}^{n} \alpha_1 \, EURTL_{t-i} + \sum_{i=0}^{n} \alpha_2 \; TER_{t-i} + \varnothing \mathrm{ECM}_{t-1} + \varepsilon_t$$

ECM Regression Case 2: Restricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
CointEq(-1)*	-0.006	0.002	-3.410	0.0007
R-squared	0.013		Mean dependent var	0.004
Adjusted R-squared	0.013		S.D. dependent var	0.045
S.E. of regression	0.044		Akaike info criterion (AIC)	-3.387
Sum squared resid	1.131		Schwarz criterion (SC)	-3.330
Log likelihood	971.286		Hannan-Quinn criter.	-3.367
Durbin-Watson stat	2.060			

The results in table 3 show that the Euro/Turkish Lira will correct itself to long-run equilibrium at a speed of adjustment (∅) of 0.6% of the time in the following week after there were terrorist attacks between 2006 and 2016. The fact that the probability of the cointegration coefficient is less than 5%, makes it statistically significant. The R-squared shows that 1.3% of the data is explained by the independent variable. In other words, the Euro/Turkish Lira barely corrected itself to long-run equilibrium in the week after there was a week with attacks. However, since the exchange rate from the week before an attack is a high indicator of the what the exchange rate looked like the following week, means that terrorist attacks can only take partial credit for this result.

For the second hypothesis, which states that attacks that included at least one fatality depreciated the Turkish Lira even more in the long run compared to when there were only injured victims, the same process was followed as presented above. Furthermore, a comparison was done using the ARDL Error Correction Form to prove the fifth hypothesis, which states that the Euro/Turkish Lira corrected itself at a slower pace after a terrorist attack that included a fatality compared to when an attack included only injured victims.

Table 4: Long-run coefficients using ARDL (1,0) from EVIEWS 10 using attacks where people were only injured as the independent variable and the Euro/Lira as the dependent variable. The coefficient is interpreted as a number. If the probability is less than 0.05, the coefficient is statistically significant.

Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.012	0.009	1.248	0.212
EURTL(-1)*	-0.004	0.003	-1.079	0.281
TER**	0.004	0.001	2.97	0.003

The estimation results in table 4 demonstrate that the coefficient of terrorist attacks that included only injured victims is statistically significant. Also in this case, the exchange rate in the week before also has a huge influence on the exchange rate of the current week. Since again the exchange rate of the week before has an influence on the exchange rate in the following week, these types of attack can only take partial credit for the depreciation for the Turkish Lira. The bounds test results in table 4, located in the appendix, prove that a terrorist attack that included only injured victims appreciated the Euro/Turkish Lira by 0.004 on average in a week when this type of attack happened. This indicates a depreciation of the Turkish Lira. What shows that a long-run relationship exists can be seen by the F-statistic value in table A19. Since the F-statistic value is higher than the upper bound value at 0.05 significance, ascertains that these two variables are cointegrated at I(0). In other words, these two variables have a long-run relationship.

Table 5: Error Correction taken from EVIEWS 10. The cointegration coefficient, which is represented as ∅ in the equation below, should determine how fast the Euro/ Turkish Lira corrected back to long-run equilibrium. A negative sign in front of the coefficient means that the exchange rate will converge towards long-run equilibrium. If it shows a positive sign, it means the exchange rate will diverge from long-run equilibrium. With that, the coefficient should be read as a percentage. If the probability is less than 0.05, the coefficient is statistically significant.

$$EURTL_t = \alpha_0 + \sum_{i=1}^{n} \alpha_1 \, EURTL_{t-i} + \sum_{i=0}^{n} \alpha_2 \; TER_{t-i} + \varnothing \mathrm{ECM}_{t-1} + \varepsilon_t$$

ECM Regression Case 2: Restricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
CointEq(-1)*	-0.004	0.001	-3.568	0.0004
R-squared	0.015		Mean dependent var	0.004
Adjusted R-squared	0.015		S.D. dependent var	0.044
S.E. of regression	0.044		Akaike info criterion (AIC)	-3.388
Sum squared resid	1.128		Schwarz criterion (SC)	-3.380
Log likelihood	971.824		Hannan-Quinn criter.	-3.385
Durbin-Watson stat	2.058			

The error correction form results in table 5 display that the Euro/Turkish Lira corrected itself to long-run equilibrium at a speed of adjustment (∅) of 0.4% percent of the time in the week after attacks that included only injured victims. The fact that the probability of the cointegration coefficient is less than 5%, makes it statistically significant.

According to the results provided in table A20, located in the appendix, the coefficient of terrorist attacks that included at least one fatality is not statistically significant, as the probability of this coefficient is higher than 5%. Coming back to the second hypothesis, which states that attacks that included at least one fatality will have a bigger impact in the long run compared to attacks that included only injured victims, it can be concluded that investors seem to react indifferently based on just injured victims or fatalities. Hence, the second hypothesis is rejected. Since, the terrorist coefficient is insignificant, there is no point in running an error correction form test. Which means that it cannot be said that attacks that included fatalities corrected at a slower pace in the following week compared to when attacks included only injured victims. Consequently, the fifth hypothesis is also rejected.

Next, this study compared attacks that happened in other parts of Turkey compared to when it happened in the biggest cities in Turkey. Both data sets were split up based on the percentage of the population, and also based on the city's significance to the country. Like was mentioned before, Ankara is the capital of Turkey. Most of the government is located there. One would assume that if an attack happens here, the impact would be huge. Istanbul is next biggest cities in Turkey. The tourism industry in Turkey contributed a lot to the Turkish Economy. Based on this assumption, this study wanted to test for the 3rd hypothesis that attacks that happened in cities such as Istanbul, Ankara, Izmir, Gaziantep, and Adana, will have a bigger long-run impact, compared to attacks that happened in other parts of Turkey.

Table 6: Long-run coefficients using ARDL (1,0) from EVIEWS 10 with attacks that happened in other parts of Turkey as the independent variable, and the Euro/Lira as the dependent variable. The coefficient is interpreted as a number. If the probability is less than 0.05, the coefficient is statistically significant.

Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.0139	0.009	1.435	0.152
EURTL(-1)*	-0.005	0.004	-1.266	0.201
TER**	0.002	0.001	2.682	0.008

The coefficient representing terrorist attacks that happened in other parts of Turkey in table A21 is statistically significant. In addition, the exchange rate in the week before also has a huge effect as well on the exchange rate of the current week. According to the results in table 6, terrorist attacks that happened in other parts of Turkey, appreciated the Euro/Turkish Lira by 0.002 on average between 2006 and 2016 in the week of the attack, meaning a depreciation of the Turkish Lira. However, since the F-statistic in table A22 lies between the boundaries at 0.05 significance, it cannot be concluded that these types of attacks have a long-run impact on the Euro/Turkish Lira.

Table 7: Error Correction taken from EVIEWS 10. The cointegration coefficient, which is represented as ∅ in the equation below, should determine how fast the Euro/ Turkish Lira corrected back to long-run equilibrium. A negative sign in front of the coefficient means that the exchange rate will converge towards long-run equilibrium. If it shows a positive sign, it means the exchange rate will diverge from long-run equilibrium. With that, the coefficient should be read as a percentage. If the probability is less than 0.05, the coefficient is statistically significant. This table illustrates how fast the Euro/Turkish Lira corrects itself after an attack happened in other parts of Turkey.

$$EURTL_t = \alpha_0 + \sum_{i=1}^{n} \alpha_1 EURTL_{t-i} + \sum_{i=0}^{n} \alpha_2 TER_{t-i} + \varnothing \mathrm{ECM}_{t-1} + \varepsilon_t$$

ECM Regression Case 2: Restricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
CointEq(-1)*	-0.005	0.002	-3.331	0.000
R-squared	0.012		Mean dependent var	0.003
Adjusted R-squared	0.012		S.D. dependent var	0.044
S.E. of regression	0.044		Akaike info criterion (AIC)	-3.385
Sum squared resid	1.131		Schwarz criterion (SC)	-3.378
Log likelihood	971.022		Hannan-Quinn criter.	-3.382
Durbin-Watson stat	2.056			

The results in table 7 show that the Euro/Turkish Lira corrected itself to long-run equilibrium at a speed of adjustment (∅) of 0.5% percent of the time in the week after there were terrorist attacks that happened in other parts of Turkey. The fact that the probability of the cointegration coefficient is less than 5%, makes it statistically significant.

Table 8: Long-run coefficients using ARDL (1,0) from EVIEWS 10 with attacks that happened in locations such as Istanbul, Ankara, Izmir, Gaziantep, and Adana as the independent variable, and the Euro/Lira as the dependent variable. The coefficient is interpreted as a number. If the probability is less than 0.05, the coefficient is statistically significant.

Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.009	0.009	1.043	0.297
EURTL(-1)*	-0.003	0.003	-0.869	0.385
TER(-1)	0.018	0.004	3.676	0.000
D(TER)	0.004	0.004	1.127	0.260

The results in table 8 illustrate that attacks that happened in either of the big cities did have an immediate effect, however it lasts until a week after the attack has happened. Also, the exchange rate from a week before continues to be an important factor in the exchange of the following week. Looking down to table 16, attacks that happened in either Istanbul, Ankara, Izmir, Gaziantep, or Adana appreciated the Euro/Turkish Lira by 0.018 on average up until a week after that included an attack located in one of these cities. Hence, a depreciation of the Turkish Lira up until a week after the attack if every other factor affecting the exchange rate was held at a constant. Seeing that the F-statistic in table 17 is higher than the boundaries at 0.05 significance, these types of attacks do have a long-run relationship with the Euro/Turkish Lira.

Comparing the results with when an attack happened in other parts of Turkey, attacks that happened in highly populated locations appreciated the Euro/Turkish Lira by 0.016 more compared to when an attack happens in other parts of Turkey. However, attacks in the bigger cities can only take partial credit for the result, as the exchange rate in the week before did also influence the exchange rate in the week when these types of attacks happened. In this case, it shows that location does play a part for investors decisions. Hence, the third hypothesis can be accepted.

Table 9: Error Correction taken from EVIEWS 10. The cointegration coefficient, which is represented as ∅ in the equation below, should determine how fast the Euro/ Turkish Lira corrected back to long-run equilibrium. A negative sign in front of the coefficient means that the exchange rate will converge towards long-run equilibrium. If it shows a positive sign, it means the exchange rate will diverge from long-run equilibrium. If the probability is less than 0.05, the coefficient is statistically significant. This table illustrates how fast the Euro/Turkish Lira corrects itself after an attack happened in either Istanbul, Ankara, Izmir, Gaziantep and Adana.

$$EURTL_t = \alpha_0 + \sum_{i=1}^{n} \alpha_1 \, EURTL_{t-i} + \sum_{i=0}^{n} \alpha_2 \, TER_{t-i} + \varnothing \mathrm{ECM}_{t-1} + \varepsilon_t$$

ECM Regression Case 2: Restricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(TER)	0.004	0.003	1.198	0.231
CointEq(-1)*	-0.003	0.001	-4.183	0.000
R-squared	0.030		Mean dependent var	0.003
Adjusted R-squared	0.028		S.D. dependent var	0.044
S.E. of regression	0.044		Akaike info criterion (AIC)	-3.400
Sum squared resid	1.111		Schwarz criterion (SC)	-3.385
Log likelihood	976.284		Hannan-Quinn criter.	-3.394
Durbin-Watson stat	2.054			

Table 9, located above, suggests that if an attack happened in a more populated location, the Euro/Turkish Lira corrected itself 0.3% of the time in the week after the attack happened. The probability of this coefficient is also less than 5%, which makes it statistically significant. Seeing that the Euro/Turkish Lira corrected more times in the week after attacks happened in other parts of Turkey, means that the sixth hypothesis is accepted, which states that the Euro/Turkish Lira corrected itself fewer times to long-run equilibrium in the week after attacks that happened in the bigger cities compared to attacks that happened other parts of Turkey.

Table 10: Long-run coefficients using ARDL (1,0) from EVIEWS 10 with attacks that included either the police, military, or government buildings as the independent variable, and the Euro/Lira as the dependent variable. as the independent variable, and the Euro/Lira as the dependent variable. The coefficient is interpreted as a number. If the probability is less than 0.05, the coefficient is statistically significant

Conditional Error Correction Regression				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.015	0.009	1.573	0.1162
EURTL(-1)*	-0.006	0.004	-1.421	0.1557
TER**	0.003	0.001	3.082	0.0022

Moving on the fourth hypothesis, the coefficient of attacks that included either the police, military, or government buildings is statistically significant based on the probability in table A25, located in the appendix. Also in this case, the exchange rate from the week before is big indicator of the exchange rate in the following week. These types of attacks did seem to influence the Euro/Turkish Lira according to the results in table 10 with a 0.003 appreciation of the exchange rate per week that included these types of attacks between 2006 and 2016. The fact that the F-statistic in table A26, located in the appendix, is higher than the boundaries at 0.05 significance, confirms the long-run relationship between these types of attacks and the Euro/Turkish Lira.

Table 11: Error Correction taken from EVIEWS 10. The cointegration coefficient, which is represented as ∅ in the equation below, should determine how fast the Euro/ Turkish Lira corrected back to long-run equilibrium. A negative sign in front of the coefficient means that the exchange rate will converge towards long-run equilibrium. If it shows a positive sign, it means the exchange rate will diverge from long-run equilibrium. If the probability is less than 0.05, the coefficient is statistically significant. This table illustrates how fast the Euro/Turkish Lira corrects itself after attacks that included either the police, military, or government buildings.

$$EURTL_t = \alpha_0 + \sum_{i=1}^{n} \alpha_1 EURTL_{t-i} + \sum_{i=0}^{n} \alpha_2 \ TER_{t-i} + \varnothing \text{ECM}_{t-1} + \varepsilon_t$$

ECM Regression Case 2: Restricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
CointEq(-1)*	-0.006	0.002	-3.663	0.0003
R-squared	0.016399		Mean dependent var	0.003656
Adjusted R-squared	0.016399		S.D. dependent var	0.044761
S.E. of regression	0.044392		Akaike info criterion (AIC)	-3.389754
Sum squared resid	1.127231		Schwarz criterion (SC)	-3.382161
Log likelihood	972.1646		Hannan-Quinn criter.	-3.386792
Durbin-Watson stat	2.052582			

The results in table 11 show that the Euro/Turkish Lira corrected itself to long-run equilibrium at a speed of adjustment ∅ of 0.6% percent of the time in the following week for every week there were terrorist attacks included either the police, military, or government buildings between 2006 and 2016. The fact that the probability of the cointegration coefficient is less than 5%, makes it statistically significant. The R-squared shows that 1.6% of the data is explained by the independent variable. This means that after these types of attacks, the Euro/Turkish Lira barely corrected itself to long-run equilibrium, considering that all other factors affecting the exchange rate were held at a constant.

According to the results provided in table A27, located in the appendix, terrorist attacks that included either educational institutions, airports, businesses, journalists, and private properties appreciated the Euro/Turkish Lira by 0.002 on average per week that included these types of attacks between 2006 and 2016. However, the probability of this coefficient is higher than 5%, which makes insignificant. Since, the terrorist coefficient is insignificant, there is no point in running an error correction form test to measure the short-run impact or a bounds test to measure the long-run impact. Coming back to the fourth hypothesis, which states that attacks where to intended target were the police, the military, or the government depreciated the Turkish Lira on the long-run by a bigger amount compared to attacks where the intended targets where business, private properties, educational institutions, and journalists, is inconclusive. This is because these two types of attacks cannot be compared to one and another as one of them has a coefficient that is insignificant. Therefore, the 7th hypothesis can also be determined as inconclusive, since it cannot be said that the exchange rate corrected fewer times in the week after attacks that included the police, the military, or the government, compared to when attacks included, business private properties, and educational institutions.

Conclusion

The main purpose of this paper was to look at the impact that terrorist attacks can have on the Euro/ Turkish Lira Exchange rate. Not only did this paper look at attacks in general, but it also looked at the types of attacks specified by victims being injured, fatalities, location, and the type of targets. One assumption to keep in mind about the conclusion is, that this study assumed that every other variable that can affect the exchange was held at a constant. The Autoregressive Distributed Lag Model Long-Run Form and Bounds Test and the ARDL Error Correction Form model was employed to examine the long-run and the short-run impact dating from 2006 to 2016.

Table 12: Hypotheses results

Concluding Results	
Hypothesis	Accepted/ Rejected/ Inconclusive
1	Rejected
2	Inconclusive
3	Accepted
4	Inconclusive
5	Inconclusive
6	Accepted
7	Inconclusive

Table 13: Speed of adjustment and long run coefficient results

Type	**Long run coefficient**	**Speed of adjustment**
All terrorist attacks	-	-0.006
Injured	0.004	-0.004
Fatalities*	-	-
Other parts of Turkey	0.002	-0.005
Big Cities	0.018	-0.003
Police, Military, or Government	0.003	-0.006
Educational institutions, Business, Private properties*	-	-
*** statistically insignificant**		

Attacks in general did not seem to have a long run relationship with the Euro/Turkish Lira. However, the results were distinctive when testing for different types of attacks. This means that depending on the type of attack in terms of injuries/fatalities, location, and target type, the exchange rate appreciated and corrected faster or slower to long run equilibrium. Not only that, but the Euro/ Turkish Lira corrected at a speed of adjustment ($\varnothing$) of 0.6% of the time in the week following an attack in general. This proves that a very low amount of the exchange rates corrected back in the week after a terrorist attack. But since the exchange rate from the week before, plus all other economic fundamentals have an impact on the exchange rate, it is hard to isolate terrorism as the main reason why there were only a small amount of the exchange rate that corrected to long-run equilibrium in the week following a terrorist attack.

When it came to comparing terrorist events that ended up in fatalities and events that included only injured victims, the result was inconclusive. This is because the coefficient for fatalities was insignificant, which made it impossible to look at the long run and the short run impact. did not have a bigger impact on the exchange compared to when attacks included only injured victims. This comes to show that in the case of Turkey, investors possibly are not making decisions based on just knowing if there were fatalities or injured victims.

Similarly, a comparison was done when the attacks happened in either Istanbul, Ankara, Izmir, Gaziantep and Adana, and when it happened in other parts of Turkey. Attacks in a more populated location such as Ankara, Istanbul, Izmir, Adana, and Gaziantep appreciated the exchange rate by 0.018 more compared to when an attack happened in less populated locations. This proves that these types of attacks have caused a depreciation of the Turkish Lira in the long run. Furthermore, the Euro/Turkish Lira corrected at a speed ($\varnothing$) of 0.2% of the time less in the week after attacks that happened in the bigger cities compared to attacks that happened in other parts of the country. This make sense, as one would expect the impact to be bigger in cities where more people live. Not only that, but when something happens in a big city, it is more likely to reach the news than if an attack happens in a smaller city. What this proves is that investors might react differently to a terrorist attack depending on the location of the attack.

When an attack included the police, the military, or the government, the Euro/Turkish Lira appreciated on the long-run with 0.003. However, when an attack included civilians, businesses, private properties, and educational institutions), the coefficient came out statistically insignificant. Similar to compared injured victims and fatalities attacks, this result is inconclusive, as no comparison can be done.

Limitations and Future Research

When interpreting the results, it was always important to take into consideration the following assumptions:

- ❖ Every result was interpreted with the assumption that all other factors influencing the exchange rate were held a constant in order to isolate terrorist attacks
- ❖ The exchange rate the week before is high indicator of the exchange rate the next week
- ❖ Terrorist attacks are not a continuous variable which makes it no ideal to test with an ARDL Model
- ❖ Whatever the empirical results show, it only holds for Terrorism in Turkey

These assumptions in turn become limitations, because it is hard to prove that terrorism is causing this impact on the exchange rate. With that, this study did not include the most recent data on terrorist attacks. Therefore, all the conclusions are based on information from the past. Proper research was done to find a database with the most up-to-date information. The Global Terrorism Database was the most accurate database out there for terrorist attacks. Unfortunately, this database has not been updated in the last two years. In general, it is always better to conduct a study based on current events. Furthermore, in order to be able to properly execute the ARDL mode, it necessary that the predictive data is continuous. Since the data on terrorist events are not continuous, makes the ARDL Model not the ideal methodology to measure an impact. However, looking at the other options for methodology, there is not an ideal methodology to use in order to measure the long run and the short run impact using variables such as terrorist events and the Euro/Turkish Lira. This is what could have played a role for barely seeing a result in terms of the of correction of the exchange rate after a week.

Future studies can look at less liquid currencies, as this study chose a more liquid currency like the Euro. A good part of foreign direct investment into Turkey is coming from South America and The Middle East. So, maybe looking at exchange rates from those geographies could be an option.

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Appendix

Table A1: Unit Root Test

This table shows the results from running an augmented dickey-fuller test on weekly attacks. If the probability is less than 5%, the null cannot be rejected at level based on the Akaike Info Criterion, intercept, and a maximum of 18 lags.

Unit Root Test results			
Augmented Dickey- Fuller Test			
Null Hypothesis	TER (General Attacks) has a unit root		
Exogenous	Constant		
Lag length	2		
		T-statistic	Probability
Augmented Dickey- Fuller test statistic		-5.185709	0.0000
Test critical values	1% level	-3.441573	
	5% level	-2.866383	
	10% level	-2.569409	

Table A2: Unit Root Test

This table shows the results from running an augmented dickey-fuller test on the Euro/Turkish Lira exchange rate. If the probability is less than 5%, the null cannot be rejected at first difference based on the Akaike Info Criterion, intercept, and a maximum of 18 lags.

Unit Root Test results			
Augmented Dickey- Fuller Test			
Null Hypothesis	D(EURTL has a unit root		
Exogenous	Constant		
Lag length	0 (Automatic - based on SIC, maxlag=18)		
		T-statistic	Probability
Augmented Dickey- Fuller test statistic		-24.46567	0.0000
Test critical values	1% level	-3.441553	
	5% level	-2.866374	
	10% level	-2.569404	

Table A3: Unit Root Test

This table shows the results from running an augmented dickey-fuller test on weekly attacks including only injured victims. If the probability is less than 5%, the null cannot be rejected at level based on the Akaike Info Criterion, intercept, and a maximum of 18 lags.

Unit Root Test results			
Augmented Dickey- Fuller Test			
Null Hyptothesis	TER(Injured) has a unit root		
Exogenous	Constant		
Lag length	3		
		T-statistic	Probability
Augmented Dickey- Fuller test statistic		-5.920382	0.0000
Test critical values	1% level	-3.441573	
	5% level	-2.866383	
	10% level	-2.569409	

Table A4: Unit Root Test

This table shows the results from running an augmented dickey-fuller test on weekly attacks including at least 1 fatality. If the probability is less than 5%, the null cannot be rejected at level based on the Akaike Info Criterion, intercept, and a maximum of 18 lags.

Unit Root Test results			
Augmented Dickey- Fuller Test			
Null Hypothesis	TER(Fatalities) has a unit root		
Exogenous	Constant		
Lag length	2		
		T-statistic	Probability
Augmented Dickey- Fuller test statistic		-4.179785	0.0008
Test critical values	1% level	-3.441573	
	5% level	-2.866383	
	10% level	-2.569409	

Table A5: Unit Root Test OPOT

This table shows the results from running an augmented dickey-fuller test on weekly attacks in other parts of Turkey. If the probability is less than 5%, the null cannot be rejected at level based on the Akaike Info Criterion, intercept, and a maximum of 18 lags.

Unit Root Test results			
Augmented Dickey- Fuller Test			
Null Hypothesis	TER(Other parts of Turkey) has a unit root		
Exogenous	Constant		
Lag length	1		
		T-statistic	Probability
Augmented Dickey- Fuller test statistic		-5.800300	0.0000
Test critical values	1% level	-3.441553	
	5% level	-2.866374	
	10% level	-2.569404	

Table A6: Unit Root Test

This table shows the results from running an augmented dickey-fuller test on weekly attacks that happened in the bigger cities.

Unit Root Test results			
Augmented Dickey- Fuller Test			
Null Hypothesis	TER(Bigger Cities) has a unit root		
Exogenous	Constant		
Lag length	0		
		T-statistic	Probability
Augmented Dickey- Fuller test statistic		-23.194010	0.0000
Test critical values	1% level	-3.441533	
	5% level	-2.866365	
	10% level	-2.569399	

Table A7: Unit Root Test

This table shows the results from running an augmented dickey-fuller test on weekly attacks where the target was either police, military, and government entities/building.

Unit Root Test results			
Augmented Dickey- Fuller Test			
Null Hypothesis	TER(Police, Military, Government) has a unit root		
Exogenous	Constant		
Lag length	1		
		T-statistic	Probability
Augmented Dickey- Fuller test statistic		-5.788211	0.0000
Test critical values	1% level	-3.441553	
	5% level	-2.866374	
	10% level	-2.569404	

Table A8: Unit Root Test (Civilians)

This table shows the results from running an augmented dickey-fuller test on weekly attacks where the target was either local business, airports, private property, and transportation.

Unit Root Test results			
Augmented Dickey- Fuller Test			
Null Hypothesis	TER(Civilians) has a unit root		
Exogenous	Constant		
Lag length	2		
		T-statistic	Probability
Augmented Dickey- Fuller test statistic		-7.945382	0.0000
Test critical values	1% level	-3.441573	
	5% level	-2.866383	
	10% level	-2.569409	

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Table A9: Breusch-Godfrey Serial Correlation LM Test.

The purpose of this test is show that there is no serial correlation between the two variables. The way to interpret the results is based on the probability Chi-square, which should be less than 5% to not reject the null hypothesis. This table illustrates the results of the LM Test, proving that there is no serial correlation between weekly attacks and the Turkish Lira/Euro exchange rate.

Breusch-Godfrey Serial Correlation LM Test	
Variables	TER(General Attacks), EURTL
Null Hyptothesis	No serial correlation at up to 2 lags
F- statistic	0.770633
Obs*R-squared	1.550626
Prob. F(2,568)	0.4632
Prob. Chi-Square(2)	0.4606

Table A10: This table illustrates the results of the LM Test, proving that there is no serial correlation between weekly attacks including only injured victims and the Turkish Lira/Euro exchange rate.

Breusch-Godfrey Serial Correlation LM Test	
Variables	TER(Injured), EURTL
Null Hypothesis	No serial correlation at up to 2 lags
F- statistic	0.773430
Obs*R-squared	1.556238
Prob. F(2,568)	0.4619
Prob. Chi-Square(2)	0.4593

Table A11: This table illustrates the results of the LM Test, proving that there is no serial correlation between weekly attacks that had at least 1 fatality and the Turkish Lira/Euro exchange rate.

Breusch-Godfrey Serial Correlation LM Test	
Variables	TER(Fatalities), EURTL
Null Hypothesis	No serial correlation at up to 2 lags
F- statistic	0.785879
Obs*R-squared	1.581219
Prob. F(2,568)	0.4562
Prob. Chi-Square(2)	0.4536

Table A12: This table illustrates the results of the LM Test, proving that there is no serial correlation between weekly attacks that happened in less populated locations and the Turkish Lira/Euro exchange rate.

Breusch-Godfrey Serial Correlation LM Test	
Variables	TER(Other parts of Turkey), EURTL
Null Hypothesis	No serial correlation at up to 2 lags
F- statistic	0.749301
Obs*R-squared	1.507815
Prob. F(2,568)	0.4732
Prob. Chi-Square(2)	0.4705

Table A13: This table illustrates the results of the LM Test, proving that there is no serial correlation between weekly attacks that happened in populated locations and the Turkish Lira/Euro exchange.

Breusch-Godfrey Serial Correlation LM Test	
Variables	TER(Bigger Cities), EURTL
Null Hypothesis	No serial correlation at up to 2 lags
F- statistic	0.421254
Obs*R-squared	0.850161
Prob. F(2,568)	0.6564
Prob. Chi-Square(2)	0.6537

Table A14: This table illustrates the results of the LM Test, proving that there is no serial correlation between weekly attacks including the police, military, or the government and the Turkish Lira/Euro exchange.

Breusch-Godfrey Serial Correlation LM Test	
Variables	TER(Police), EURTL
Null Hypothesis	No serial correlation at up to 2 lags
F- statistic	0.768758
Obs*R-squared	1.546863
Prob. F(2,568)	0.4641
Prob. Chi-Square(2)	0.4614

Table A15: This table illustrates the results of the LM Test, proving that there is no serial correlation between weekly attacks including the business, educational institutions, or private properties and the Turkish Lira/Euro exchange.

Breusch-Godfrey Serial Correlation LM Test	
Variables	TER(Civilians), EURTL
Null Hypothesis	No serial correlation at up to 2 lags
F- statistic	0.697801
Obs*R-squared	1.404436
Prob. F(2,568)	0.4981
Prob. Chi-Square(2)	0.4955

Table A16: Estimation results of

$$EURTL_t = \alpha_0 + \sum_{i=0}^{n} \alpha_{1i}\, EURTL_{t-i} + \sum_{i=0}^{n} \alpha_{2i}\, TER_{t-i} + \alpha_3\, EURTL_{t-1} + \alpha_4 TER_{t-1} + \mu_t$$

with attacks in general as the independent variable and the Euro/Lira as the dependent variable. The lag length was chosen automatically by EVIEWS based on the Schwarz criterion. If the probability is less than 0.05, the coefficient is statistically significant

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
EURTL(-1)	0.994	0.004	238.2197	0.000
TER	0.002	0.001	2.779526	0.006
C	0.014	0.009	1.483917	0.138
R-squared	0.992		Mean dependent var	2.376
Adjusted R-squared	0.993		S.D. dependent var	0.515
S.E. of regression	0.044		Akaike info criterion (AIC)	-3.379
Sum squared resid	1.131		Schwarz criterion (SC)	-3.356
Log likelihood	971.286		Hannan-Quinn criter.	-3.370
F-statistic	38095.37		Durbin-Watson stat	2.060
Prob(F-statistic	0.000			

Table A17: Autoregressive distributed lag bounds tests. These calculations were done in EVIEWS 10 with variables weekly attacks and weekly Turkish Lira/Euro exchange rates. If the F-statistic is lower than the lower bound critical value at 5% significance, these variables are not cointegrated in the long-run. If the F-statistic is higher than the upper bound critical value at 5% significance, these variables are cointegrated in the long-run. The reasons 0.05% is chosen is because when running the unit root test, the results are compared at the 5% level.

Null Hypothesis: No long-run Relationship Exist		
Test-Statistic	**Value**	**K**
F-statistic	3.86	1
Critical Value Bounds		
Significance	**Lower Bound**	**Upper bound**
0.1	3.02	3.51
0.05	3.62	4.16
0.025	4.18	4.79
0.01	4.94	5.58
Actual sample size	573	

Table A18: Estimation results of

$$EURTL_t = \alpha_0 + \sum_{i=0}^{n} \alpha_{1i}\, EURTL_{t-i} + \sum_{i=0}^{n} \alpha_{2i}\, TER_{t-i} + \alpha_3\, EURTL_{t-1} + \alpha_4 TER_{t-1} + \mu_t$$

with attacks including only injured people as the independent variable and the Euro/Lira as the dependent variable. The lag length was chosen automatically by EVIEWS based on the Schwarz criterion. If the probability is less than 0.05, the coefficient is statistically significant.

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
EURTL(-1)	0.996	0.004	254.311	0.000
TER	0.004	0.001	2.969	0.003
C	0.012	0.009	1.2478	0.212
R-squared	0.993		Mean dependent var	2.376
Adjusted R-squared	0.993		S.D. dependent var	0.516
S.E. of regression	0.044		Akaike info criterion (AIC)	-3.382
Sum squared resid	1.129		Schwarz criterion (SC)	-3.359
Log likelihood	971.824		Hannan-Quinn criter.	-3.373
F-statistic	38167.54		Durbin-Watson stat	2.0589
Prob(F-statistic	0.00			

Table A19: Autoregressive distributed lag bounds tests. These calculations were done in EVIEWS 10 with variables weekly attacks and weekly Turkish Lira/Euro exchange rates. If the F-statistic is lower than the lower bound critical value at 5% significance, these variables are not cointegrated in the long-run. If the F-statistic is higher than the upper bound critical value at 5% significance, these variables are cointegrated in the long-run. The reasons 0.05% is chosen is because when running the unit root test, the results are compared at the 5% level.

Null Hypothesis: No long-run Relationship Exist		
Test-Statistic	**Value**	**K**
F-statistic	4.23	1
	Critical Value Bounds	
Significance	**Lower Bound**	**Upper bound**
0.1	3.02	3.51
0.05	3.62	4.16
0.025	4.18	4.79
0.01	4.94	5.58
Actual sample size	573	

Table A20: Estimation results of

$$EURTL_t = \alpha_0 + \sum_{i=0}^{n} \alpha_{1i}\, EURTL_{t-i} + \sum_{i=0}^{n} \alpha_{2i}\, TER_{t-i} + \alpha_3\, EURTL_{t-1} + \alpha_4 TER_{t-1} + \mu_t$$

with attacks that included at least one fatality independent variable and the Euro/Lira as the dependent variable. The lag length was chosen automatically by EVIEWS based on the Schwarz criterion. If the probability is less than 0.05, the coefficient is statistically significant.

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
EURTL(-1)	0.996	0.004	234.369	0.000
TER	0.003	0.001	1.886	0.060
C	0.011	0.009	1.157	0.248
R-squared	0.992		Mean dependent var	2.376
Adjusted R-squared	0.992		S.D. dependent var	0.516
S.E. of regression	0.045		Akaike info criterion (AIC)	-3.372
Sum squared resid	1.139		Schwarz criterion (SC)	-3.349
Log likelihood	969.211		Hannan-Quinn criter.	-3.363
F-statistic	37818.46		Durbin-Watson stat	2.059
Prob(F-statistic	0.000			

Table A21: Estimation results of

$$EURTL_t = \alpha_0 + \sum_{i=0}^{n} \alpha_{1i}\, EURTL_{t-i} + \sum_{i=0}^{n} \alpha_{2i}\, TER_{t-i} + \alpha_3\, EURTL_{t-1} + \alpha_4 TER_{t-1} + \mu_t$$

with attacks that happened in other parts of Turkey as the independent variable, and the Euro/Lira as the dependent variable. The lag length was chosen automatically by EVIEWS based on the Schwarz criterion. If the probability is less than 0.05, the coefficient is statistically significant.

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
EURTL(-1)	0.994	0.004	239.094	0.000
TER	0.002	0.001	2.682	0.0075
C	0.0139	0.009	1.435	0.152
R-squared	0.993		Mean dependent var	2.376
Adjusted R-squared	0.993		S.D. dependent var	0.516
S.E. of regression	0.045		Akaike info criterion (AIC)	-3.379
Sum squared resid	1.132		Schwarz criterion (SC)	-3.356
Log likelihood	971.022		Hannan-Quinn criter.	-3.369
F-statistic	38060.06		Durbin-Watson stat	2.056
Prob(F-statistic	0.000			

Table A22: Autoregressive distributed lag bounds tests. These calculations were done in EVIEWS 10 with attacks that happened in other parts of Turkey as the independent variable, and the Euro/Lira as the dependent variable. If the F-statistic is lower than the lower bound critical value at 5% significance, these variables are not cointegrated in the long-run. If the F-statistic is higher than the upper bound critical value at 5% significance, these variables are cointegrated in the long-run. The reasons 0.05% is chosen is because when running the unit root test, the results are compared at the 5% level.

Null Hypothesis: No long-run Relationship Exist		
Test-Statistic	**Value**	**K**
F-statistic	3.684711	1
	Critical Value Bounds	
Significance	**Lower Bound**	**Upperbound**
0.1	3.02	3.51
0.05	3.62	4.16
0.025	4.18	4.79
0.01	4.94	5.58
Actual sample size	573	

Table A23: Estimation results of

$$EURTL_t = \alpha_0 + \sum_{i=0}^{n} \alpha_{1i}\, EURTL_{t-i} + \sum_{i=0}^{n} \alpha_{2i}\, TER_{t-i} + \alpha_3\, EURTL_{t-1} + \alpha_4 TER_{t-1} + \mu_t$$

with attacks that happened in locations such as Istanbul, Ankara, Izmir, Gaziantep, and Adana, as the independent variable, and the Euro/Lira as the dependent variable. The lag length was chosen automatically by EVIEWS based on the Schwarz criterion. The coefficient is interpreted as a number. If the probability is less than 0.05, the coefficient is statistically significant.

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
EURTL(-1)	0.996	0.004	268.484	0.000
TER	0.004	0.004	1.127	0.260
TER(-1)	0.014	0.004	4.076	0.000
C	0.009	1.043	1.043	0.297
R-squared	0.992		Mean dependent var	2.376
Adjusted R-squared	0.992		S.D. dependent var	0.515
S.E. of regression	0.044		Akaike info criterion (AIC)	-3.393
Sum squared resid	1.115		Schwarz criterion (SC)	-3.363
Log likelihood	976.284		Hannan-Quinn criter.	-3.381
F-statistic	25801.92		Durbin-Watson stat	2.0540
Prob(F-statistic	0.000			

Table A24: Autoregressive distributed lag bounds tests. These calculations were done in EVIEWS 10 with attacks that happened in either Istanbul, Ankara, Izmir, Gaziantep, or Adana as the independent variable, and the Euro/Lira as the dependent variable. If the F-statistic is lower than the lower bound critical value at 5% significance, these variables are not cointegrated in the long-run. If the F-statistic is higher than the upper bound critical value at 5% significance, these variables are cointegrated in the long-run. The reasons 0.05% is chosen is because when running the unit root test, the results are compared at the 5% level.

Null Hypothesis: No long-run Relationship Exist		
Test-Statistic	**Value**	**K**
F-statistic	5.812221	1
Critical Value Bounds		
Significance	**Lower Bound**	**Upperbound**
0.1	3.02	3.51
0.05	3.62	4.16
0.025	4.18	4.79
0.01	4.94	5.58
Actual sample size	573	

Table A25: Estimation results of

$$EURTL_t = \alpha_0 + \sum_{i=0}^{n} \alpha_{1i}\, EURTL_{t-i} + \sum_{i=0}^{n} \alpha_{2i}\, TER_{t-i} + \alpha_3\, EURTL_{t-1} + \alpha_4 TER_{t-1} + \mu_t$$

with attacks that included either the police, military, or government buildings as the independent variable, and the Euro/Lira as the dependent variable. The lag length was chosen automatically by EVIEWS based on the Schwarz criterion. If the probability is less than 0.05, the coefficient is statistically significant.

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
EURTL(-1)	0.994147	0.004117	241.4487	0.0000
TER	0.003037	0.000985	3.082219	0.0022
C	0.015101	0.009599	1.573198	0.1162
R-squared	0.992597		Mean dependent var	2.376425
Adjusted R-squared	0.992571		S.D. dependent var	0.515949
S.E. of regression	0.044470		Akaike info criterion (AIC)	-3.382774
Sum squared resid	1.127231		Schwarz criterion (SC)	-3.359994
Log likelihood	972.1646		Hannan-Quinn criter.	-3.373888
F-statistic	38213.24		Durbin-Watson stat	2.052582
Prob(F-statistic	0.000000			

Table A26: Autoregressive distributed lag bounds tests. These calculations were done in EVIEWS 10 with attacks that included either the police, military, or government buildings as the independent variable, and the Euro/Lira as the dependent variable. If the F-statistic is lower than the lower bound critical value at 5% significance, these variables are not cointegrated in the long-run. If the F-statistic is higher than the upper bound critical value at 5% significance, these variables are cointegrated in the long-run. The reasons 0.05% is chosen is because when running the unit root test, the results are compared at the 5% level.

Null Hypothesis: No long-run Relationship Exist		
Test-Statistic	**Value**	**K**
F-statistic	4.46	1
	Critical Value Bounds	
Significance	**Lower Bound**	**Upper bound**
0.1	3.02	3.51
0.05	3.62	4.16
0.025	4.18	4.79
0.01	4.94	5.58
Actual sample size	573	

Table A27: Estimation results of

$$EURTL_t = \alpha_0 + \sum_{i=0}^{n} \alpha_{1i}\, EURTL_{t-i} + \sum_{i=0}^{n} \alpha_{2i}\, TER_{t-i} + \alpha_3\, EURTL_{t-1} + \alpha_4 TER_{t-1} + \mu_t$$

with attacks that included either educational institutions, airports, businesses, journalists, and private properties as the independent variable, and the Euro/Lira as the dependent variable. The lag length was chosen automatically by EVIEWS based on the Schwarz criterion. If the probability is less than 0.05, the coefficient is statistically significant.

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
EURTL(-1)	0.998	0.004	254.089	0.000
TER	0.002	0.002	1.154	0.249
C	0.006	0.009	0.685	0.493
R-squared	0.992		Mean dependent var	2.376
Adjusted R-squared	0.992		S.D. dependent var	0.516
S.E. of regression	0.045		Akaike info criterion (AIC)	-3.369
Sum squared resid	1.143		Schwarz criterion (SC)	-3.346
Log likelihood	968.098		Hannan-Quinn criter.	-3.360
F-statistic	37670.58		Durbin-Watson stat	2.059
Prob(F-statistic	0.000			